

**IMMIGRATION AND THE LABOR MARKET**

by

**RACHEL MIRIAM FRIEDBERG**

B.A., University of Illinois at Urbana-Champaign  
(1986)

Submitted to the Department of Economics  
in Partial Fulfillment of the Requirements  
for the Degree of

**DOCTOR OF PHILOSOPHY**  
in Economics

at the

Massachusetts Institute of Technology

May 1993

copyright Rachel Miriam Friedberg

The author hereby grants to MIT permission to reproduce and to distribute copies of this thesis document in whole or in part.

Signature of Author \_\_\_\_\_  
Department of Economics  
May 1993

Certified by \_\_\_\_\_  
Professor Henry S. Farber  
Thesis Supervisor

Accepted by \_\_\_\_\_  
Professor Richard S. Eckaus  
Department Committee on Graduate Studies

**ARCHIVES**  
MASSACHUSETTS INSTITUTE  
OF TECHNOLOGY

**JUN 09 1993**

LIBRARIES

# IMMIGRATION AND THE LABOR MARKET

by

RACHEL MIRIAM FRIEDBERG

Submitted to the Department of Economics  
in May 1993 in partial fulfillment of the  
Requirements for the Degree of  
Doctor of Philosophy in Economics

## ABSTRACT

This dissertation studies the assimilation of immigrants into the labor markets of the United States and Israel. I examine several aspects of immigrant assimilation, in particular: the earnings differentials that exist between immigrants and native-born workers with similar demographic and skill characteristics; the rate at which those differentials diminish with time since migration; the factors that speed or slow the process of assimilation; the transferability of origin-country human capital; the effect of an immigrant's age at arrival on his labor market performance; the importance of language skills for earnings; and potential changes in the labor market performance of successive immigrant cohorts.

Chapter One studies immigrants in Israel. Using data from the 1983 Israeli Census, I measure the extent to which the education that immigrants accumulated in their countries of origin is transferable into earnings potential in Israel. The return to schooling obtained abroad is found to be higher for Ashkenazi immigrants than for Sephardi immigrants. Sephardi-source education receives a lower return than education obtained in Israel, while Western-source education actually earns a higher return. These patterns probably reflect differences in school quality across countries of origin and the compatibility of education received abroad with skill requirements in the Israeli labor market. However, these results could also be due to a lesser degree of discrimination between Ashkenazi and Sephardi immigrant workers at low levels of education than at high levels.

While the direct return to a year of schooling in Israel is estimated to be higher for natives than for immigrants, education obtained in Israel appears to significantly raise the return to schooling acquired abroad for Sephardis, with weaker effects for Ashkenazis. This is consistent with the idea that Israeli schooling enables a worker to translate the human capital he accumulated in his country of origin into terms rewarded in the Israeli labor market, suggesting a role for policies which encourage immigrants to obtain further training after arrival. However, this result could also be due to positive self-selection in educational attainment following migration. Finally, with the possible exception of Western immigrants, more highly educated immigrants do not appear to assimilate more quickly than others in Israel.

Imperfect human capital transferability is one reason to expect people who migrate later in life to experience more difficulty assimilating than people who migrate while still young. In Chapter Two, I analyze the importance of age at arrival for the labor market performance of immigrants in the United States. Using microdata from

the 1970 and 1980 U.S. Censuses, I measure the impact of the age at which an immigrant arrived in the country on his earnings, relative to otherwise comparable natives, and on the rate at which his relative earnings rise with time since arrival. I find that age at arrival has a large negative effect on immigrant earnings. For example, I find that an immigrant who arrived in the United States at age thirty is at an 11.6% earnings disadvantage, relative to an otherwise comparable immigrant who arrived at age ten. Arriving at a young age thus confers benefits similar in magnitude to the premium associated with immigrating from Western Europe, rather than from Latin American.

The key insight of this chapter is that, among labor force participants, there is a spurious negative correlation between age at arrival and years since arrival, due to truncation bias. This is because, among immigrants who have been in the United States for many years, those who immigrated later in life have already retired and are no longer in a sample of working people. Similarly, among recent arrivals, those who arrived as children have not yet joined the labor force, and thus are also excluded from a sample of working people. Since age at arrival has an adverse effect on immigrant earnings, previous studies that do not correct for this factor necessarily overstate the relative earnings gain that immigrants experience with time since migration.

Taking into account age at arrival, I find that the rate at which the earnings of immigrants catch up to those of comparable natives with years since arrival is lower than uncorrected estimates would indicate. In addition, corrected estimates of cohort effects on earnings show no common pattern of decline in the skill-corrected quality (e.g., ability, motivation, or other unobserved characteristics) of recent cohorts of immigrants to the United States, as uncorrected estimates would suggest.

Chapter Three analyzes the factors that underlie the negative effect of age at arrival on immigrant labor market performance. The chapter evaluates two explanations for this effect: 1) Younger people are better able to learn a second language than are older people, and English language proficiency is an important determinant of earnings in the United States. 2) For a given level of schooling, the later in life an individual migrates, the greater is the fraction of his schooling acquired outside the United States. Since education acquired abroad receives a lower return in the U.S. labor market than that acquired domestically, this will lead to lower earnings for older migrants.

Using microdata from the 1980 U.S. Census and the 1976 Survey of Income and Education to decompose the measured effect of age at arrival found in Chapter Two, I conclude that as much as one-third of that effect is due to fact that much of older immigrants' education was acquired abroad. An additional 20-35% can be attributed to the higher level of English language proficiency of younger immigrants. The residual effect of age at arrival is hypothesized to be due to the greater general adaptability of younger people and to differential selectivity among adult and child immigrants.

Thesis Supervisor: Dr. Henry S. Farber  
Title: Professor of Economics

## ACKNOWLEDGEMENTS

Many people have given me advice and support through the course of writing this dissertation. First and foremost, I would like to thank my two advisors, Henry Farber and Lawrence Katz. I consider myself very fortunate to have had two such attentive and encouraging advisors.

Hank has been a valued source of help and guidance throughout my time at MIT. He was always willing to have a long and thoughtful talk about my research. Early on, Hank encouraged me to write a dissertation on immigration, a topic which I have thoroughly enjoyed. He prodded me at the right moments and was unsparing with his attention, even when he was away from Cambridge.

Larry has been a wonderful mentor. I have learned an enormous amount of economics from him-- both from his thorough comments on my own work and from talking with him about more general questions. Larry was always available to give help and suggestions and was generous with his time at all hours. He provided direction and advice at every stage of this dissertation. I am indebted to him for all that he has taught me.

Many other people provided important input to this work. I am grateful to Joshua Angrist, Janet Currie, Robert Gibbons, Thomas Lemieux, Lisa Lynch, and Michael Piore, each of whom has given me much attention and help. Claudia Goldin has been a friend and a role model, and I have learned a great deal from her.

I thank Stanley Fischer for inspiring me to come to MIT, and I thank Fred Gottheil for being the best teacher I have ever had and inspiring me to go into economics.

I would also like to thank my fellow graduate students, from whom I have learned so much. I thank David Cutler for his constant friendship and for helping me through the rocky terrain of our first year. Gerald Oettinger was a valued fellow Labor compatriot. The "econogals"-- Jan Eberly, Susan Ettner, Betty Krier, and Pam Loprest-- were like older sisters, lighting the way ahead of me. Friends from up the river-- Karen Dynan, Ceci Rouse, and Jon Gruber-- also provided a valuable source of support and companionship during the later stages of thesis writing.

The National Bureau of Economic Research provided a wonderful intellectual atmosphere. So much of what I learned during my years at graduate school came through work, conversations, interaction, and pure osmosis at the Bureau. Dan Feenberg deserves a special word of thanks for his patient and generous help with the endless computing problems and questions I brought to him over the years.

I gratefully acknowledge funding from the U.S. Department of Education Jacob Javits Graduate Fellowship program, the MIT Program for the Study of the Israeli Economy, the Maurice Falk Institute for Economic Research in Israel, and the MIT Economics Department. For help in obtaining data, I thank Michal Boozer, David Card, Michal Peleg, and David Rodda.



I could not have completed this work without the support of my loving family: my parents, Barbara and Maurice Friedberg, my sister Edna Friedberg, and my grandmother Ida Jam Friedberg. Good friends like Iris Bahar, Laura Blumenfeld, Susan Dickman, Janice Goldman, Alex Sagan, Joakim Stymne and Leo Shaw saw me through graduate school from beginning to end and helped me maintain perspective and a sense of humor.

Finally, I would like to thank David Weil. David has been with me every single step of the way and has been supportive, helpful, understanding, and encouraging throughout.

## CONTENTS

<b>General Introduction</b>	<b>8</b>
<b>Chapter 1: You Can't Take it With You? Immigration and the Returns to Human Capital: Evidence From Israel</b>	<b>16</b>
I.    Introduction	17
II.   Immigration and the Returns to Human Capital	18
III.  Data	21
IV.  Empirical Results: Immigration and Earnings	23
V.    Empirical Results: Returns to Schooling	26
A.  Years of Schooling	27
B.  Discrete Levels of Schooling	30
VI.  Conclusion	36
VII.  Appendix	39
VIII. Tables	40
IX.  Figure	50
<b>Chapter 2: The Labor Market Assimilation of Immigrants in the United States: The Role of Age at Arrival</b>	<b>51</b>
I.    Introduction	52
II.   Age at Arrival	54
III.  Previous Work	58
IV.  Econometric Framework	60
V.    Data	64
VI.   Results	67
A.  The Effect of Age at Arrival on Immigrant Earnings	68
B.  The Effect of Age at Arrival on Cross-Sectional Patterns	70
C.  Immigrant-Native Earnings Convergence	72
D.  Changes in Cohort Quality	74
VII.  Conclusion	76
VIII. Tables	78
IX.  Figures	88
<b>Chapter 3: The Success of Young Immigrants in the U.S. Labor Market: An Evaluation of Competing Explanations</b>	<b>91</b>
I.    Introduction	92
II.   The Premium Associated With Low Age at Arrival	94
III.  Data	96
A.  United States Census	97
B.  Survey of Income and Education	98

IV.	Measuring the Effect of Age at Arrival on Earnings	100
V.	Education Source	103
	A. Patterns	104
	B. The Effect of Education Source on Earnings (PUMS)	106
	C. The Effect of Education Source on Earnings (SIE)	107
VI.	English Language Proficiency	109
	A. Patterns	109
	B. The Effect of English Language Proficiency on Earnings (PUMS)	111
	C. The Effect of English Language Proficiency on Earnings (SIE)	113
VII.	Decomposition of the Effect of Age at Arrival	116
VIII.	Conclusion	120
IX.	Tables	122
X.	Figure	138
	 <b>General Conclusion</b>	 139
	 <b>Bibliography</b>	 141

## INTRODUCTION

Immigrants comprise a large fraction of the labor force in the United States. Currently, approximately one out of ten workers in this country is foreign-born. That number is even higher among the less educated: one fifth of workers with less than a high school education are immigrants.<sup>1</sup> In addition, the rate of immigration to the United States is growing. Recent changes in immigration law have increased the number of immigrants to be admitted into the country each year by 25%.

In Israel, immigration is even more central to the labor market. Fully half of the country's population was born abroad, with those immigrants coming from a wide variety of countries of origin. The current mass migration of Jews from the former Soviet Union has made the question of immigrant assimilation the most important domestic policy issue in Israel today.

Indeed, in many countries, immigration has recently become a subject of great importance. The economic and social impact of the many guestworkers in Western Europe is currently the subject of a great deal of political controversy. The war in the former Yugoslavia and the politically and economically volatile situation in the former Soviet bloc could potentially result in enormous flows of refugees across borders. All of these have made immigration a central political and economic issue throughout Europe.

Because of the magnitude of international migration flows, it is important for economists and policymakers to understand the factors that determine the successful integration of immigrants into the receiving labor market.

When immigrants first arrive in a new country, they lack many skills important

---

<sup>1</sup> Borjas, Freeman, and Katz, 1992.

in the labor market. The education, training, and labor market experience they have were acquired in another country and may not transfer well to their host country. They may not speak the language of their new country. In general, they lack many types of country-specific human capital. Because of these deficits, newly arrived immigrants may earn less than natives who have comparable skill and demographic characteristics. With time, the immigrants may learn to adapt to conditions in their host country, determine how to best apply the skills they have in their new country, improve their language proficiency, become better informed about domestic institutions, and gain other country-specific human capital. To the extent that this happens, their earnings should converge toward those of comparable natives.<sup>2</sup>

There is a perennial debate in the United States about the extent to which immigrants successfully assimilate. This debate takes place, not only among social scientists, but among policymakers, in the media, and in public opinion. Supporters of tight restrictions on immigration assert that immigrants are overwhelmingly low-skilled people, with low employment rates, low earnings, and high welfare dependence rates. Immigrants are thought to constitute a long-term burden on the social welfare system and to contribute little to the country's well-being. At the other extreme are the supporters of "open door" immigration policy. Apart from humanitarian considerations, their view is based on the belief that, after a relatively short adjustment period, immigrants become highly productive members of society, outperforming natives of comparable skill levels, rejuvenating depressed areas through their

---

<sup>2</sup> Earlier work on this subject found that immigrants in the United States eventually overtake comparable natives, in terms of earnings. This result was attributed to positive self-selection among immigrants (see Chiswick, 1978). This finding is refuted by Borjas (1985). This issue is discussed in detail in Chapter Two.

entrepreneurial initiative, and paying more in taxes than they consume in government provided services.

In this dissertation, I study the extent and determinants of immigrants' assimilation into the labor markets of the United States and Israel. I examine several aspects of immigrant assimilation, including: the degree to which immigrant earnings are comparable to the earnings of natives with similar demographic and skill characteristics; the rate at which the earnings gap between immigrants and natives narrows with time since migration (i.e., Is the gap ever eliminated? How long does it take to close it?); the factors that speed or slow the process of assimilation; the transferability of origin-country human capital; the effect of an immigrant's age at arrival on his labor market performance; the importance of language skills for earnings; and whether there have been changes in the labor market performance of successive immigrant cohorts.

The first chapter of this dissertation begins this analysis with an examination of immigrants in Israel. The chapter documents the earnings differentials that exist between immigrants and native-born Israelis and how this differential varies by country of origin. The focus of the chapter is the extent to which the human capital that immigrants accumulated in their origin countries is of value in Israel. In particular, I measure the degree to which schooling obtained abroad is transferable into earnings potential in Israel, and how that varies by country of origin, education level, and configuration of schooling. A related question is the relative value to immigrants of acquiring human capital after immigrating.

The answers to these questions are found by making four comparisons: the return to Israeli schooling for immigrants versus natives; the return to Israeli versus

foreign schooling for immigrants; the interaction of Israeli and foreign schooling for immigrants; and the differences in the assimilation rates of more and less educated immigrants. The chapter also examines whether these returns depend on the particular configuration of educational attainment, in terms of level and source.

Using data from the Israeli Census, I find that the direct return to a year of schooling in Israel is higher for natives than for immigrants, regardless of country of origin, in most of the analysis. The greater return received by natives is consistent with the argument that their language and other country-specific skills enable them to get more out of a year of schooling in Israel than do immigrants. It also argues against the hypothesis that immigrants would benefit more than natives from attending school in Israel because, in addition to gaining the human capital usually associated with schooling, being in school might enable immigrants to learn about Israeli institutions and "ways of doing things" more completely than they would out of school.

The return to education obtained abroad is found to be higher for Ashkenazi immigrants than for Sephardi immigrants. Sephardi-source education receives a lower return than education obtained in Israel, while Western-source education actually earns a higher return. These patterns probably reflect differences in school quality across countries of origin and the extent to which foreign schooling is well matched to the needs of the Israeli labor market. However, these results could also be due to a lesser degree of discrimination between Ashkenazi and Sephardi immigrant workers at low levels of education than at high levels. Care must be taken in interpreting the changes in these estimates when they are made net or inclusive of the assimilation which accompanies years since immigration.

Education obtained in Israel is found to significantly raise the return to schooling

acquired abroad for Sephardis, with weaker effects for Ashkenazis. This is consistent with the idea that destination country schooling allows an individual to translate the human capital he accumulated in his country of origin into terms rewarded in the destination labor market. This finding suggests a potential role for policies which encourage immigrants to obtain further training after immigration, although further work would be needed to disentangle the treatment effect of obtaining schooling in Israel from the issue self-selection in educational attainment which usually troubles studies of the return to schooling.

Finally, with the possible exception of immigrants from Western Europe and the Americas, there is no evidence of faster assimilation rates for more highly educated immigrants. Equivalently, the return to origin-country schooling does not generally rise with time in Israel.

The results of this first chapter lead to a natural question, which is whether the measured benefit of obtaining schooling in Israel rather than abroad might be picking up a different but related effect. Immigrants who attend school in the origin country rather than the destination country are, on average, older upon migration than immigrants who complete all their schooling after arrival. For many reasons, one might believe that immigrants who arrive later in life experience more difficulty assimilating than immigrants who migrate while still young.

In Chapter Two, I analyze the importance of age at arrival for the labor market performance of immigrants in the United States. Using data from the Public Use Microdata Samples of the 1970 and 1980 U.S. Censuses, I measure the impact of the age at which an immigrant arrived in the country on his earnings, relative to otherwise comparable natives, and on the rate at which his relative earnings rise with time since



arrival. I demonstrate that age at arrival has a large negative effect on immigrant earnings. Holding constant other factors, immigrants who arrive at older ages earn significantly less at every stage of their assimilation paths than do their younger arrival-age counterparts. For example, I find that an immigrant who arrived in the United States at age thirty is at an 11.6% earnings disadvantage, relative to an otherwise comparable immigrant who arrived at age ten. Arriving at a young age thus confers benefits similar in magnitude to the premium associated with immigrating from a European country, rather than from a Latin American country.

One of the key insights of this paper is that, among labor force participants, there is a spurious negative correlation between age at arrival and years since arrival, due to truncation bias. This is because, among immigrants who have been in the United States for many years, those who immigrated later in life have already retired and are no longer in a sample of working people. Similarly, among immigrants who have been in the country only a few years, those who arrived as children have not yet joined the labor force, and thus are also excluded from a sample of working people. Since age at arrival has an adverse effect on immigrant earnings, previous studies that do not correct for this factor necessarily overstate the relative earnings gain that immigrants experience with time since migration.

Taking into account age at immigration, I present corrected estimates of the rate at which the earnings of immigrants catch up to those of comparable natives with years since arrival. I find that the rate of earnings convergence is lower than uncorrected estimates would indicate, particularly for those who immigrated at a young age.

Finally, in contrast to the general decline in cohort quality indicated by

uncorrected estimates, once age at arrival is taken into account, there does not appear to be a common pattern of decline in the skill-corrected quality (e.g., ability, motivation, or other unobserved characteristics) of recent cohorts of immigrants to the United States. While I do find a quality decline for certain groups, there is no evidence of a decline among recent Mexican or East Asian immigrants.

While Chapter Two clearly establishes that there is a large premium associated with immigrating at a younger age, it leaves open the question of what that premium is due to. In Chapter Three, I look more closely at the factors behind the effect of age at arrival shown in the second chapter. The chapter examines two explanations for this effect: 1) Younger people are better able to learn a second language than are older people, and English language proficiency is an important determinant of earnings. 2) For a given level of schooling, the later in life an individual migrates, the greater is the fraction of his schooling acquired outside the United States. Since education acquired abroad receives a lower return in the U.S. labor market than that acquired domestically, this will lead to lower earnings for older migrants.

To maintain comparability with Chapter Two, this chapter uses microdata from the 1980 U.S. Census. It also uses data from the 1976 Survey of Income and Education, to take advantage of the superior information on language skills and origin-country schooling available in that dataset. Decomposing the measured effect of age at arrival found in Chapter Two, I conclude that as much as one-third of that effect is due to fact that much of older immigrants' education was acquired abroad. An additional 20-35% can be attributed to the higher level of English language proficiency of younger immigrants. The residual effect of age at arrival is hypothesized to be due to the greater general adaptability of younger people and to differential selectivity

among adult and child immigrants. To the extent that there is selection in immigration, the selection process applies to the adults who need to qualify to enter the United States and who make the decision to migrate, based on their economic prospects. The children they bring with them are not subject to this selection process, so as long as unobservable characteristics are not perfectly transmitted from parent to child, the extent of selection among children will be weaker. This would lead, in the case of immigrant groups who are negatively selected, to a negative measured effect of age at arrival, which captures the children's regression to the mean. This reasoning also explains the apparent anomaly of a positive effect of age at arrival found for immigrants from Western European-- a group often thought to be positively self-selected.

The final section of the dissertation offers some overall conclusions that can be drawn from these findings about the labor market assimilation of immigrants. It also proposes directions for future research.

## **CHAPTER ONE**

**You Can't Take it With You?:**

**Immigration and the Returns to Human Capital:  
Evidence From Israel**

## I. Introduction

With as many as one million Russian immigrants expected to arrive in Israel over the next five years, the question of immigrant assimilation is currently the most important domestic policy issue in Israel. In Western Europe, the large number of guestworkers and the potentially enormous flows of people across borders resulting from the recent political changes in Eastern Europe and the former Soviet Union have made addressing issues of immigration and workforce assimilation a very high policy priority there as well.

An important determinant of the economic success of immigrants is the extent to which the human capital they accumulated in their origin countries is of value in their destination country, or the "transferability" of their origin country human capital. A related question is the relative value to immigrants of acquiring human capital after immigrating. Understanding these two factors is important for predicting how successfully new immigrants will be integrated into the receiving labor market and therefore what their impact on natives may be.

How much of the skills that immigrants bring with them is transferable into earnings potential in the destination country? How does that vary by country of origin and skill level? What are the benefits to immigrants of additional human capital accumulation in their destination country? What factors affect the speed of labor market assimilation? And finally, what policies might facilitate this absorption?

Aside from its specific implications for Israel, the analysis here may shed light on this set of questions more generally. The Israeli case provides a rich and varied pool of immigrants to observe. They come from a wide range of countries and with vastly different educational and occupational backgrounds.

This paper documents the facts concerning the returns to human capital among immigrants to Israel, using years of schooling as an index of human capital. In the following section, I discuss in more detail the questions to be addressed in the paper. The third section lays out some basic facts about the Israeli labor market and describes the data used. Section four examines the effects of immigrant status, continent of origin, and years since immigration on earnings. In the fifth section, I look at the return to schooling obtained in the country of origin and in Israel. I examine the effect that previous schooling has on earnings, and whether more highly educated immigrants have faster assimilation rates. The final section summarizes and offers some directions for further research.

## **II. Immigration and the Returns to Human Capital**

This paper is about the returns that immigrants receive to human capital obtained abroad and in Israel, and how those returns compare to those received by native Israelis. Throughout the paper, I use years of schooling as the measure of human capital. I focus on four parameters: 1) the return to foreign schooling for immigrants (both the level and changes in the level with time since migration); 2) the return to Israeli schooling for immigrants; 3) the return to Israeli schooling for natives; and 4) the interaction of foreign schooling and Israeli schooling for immigrants.

The first question is the transferability of the education immigrants obtained in their countries of origin, that is, the extent to which that human capital is valued in Israel. This may differ across origin groups for two major reasons. The first is the quality of the schooling obtained abroad. This depends on the country in which it was

acquired. Westerners, for example, might be expected to receive a higher return to their previous schooling than those from less developed countries because Western schooling is generally considered to be of higher quality. In particular, though, it is the "fit" between the training received abroad and the Israeli labor market that is important. This match quality is the second major factor affecting transferability. Immigrants from countries with economies more similar to Israel's received training which is probably better matched to the needs of the Israeli labor market. Even within country of origin, the level and type of education is likely to be important for transferability. For example, primary school might transfer well for many origin groups, while law school might not, because of its institutional specificity.

The return to schooling received abroad may also rise with years since immigration. We might expect the earnings of highly educated immigrants and less educated immigrants to be compressed upon their arrival to Israel, with both groups working in low skill jobs that require little language proficiency or other country-specific human capital. As the immigrants gain country-specific human capital (i.e., improve their Hebrew, learn how best to apply their previously acquired skills in the Israeli labor market, learn about job opportunities in their fields, etc.) they might sort themselves into more differentiated occupations, resulting in a rise in the education differential for with time since migration.

When immigrants first arrive in a new country, they are at a disadvantage in the labor market, relative to natives with comparable skill and demographic characteristics. This is likely to be because natives have many country-specific skills and information that immigrants do not. As the immigrants spend time in the country and begin to acquire this country-specific knowledge, their labor market performance may be

expected to improve, relative to their native counterparts. The rate at which the earnings gap between immigrants and natives narrows with years since migration is what I will refer to as the "assimilation rate". A rise with years since migration in the return to previously acquired schooling is thus definitionally equivalent to a higher assimilation rate for more educated immigrants, the group which stands to gain the most upward mobility as the result of a learning period.

In addition to education acquired abroad, education received in Israel is an important aspect of the human capital story for immigrants as well. Twenty-eight percent of the immigrants in the sample used received all of their schooling in Israel and fifteen percent attended school both before and after immigration. The return to Israeli schooling for immigrants may differ from the return received by natives. On the one hand, natives have the language and other skills that might enable them to get more out of a given year of schooling in Israel. On the other hand, attending school in Israel may speed the social assimilation process for immigrants. If, in addition to providing them with the human capital usually associated with schooling, school enables immigrants to learn about Israeli institutions, language, and society more rapidly and completely than they would out of school, then the return to Israeli schooling might be higher for immigrants than for natives.

A second interesting effect of Israeli schooling on immigrants is that it may help them to translate their foreign human capital into Israeli terms. Attending school in Israel may aid in the transferability of an immigrant's human capital through teaching him very concrete things, like the language proficiency needed to literally "translate" his skills, as well as less easily measured things, such as knowledge of Israeli "ways of doing things" and institutional peculiarities. These tools and information may enable



immigrants to better apply their previously acquired skills in the new labor market setting. Especially for immigrants who come with skills or education not very well matched to Israel, attending school in Israel may be invaluable in teaching them to use that knowledge in ways rewarded in the Israeli labor market, information which would be very difficult to get without further formal training. In terms of estimated parameters, this indirect effect of Israeli schooling would be seen below in a higher return to an immigrant's foreign schooling when it has been followed by schooling in Israel.

### **III. Data**

The data used in this analysis are taken from the 1983 Israeli census. The entire dataset contains about 470,000 individuals, approximately one-tenth of the population. All Israeli citizens-- Jews, Arabs, and others-- are included. This covers virtually all people living in Israel proper, as well as Israeli citizens living in the West Bank and Gaza Strip, who represent 2% of the population.

Only male immigrants are included in this study. This is to facilitate comparisons with results from the literature on immigration to the United States, which focusses primarily on male immigrants. For security reasons, men between the ages of 18 to 24 are coded as age 21 in the public-use files of the census microdata. This censoring generates difficulties in calculating many key variables used in the analysis, such as years since migration. I therefore limit the sample to men between the ages of 25 and 65.

Only workers who are salaried, full-time, and do not work in agriculture are

included in the sample. I exclude all students, kibbutz and collective members, and self-employed workers. Arabs are also excluded from the sample, since I do not wish to focus on Jewish-Arab differences in the labor market in this paper, and these differences alone would require careful separate analysis. Finally, only those reporting earnings of between 5,000 and 500,000 shekels per month are kept (approximately \$150-\$15,000)<sup>3</sup>. After these cuts, there are 54,175 individuals in the sample.

I then divide the population into five groups. Natives represent only 34% of the total sample. Immigrants are classified into four continent-of-origin groups:

- 1) "Western"-- primarily Western Europe and the Americas
- 2) "Eastern Europe"
- 3) "USSR"
- 4) "Sephardi"-- Africa and Asia

The countries included under each heading are listed in an appendix. Table One shows the breakdown of immigrants into the four continent groups, as well as the major countries of origin. Half of the immigrants are Sephardi (African and Asian) and half are Ashkenazi (of European descent), the two broad Jewish ethnic groups. Almost half of all immigrants are from the USSR, Morocco, or Romania, with the remainder distributed over a wide range of countries.

The mean characteristics of the sample are presented in Table Two. The mean age of immigrants is 45.6, eleven years older than the average native. The typical immigrant came to Israel in 1956 and was 19 years old upon arrival, but 15% of Soviet immigrants have been in Israel for only five years or fewer.

---

<sup>3</sup> Approximately 10% of the sample had zero income. Another 3% had income below 5,000 shekels and .1% had income over 500,000 shekels.

Mean monthly earnings for this sample are about \$1,400. Information is available on hours worked per week, but as many people appear to have reported hours per month instead, creating an hourly wage variable introduces more noise than signal to the data. I thus use the monthly earnings measure in all of the analysis below.

Table Three contains detailed information on schooling for the five broad origin groups. The average years of completed schooling among native Israelis is 12.3 years. This figure is highest for Western immigrants (14.1 years) and lowest for Sephardi immigrants (9.4 years). A third of the Sephardis have only attended primary school, but over one-third of native Israelis and over half of the Western immigrants have had some post-secondary education.

#### **IV. Empirical Results: Immigration and Earnings**

It is instructive to begin the analysis with a standard human capital earnings function to see the basic relationships in the Israeli data and compare them to the standard results obtained for the United States. This is done in the first column of Table Four. The dependent variable in this and all the tables that follow is the log of monthly shekel earnings. The right hand side variables in this specification include marital status, potential labor market experience and its square, and years of completed schooling. It should be noted that the standard constructed "potential labor market experience" variable, i.e. age minus education minus a constant, may be less close to actual labor market experience in Israel than it is in the United States, due to variations in the length of army service in Israel.

The results in column one show a premium of about 19% to being married. The return to experience (evaluated at 45 years of age and 12 years of schooling) is approximately 2.2% per year. The return to schooling is about 7.8% per year. It is interesting to note that all of these coefficients are quite close to standard estimates of these parameters found in U.S. data. Adding industry and occupation dummies does not appreciably change any of the coefficients, except of course lowering the return to schooling. For the remainder of this paper, I do not correct for industry and occupation in the earnings regressions. This is because I wish to include earnings gains associated with rising occupational status as part of the earnings growth immigrants experience as they assimilate.<sup>4</sup>

Turning to immigration, the basic earnings equation is modified in column (2) of Table Four by the addition of immigrant status, years since immigration, and its square. Since this regression holds years since arrival constant, the immigrant status dummy measures the earnings disadvantage, relative to an otherwise comparable native, of a newly arrived immigrant. The "years since arrival" variable captures the rate at which that gap is reduced as immigrants assimilate into the labor market.<sup>5</sup>

---

<sup>4</sup> In regressions not reported here, correcting for the same set of observable characteristics and including a dummy for the ability to speak Hebrew, Israeli Arabs were found to earn approximately one-third less than Israeli Jews. This differential shrank only slightly when one-digit occupation and industry controls were added. It would be interesting to further investigate this earnings differential to see how it differs by education group and by sex, and to see the effect of finer occupation and industry controls. In other results not reported here, women were found to earn 25% less than men, not correcting for industry or occupation.

<sup>5</sup> It should be noted that since these data are from a single cross-section, aging and cohort effects cannot be separately estimated in them. This means that the measured effect of time variables could be due to assimilation or to earlier cohorts being of higher quality (see Borjas, 1985) or experiencing less discrimination than more recent cohorts of immigrants of that ethnic group. In contrast to the case of the United States, in Israel there is no independent evidence suggesting a strong systematic cohort effect in either direction. I thus discuss the impact of years in Israel as an assimilation effect, subject to this qualification, which could be explicitly addressed in future work by using multiple cross-sections.

Column (2) shows that, upon arrival in Israel, the average immigrant earns about one-third less than a native Israeli with the same observable characteristics. This earnings gap diminishes over time, but is eliminated altogether only after about 35 years.

In column (3), I allow earnings at arrival to differ among continent of origin groups, while restricting the effect of years since arrival to be the same for all groups. This yields the result that among immigrants, holding schooling and experience constant, Westerners earn 31.9% less than natives upon arrival, Eastern Europeans 36.8% less, Soviets 35.8% less, and Sephardis 49.8% less.

When the effect of years since immigration is allowed to vary by origin as well, the result is the set of relative earnings profiles plotted in Figure One. Westerners start out at the highest level of all immigrant groups, with Eastern European and Soviet immigrants earning relatively less. Over time, these three groups roughly converge, with Sephardi immigrants lagging far behind. The fact that the former groups actually overtake natives after 19-24 years could simply be an artifact of ethnic differences persisting within the native population (i.e., if white immigrants in the United States eventually just reached parity with white natives, we would still observe them overtaking the native U.S. population taken as a whole because minorities are included in the latter group but not the former). In addition, the great majority of immigrants have fewer years since immigration than the post-takeover point, so that this portion of the profile is largely out of sample prediction.

## V. Empirical Results: Returns to Schooling

Having established the basic stylized facts concerning the relative earnings of immigrants in Israel, we turn to the question of the relative returns to schooling received by immigrants and natives and-- for immigrants-- to schooling obtained in Israel as opposed to schooling obtained abroad.

To measure an individual's level of education, I use the number of completed years of schooling. One exception is that all observations for which the last type of schooling was post-secondary yeshiva<sup>6</sup> are excluded from the sample. This is because religious people often continue to study at such institutions throughout life. Attending a post-secondary yeshiva is better classified as a religious activity than as a program of human capital accumulation applicable in the labor market. Thus, including in the sample individuals who count such yeshiva in their total years of schooling would bias the coefficient on standard schooling downward.<sup>7</sup>

To construct measures of the years of schooling completed in the origin country and in Israel, I make the assumption that people start school at the age of seven and attend continuously until they complete their total years of schooling. Since I know the age at which an immigrant arrived in Israel, I can calculate the years of schooling that would have been completed before and after his move to Israel.<sup>8</sup> The resulting

---

<sup>6</sup> religious academy

<sup>7</sup> I also exclude the small number of other people in the sample with suspiciously high reported years of schooling (over twenty-seven years).

<sup>8</sup> A caveat: for individuals with discontinuous schooling histories, this method will bias upward the number of years acquired abroad. The bias will be greater, the longer an individual was out of school between schooling spells. It is possible, however, to put upper and lower bounds on these estimates of origin schooling and Israeli schooling and to reestimate the equations using these bounds. For example, an immigrant with 12 years of schooling who immigrated to Israel at age 2 necessarily obtained all 12 years after immigration.

mean years of schooling in Israel and abroad are shown in the first set of rows in Table Three. Just under half of all immigrants have attended school in Israel. The average fraction of schooling acquired abroad is 65%. This fraction is lowest for Sephardi immigrants (55%) and highest for Soviet immigrants (86%), only one fifth of whom have attended school in Israel at all.

We can now turn to an examination of the returns to schooling. The analysis is first performed using a continuous years of schooling variable and then using a set of indicator variables for different combinations of schooling levels and sources.

#### **V.A Years of Schooling**

Table 5A examines the effect of schooling obtained abroad and in Israel on the log monthly earnings of natives and immigrants. All immigrant groups are constrained to have the same coefficients in this regression. The right hand side variables include years of schooling in Israel and its interaction with immigrant status. This term captures the difference in the return to Israeli schooling for natives and immigrants. Years of schooling acquired abroad and its interaction with years of schooling in Israel are included to measure the return to foreign education and whether that return changes as a result of subsequent education in Israel. Finally, I include the interaction of years since immigration with origin-source education. This is to capture differences in the assimilation rates of more and less educated immigrants.

The pattern of coefficients on the basic demographic variables in Table 5A is generally the same as in previous tables. However, the negative effect of immigrant status and the positive impact of years since immigration are mitigated, indicating that the previous estimates of these coefficients were also picking up differences in the

returns to the different types of schooling.

The estimated return to schooling in Israel is 9.5% for natives and 7.6% for immigrants. The greater return received by natives is consistent with the argument that their country-specific skills, including their superior Hebrew language ability, enable them to get more out of a year of schooling than does an immigrant.

The return to education obtained in the origin country is 5.6% for immigrants who completed their education abroad. However, it is significantly higher for those who subsequently had some schooling in Israel. For the average immigrant, who has completed 3.7 years of schooling in Israel, this interaction raises the average return to origin-source education to 6.9%. This positive interaction is consistent with the idea that acquiring training in Israel enables immigrants to better translate their previously acquired human capital into terms valued in the Israeli labor market. However, this pattern could also reflect positive self-selection on the part of individuals who choose to get further schooling after immigration. Unfortunately, it is impossible to distinguish between these effects in this data. The interaction of origin and Israeli schooling also raises the average return to Israeli schooling for immigrants. For the typical immigrant, who has 7 years of origin-source education, the return to Israeli schooling is 8.9%, a figure much closer to the return received by natives.

Finally, the assimilation rate of more educated immigrants is found to be slightly lower than that of their less educated counterparts. This is somewhat surprising, since one might imagine that when immigrants first arrive in the country, there is a compression of labor market outcomes between skill groups, but that over time, their earnings would diverge. However, the return to source country education falls somewhat with time since immigration.



When this earnings equation is estimated separately for each of the five ethnic groups, the results are what is shown in Table 5B. Taking into account the average size of the interaction between origin and Israeli schooling, the return to schooling in Israel is 7.6% for immigrants taken as a whole. Westerners earn 5.6%, Eastern Europeans 7.1%, Soviets 6.9%, and Sephardis 7.1%. The return earned by natives (9.9%) is again significantly higher than that of any of the immigrant groups. This provides further evidence against the hypothesis mentioned above, that schooling provides more total human capital per year to immigrants than to natives.<sup>9</sup>

To calculate the return to origin country schooling, we must sum up all of the relevant effects. To do this, we add the coefficients on education, education acquired abroad, the interaction of foreign and Israeli education times the average amount of Israeli education, and the interaction of foreign education with years since arrival times average years since arrival. This calculation yields the following returns to origin schooling: 7.2% for immigrants overall, 7.0% for Westerners, 6.7% for Eastern Europeans, 7.5% for Soviets, and 6.6% for Sephardis. The return to source country education is thus higher than the return to Israeli education for Westerners and Soviets. Sephardi and Eastern European education earn a lower return than education obtained in Israel. While this pattern supports the idea that school quality is higher and better matched to Israel in Ashkenazi countries of origin than Sephardi ones, these results could equally well reflect less discrimination between Ashkenazi and Sephardi immigrant workers at lower levels of education than at higher levels.

---

<sup>9</sup> This is net of the effect associated with "years since arrival", i.e., the acquisition of country-specific information and skills that come with time spent in Israel. This correction implicitly assumes that this effect is the same for immigrants, whether they are in school or in the labor force. In section VB below, I experiment with omitting this correction.

For Sephardi immigrants, there is a large rise in the return to foreign schooling resulting from acquiring further education in Israel. Above, I argued that Israeli training may enable an immigrant to translate the human capital he brought with him to Israel into terms valued in the Israeli labor market. It is therefore not surprising that Sephardis appear to benefit the most from this indirect effect of Israeli schooling, since, among immigrant groups, their origin country education appears to be the least well matched to the Israeli economy. Eastern Europeans also experience an increase in the return to their source country education following schooling in Israel, but the effect for this group is smaller. For Western immigrants, there is a puzzling negative effect of having attended school in Israel on the return to education acquired abroad. It is unclear what lies behind this anomaly.

Finally, the earnings difference between more and less skilled immigrants appears to be initially compressed and subsequently divergent only among Western immigrants, and this effect is very imprecisely estimated. In other words, assimilation rates do not generally vary by foreign education level.

#### **V.B Discrete Levels of Schooling**

Some of the results in the last section, such as the higher return to foreign education than to Israeli education, may simply be artifacts of the assumption of linearity in the return to schooling. Since immigrants' foreign education precedes their Israeli education, education in Israel necessarily take place at a higher level of total years of schooling. If there are decreasing returns to schooling, the estimated return to Israeli schooling for immigrants, following the methodology in the previous section, will be downward biased. In this section, the return to schooling is allowed to vary

with its level.

The measure of education used in this section is constructed in the following manner: each individual is classified as having terminated his education in primary school (grades 1-8), high school (grades 9-12), or "college" (above grade 12). Using the information on current age and year of immigration as above, I determine whether the given school level took place abroad or in Israel<sup>10</sup>, yielding six dummy variables:

- 1) attended primary school abroad
- 2) attended primary school in Israel
- 3) attended high school abroad
- 4) attended high school in Israel
- 5) attended college abroad
- 6) attended college in Israel

From these six variables, I calculate the nine indicator variables used in the regressions below. The three letters in the variable name denote primary school, high school, and college, respectively. An "I" signifies that this schooling took place in Israel. An "F" signifies that it took place abroad. An "O" means that this level was not attained. The values of the nine dummies are thus as follows:

- III- primary, high school, and college all obtained in Israel.
- IIO- primary and high school in Israel. no college.
- IOO- primary in Israel. no high school or college.
- FFF- primary, high school, and college all obtained abroad.
- FFO- primary and high school abroad. no college.
- FOO- primary abroad. no high school or college.
- FFI- primary and high school abroad. college in Israel.
- FII- primary abroad. high school and college in Israel.
- FIO- primary abroad. high school in Israel. no college.

The sample means for these different schooling combinations are presented in

---

<sup>10</sup> For people who completed part of a unit in each country, I experimented with alternative methods of assigning that schooling to a country: according to where the majority of that unit took place, as foreign if any of it took place abroad, or as Israeli if any of it took place in Israel. The results using these different measures were quite similar, so I present results only for the first method.

the bottom panel of Table Three. Regressions of log monthly earnings on the basic demographic variables and these nine schooling configuration dummies are presented in Table 6A. In this specification, years since immigration is not included on the right hand side. This is because of the interpretation problem which arises because of the systematic relationship between years since immigration and the schooling dummies. As an illustration, consider the case of an immigrant who attended school from the first grade through college in Israel. The fact that this immigrant obtained all of his education in Israel cannot be separated from the fact that he therefore must have been in Israel since early childhood. Similarly, someone who immigrated to Israel at the age of ten could not possibly have completed high school abroad. In other words, it is impossible to hold years since immigration constant and compare the earnings of, say, an FFF immigrant with an III immigrant. There is no way to separate out the effect on earnings of the difference in schooling sources from the difference in years since migration. By excluding years since immigration, the schooling and years in Israel effects are subsumed into one coefficient, that on schooling.

On the other hand, there does exist large variation in years since immigration for the many individuals with similar schooling configurations, which enables us to separately identify the two effects in these cases. Thus, in Table 6B, I present regressions including years since immigration for comparison.<sup>11</sup>

Since the constant term and the returns to demographics vary somewhat across groups, direct comparisons cannot be made between the return to a given

---

<sup>11</sup> The education dummies are all quite significant in both of these tables, with the exception of F00 and I00 for some groups. The insignificance of these dummies means that it is difficult in these cases to accurately measure the relative return to primary school acquired in Israel versus abroad.

configuration for two ethnic groups merely by comparing their corresponding coefficients. Direct comparisons can be made, however, for the difference between two ethnic groups in the difference between two schooling configurations (i.e., to compare the difference between III and FFF for Westerners versus that difference for Soviets).

These differences in differences are presented in Tables 7A and 7B. The numbers in Table 7A correspond to the regressions in Table 6A, while those in Table 7B correspond to the regressions in Table 6B. There are 134 differences reported in these tables. To put some structure on these estimates, it is instructive to focus on three comparisons: 1) the return to attending school in Israel for natives versus immigrants, when both groups obtained their previous education in Israel; 2) the return to attending school in Israel for natives versus immigrants, when the immigrants obtained their previous education abroad; and 3) the return to Israeli versus origin schooling for immigrants.

The return to attending school in Israel for natives versus immigrants, when both groups obtained their previous education in Israel, can be seen in the following comparisons. The two leftmost columns of the upper panel of each table show the return to schooling obtained in Israel for the five ethnic groups. The college-high school differential (III-IIO) is smaller for immigrants than for natives. The high school-primary differential (IIO-IOO) varies considerably by group, with Westerners and Soviets gaining much more than natives and Sephardis gaining much less. The size of these differentials is not substantially affected by whether years since immigration is included in the regression or not. It thus appears that, among immigrants who received no schooling abroad (i.e. immigrated too young), the returns to college are

lower than the return for natives, while for high school, the immigrant-native difference is mixed.

The second set of comparisons is of the return to attending school in Israel for natives versus immigrants, when the immigrants obtained their previous education abroad. One example is to compare the return to college in Israel for an immigrant with high school from abroad (FFI-FFO) versus for a high school educated native (III-IIO). The difference for natives is 51.5%. This increment is comparable for Western and Soviet immigrants, and even somewhat higher for Sephardis in Table 7A. The size of these returns is significantly reduced when years since immigration is included in the regression (Table 7B), with the return for all immigrant groups falling below that of natives.

The third set of comparisons is of the return to Israeli versus origin schooling for immigrants. The difference in earnings for someone who attended school through college in Israel versus abroad is (III-FFF). When years since arrival is not included in the regression, this difference is positive for all groups. The difference for high school level individuals (IIO-FFO) is also positive in all cases. Taking years since immigration into account, however, in Table 7B, all these differences become negative or insignificant. It is important to note that the effect of years in Israel outweighs these negative effects, so that a person with IIO education still earns more than a person with FFO education. But these results would seem to suggest that, removing the accompanying effect of assimilation, in general, the quality of schooling obtained abroad is comparable or even slightly higher than that of Israeli schooling, with Western-origin education being much more valued in Israel than Israeli schooling. Looking at immigrants with foreign schooling who complete their education in Israel

versus those who complete it abroad yields a similar pattern. For example, the value of attending college in Israel versus abroad, FFI-FFF, is positive when years since arrival is not corrected for. When this effect is partialled out, however, attending college in Israel is found to be less valuable than attending it in the country of origin for Westerners, as valuable for Soviets and East Europeans, and less valuable for Sephardis. Looking at this comparison at the high school level (FII-FFF), Table 7A shows positive values for all groups, while Table 7B shows insignificant ones (with the exception of Westerners, whose origin-source education is always found to be highly valued). In all cases, adding years since immigration to the regression greatly reduces the measured value of education obtained in Israel. Because of the conceptual issues discussed above, whether years since immigration should be included in the regression from which these measures are derived depends on the precise interpretation we wish to put on the coefficients.

## VI. Conclusion

This paper examines the returns to education for natives and immigrants in Israel, using years of schooling as one measure of workers' human capital. It focusses on four comparisons: 1) the return to Israeli schooling for immigrants versus natives; 2) the return to Israeli versus foreign schooling for immigrants; 3) the interaction of Israeli and foreign schooling for immigrants; and 4) the differences in the assimilation rates of more and less educated immigrants. It also examines whether these returns depend on the particular configuration of educational attainment, in terms of level and source.

The direct return to a year of schooling in Israel is found to be higher for natives than for immigrants, regardless of country of origin, in most of the analysis. The greater return received by natives is consistent with the argument that their language and other country-specific skills enable them to get more out of a year of schooling in Israel than do immigrants. It also argues against the hypothesis that immigrants would benefit more than natives from attending school in Israel because, in addition to gaining the human capital usually associated with schooling, being in school might enable immigrants to learn about Israeli institutions and "ways of doing things" more completely than they would out of school.

The return to education obtained abroad is found to be higher for Ashkenazi immigrants than for Sephardi immigrants. Sephardi-source education receives a lower return than education obtained in Israel, while Western-source education actually earns a higher return. These patterns probably reflect differences in school quality across countries of origin and the extent to which foreign schooling is well matched to the needs of the Israeli labor market. However, these results could also be due to a lesser



degree of discrimination between Ashkenazi and Sephardi immigrant workers at low levels of education than at high levels. Care must be taken in interpreting the changes in these estimates when they are made net or inclusive of the assimilation which accompanies years since immigration.

Education obtained in Israel is found to significantly raise the return to schooling acquired abroad for Sephardis, with weaker effects for Ashkenazis. This is consistent with the idea that destination country schooling allows an individual to translate the human capital he accumulated in his country of origin into terms rewarded in the destination labor market. This finding suggests a potential role for policies which encourage immigrants to obtain further training after immigration. Although this appears to be an efficient way of increasing the earnings potential of certain groups, further work would be needed to disentangle the treatment effect of obtaining schooling in Israel from the issue self-selection in educational attainment which usually troubles studies of the return to schooling.

Finally, with the possible exception of immigrants from Western Europe and the Americas, there is no evidence of faster assimilation rates for more highly educated immigrants. Equivalently, the return to origin country schooling does not generally rise with time in Israel.

Future work on the returns to immigrants' human capital could broaden the analysis to include labor market experience acquired abroad and in Israel, in addition to the schooling measures used in this paper. Another interesting extension would be to examine the occupational mobility of immigrants. The Israeli census contains information on respondents' industry and occupation five years before the survey. In addition, there have been a series of short panel surveys conducted which include

information on immigrants' industry and occupation in their origin country and the level and type of education they obtained there (unfortunately, these panel datasets contain no earnings data). The extent and pattern of occupational mobility observed among immigrants could thus be compared to that of natives. This would provide additional evidence regarding an initial compression and subsequent spread of skill differentials among immigrants. Further research could also profitably use multiple cross-sections to separately identify cohort and assimilation effects.

## Appendix

### Continent of Origin Groups

1. West: Canada, USA, Germany, Austria, Switzerland, Finland, Sweden, Norway, Denmark, United Kingdom, Ireland, Holland, Belgium, Luxembourg, France, Portugal, Spain, Italy, Zimbabwe (Rhodesia), South Africa, Australia, New Zealand, unspecified Oceania, unspecified Europe, Mexico, Cuba, Panama, Venezuela, Colombia, Ecuador, Peru, Bolivia, Brazil, Uruguay, Argentina, Chile, unspecified Central America, unspecified South America

2. Eastern Europe: Poland, Romania, Yugoslavia, Bulgaria, Greece, Albania, Czechoslovakia, Hungary

3. Soviet: USSR

4. Sephardi: Cyprus, Turkey, Syria, Lebanon, Jordan, Iraq, Saudi Arabia, Yemen, South Yemen, Iran, Afghanistan, India, Pakistan, Burma, Indonesia, Philippines, China, Mongolia, Korea, Japan, Morocco, Tangier, Algeria, Tunisia, Libya, Sudan, Egypt, Ethiopia, Eritrea, Somalia, unspecified Africa, unspecified Asia

**Table One**

**Area of Origin**

1) Percent of Immigrants by Continent:

Western Hemisphere and W. Europe	9.01
Eastern Europe	29.26
USSR	12.88
Sephardi	48.85

2) Percent of Immigrants by Most Common Countries:

USSR	15.68
Morocco	14.65
Romania	14.29
Iraq	8.79
Poland	8.72
Iran	3.72
Yemen	3.63
Turkey	3.59
Egypt/Sudan	2.81
Tunisia	2.34
Bulgaria	2.28
Germany	2.26
Libya	1.85
India/Pakistan	1.59
Argentina	1.36
Hungary	1.31
Czechoslovakia	1.23
USA	1.04

Source: author's tabulations of the 1983 Israeli census microdata.

**Table Two**  
**Summary Statistics**

	<u>Native</u>	<u>Immigrant</u>	<u>Western</u>	<u>E.European</u>	<u>Soviet</u>	<u>Sephardi</u>
age	34.7 (8.5)	45.6 (10.8)	44.1 (10.8)	49.8 (10.5)	44.2 (11.4)	43.6 (10.1)
year of immigration		1956.0 (10.9)	1957.6 (14.5)	1952.9 (9.8)	1967.8 (12.1)	1954.5 (8.0)
weeks worked per year	50.4 (8.0)	50.9 (7.2)	50.2 (7.2)	51.2 (6.2)	51.1 (6.9)	50.9 (7.8)
hours worked per week	48.8 (6.5)	47.9 (5.7)	48.3 (6.5)	48.1 (5.9)	47.5 (5.5)	47.8 (5.5)
gross monthly income	44,766 (32,042)	41,504 (29,754)	55,593 (37,737)	48,269 (33,000)	41,293 (29,013)	34,909 (23,832)
married (%)	85.4	93.2	91.8	93.1	93.6	93.4
don't speak Hebrew (%)	.3	4.7	4.6	4.0	15.3	2.3
years since immigration		26.9 (10.9)	25.3 (14.5)	30.0 (9.8)	15.1 (12.1)	28.4 (8.0)
years since immig. < 5 (%)		3.5	8.8	1.0	14.7	1.1
age at immigration		18.6 (12.5)	18.8 (13.6)	19.8 (11.7)	29.1 (14.0)	15.2 (10.6)
sample size	18,560	35,615	3,209	10,422	4,587	17,397

Note: Figures are sample means. Standard deviations are in parentheses.

Table Three: Schooling

	<u>Native</u>	<u>Immigrant</u>	<u>Western</u>	<u>E.European</u>	<u>Soviet</u>	<u>Sephardi</u>
<u>years of schooling</u>						
education in Israel	12.3 (3.2)	3.7 (5.1)	4.8 (6.1)	3.6 (5.3)	1.7 (4.0)	4.1 (4.8)
education abroad		7.0 (5.4)	9.2 (6.9)	7.9 (5.0)	10.3 (5.0)	5.2 (4.6)
total education	12.3 (3.2)	10.8 (4.2)	14.1 (3.9)	11.5 (3.9)	12.0 (4.0)	9.4 (3.9)
finished education in Israel (%)		46.3	51.6	42.7	21.3	54.1
<u>highest level attained (%)</u>						
primary	12.8	27.4	7.7	24.8	18.7	34.9
high school	50.9	41.4	34.4	40.8	35.9	44.6
college	35.9	27.3	57.3	33.4	43.7	13.8
<u>whether level attained and source (%)</u>						
primary = F		67.9	69.2	76.7	88.0	57.1
primary = I	99.7	28.4	30.3	22.4	10.3	36.3
high school = F		35.2	52.6	40.1	63.8	21.5
high school = I	86.8	33.6	39.1	34.1	15.8	36.8
college = F		13.3	31.7	14.1	33.5	4.1
college = I	35.9	14.0	25.6	19.3	10.2	9.6
III	35.9	7.5	15.0	10.1	4.4	5.4
IIO	50.9	14.3	13.0	10.0	4.7	19.6
IOO	12.8	6.4	2.2	2.1	1.1	11.2
FFF		13.3	31.7	14.1	33.5	24.1
FFO		19.3	15.4	22.7	27.7	15.8
FOO		21.0	5.5	22.7	17.5	23.7
FFI		2.5	5.4	3.2	2.5	1.6
FII		3.9	5.0	5.9	3.2	2.6
FIO		7.7	5.9	7.9	3.4	9.1
OOO	.2	3.6	.3	.7	1.4	6.5

Note: Standard deviations in parentheses. "Primary = I" is a dummy variable, indicating that primary schooling was completed in Israel; "Primary = F" indicates that primary schooling was completed abroad. The three letter combinations (FIO, etc.) are indicator variables to be interpreted as follows: The first letter indicates the location of primary school, the second the location of secondary school, and the third the location of college. F indicates foreign, I indicates Israel, and O indicates none. Thus "FIO" indicates a person who attended primary school abroad, high school in Israel, and did not attend college.

Table Four: Immigrant Status and Earnings Convergence

	(1)	(2)	(3)	(4)
married	.200 ( 26.3)	.204 ( 27.1)	.206 ( 27.5)	.207 ( 27.7)
experience	.0263 ( 27.0)	.0259 ( 26.1)	.0268 ( 27.2)	.0272 ( 27.5)
exp <sup>2</sup> /100	-.0297 (-20.6)	-.0293 (-20.3)	-.0322 (-22.3)	-.0328 (-22.7)
education	.0775 (123.9)	.0792 (125.4)	.0741 (111.7)	.0741 (111.2)
immigrant		-.344 (-28.8)		
Western			-.319 (-21.3)	-.317 (-15.2)
E.European			-.368 (-24.3)	-.360 (-15.1)
Soviet			-.358 (-29.4)	-.436 (-22.1)
Sephardi			-.498 (-33.5)	-.393 (-15.5)
years in Israel		.0146 (17.5)	.0208 ( 21.9)	
years in Isr <sup>2</sup> /100		-.0135 ( -8.5)	-.0237 (-13.7)	
West * yrs in Isr				.0185 ( 9.2)
West * yrs in Isr <sup>2</sup> /100				-.0164 (-4.0)
E.Eur * yrs in Isr				.0210 ( 13.0)
E.Eur * yrs in Isr <sup>2</sup> /100				-.0242 ( -8.5)
Soviet * yrs in Isr				.0293 ( 13.7)
Soviet * yrs in Isr <sup>2</sup> /100				-.0351 ( -8.4)
Sephardi * yrs in Isr				.0164 ( 9.0)
Sephardi * yrs in Isr <sup>2</sup> /100				-.0204 ( -6.1)
constant	8.94 (525.9)	8.96 (526.2)	9.02 (527.5)	9.01 (526.8)
R <sup>2</sup>	.257	.274	.282	.283
N	54,175	54,175	54,175	54,175

Note: Dependent variable is log monthly earnings. t-statistics in parentheses.

**Table 5A: The Return to Origin Country Schooling**

married	.194 ( 25.8)
experience	.0310 ( 30.0)
exp <sup>2</sup> /100	-.0346 (-23.2)
immigrant	-.0915 (-3.0)
years in Israel	.0139 ( 9.7)
years in Israel <sup>2</sup> /100	-.0137 ( -6.7)
education	.0947 ( 83.1)
education * immigrant	-.0188 (-12.8)
education abroad	-.0197 ( -9.9)
educ abroad * educ in Isr	.00192 ( 10.2)
educ abroad * yrs in Isr	-.000223 ( -3.6)
constant	8.69 (383.6)
R <sup>2</sup>	.280
N	54,175

Note: t-statistics in parentheses. Dependent variable is log monthly earnings.



Table 5B: The Return to Origin Country Schooling

	<u>Native</u>	<u>Immigrant</u>	<u>Western</u>	<u>E.European</u>	<u>Soviet</u>	<u>Sephardi</u>
married	.172 ( 16.5)	.197 ( 18.4)	.173 ( 4.7)	.241 ( 12.1)	.139 ( 4.8)	.184 ( 12.3)
experience	.0523 ( 26.3)	.0109 ( 7.5)	.0296 ( 6.1)	.0214 ( 6.5)	.00797 ( 2.3)	.00792 ( 3.3)
exp <sup>2</sup> /100	-.0646 (-18.9)	-.0120 ( -6.3)	-.0470 ( -6.2)	-.0328 ( -7.9)	-.0107 ( -2.1)	-.00802 ( -2.7)
years in Israel		.0166 ( 11.4)	.0133 ( 2.3)	.0304 ( 8.0)	.0305 ( 8.0)	.0195 ( 7.7)
years in Isr <sup>2</sup> /100		-.0122 ( -5.9)	-.00307 ( -0.4)	-.0284 ( -6.0)	-.0333 ( -6.5)	-.0212 ( -5.7)
education	.0989 ( 87.3)	.0673 ( 57.2)	.0660 ( 15.1)	.0586 ( 24.5)	.0620 ( 14.6)	.0552 ( 30.2)
educ abroad		.00728 ( 3.7)	.000590 ( 0.0)	.0190 ( 3.9)	.00412 ( 0.7)	.00710 ( 2.0)
educ abroad * educ in Isr		.00172 ( 9.1)	-.00104 ( -1.8)	.00159 ( 4.9)	.000638 ( 0.9)	.00294 ( 10.1)
educ abroad * years in Isr		-.000219 ( -3.5)	.000318 ( 1.4)	-.000554 ( -3.9)	-.000129 ( -0.6)	-.000306 ( -2.7)
constant	8.36 (274.1)	8.94 (256.2)	8.89 ( 81.7)	8.72 (107.1)	9.07 (125.7)	9.05 (159.3)
R <sup>2</sup>	.325	.260	.229	.246	.307	.189
N	18,560	35,615	3,209	10,422	4,589	17,397

Note: t-statistics in parentheses. Dependent variable is log monthly earnings.

**Table 6A: Returns to Different Configurations of Schooling  
(not correcting for years since immigration)**

	<u>Native</u>	<u>Immigrant</u>	<u>Western</u>	<u>E.European</u>	<u>Soviet</u>	<u>Sephardi</u>
married	.184 ( 17.3)	.202 ( 18.7)	.241 ( 6.5)	.248 ( 12.2)	.154 ( 5.1)	.184 ( 12.4)
experience	.053 ( 26.3)	.033 ( 24.1)	.032 ( 6.8)	.046 ( 16.0)	.019 ( 5.2)	.032 ( 16.5)
exp <sup>2</sup> /100	-.0685 (-19.5)	-.0384 (-19.9)	-.0362 ( -4.8)	-.0600 (-15.1)	-.0218 ( -4.0)	-.0422 (-15.5)
III	1.106 ( 16.4)	1.049 ( 53.9)	1.171 ( 7.0)	.899 ( 14.4)	1.121 ( 15.6)	.815 ( 31.7)
IIO	.591 ( 8.8)	.555 ( 30.7)	.741 ( 4.4)	.451 ( 7.3)	.771 ( 10.8)	.400 ( 18.7)
IOO	.221 ( 3.2)	.219 ( 11.2)	.306 ( 1.7)	.122 ( 1.8)	.337 ( 3.7)	.129 ( 5.9)
FFF		.825 ( 46.8)	.994 ( 6.0)	.650 ( 10.7)	.747 ( 11.7)	.670 ( 26.9)
FFO		.427 ( 25.9)	.533 ( 3.2)	.340 ( 5.7)	.383 ( 6.0)	.308 ( 16.0)
FOO		.153 ( 9.7)	.246 ( 1.4)	.098 ( 1.7)	.141 ( 2.2)	.072 ( 4.1)
FFI		.969 ( 41.5)	1.044 ( 6.1)	.773 ( 11.7)	.895 ( 11.5)	.842 ( 24.6)
FII		1.005 ( 47.2)	1.047 ( 6.2)	.831 ( 13.1)	1.066 ( 14.2)	.819 ( 27.7)
FIO		.562 ( 29.8)	.789 ( 4.7)	.461 ( 7.4)	.642 ( 8.7)	.391 ( 17.5)
constant	8.83 (125.6)	9.13 (340.9)	9.07 ( 53.0)	9.14 (121.7)	9.40 (113.4)	9.26 (245.5)
R <sup>2</sup>	.298	.241	.187	.226	.237	.192
N	18,560	35,615	3,209	10,422	4,589	17,397

Note: t-statistics in parentheses. Dependent variable is log monthly earnings. The three letter combinations (FIO, etc.) are dummy variables that are interpreted as follows: The first letter indicates the location of primary school, the second the location of secondary school, and the third the location of post-secondary school. F indicates foreign, I indicates Israel, and O indicates none. OOO is the omitted category.

**Table 6B: Returns to Different Configurations of Schooling  
(correcting for years since immigration)**

	<u>Native</u>	<u>Immigrant</u>	<u>Western</u>	<u>E.European</u>	<u>Soviet</u>	<u>Sephardi</u>
married	.184 ( 17.3)	.199 ( 18.6)	.220 ( 6.0)	.244 ( 12.1)	.137 ( 4.7)	.182 ( 12.3)
experience	.053 ( 26.3)	.016 ( 10.9)	.022 ( 4.5)	.027 ( 8.9)	.012 ( 3.5)	.016 ( 7.3)
exp <sup>2</sup> /100	-.0685 (-19.5)	-.0250 (-12.7)	-.0406 (-5.2)	-.0447 (-10.9)	-.0209 (-4.0)	-.0271 (-9.4)
yrs in Isr		.013 ( 14.7)	.019 ( 6.8)	.016 ( 7.9)	.029 ( 14.0)	.014 ( 8.6)
yrs in Isr <sup>2</sup> /100		-.003 (-2.0)	-.005 (-1.0)	-.009 (-2.7)	-.028 (-7.2)	-.010 (-3.5)
III	1.106 ( 16.4)	.784 ( 36.6)	.716 ( 4.2)	.675 ( 10.4)	.593 ( 7.7)	.639 ( 22.1)
IIO	.591 ( 8.8)	.344 ( 17.7)	.354 ( 2.1)	.277 ( 4.4)	.269 ( 3.5)	.266 ( 11.2)
IOO	.221 ( 3.2)	.035 ( 1.7)	-.029 (-0.1)	-.029 (-0.4)	-.148 (-1.5)	.018 ( 0.8)
FFF		.851 ( 47.8)	.987 ( 6.0)	.694 ( 11.5)	.654 ( 10.5)	.690 ( 27.5)
FFO		.414 ( 25.3)	.508 ( 3.1)	.332 ( 5.7)	.269 ( 4.3)	.312 ( 16.2)
FOO		.137 ( 8.7)	.216 ( 1.3)	.098 ( 1.7)	.070 ( 1.1)	.064 ( 3.7)
FFI		.846 ( 35.9)	.846 ( 5.0)	.681 ( 10.3)	.595 ( 7.7)	.780 ( 22.6)
FII		.834 ( 38.0)	.756 ( 4.4)	.693 ( 10.8)	.653 ( 8.6)	.72 ( 23.6)
FIO		.435 ( 22.6)	.551 ( 3.3)	.365 ( 5.9)	.286 ( 3.8)	.324 ( 14.1)
constant	8.83 (125.6)	9.30 (315.4)	9.16 ( 53.6)	9.26 (112.4)	9.43 (115.0)	9.34 (209.9)
R <sup>2</sup>	.298	.261	.220	.241	.292	.201
N	18,560	35,615	3,209	10,422	4,589	17,397

Note: see note for Table 6A.

**Table 7A: Differences in the Returns to Different Schooling Configurations (not correcting for years since immigration)**

	<u>III-IIO</u>	<u>IIO-IOO</u>	<u>FFF-FFO</u>	<u>FFO-FOO</u>	<u>III-FFF</u>	<u>III-FFI</u>	<u>III-FII</u>
Native	.5147 (.0080)	.3705 (.0116)	NA	NA	NA	NA	NA
Immigrant	.4938 (.0122)	.3362 (.0128)	.3978 (.0098)	.2737 (.0087)	.2240 (.0126)	.0800 (.0195)	.0439 (.0168)
Western	.4300 (.0373)	.4350 (.0713)	.4611 (.0324)	.2876 (.0491)	.1770 (.0307)	.1268 (.0491)	.1239 (.0507)
E. European	.4480 (.0232)	.3290 (.0381)	.3100 (.0179)	.2418 (.0159)	.2487 (.0233)	.1256 (.0335)	.0681 (.0266)
Soviet	.3499 (.0483)	.4342 (.0748)	.3638 (.0190)	.2424 (.0236)	.3738 (.0369)	.2255 (.0576)	.0552 (.0533)
Sephardi	.4142 (.0177)	.2714 (.0139)	.3624 (.0199)	.2357 (.0119)	.1445 (.0246)	-.0269 (.0327)	-.0047 (.0272)

	<u>FFI-FFF</u>	<u>FII-FFF</u>	<u>IIO-FFO</u>	<u>IOO-FOO</u>	<u>IIO-FIO</u>	<u>FFI-FFO</u>
Native	NA	NA	NA	NA	NA	NA
Immigrant	.1440 (.0184)	.1801 (.0155)	.1279 (.0101)	.0655 (.0129)	-.0075 (.0120)	.5418 (.0182)
Western	.0501 (.0456)	.0530 (.0471)	.2081 (.0383)	.0607 (.0789)	-.0475 (.0495)	.5113 (.0506)
E. European	.1231 (.0314)	.1806 (.0252)	.1107 (.0217)	.0235 (.0370)	-.0103 (.0245)	.4330 (.0311)
Soviet	.1483 (.0482)	.3185 (.0428)	.3877 (.0363)	.1959 (.0690)	.1285 (.0517)	.5121 (.0488)
Sephardi	.1714 (.0336)	.1492 (.0287)	.0927 (.0139)	.0570 (.0145)	.0095 (.0147)	.5338 (.0303)

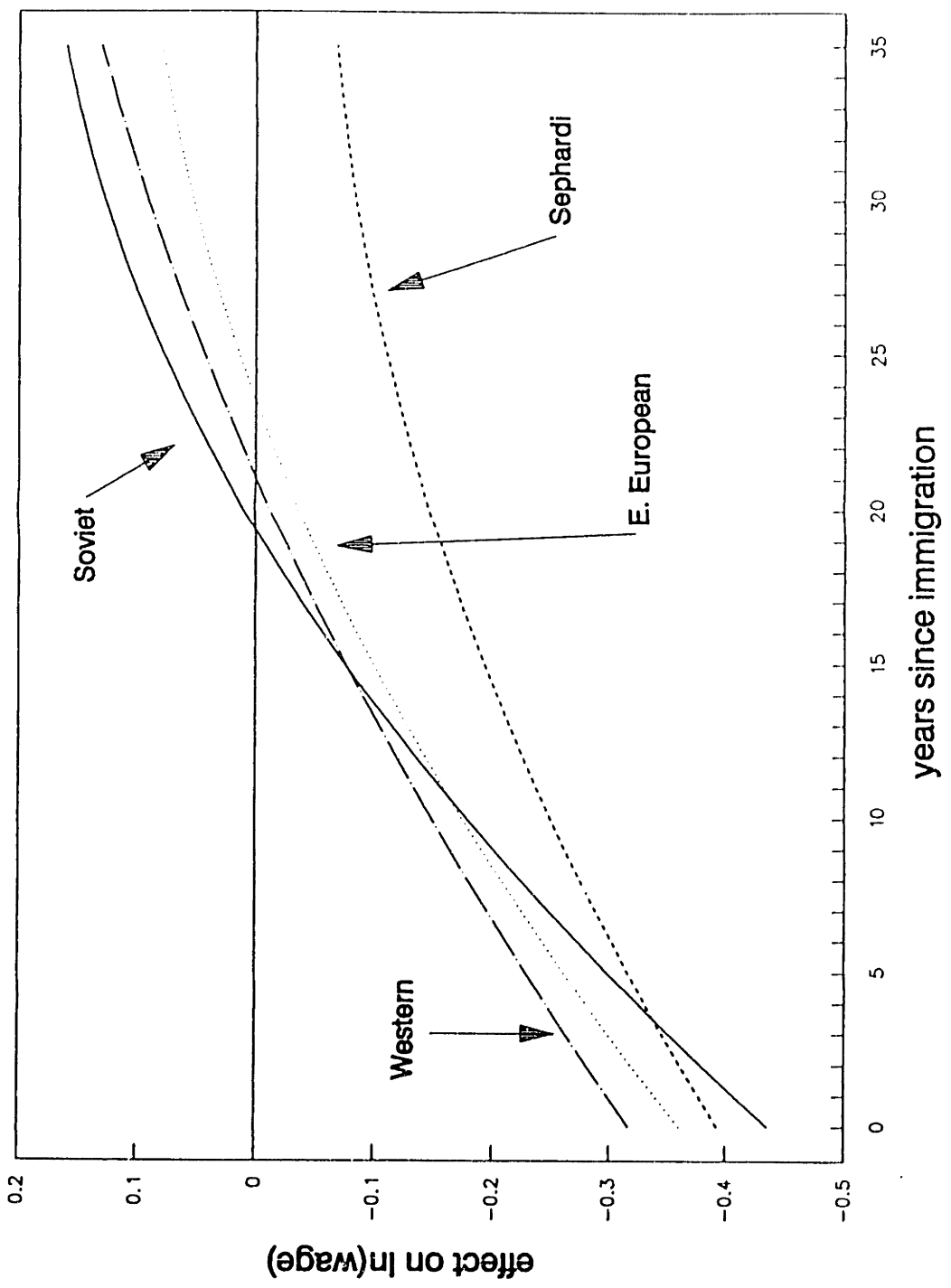
Note: Measures are the difference in log earnings for people with the specified configurations of schooling, derived from table 6A. See the note following Table Six for an explanation of these schooling variables.

**Table 7B: Differences in the Returns to Different Schooling Configurations (correcting years since immigration)**

	<u>III-IIO</u>	<u>IIO-IOO</u>	<u>FFF-FFO</u>	<u>FFO-FOO</u>	<u>III-FFF</u>	<u>III-FFI</u>	<u>III-FII</u>
Native	.5147 (.0108)	.3705 (.0116)	NA	NA	NA	NA	NA
Immigrant	.4402 (.0122)	.3086 (.0127)	.4368 (.0099)	.2773 (.0087)	-.0670 (.0157)	-.0623 (.0199)	-.0501 (.0169)
Western	.3624 (.0371)	.3839 (.0700)	.4797 (.0322)	.2914 (.0487)	-.2711 (.0493)	-.1292 (.0538)	-.0400 (.0519)
E. European	.3974 (.0232)	.3068 (.0378)	.3627 (.0185)	.2339 (.0158)	-.0197 (.0299)	-.0062 (.0346)	-.0183 (.0272)
Soviet	.3235 (.0466)	.4182 (.0725)	.3847 (.0184)	.1988 (.0230)	-.0611 (.0438)	-.0025 (.0575)	-.0604 (.0525)
Sephardi	.3736 (.0179)	.2473 (.0139)	.3778 (.0199)	.2480 (.0119)	-.0506 (.0280)	-.1406 (.0335)	-.0806 (.0276)
	<u>FFI-FFF</u>	<u>FII-FFF</u>	<u>IIO-FFO</u>	<u>IOO-FOO</u>	<u>IIO-FIO</u>	<u>FFI-FFO</u>	
Native	NA	NA	NA	NA	NA	NA	
Immigrant	-.0047 (.0188)	-.0169 (.0166)	-.0704 (.0120)	-.1016 (.0141)	-.1015 (.0123)	.4321 (.0183)	
Western	-.1419 (.0477)	-.2311 (.0522)	-.1538 (.0497)	-.2462 (.0837)	-.1967 (.0505)	.3378 (.0518)	
E. European	-.0136 (.0325)	-.0014 (.0280)	-.0544 (.0254)	-.1273 (.0397)	-.0876 (.0252)	.3491 (.0316)	
Soviet	-.0586 (.0478)	-.0007 (.0447)	.0001 (.0419)	-.2193 (.0731)	-.0167 (.0512)	.3261 (.0482)	
Sephardi	.0900 (.0339)	.0300 (.0297)	-.0464 (.0171)	-.0456 (.0165)	-.0587 (.0154)	.4678 (.0305)	

Note: Measures are the difference in log earnings for people with the specified configurations of schooling, derived from table 6B. See the note following Table Six for an explanation of these schooling variables.

Figure One  
Earnings and Years Since Immigration



**CHAPTER TWO**

**The Labor Market Assimilation of Immigrants  
in the United States:**

**The Role of Age at Arrival**

## I. Introduction

Immigrants represent a large and increasing share of the labor force of the United States. Currently, just under 10% of the U.S. labor force is foreign-born<sup>12</sup>. In October of 1991, a new immigration policy took effect which increased the number of immigrants to be admitted into the country each year from 560,000 to 700,000 people. Despite the magnitude of these numbers, however, some of the most basic issues concerning the economic integration of immigrants into the country remain unresolved. Do immigrants successfully assimilate into the labor market? What factors affect their assimilation? Do immigrants ever catch up to natives, and if so, how long does that process take? Finally, can immigration policy affect the answers to these questions?

Upon arrival in the country, immigrants can be expected to be at an earnings disadvantage, relative to natives, because they lack certain U.S.-specific skills and information that natives have. Over time, as they learn about American institutions, learn how to best apply the skills they have in this country, improve their English, and gain other U.S.-specific human capital, their earnings may catch up to, and possibly overtake, those of comparable natives. I examine three aspects of immigrant assimilation: 1) the degree to which immigrant earnings are comparable to the earnings of natives with similar demographic and skill characteristics; 2) the rate at which the gap between immigrants and natives narrows with time since immigration; and 3) changes in the skill-corrected quality of successive immigrant cohorts.

I focus on a particular determinant of immigrant earnings which has been largely overlooked in the literature: the age at which an individual immigrated to the United

---

<sup>12</sup> Borjas, Freeman, and Katz (1991)



States. There are many reasons to expect that immigrants who arrive at young ages will assimilate more successfully than immigrants who arrive at older ages. Using microdata from the 1970 and 1980 Public Use Samples of the U.S. Census, I demonstrate that age at arrival is indeed a very important factor affecting immigrant earnings.

There is a substantial amount of variation in the typical arrival age of different immigrant groups. Furthermore, I show that, as a result of sample truncation at labor force entry and exit, there is a systematic spurious negative correlation in the data between years since migration and age at immigration. This is because, among immigrants who have been in the United States for many years, those who immigrated later in life have already retired and are no longer in a sample of working people. Similarly, among immigrants who have been in the country only a few years, those who arrived as children have not yet joined the labor force, and thus are also excluded from a sample of working people. Since age at immigration has a negative effect on immigrant earnings, a failure to correct explicitly for age at immigration leads to omitted variable bias in estimates of the relative earnings of different immigrant groups and of the same group over time.

In the next section of the paper, I discuss the importance of age at immigration for immigrant earnings. Section Three briefly reviews previous work on assimilation and demonstrates the bias implicit in these studies if age at arrival is important. I lay out the estimation strategy to be used in Section Four, describe the data in Section Five, and present the empirical results in Section Six. The final section concludes.

## II. Age at Arrival

The age at which an individual migrates to the United States is a potentially important determinant of how that immigrant will eventually do in the labor market. There are many reasons why an immigrant who arrives as a youth might be expected to assimilate better than an immigrant who arrives in adulthood. Immigrants who arrive as children attend school in the United States. They also accumulate all of their labor market experience in this country. It is reasonable to presume that, for most countries of origin, human capital acquired abroad receives lower returns in the United States than that acquired here. In addition, there may be less quantifiable barriers to assimilation that result from labor market experience obtained abroad, for example, those faced by an adult coming from a socialist country, who must adjust to a very different set of labor market institutions. A second important issue is that children are more able to become fluent in a second language than are adults. There is considerable evidence that English language skills are an important determinant of earnings potential.<sup>13</sup> Finally, younger people are more adept at becoming socially assimilated than are older people. There are many cultural barriers important to labor force assimilation that immigrants must overcome. To give an extreme example, for many of the recent Ethiopian immigrants to Israel, indoor plumbing and electricity are completely new concepts. The children among them are much more able to adapt to these new technologies and to other aspects of life in an industrialized economy than are the adults. Given their shorter expected work lives, older immigrants also have less of an incentive to invest in any of these forms of new human capital (schooling, language, etc.). For all these reasons, people who immigrate at young ages are less

---

<sup>13</sup> See Chiswick (1991) and McManus, Gould, and Welch (1983).

distinguishable from natives than are other immigrants. Despite the plausibility of an effect of age at arrival on labor market outcomes, very little attention has been paid to it in the literature on labor market assimilation.<sup>14</sup>

A crucial aspect of age at immigration, and one that has not been recognized, is that immigrants of recent and early cohorts who are participating in the labor force differ substantially in their average ages at migration. This difference may not be due to any true change in the age distribution of immigrants coming to the United States, but simply to the following logic: When studying earnings, we sample only people currently in the labor market. An immigrant who came to the United States a long time ago, say in 1930, and who is still working must have been quite young when he arrived. Had he been relatively old when he came to this country, he would already be retired. Similarly, an immigrant who arrived only recently, say last year, must have already been an adult upon arrival to be observed in the labor force now. Someone who came that recently as a child would still be in school. There is, therefore, a systematic truncation of the ages at immigration we observe for cohorts which have been in the United States for different amounts of time. In particular, age at immigration is negatively correlated with time since immigration. Thus, if being young when you immigrate matters and is not accounted for, immigrants who have been in the country a long time will appear to be of higher "quality" (i.e., earnings potential, correcting for observable skills) than immigrants who have only been in the country a short amount of time. This relationship will hold, even in the absence of any true difference in unobservable factors.

Table One illustrates the importance of this phenomenon. Using data from the

---

<sup>14</sup> See Kossoudji (1989) and Smith (1991).

1980 U.S. Census (which will be described below in more detail), the table presents the mean current age, years since migration, and age at immigration for male immigrants from five arrival-year cohorts and five country of origin categories, as well as the average for all origin groups. The first set of columns presents these numbers for all male immigrants in the country-cohort cell. The second set of columns presents these means for male labor force participants only.

As might be expected, for any origin group, the average current age is higher for cohorts which have been in the United States for a long time than for more recent arrivals. For example, the average current age for all immigrants who came between 1950-59 is 46.6, in contrast to 25.1 for those who came in 1975-79. The age distribution across cohorts is obviously more compressed when only labor force participants are considered (i.e. 43.0 and 31.7 for these same two groups).

An immigrant's age at arrival is computed by simply subtracting years since migration from current age. Looking down the first set of columns for the entire population, we see the "true" variation in age at arrival. For example, these numbers tell us that the average Mexican immigrant to the United States is about 18 years old upon arrival, while the average Eastern European is about 27 years old.

Looking within origin group, the variation is smaller than is the cross-group variation. As is seen in the top set of rows, arrival age seems to have remained constant at about 22 years of age over the thirty year period 1950-1980. The small upward drift in this number can probably be attributed to higher mortality rates among older people, i.e. that some of the oldest people in the earliest cohorts are no longer alive, somewhat reducing the average arrival age of earlier cohorts.

Examining the numbers for labor force participants, however, shows a strikingly

different picture. While the rise in average age at arrival across arrival cohorts in the "population" column is at most about one year, that rise in the "labor force participants" sample is measured to be 11.1 years. East Asians are the only origin group for which there has been a very large rise in true age at arrival across arrival cohorts. Looking at the population figures for East Asian immigrants, there has been a true rise of about 6.6 years in mean arrival age. Looking at labor force participants would lead one to believe that there had been a 16 year rise in that average.

The magnitude of spurious differences in the average age at migration among labor force participants in early and recent cohorts is thus quite large. This relationship will be present in any sample used to study immigrant earnings, since it is due only to the age truncation implicit in limiting the sample to labor force participants.

To the extent that age at immigration affects relative earnings negatively, this spurious negative correlation between years since arrival and age at arrival will lead to an overestimate of the earnings of immigrants who have been in the United States for a long time, relative to those who have been here a shorter time. This translates into an overestimate of the extent to which the earnings of immigrants rise with time since immigration (i.e. earnings convergence). Omitted variable bias will also result from failing to account for the "true" differences in the average age at arrival of different immigrant groups. These will bias measures involving the relative earnings of any two immigrant groups which have different distributions of arrival age, for example, changes in the quality of immigrant cohorts over time, differences in the earnings of immigrants from different countries of origin, and so on. The reasons for these biases are explained more precisely in the next section.

### III. Previous Work

One of the earlier papers studying assimilation is that by Chiswick (1978). Chiswick examines a cross-section of the population, regressing earnings on the standard individual characteristics<sup>15</sup>, a dummy for immigrant status and time since immigration. He finds a strong positive coefficient on years since arrival, and concludes that assimilation is therefore very important. His estimate is that white male immigrants overtake natives of similar characteristics in 15-20 years.

Borjas (1985) counters these findings with the argument that, in a single cross-section, a positive effect of years since migration could be picking up not only assimilation, but changes in cohort quality as well. The argument is that earlier cohorts may simply perform better at every stage than recent ones, so that a difference in their earnings reflects not only a difference in the time they have had to assimilate, but a "quality" difference as well. Borjas examines two cross-sections of the population to separately identify these two effects. This is illustrated in Figure One. Chiswick's measure, the difference between points B and C, can be decomposed into two parts. True within-cohort earnings catch up is measured by looking at the difference between points A and B. Cross-cohort quality changes are measured by comparing the relative earnings of two cohorts, each observed when it has been in the country for a certain number of years. This is measured by looking at the difference between points A and C. Performing this decomposition of the cross-sectional difference, Borjas finds much smaller catch up rates than those found by Chiswick. He attributes most of the cross-sectional difference between cohorts to significant declines in the quality of successive cohorts of immigrants coming to the United

---

<sup>15</sup> schooling, experience, marital status, urban location, etc.

States.<sup>16</sup>

To the extent that age at immigration is an important determinant of earnings, its exclusion from these analyses introduces an omitted variable bias to measures of immigrant-native relative earnings, catch up rates, and changes in cohort quality. The reason for this is illustrated in Figure Two.

For simplicity, imagine that there are only two arrival ages: child and adult. As was shown above, there is a spurious negative correlation between age at arrival and years since arrival among labor force participants. In this stylized example, this means that at 10 years since migration, we only observe immigrants who arrived as adults, while at 20 years since migration, we only observe immigrants who arrived as children. If age at arrival has a negative effect on earnings, it follows that estimates of within-cohort earnings growth which do not correct for age at arrival will be biased upward. This is because such an estimate will compare an adult-at-arrival group in 1970 to a child-at-arrival group in 1980. In terms of Figure Two, it will capture the difference between points C and B, rather than the difference between points A and B or points C and D.

In addition to this "spurious" variation in age at arrival, "true" variation in age at arrival may bias any of these measures-- the level of the earnings gap for different origin groups, the rate of earnings convergence, and the changes in cohort quality within origin group over time.

---

<sup>16</sup> In subsequent work, Borjas examines the importance of self-selection (Borjas 1987) and country of origin (Borjas 1991) for this finding. LaLonde and Topel (1990) argue that the low rates of assimilation found by Borjas are simply an artifact of the rise in earnings inequality which took place in the 1970s. LaLonde and Topel repeat Borjas' exercise, using as the native base group those natives who are at the same percentile of the residual earnings distribution as immigrants in 1970. They find that immigrants have high rates of earnings growth, relative to natives.

#### IV. Econometric Framework

In order to identify the effect that age at arrival has on immigrant earnings, we must separate its impact from the impact of other related determinants of earnings. In particular, we must partial out the effects on relative earnings of current year, current age (or labor market experience), years since migration, and arrival cohort in order to isolate the effect of arrival age on relative earnings.

To provide the intuition for how the return to age at arrival can be separately identified, I present a simple numerical example in Table Two. This table presents hypothetical data from a 1980 cross-section for four people, two immigrants and two natives. The table shows the current age and wage for each of these four people. For the immigrants, it also shows year of arrival, years since arrival, and age at arrival.

The two immigrants in this example are a father and son who arrived in the United States at the same time, in 1960. When they arrived, the father was 25 years old and the son was 5 years old. When we observe these two people in 1980, the father is 45 years old, and the son is 25 years old. The other two people in this table are the immigrants' native counterparts, a father and son, who are of the same ages as the immigrant father and son. All other demographic variables (education, marital status, etc.) are assumed to be the same for these four people. The final column in the table gives the value of each immigrant's earnings, relative to the earnings of his same-aged native counterpart.

The numbers in the table are constructed to illustrate a particular hypothesis: Controlling for all other observable effects on earnings, an immigrant who comes to the United States as a child will perform better in the labor market, relative to his native counterparts, than will an immigrant who comes as an adult. In this example,



the immigrant father earns 70% of what the native father earns, while the immigrant son earns 90% of what the native son earns.

The key to the identification of the return to age at arrival lies in this difference in differences. The difference, or earnings gap, is 90% for the son and 70% for the father. The difference in these differences is thus 20%, and that 20% is the effect of age at arrival.

By looking at the difference in differences, the other effects that appear in Table Two are partialled out: 1) By comparing immigrants to natives, we net out year fixed effects; 2) By comparing each immigrant to natives his own age, we partial out the effect of current age; 3) By comparing the relative wages of two immigrants who are members of the same arrival cohort and have been in the United States for the same number of years, there is no variation in years since migration or arrival cohort to explain the difference in relative earnings.

The only variation that is left to account for the 20% difference in differences is the different ages at arrival of the father and son. In this example, arriving as a child yields a 20 percentage point return, in terms of earnings relative to comparable natives.

Translating the above intuition into a regression framework, let earnings be determined by the following "true" model:

$$W^N = \beta_0 + X\beta_x + \beta_A A + e \tag{1}$$

$$W^M = \beta_0 + X\beta_x + \beta_A A + \beta_Y Y + B_x \alpha + \sum_i \beta_{C,i} C_i + e \tag{2}$$

Where  $W^N$  and  $W^M$  denote log earnings for natives and immigrants, respectively.  $X$  denotes individual characteristics (e.g. demographics, education, etc.), "A" denotes current age (or experience), and  $\epsilon$  is an error term. Native earnings are thus determined according to the standard human capital framework. In addition to these variables, there are three more factors determining immigrant earnings: the number of years since arrival ( $Y$ ), age at arrival ( $a$ )<sup>17</sup>, and an arrival-cohort fixed effect ( $C_i$ , where  $i$  denotes year of arrival).

In any given cross-section, however, years since arrival and arrival cohort are indistinguishable. These two effects are thus both absorbed by the set of arrival cohort dummy variables,  $C_i$ . For the estimation, immigrants and natives are pooled and a joint equation is estimated<sup>18</sup>:

$$W = \beta_0 + X\beta_x + \beta_A A + \beta_a a + \sum_i \beta_{C_i} C_i + \epsilon \quad (3)$$

where  $a=0$  and  $C_i=0$  for natives. The coefficient on the constant term in this regression,  $\beta_0$ , reflects the value of the constant for natives, who are the base group. The coefficients on the set of immigrant arrival-cohort dummy variables therefore measure the earnings of immigrants in that arrival-cohort, relative to the native base group (i.e., the immigrant-native earnings gap).

The key to the identification lies in the pooling of immigrants and natives. For immigrants, there is a perfect linear relation among three of the variables of interest.

---

<sup>17</sup> To the extent that the return to age at arrival changes with years since arrival, this specification will pick up the average effect.

<sup>18</sup> In principle,  $\beta_x$  could be allowed to differ for immigrants and natives.

In particular,  $A = \alpha + Y$ .<sup>19</sup> Therefore, in a sample of immigrants, these three parameters cannot be separately identified in a linear equation with  $A$ ,  $\alpha$ , and  $Y$  on the right hand side. However, this linear relation does not hold for natives (age does not equal zero plus zero). Therefore, if immigrants and natives are pooled, by imposing the restriction that  $\beta_A^N = \beta_A^M$ , all three parameters can be identified.

In any case, the restriction that the return to age (or experience) be the same for immigrants and natives is necessary, by definition, in order to obtain a measure of immigrant assimilation. This restriction means that the coefficient on years since arrival<sup>20</sup> can be interpreted as the assimilation rate: the rate at which the earnings of immigrants converge to the earnings of same-aged and otherwise comparable natives, with years since arrival.<sup>21</sup> Put another way, the effect of years since arrival measures that part of immigrant earnings growth which is over and above the "normal" growth due to the accumulation of labor market experience, which natives acquire as well. Measuring the extent to which the earnings profile of immigrants is more steeply sloped than that of natives, by definition, requires a sample including both groups and the imposition of this restriction.

Since multiple cross-sections of data are required to separately identify arrival-cohort fixed effects and the effect of years since arrival, this pooled equation is then estimated once with the 1970 Census and once with 1980 Census:

---

<sup>19</sup> or equivalently,  $A = \alpha + (\text{constant} - C_i * T_i)$ , where  $T_i$  equals arrival cohort  $C_i$ 's year of arrival and the constant is the survey year.

<sup>20</sup> Recall that, absent arrival cohort fixed effects (which will be eliminated below by using multiple cross-sections of data), the pattern of coefficients on the arrival-cohort dummy variables measures the effect of years since arrival.

<sup>21</sup> i.e., the speed at which the "earnings gap" shrinks with years since arrival

$$W_{70} = \gamma_0 + X\gamma_x + \gamma_A A + \gamma_a a + \sum_i \gamma_{c,i} C_i + e \quad (4)$$

$$W_{80} = \beta_0 + X\beta_x + \beta_A A + \beta_a a + \sum_i \beta_{c,i} C_i + e \quad (5)$$

The rate at which immigrants catch up to natives with time since immigration can be measured by observing the same arrival cohort of immigrants in 1970 and again in 1980 and measuring the extent to which the size of the immigrant-native earnings gap has narrowed over those ten years. This, again, can be seen as the difference between points A and B in Figure One. In terms of the above regressions, this is computed as  $(\beta_{c,i} - \gamma_{c,i})$ .

Changes in cohort quality can be measured by comparing the earnings of cohort  $i$  at a given number of years since immigration to the earnings of cohort  $i-10$  at that same number of years since migration. For example, we can compare the 1980 earnings of immigrants who came in 1960-69 (11-20 years after arrival) to the 1970 earnings of immigrants who came in 1950-59 (also 11-20 years after arrival). In Figure One, this is seen as the difference between points C and A. In terms of the coefficients above, this measure can be expressed as  $(\beta_{c,i} - \gamma_{c,i-10})$ .

## **V. Data**

The data I use are taken from the Public Use Microdata Samples of the U.S. Census of 1970 and 1980. For 1970, I use the 1/100 (i.e. 1% of the U.S. population), county group, 5% questionnaire sample. For 1980, I use the 1/100 B sample.

I group immigrants into eight categories, primarily according to geographic criteria, but also on the basis of country similarity in terms of economic development, income distribution, etc.:

- 1) W. Europe-- Western and Northern Europe
- 2) E. Europe-- Eastern Europe, the USSR, and Southern Europe
- 3) W. Asia-- North Africa and Asia outside of the Far East
- 4) E. Asia-- the Far East
- 5) Mexico
- 6) Other Hispanic-- South and Central America and the Caribbean
- 7) English Speaking countries-- Great Britain, Canada, Australia, New Zealand, and South Africa
- 8) Other-- primarily sub-Saharan Africa and the Pacific

The country breakdown of immigration to the U.S. can be seen in Table Three. Before 1950, over three quarters of all immigrants came from Europe and from English speaking countries. In the subsequent thirty years, however, there was a dramatic change in the origin country pattern of immigration. Approximately 40% of all immigrants in 1980 came from Mexico<sup>22</sup> and other Hispanic countries, with another quarter coming from East Asia.

This study analyzes male immigrants only. This is because the labor market participation patterns of women differ greatly across countries, making it much more complicated to assess the U.S. labor market "performance" of female immigrants than is the case for men.

---

<sup>22</sup> for a discussion of the number of illegal immigrants to the U.S., see Warren and Passel (1987), Passel and Woodrow (1987), Borjas, Freeman, and Lang (1991).

The full 1/100 census samples from 1970 and 1980 together contain approximately 4 million individuals. Sampling only males and only those for whom information on key variables is not imputed reduces the sample to around 1.7 million. Of those males, 90,818 are immigrants. For computational manageability, I randomly sample 1 in 4 natives, bringing the total number of natives down to 415,253.

Because of small sample sizes for the West Asia and "Other" categories, I do not include these groups in the analysis. I also do not include immigrants from English speaking countries. This is because their assimilation behavior is qualitatively different from that of all the other groups. The fact that their behavior is quite different provides evidence for the relative importance of language for immigrant labor market performance. For the purposes of this analysis, however, including them would only cloud the results for those from non-English speaking countries. Once these groups are dropped and only full-time income-earning labor force participants are sampled, there are 164,277 natives and 29,719 immigrants in the sample. For most of the analysis, immigrants who arrived before 1950 are also excluded, reducing the number of immigrants by about one-third. This is because their year of arrival is not reported more finely than "pre-1950", so that key variables cannot be computed.

The sample characteristics of immigrant men in the remaining five country of origin groups and native men are summarized in Table Four. European immigrants are the oldest group. The most highly educated are East Asians and natives. Mexicans are the youngest and least educated of the origin groups. Labor force participation is around 80% for the entire sample. Contrary to popular conceptions, the self-employment rate of East Asians is not much higher than the native rate. Finally, not correcting for any observable characteristics, Western Europeans have the highest

average annual earnings, with Mexicans earning only about half as much.

## VI. Results

The dependent variable in all of the regressions run is the log of annual salary plus self-employment earnings. The right hand side variables in all specifications include weeks worked, four education categories, an experience<sup>23</sup> quartic, race, and marital status. Dummy variables for occupation and industry are not included in order to capture movements across these categories as part of the process through which immigrants improve their earnings.<sup>24</sup> Immigrants are pooled with native men, who are the base group.

For immigrants, there is a dummy included for each of five arrival cohorts (1950-59, 1960-64, 1965-69 in both the 1970 and 1980 regressions. In the 1980 regressions, there are also dummies for the 1970-74 and 1975-79 arrival cohorts). When different immigrant groups are included in the same regression, a set of dummy variables for country of origin categories is included on the right hand side as well.

Results of the basic regression from 1980 appear in Table Five. For immigrants, all five arrival-cohort dummies are included, so one country of origin dummy must be dropped. The omitted origin group is Eastern Europeans. The country of origin dummies in this regression therefore measure the earnings of various immigrant groups relative to the earnings of Eastern Europeans. For example, the

---

<sup>23</sup> where experience is defined as potential labor market experience: age-education-6.

<sup>24</sup> The classic example, of course, is the professional immigrant who works for a while as a taxi driver.

Western European dummy of .08 means that Western Europeans earn 8% more than Eastern Europeans. East Asians also earn more, while Mexicans and Hispanics earn less.

Turning to the arrival-cohort dummies, as in other studies, most immigrants are found to be at an earnings disadvantage relative to natives. This disadvantage is greatest for the most recent arrivals and becomes progressively smaller for those immigrants who have been in the country longer. In the case of the Eastern European base group, those who have been in the U.S. for over twenty years actually earn slightly more than comparable natives.

The pattern in the coefficients on the cohort dummies masks three separate effects: 1) the true within-cohort rate of earnings catch up, 2) differences in cohort quality, and 3) differences in average age at arrival. The following four sections of the paper provide estimates of the size of these three effects, investigating the effect of age at arrival on immigrant earnings and the importance of correcting for it in measures of immigrant catch up and cohort quality.

#### **VI.A The Effect of Age At Arrival on Immigrant Earnings**

The regression in Table Five presented the standard results on immigrant earnings found in cross-sections of U.S. data. Introducing the effect of age at arrival to this basic equation produces the result shown in Figure Three.

On the horizontal axis in this graph is age at arrival. On the vertical axis are average earnings of immigrants, relative to comparable natives. This measure holds



constant observable characteristics, country of origin, and years since arrival.<sup>25</sup> The figure plots the values of individual age-at-arrival dummy variables added to the specification just shown, so that each dummy captures the earnings of immigrants who arrived at a particular age, relative to their native counterparts.

Immigrating at a late age is seen to have a strong negative effect on the relative earnings of an immigrant. Relative earnings are roughly the same for all those immigrating as children, but become increasingly negative for adults.<sup>26</sup>

Table Six presents estimates of the effect of age at arrival on immigrant relative earnings. In the top row, all immigrants are pooled together, with separate estimates for each of the five origin groups shown in the rows below. The leftmost column contains the coefficient on age at immigration, entered as a linear, continuous variable in the basic earnings regression, while the effect is allowed to vary by arrival cohort in the set of columns to the right.

Looking at the upper left-hand corner of the table, the average coefficient on age at arrival for all countries and cohorts is  $-.0058$  per year of age at arrival. To put this in the context of the example described earlier, holding all else constant, the relative wage of the immigrant who came as a 5 year old will be 11.6 percentage points higher than that of an immigrant who came as an 25 year old.

The importance of this effect varies by country of origin. Age at arrival matters a great deal for East Asians, and more than average for Mexicans and Hispanics. The

---

<sup>25</sup> As explained above, this cannot be separated from cohort fixed effects in a single cross-section.

<sup>26</sup> There are very few immigrants who arrived at high ages and are still participating in the labor force. These small cell sizes are the reason that the line in Figure Three jumps at higher arrival ages.

effect for Western Europeans, on the other hand, is virtually negligible. This could be because the negative effect of arriving in adulthood is counteracted by strong positive self-selection among adult immigrants from Western Europe. It would not be unreasonable to imagine that only those Western Europeans who expect to do quite well in the United States immigrate.<sup>27</sup> If the children such immigrants bring with them are not subject to this positive selection, the selection and arrival age effects for this group may well cancel each other out.<sup>28</sup>

When the effect of age at immigration is allowed to differ by cohort (columns 2-6), the coefficients are again large, negative, and statistically significant (again, with the exception of the Western Europeans). The effect appears to be most pronounced among recent arrivals, a point which will be discussed in section VI.3 below.

#### **VI.B The Effect of Age at Arrival on Cross-Sectional Patterns**

In the second section of the paper, it was demonstrated that the more recent the cohort, the higher the average age at arrival of its members. Since it has also been shown that age at arrival has a strong negative effect on earnings, it seems logical that adding a correction for age at arrival will compress the large earnings difference between early and recent cohorts found in a cross-section.

To examine this effect, Table Seven presents estimates of the immigrant-native

---

<sup>27</sup> see Borjas 1987.

<sup>28</sup> Another reason for a small effect of age at arrival for this group could be that human capital from Western Europe is more readily transferable to the U.S. labor market than human capital from other countries. In addition, many Western European immigrants may know English upon arrival to the United States.

earnings gap by arrival cohort, both with and without a correction for age at arrival.<sup>29</sup> The results in each column come from a separate regression. The coefficients presented are arrival-cohort fixed effects from 1980 earnings equations, comparing the earnings of the specified cohort to those of the omitted 1950-59 arrival cohort. These numbers show how far behind recent immigrants are relative to earlier ones. In the first column, we see that, as in Table 5, the more recent the cohort, the lower its earnings, compared to the 1950-59 base group. Those arriving in 1965-69 earn 7.6% less and those arriving in 1975-79 earn 27.9 percentage points less.

We can now compare this cross-sectional difference in the earnings of different cohorts, with and without a correction for age at arrival. In the two columns labelled "All Immigrants", the earnings of the 1975-79 cohort, relative to 1950s immigrants, rises from -27.9% to -20.3% when age at arrival is added to the regression. This means that the earnings difference between earlier and more recent cohorts is not as large as it would have appeared. This compression takes place for virtually all cohorts and origin groups (again excepting Western Europeans). It thus appears that about one quarter of the cross-sectional difference between early and recent arrivals is simply due to their artificially different ages at immigration. The remaining difference can be attributed either to true within-cohort earnings convergence or to changes in cohort quality.

---

<sup>29</sup> The numbers in the table are the estimated coefficients on arrival-cohort dummies from 1980 log earnings equations. The numbers in each column come from a separate regression. Two regressions are run for each origin group, one without and one with a correction for age at arrival.

## VI.C Immigrant-Native Earnings Convergence

Having established in Section VI.1 that the immigrant-native earnings gap is smaller for those immigrants who arrive at younger ages, we now turn to measures of the rate at which that gap narrows with time since migration, correcting for age at arrival.

Table Eight shows the extent to which immigrants improve their standing, relative to natives, with time spent in the United States. Recall that to identify this parameter requires two cross-sections of data. The measures in the table are the reduction in the immigrant-native earnings gap for the specified arrival cohort over the ten years between 1970 and 1980.<sup>30</sup> In Figure One, this is seen as the difference between point A and point B. In terms of the regression framework laid out in Section Four, this is  $(\beta_{c,t} - \gamma_{c,t})$ . The "uncorrected" estimates in the table correspond to the difference between points C and B in Figure Two. The "corrected" estimates correspond to the difference between points A and B for children (those who migrated before age 19) and the difference between points C and D for adults (those who migrated at age 19 or older).

The results when all immigrants are pooled together are shown in the top three rows of Table Eight. When arrival age is not corrected for (top row), the rate at which immigrants catch up to natives is estimated at around 1.5% per year. This number is largest for the most recent arrivals, implying that the rate of catch up is nonlinear, that

---

<sup>30</sup> Recall that the gap is the coefficient on an immigrant group dummy in a pooled earnings equation.

is, quite steep in the first years after immigration and levelling off subsequently.<sup>31</sup>

Rows 2 and 3 present the corrected estimates of earnings catch up by age at arrival, where "Children" are defined as those who immigrated before age 19 and "Adults" are defined as those who came at age 19 or older. As was predicted above, once age at arrival is corrected for, estimates of relative earnings growth are much smaller, at least for those who immigrated as children. For this group, relative earnings only rise by about .5% per year. The catch up rate for immigrants who came as adults is still high, although it is smaller than the uncorrected version for all groups, except Europeans.<sup>32</sup> In any case, since one-third of the immigrants in this sample came to the United States as children, failing to correct for age at arrival leads to a large overestimate of the rate at which the immigrant-native earnings gap narrows over time for the typical immigrant.<sup>33</sup>

The fact that high arrival-age immigrants catch up at a faster rate than low arrival-age immigrants (with the exception of East Asians) should not be confused with the fact that the former group still earns relatively less at every point in time. This result simply indicates that the difference in the immigrant-native earnings gap of these two groups is reduced somewhat over time.

---

<sup>31</sup> Earnings catch up is expressed in terms of a gain in relative earnings, not in terms of how much of the original gap has been eliminated. Thus, if the difference between immigrant and native earnings decays exponentially with years since migration, the rate of catch up measured here will fall over time.

<sup>32</sup> Unfortunately, when convergence rates are estimated separately by origin category, small cell sizes prevent precise inferences about the cross-country differences in this pattern.

<sup>33</sup> When the average is broken down into country categories, most of the estimates are statistically insignificant, due to small cell sizes (cells of origin group by cohort by age by year).

#### VI.D Changes in Cohort Quality

Much work has been done, primarily by Borjas (1985, 1987, 1990b), on changes in the quality of recent immigrant cohorts. In particular, this work has argued that, as a result of changes in U.S. immigration policy in 1964, emphasizing family ties over skill qualifications, immigrants to the U.S. are now of lower "quality" than were earlier cohorts. This decline in quality is said to have occurred not just in terms of observable skill levels, but also as a drop in earnings, once changes in skill levels and demographic factors have been accounted for. This is interpreted as a decline in the unobserved ability or motivation of recent immigrants.

Measures of change in the skill-corrected quality of successive immigrant cohorts are presented in Table Nine. The measures in the table are the difference in the level of immigrant-native relative earnings (i.e. immigrant dummy variables), comparing two arrival cohorts at the same number of years since immigration. For example, in the first column, the earnings of immigrants in the 1960-69 cohort are observed in 1980 (11-20 years after migration) and compared to the earning of immigrants in the 1950-59 cohort when it is observed in 1970 (also at 11-20 years after migration). This is the difference between points C and A in Figure One. In terms of the regression framework laid out above, this is calculated as  $(\beta_{c,t} - \gamma_{c,t-10})$ .

The middle column of this table compares the last cohort to come before the change in the immigration law with the cohort that came five years after the new policy took effect. To the extent that the law changed the quality of immigrants admitted to the country, it should be most apparent in this column.

The averages in the top row, computed for all immigrant groups pooled, mask important differences across country of origin groups. We thus look at the results by

origin group, although the standard errors are often too large for precise inferences to be made.

When age at immigration is not taken into account, there appears to have been a decline in the quality of cohorts in all country of origin groups, except for Western Europe. Once age at arrival is corrected for, however, the picture appears quite different. There does appear to have been a decline in cohort quality for Hispanics and Europeans. There is no evidence, however, of a decline in the quality of immigrants from Mexico or East Asia. If anything, the cohort that came after the family reunification laws took effect seems to be doing relatively better than the earlier cohort did at the same stage (i.e. years since arrival). Some of the previously measured decline in cohort quality over this period can thus be attributed to differences in average ages at migration, rather than to a decline in the underlying ability or motivation of the newer immigrants.

## VII. Conclusion

In this paper, I show that age at arrival is an important determinant of immigrant earnings in the United States. Holding constant other factors, immigrants who arrive at older ages earn significantly less at every stage of their assimilation paths than do their younger arrival-age counterparts. This is true for all of the country of origin groups examined, with the exception of Western Europeans. For this group, I hypothesize that different selection mechanisms determining the immigration of adults and children cancel out the negative effect of age at arrival.

Among labor force participants, age at arrival is shown to be spuriously negatively correlated with time since immigration. This relationship is due to the fact that, among immigrants who arrived a long time ago, only those who arrived at young ages are still in the labor force. Similarly, among recent arrivals, only those who arrived as adults are already in the labor force. Failing to explicitly account for the negative effect of age at immigration on earnings thus biases measures of the relative earnings of different immigrant groups and the changes in those differences over time. In particular, once age at arrival is taken into account, the cross-sectional difference between early and recent arrivals is reduced by about 25%.

The extent to which the gap between immigrant and native earnings narrows with time since migration is found to be smaller than the rate implied by uncorrected estimates. Although they earn relatively more at every point, immigrants who arrive at young ages experience much less relative earnings growth over time than do immigrants who arrive at older ages. The advantage of low arrival age thus declines somewhat over time.

Finally, correcting for age at arrival has mixed effects on estimates of the



change in the skill-corrected quality of successive immigrant cohorts. The decline in cohort quality found in previous studies is maintained in my results for European and non-Mexican Hispanic immigrants. I find no evidence, however, of a quality decline among more recent immigrants from Mexico or East Asia, who, in 1980, comprised just under half of all immigration to the United States.

**Table One**  
**Average Age at Arrival**

Country of Origin	Arrival Cohort	Population			Labor Force Participants		
		Age	Years Since Arrival	Age at Arrival	Age	Years Since Arrival	Age at Arrival
All Immigrants	1950-59	46.6	25.5	21.2	43.0	25.5	17.6
	1960-64	39.4	18.0	21.5	38.5	18.0	20.5
	1965-69	35.0	13.0	22.1	37.4	13.0	24.4
	1970-74	30.2	8.0	22.2	34.4	8.0	26.4
	1975-79	25.1	3.0	22.2	31.7	3.0	28.7
W. European	1950-59	44.6	25.5	19.3	40.9	25.5	15.6
	1960-64	38.4	18.0	20.5	37.3	18.0	19.3
	1965-69	34.6	13.0	21.7	37.8	13.0	24.8
	1970-74	31.3	8.0	23.4	37.1	8.0	29.1
	1975-79	24.6	3.0	21.6	33.4	3.0	30.4
E. European	1950-59	53.8	25.5	28.4	48.6	25.5	23.2
	1960-64	44.8	18.0	26.8	41.3	18.0	23.3
	1965-69	38.7	13.0	25.7	38.9	13.0	25.9
	1970-74	34.5	8.0	26.5	36.8	8.0	28.8
	1975-79	30.9	3.0	28.0	35.0	3.0	32.0
E. Asian	1950-59	42.3	25.5	17.1	40.3	25.5	15.0
	1960-64	38.4	18.0	20.4	37.9	18.0	19.9
	1965-69	35.6	13.0	22.4	38.0	13.0	25.0
	1970-74	30.8	8.0	22.9	35.9	8.0	27.9
	1975-79	26.7	3.0	23.7	34.2	3.0	31.2
Mexican	1950-59	44.3	25.5	18.9	41.8	25.5	16.5
	1960-64	36.9	18.0	19.0	36.7	18.0	18.7
	1965-69	29.9	13.0	17.0	33.1	13.0	20.1
	1970-74	26.6	8.0	18.6	30.8	8.0	22.8
	1975-79	21.2	3.0	18.3	27.1	3.0	24.1
Hispanic	1950-59	46.1	25.5	20.6	44.4	25.5	18.9
	1960-64	41.1	18.0	23.1	39.4	18.0	21.4
	1965-69	37.8	13.0	24.8	38.8	13.0	25.8
	1970-74	31.5	8.0	23.5	35.3	8.0	27.3
	1975-79	25.3	3.0	22.3	31.5	3.0	28.5

Note: Values are means for male immigrants, tabulated using the 1980 U.S. Census 1/100 sample.

**Table Two**  
**Identification Illustration**

	Current Year	Current Age	Current Wage	Year of Arrival	Years Since Arrival	Age at Arrival	Relative Wage
Immigrant Parent	1980	45	70	1960	20	25	.70
Native Parent	1980	45	100	--	--	--	--
Immigrant Child	1980	25	45	1960	20	5	.90
Native Child	1980	25	50	--	--	--	--

Note: hypothetical data for the purpose of illustration.

**Table Three****The Sources of Immigration to the United States**

Country of Origin	pre-1950	1950-59	1960-64	1965-69	1970-74	1975-79
W. Europe	33.9	30.4	17.0	10.1	5.8	4.5
E. Europe	24.9	21.8	10.6	12.9	9.6	7.1
W. Asia	1.5	2.9	4.3	7.4	9.1	13.0
E. Asia	5.2	6.2	8.5	13.1	18.8	25.3
Mexico	7.6	13.2	14.9	17.7	25.7	22.5
Other Hispanic	3.1	7.7	26.4	27.0	22.7	16.5
English Speaking	20.5	15.5	15.2	8.8	4.6	6.6
Other	3.3	2.3	3.1	3.1	3.8	4.5
Total	100.0	100.0	100.0	100.0	100.0	100.0

Note: Figures are for males only, tabulated using the 1980 U.S. Census 1/100 sample. "Other" category includes primarily sub-Saharan Africa and the Pacific.

**Table Four**  
**Sample Characteristics**

	Native	Immigrant					
		All	W. Euro.	E. Euro.	E. Asian	Mexican	Hispanic
Age	37.9	38.2	42.2	43.9	36.5	33.5	37.0
Non-White (%)	12.0	37.0	1.2	1.3	95.6	51.0	46.1
Married (%)	68.0	71.8	77.4	79.5	69.8	71.2	67.2
High School Graduate (%)	74.7	63.0	66.8	59.9	80.4	24.5	65.1
In Labor Force (%)	83.5	81.4	84.1	83.8	80.3	81.9	80.4
Weeks Worked > = 40 (%)	84.0	82.8	87.0	86.0	81.3	78.7	82.2
Self-Employed (%)	9.3	9.5	12.7	11.5	10.7	3.9	7.8
Annual Earnings (1979 \$)	16,530	16,480	20,444	18,066	16,082	10,308	13,689
Sample Size:							
1970 Census	74,597	11,937	4,066	3,266	1,113	1,476	2,016
1980 Census	89,680	17,782	3,582	3,157	2,960	4,097	3,986

Note: Values are 1980 means and are computed for adult men aged 18-65. "Sample size", "Weeks Worked > = 40", "Self-Employed", and "Annual Earnings" refer to male labor force participants only. "All Immigrants" includes all immigrants in the five specified origin groups.

**Table Five**

**Earnings Determination for Natives and Immigrants**

<u>Variable</u>	<u>Coefficient</u>	<u>Standard Error</u>
constant	7.76	(.030)
weeks 48-49	.147	(.010)
weeks 50-52	.237	(.007)
education = 12	.228	(.006)
education 13-15	.345	(.007)
education > = 16	.641	(.006)
experience	.140	(.006)
experience <sup>2</sup> /100	-.519	(.033)
experience <sup>3</sup> /1000	.089	(.008)
experience <sup>4</sup> /10000	-.0061	(.0006)
non-white	-.171	(.006)
married	.171	(.005)
<u>Country of Origin:</u>		
W. European	.080	(.017)
E. Asian	.064	(.019)
Mexican	-.138	(.017)
Hispanic	-.097	(.016)
<u>Arrival Cohort:</u>		
arrived 1950-59	.034	(.015)
arrived 1960-64	.033	(.018)
arrived 1965-69	-.042	(.016)
arrived 1970-74	-.135	(.016)
arrived 1975-79	-.245	(.017)
R <sup>2</sup>	.237	
observations	98,447	

Note: The dependent variable is the log of 1980 annual salary and self-employment earnings. Immigrant and native men are pooled. The base group is unmarried white natives with less than 12 years of schooling who worked 40-47 weeks in 1980. The omitted immigrant dummy is for the Eastern European category. Standard errors are in parentheses.

**Table Six****The Effect of Age at Arrival on Immigrant Earnings**

Country of Origin	Arrival Cohort					
	All	1950-59	1960-64	1965-69	1970-74	1975-79
All Immigrants	-.0058 (.0005)	-.0013 (.0010)	-.0045 (.0012)	-.0058 (.0011)	-.0102 (.0011)	-.0087 (.0012)
W. European	.0009 (.0011)	.0008 (.0015)	.0043 (.0026)	-.0007 (.0031)	-.0035 (.0038)	.0005 (.0045)
E. European	-.0052 (.0012)	.0000 (.0022)	-.0038 (.0031)	-.0032 (.0024)	-.0081 (.0028)	-.0177 (.0033)
E. Asian	-.0111 (.0013)	-.0062 (.0032)	-.0093 (.0040)	-.0149 (.0031)	-.0123 (.0024)	-.0108 (.0022)
Mexican	-.0090 (.0016)	-.0048 (.0024)	-.0089 (.0029)	-.0046 (.0029)	-.0147 (.0023)	-.0102 (.0025)
Hispanic	-.0073 (.0010)	-.0048 (.0029)	-.0072 (.0020)	-.0057 (.0018)	-.0111 (.0018)	-.0059 (.0026)

Note: Measures are the overall (column 1) and the cohort specific (remaining columns) return to age at arrival from 1980 earnings equations. Estimates for "All Immigrants" correct for area of origin. Standard errors are in parentheses.

Table Seven

Earnings by Arrival Cohort

Without and With a Correction for Age at Arrival

Arrival Cohort	All Immigrants	W. European	E. European	E. Asian	Mexican	Hispanic
1960-64	-.0011 (.0170) (.0171)	-.0310 (.0319) (.0325)	-.0313 (.0406) (.0406)	.0504 (.0507) (.0513)	-.0678 (.0394) (.0395)	.0594 (.0381) (.0383)
1965-69	-.0759 (.0159) (.0164)	-.0253 (.0356) (.0373)	-.0727 (.0335) (.0339)	-.0673 (.0409) (.0459)	-.1260 (.0352) (.0356)	-.0671 (.0367) (.0376)
1970-74	-.1689 (.0157) (.0166)	-.0086 (.0427) (.0455)	-.1941 (.0345) (.0354)	-.1890 (.0411) (.0446)	-.2487 (.0313) (.0322)	-.1147 (.0373) (.0385)
1975-79	-.2785 (.0165) (.0178)	.0245 (.0454) (.0487)	-.3962 (.0397) (.0414)	-.2899 (.0407) (.0461)	-.3633 (.0321) (.0336)	-.2085 (.0401) (.0413)
Age at Arrival	-.00585 (.00053)	.00087 (.00112)	-.00521 (.00121)	-.01106 (.00125)	-.00898 (.00116)	-.00735 (.00095)

Note: The coefficients in this table are arrival-cohort fixed effects from 1980 earnings equations. They measure the earnings of the specified cohort, relative to the earnings of the omitted 1950-59 arrival cohort. Estimates for "All Immigrants" correct for area of origin. Standard errors are in parentheses.



**Table Eight**

**Within-Cohort Growth in Immigrant-Native Relative Earnings  
(over 10 years)**

Country of Origin	Age at Immigration	Arrival Cohort		
		1950-59	1960-64	1965-69
All Immigrants	Uncorrected	.092 (.017)	.151 (.023)	.210 (.022)
	Corrected: Child	.069 (.026)	.043 (.042)	.043 (.059)
	Adult	.095 (.021)	.146 (.025)	.198 (.023)
W. European	Uncorrected	-.011 (.022)	-.013 (.039)	.072 (.043)
	Corrected: Child	-.029 (.035)	-.266 (.099)	-.163 (.153)
	Adult	.002 (.030)	.029 (.045)	.100 (.047)
E. European	Uncorrected	.008 (.026)	.043 (.047)	.189 (.038)
	Corrected: Child	-.024 (.053)	-.016 (.110)	-.131 (.135)
	Adult	.013 (.030)	.017 (.054)	.189 (.042)
E. Asian	Uncorrected	.046 (.051)	.146 (.055)	.117 (.042)
	Corrected: Child	.086 (.085)	.213 (.146)	.211 (.230)
	Adult	.021 (.067)	.097 (.062)	.084 (.044)

(table continues next page)

Table Eight (continued)

Country of Origin	Age at Immigration	Arrival Cohort			
		1950-59	1960-64	1965-69	
Mexican	Uncorrected	.159 (.036)	.137 (.045)	.232 (.041)	
	Corrected:	Child	.184 (.057)	.072 (.081)	.167 (.095)
		Adult	.116 (.048)	.105 (.056)	.201 (.048)
Hispanic	Uncorrected	.000 (.042)	.116 (.030)	.112 (.028)	
	Corrected:	Child	.013 (.075)	.006 (.063)	-.165 (.106)
		Adult	-.034 (.052)	.113 (.035)	.102 (.031)

Note: The measures in this table are the rise in the value of immigrant-native relative earnings (i.e. the immigrant dummy) for a given arrival cohort between 1970 and 1980. The corrected estimate is computed once for immigrants who arrived before age 19 ("child") and once for those who arrived after age 19 ("adult"). Estimates for "All Immigrants" correct for area of origin. Standard errors on the differences are in parentheses.

**Table Nine**  
**Cohort Quality Change**

Country of Origin	Correction for Age at Arrival	<u>Arrival Cohort</u>		
		1960-69 vs. 1950-59	1970-74 vs. 1960-64	1975-79 vs. 1965-69
All Immigrants	Uncorrected	.052 (.018)	-.013 (.023)	.012 (.023)
	Corrected	.018 (.027)	-.051 (.032)	-.033 (.034)
W. European	Uncorrected	-.040 (.026)	.010 (.048)	.122 (.051)
	Corrected	-.170 (.046)	-.150 (.067)	-.051 (.072)
E. European	Uncorrected	-.049 (.027)	-.119 (.042)	-.134 (.044)
	Corrected	-.062 (.054)	-.140 (.068)	-.137 (.071)
E. Asian	Uncorrected	.020 (.043)	-.093 (.046)	-.106 (.039)
	Corrected	.232 (.075)	.160 (.086)	.175 (.091)
Mexican	Uncorrected	.056 (.032)	-.044 (.038)	-.005 (.038)
	Corrected	.126 (.057)	.039 (.065)	.084 (.069)
Hispanic	Uncorrected	-.011 (.031)	-.058 (.029)	-.029 (.033)
	Corrected	-.069 (.050)	-.135 (.054)	.149 (.060)

Note: Values are the difference in the earnings, relative to natives, of the specified arrival cohorts when observed at the same number of years since arrival. A negative value corresponds to a decline in cohort quality. Estimates for "All Immigrants" correct for area of origin. Standard errors on the differences are in parentheses.

Figure One

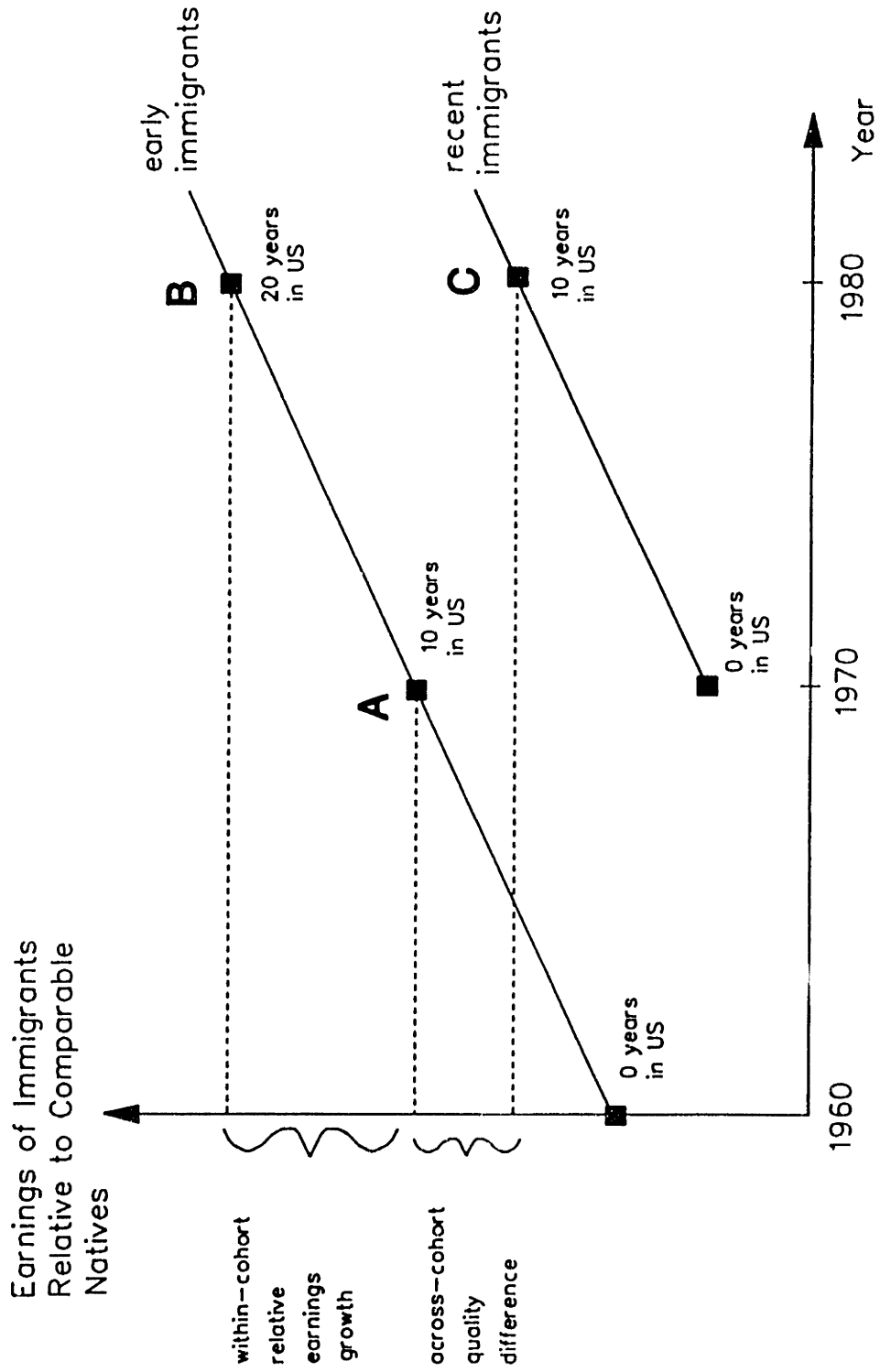


Figure Two

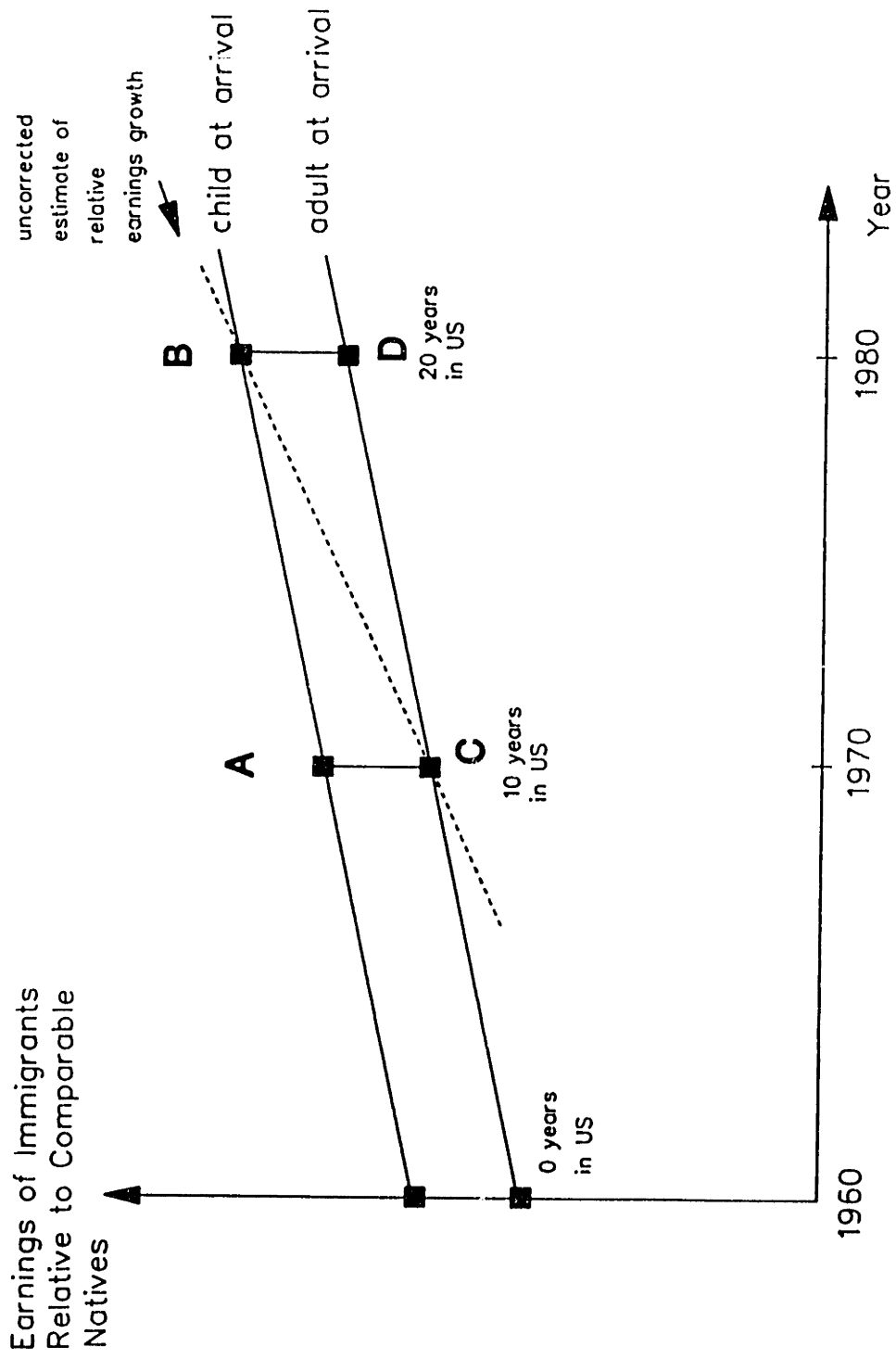
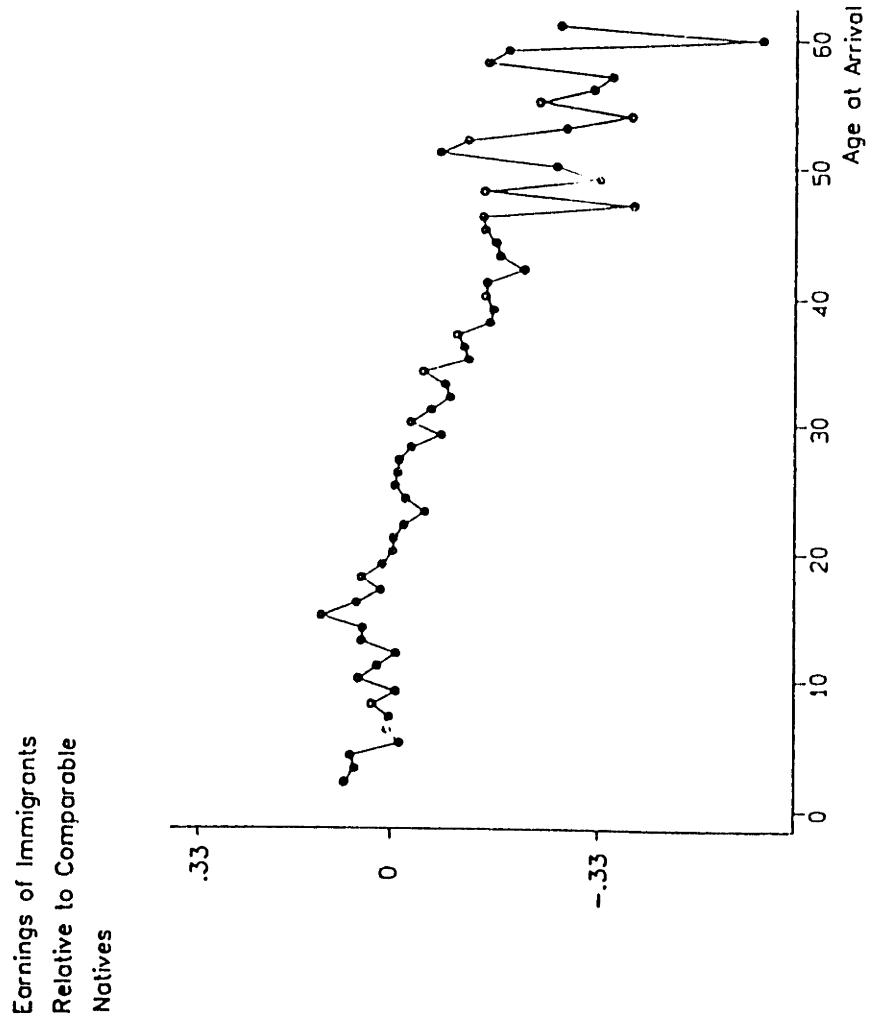


Figure Three



**CHAPTER THREE:**

**The Success of Young Immigrants in the U.S. Labor Market:**

**An Evaluation of Competing Explanations**

## I. Introduction

As immigration to the United States grows, it becomes increasingly important to understand the factors that determine the success or failure of immigrants in the U.S. labor market. Supporters of tight restrictions on immigration assert that immigrants are overwhelmingly low-skilled individuals, with low employment rates, low earnings, and high welfare dependence rates. Immigrants are thought to be unassimilable, constituting a long-term burden on the social welfare system and contributing little to the country's well-being. At the other extreme are the supporters of "open door" immigration policy. Apart from humanitarian considerations, their view is based on the belief that, after a relatively short adjustment period, immigrants become highly productive members of society, outperforming natives of comparable skill levels, rejuvenating depressed areas through their entrepreneurial initiative, and paying more in taxes than they consume in government provided services.

The key to this debate lies in understanding what makes certain immigrants and immigrant groups perform better in the U.S. labor market than others. In this paper, I focus on one factor which has been shown to contribute to immigrant success, namely, an immigrant's age upon arrival to this country. Holding constant other factors, immigrants who arrive at older ages earn significantly less at every stage of their assimilation paths than do their younger arrival-age counterparts.<sup>34</sup> For each year of age at arrival, the gap between immigrant and native earnings grows by about .3 percent. Arriving at a young age thus confers benefits similar in magnitude to the premium associated with immigrating from a European country, rather than from a Latin American country.

---

<sup>34</sup> see Chapter Two



There are competing explanations for why age at arrival is so important for economic assimilation. This paper examines the impact of two factors. First, for a given level of schooling, the later in life an individual migrates, the greater is the fraction of his schooling acquired outside the United States. If education acquired abroad receives a lower return in the U.S. labor market than that acquired domestically, this will lead to lower earnings for older migrants. Second, younger people are more able to learn a second language than are older people, and English language skills are an important determinant of earnings.

Using data from the 1980 U.S. Census and the 1976 Survey of Income and Education, I find that as much as one-third of the measured effect of age at arrival is due to the fact that much of older immigrants' education was acquired abroad. An additional 20-35% can be attributed to the higher level of English language proficiency among younger immigrants. The residual effect of age at arrival is hypothesized to be due to the greater ability of younger people to assimilate into a new economic and social setting and to a greater degree of selectivity among older immigrants<sup>35</sup>.

In the next section of the paper, I discuss in more detail the factors that may be responsible for the negative effect of age at arrival on immigrant earnings. The following section describes the two samples used and some data considerations. In Section Four, I demonstrate the negative effect of age at arrival in the two datasets. I then turn to explaining this effect in Section Five, which presents empirical results on the importance of the source of schooling for its return and for the measured effect of age at arrival. The following section documents the importance of English language

---

<sup>35</sup> To the extent that there is selection in migration, this selection holds for the adults who make the decision to migrate.

proficiency-- both current and upon immigration-- for earnings and for estimated effect of age at arrival. Finally, in Section Seven, I analyze how much of the measured effect of age at arrival can be accounted for by these two factors. The final section summarizes and suggests directions for future work.

## **II. The Premium Associated With Low Age at Arrival**

Previous work has shown that the age at which an individual migrates to the United States is an important determinant of his earnings, relative to native workers with similar demographic and skill characteristics. Holding constant other factors, immigrants who arrive at older ages earn significantly less at every stage of their assimilation paths than do their younger arrival-age counterparts.<sup>36</sup>

Upon arrival in the country, immigrant workers earn less than otherwise comparable native workers because they lack many skills and information specific to the U.S. labor market which natives have. As the immigrants gain this country-specific human capital, their earnings converge toward those of natives<sup>37</sup>.

There are many reasons why an immigrant who arrives as a youth might be expected to assimilate better than an immigrant who arrives in adulthood. One important factor is language. It is well known that children learn second languages more quickly and master them more completely than do adults (see Harley (1986),

---

<sup>36</sup> Chapter Two focuses on the importance of accounting for age at arrival when assessing the extent of labor market assimilation among immigrants and when evaluating whether there have been changes in the quality of successive cohorts of immigrants to the United States. See also Smith (1991).

<sup>37</sup> In the case of positively self-selected immigrants, earnings could overtake those of natives who are comparable along observable dimensions.

Kennedy (1988), Palić (1990), and Spolsky (1989)). There is considerable evidence that English language skills are an important determinant of earnings potential (see MacManus, Gould, and Welch (1983) and Chiswick (1991)). This will lead immigrants who arrive at younger ages to earn more than similar immigrants who arrive later in life.

A second factor is that immigrants who arrive as children acquire their human capital domestically. They also accumulate all of their labor market experience in this country. Immigrants who come to the United States late in life have human capital which was acquired abroad. This human capital may not be well suited to the requirements of U.S. jobs. For this reason, it would be reasonable to presume that, for most countries of origin, human capital acquired abroad receives lower returns in the United States than that acquired here.<sup>38</sup> Since the older is an immigrant upon arrival, the greater is the fraction of his human capital obtained in his country of origin, older arrival-age immigrants will earn less than their younger arrival-age counterparts.

Finally, it is not unreasonable to presume that younger people are more generally adaptable than are older people. There are many cultural barriers important to labor force assimilation that immigrants must overcome. If younger people are able to adapt to social norms and if they form networks of native-born friends, this may help them perform better in the labor market than older arrival-age immigrants.

There is one additional factor, unrelated to an actual effect of age at arrival, but which could be responsible for a measured effect. Within the constraints of the entry and exit policies they face, individuals self-select to migrate to this country. The issue of self-selection has received considerable attention in the literature. Borjas (1987)

---

<sup>38</sup> Such evidence is found in Chapter One.

recognizes that immigrants could be either positively or negatively selected, and that, in fact, many immigrants to the United States are negatively self-selected, in terms of the unobserved skill characteristics<sup>39</sup>.

The key here is that the nature of selection among adult and child immigrants is probably different. Arguments about selection apply to the adults who need to qualify to enter the United States and who are making the decision based on their economic prospects. The children they bring with them are not subject to this selection process. As long as unobservable characteristics are not perfectly transmitted from parent to child, the extent of selection among the children will be weaker.

This would lead, in the case of immigrant groups who are negatively selected, to an observed negative effect of age at arrival, which will simply be picking up the lesser extent of negative selection among children. As shown below, there is an anomalous result of a positive effect of age at arrival for immigrants from Western Europe. This group is often thought to be positively self-selected. This provides some evidence that the nature of selection may play a role in the estimated effect of age at arrival.

### **III. Data**

There are two major datasets that are amenable to use in this paper. They are the Public Use Microdata Sample (PUMS) of the U.S. Census and the Survey of Income

---

<sup>39</sup> Although, along observable dimensions, immigrants to the United States are a positively self-selected group, with the only exception being immigrants from Mexico.

and Education (SIE), which is a 1976 cross-section of the U.S. population. Below, I will discuss the advantages and disadvantages of each, describe the sample selection rules used, and characterize the resulting samples of native and foreign born individuals.

### **III.A United States Census**

The first dataset is the 1980 U.S. Census (1/100 B sample). The primary advantage of the PUMS over the SIE is that the sample sizes for individual immigrant groups are large. This allows for more precise estimates by origin group than are possible with the SIE.

I divide foreign-born individuals into eight categories, primarily according to geographic criteria, but also on the basis of country similarity in terms of economic development, income distribution, etc.:

- 1) W. Europe-- Western and Northern Europe
- 2) E. Europe-- Eastern Europe, the USSR, and Southern Europe
- 3) W. Asia-- North Africa and Asia outside of the Far East
- 4) E. Asia-- the Far East
- 5) Mexico
- 6) Other Hispanic-- South and Central America and the Caribbean
- 7) Anglophone countries-- Great Britain, Canada, Australia, New Zealand, and South Africa
- 8) Other-- primarily sub-Saharan Africa and the Pacific

In order to make these results comparable with previous work on immigrant earnings, I analyze only men. Women are usually excluded from these studies because the labor market participation patterns of women differ greatly across countries, making it much

more complicated to assess the U.S. labor market performance of female immigrants than is the case for men. For most of the analysis, immigrants who arrived before 1950 are also excluded. This is because their year of arrival is not reported more finely than "pre-1950", so that key variables cannot be computed.

The sample characteristics of immigrant and native men are summarized in Table One. European immigrants are the oldest group. The most highly educated are East Asians and natives. Mexicans are the youngest and least educated of the origin groups. Labor force participation is around 80% for the entire sample. The self-employment rate of immigrants is not much higher than the native rate. However, since natives are much more likely than immigrants to be farmers, urban self-employment rates among immigrants are indeed higher. Finally, not correcting for any observable characteristics, Western Europeans have the highest average annual earnings, with Mexicans earning only about half as much. Turning to characteristics specifically related to immigration, In Table Two, we see that the origin mix of immigration to the United States has changed over time. The immigrants from Europe and Anglophone countries have been in the country longer than have the immigrants from East Asia and Spanish speaking countries. We also see that age at arrival varies by origin group. For example, the average East Asian is seven years older upon arrival to the United States than the average immigrant from Western Europe.

### **III.B Survey of Income and Education**

The second dataset used in this paper is the 1976 Survey of Income and Education. The principle advantage of the SIE over the PUMS is that, in the SIE, respondents explicitly report the number of years of schooling they obtained abroad.

In the PUMS data, this number must be imputed, using information on total education, age, and years since arrival. In order to impute origin-country schooling and U.S.-schooling from these three pieces of information, it is necessary to assume that schooling precedes labor market experience. To the extent that this is a poor assumption and there are actually breaks in schooling (i.e. schooling and experience are interspersed), the SIE is superior to the PUMS for studying the questions in this paper. I therefore use both datasets to examine the importance of acquiring schooling in the United States, as opposed to abroad.

An additional advantage of the SIE is that it has a wider range of questions about language than does the PUMS. Both the PUMS and the SIE include a question on the ability to speak English. In addition to this, the SIE includes information on the respondents' mother tongue and the language in which they were taught basic subjects, such as math and science, in school. These allow us to gain a better understanding of what aspect of language is most important for labor market success--current ability to speak English, having arrived in the country already fluent in English, or having acquired human capital in an English-speaking environment.

Sample means for the SIE sample are shown in Table Three. There are only sixteen countries listed as possible answers to the question of origin, so, unlike in the PUMS, many immigrants from a broad range of countries fall into the "Other" origin category. The sample includes men aged 18-65 who worked 40 or more weeks in 1975 and usually worked 35 or more hours per week. Immigrants with missing information on year of arrival or years of origin education are excluded from the sample. Finally, immigrants who arrived in the United States before 1920 are eliminated because there is no more specific information on their year of arrival.

The patterns in the data are very similar to those in the PUMS sample. Mexican immigrants are the youngest and least educated of the origin groups, and they have the lowest earnings. Western Europeans are the most highly educated and have the highest earnings. Turning to age at arrival in Table Four, the average Western European immigrant was only 16.7 years old upon arrival to the United States, while East Asians and Hispanics were typically 8 and 12 years older than that, respectively. The figures for years since arrival also confirm that earlier immigrants tended to be from Europe and Anglophone countries, while the more recent ones (as of 1976) originated in East Asia and Spanish-speaking countries.

#### IV. Measuring the Effect of Age at Arrival on Earnings

Earnings are assumed to be determined according to the following model:

$$W^N = \beta_0 + X\beta_x + \beta_A A + \epsilon$$

$$W^M = \beta_0 + X\beta_x + \beta_A A + \beta_Y Y + B_\alpha \alpha + \sum_i \beta_{C_i} C_i + \epsilon$$

Where  $W^N$  and  $W^M$  denote log earnings for natives and immigrants, respectively.  $X$  denotes individual characteristics (e.g. demographics, education, etc.), "A" denotes current age (or experience), and  $\epsilon$  is an error term. Native earnings are thus determined according to the standard human capital framework. In addition to these variables, there are three more factors determining immigrant earnings: the number of years since arrival ( $Y$ ), age at arrival ( $\alpha$ ), and an arrival cohort fixed effect ( $C_i$ , where  $i$  denotes year of arrival). In a single cross section, the effect of years since arrival and cohort fixed effects are not separately identifiable. However, since distinguishing



between these two effects is not necessary for examining the issues this paper is about, only one cross-section of data is needed.

The earnings regressions take the form:

$$W = \beta_0 + X\beta_x + \beta_A A + \beta_\alpha \alpha + \beta_Y Y + \epsilon$$

where  $\alpha = 0$  and  $Y = 0$  for natives. The constant term in this regression picks up the value of the constant for natives. The coefficients on the set of immigrant arrival-cohort dummy variables pick up the earnings of immigrants, relative to the native base group, i.e., the immigrant-native earnings gap.

At first glance, it might appear that this regression is not identified because it includes "age" (experience + education + 6), years since arrival, and age at arrival. This is because for immigrants, these three variables are obviously collinear (age at arrival = age - years since arrival). The key to the identification of all three effects is that these variables are not collinear for natives. There is no identification problem when there is collinearity among variables for a subset of the observations, only if the collinearity exists for the entire sample. Therefore, to have identification, it is necessary to have natives as well as immigrants in the estimation. By imposing natives' return to experience on both groups (which is what happens when the coefficient on experience is restricted to be the same for immigrants and natives in a sample dominated by natives), we are in effect defining assimilation to be the extent to which immigrants close the earnings gap with their same-aged native counterparts. This is an appealing definition of assimilation, as it allows the earnings gap to always be framed in terms of a comparison with a native base groups of the same age.

The first column of Table Five shows the results of estimating this basic earnings equation on the full sample of natives and immigrants in the PUMS data. The

dependent variable in these regressions is the log of annual wage, salary, and self-employment income. The right-hand side variables include weeks worked, race, marital status, an experience quartic, and education<sup>40</sup>. The other independent variables pertain to immigrants only. They are: six dummy variables for area of origin, years since arrival, and age at arrival.

Immigrants from Mexico and other Hispanic countries have lower earnings than comparable native workers. Immigrants from Western Europe and Anglophone countries actually have higher earnings than comparable natives. This suggests that immigrants from these countries are positively self-selected or that they have certain skills that are not accounted for in this regression.

The coefficient on years since arrival is positive. However, this should not necessarily be interpreted as indicating that the earnings of immigrants necessarily converge to those of natives with years since arrival. This is because a positive effect of years since arrival may also be picking up a decline in cohort quality.

Finally, immigrating at a late age is seen to have a strong negative effect on the relative earnings of an immigrant. The earnings gap rises .3% for each year of age upon arrival. The importance of this effect varies by country of origin. Age at arrival matters a great deal for East Asians and Hispanics. The effect for people from Anglophone countries, on the other hand, is virtually negligible, and the effect for Western Europeans is actually positive. This could be because the negative effect of arriving in adulthood is counteracted by strong positive self-selection among adult immigrants from Western Europe. It would not be unreasonable to imagine that only those Western Europeans who expect to do quite well in the United States immigrate.

---

<sup>40</sup> To conserve space, of these factors, only education is reported in the tables.

If the children such immigrants bring with them are not subject to this selection, the selection and arrival age effects for this group may well cancel each other out.

Table Six performs the same analysis using the SIE. The sample used is full-time men who worked more than 40 weeks out of the year. The dependent variable is ageing log annual earnings. Independent variables which are not reported in the table include weeks worked, weeks worked part-time, a flag for income topcoding, race, marital status, and an experience quartic<sup>41</sup>. The results in this table are the same as those found in the PUMS data, with all of the coefficients being of a slightly smaller magnitude. The immigrant dummy is insignificant, both for a sample of all immigrants and excluding those immigrant whose mother tongue is English. Years since arrival is positively associated with immigrant earnings, and age at arrival is negatively associated with earnings. In the second column, the adverse effect of age at arrival is found to be stronger for immigrants whose native language is not English. This points toward English language ability as a potentially important factor underlying the measured negative effect of age at arrival, an idea which will be explored more carefully below.

## **V. Education Source**

Immigrants generally have lower earnings than native workers with comparable skill and demographic characteristics. The earnings gap between immigrants and natives is usually attributed to unmeasured (though not unmeasurable) skill and ability deficits, which appear to diminish somewhat with time since arrival. The earnings gap

---

<sup>41</sup> These variables are included in all of the SIE earnings equations to follow.

is larger for immigrants who arrived in the United States at older ages. This suggests that factors that lead to lower immigrant productivity are more pronounced among immigrants who arrive later in life than among immigrants who migrate at an earlier point.

In this section, I examine the first of two factors which are plausibly associated with lower earnings and which I hypothesize would be more problematic for older arrivals. This first factor is the country in which an immigrant obtained his schooling. In related work on immigration to Israel (see Chapter One), I found that years of schooling obtained abroad receive a much lower return, in terms of earnings in Israel, than do years of schooling obtained in Israel. This probably has to do with differences in school quality across countries, as well as the match between the training received and the skills required in the destination labor market. What matters for earnings then is not just total years of schooling, but the source of the education as well.

Because most individuals have completed their schooling by the time they are young adults, immigrants who arrive later in life will have obtained all of their education abroad, while immigrants who arrive as children will go through the U.S. school system.

### **V.A Patterns**

I examine the breakdown of total schooling into years completed in the origin-country and years completed in the United States using the PUMS data in Table Seven. The dependent variable in this table is the fraction of total years of schooling which were completed abroad. The independent variables are age at arrival, years since arrival, and the interaction of those two.

At first glance, it may seem a meaningless exercise to regress the fraction of schooling obtained abroad on age at arrival and years since arrival. This is because there is a purely mechanical relationship between the fraction of total schooling which was obtained abroad and years since arrival. This fraction must decline with years since arrival because total years of schooling can rise but not fall and years of foreign schooling cannot change with years since arrival. In addition, age at arrival limits the possible number of years of origin schooling. However, even though these numbers vary in predictable ways with the right hand side variables, the way in which the denominator of this fraction varies with age at arrival is not knowable, *ex ante*. Young immigrants may tend to get more or fewer total years of schooling than older immigrants, so that the covariance of age at arrival and the fraction of schooling obtained abroad could in fact be positive or negative. So, although these estimates necessarily reflect the obvious mechanical relationship present, there is some additional behavioral information reflected in them as well, which makes them interesting to analyze.

For all immigrant groups, the fraction of education which was obtained abroad declines with years since arrival. This result is obvious by definition because total years of schooling can never decline over time, and if it rises, that represents a rise in U.S.-source education.

Age at arrival is found to have a negative effect on the fraction of schooling obtained abroad. This is surprising, given the original reasoning laid out above. It is less puzzling when it is noted that the interaction of age at arrival and years since arrival is positive. By definition, the fraction of education obtained abroad must be one when an immigrant first arrives in this country, regardless of age at arrival. The fact

that the regression estimates yield a negative effect of age at arrival suggests that there is some nonlinearity in the effect of years since arrival which is not captured by this linear equation. Younger immigrants do indeed have a smaller fraction of education obtained abroad, according to these estimates, after about two years. The alternative explanation, that younger immigrants obtain less total education than do older ones, is not borne out by the data.<sup>42</sup>

A similar analysis, using data from the SIE, is shown in Table Eight. Immigrants who were older on arrival to the United States are found to have obtained more of their schooling abroad, and this fraction declines with years since migration.

#### **V.B The Effect of Education Source on Earnings (PUMS)**

To investigate the importance of the source of an immigrant's schooling, Table Nine augments the basic specification with the number of years of schooling which were completed in the country of origin. Although this measure is computed using education, age at arrival, and years since arrival, it is fortunately not a linear combination of these three variables, and so we are able to separately identify its effect.

The coefficient on years of schooling completed abroad can be interpreted as the difference between the return to schooling obtained in the United States and the return to schooling obtained in the country of origin. The estimate for all immigrants pooled together (column one) is negative and statistically significant, but economically fairly small. The return to U.S. schooling is 7.6%, while the return to foreign schooling is 7.1%. The difference in these returns is largest for schooling acquired in Eastern

---

<sup>42</sup> at least in the SIE

Europe and in Mexico. There is no difference in the return to U.S. schooling and schooling completed in Anglophone countries, a point which will be further addressed in the section on language proficiency below.

Allowing the return to education to differ for foreign and domestic schooling reduces the negative effect of age at arrival from  $-.003$  to  $-.002$  for immigrants taken as a whole. This reduction is larger for immigrants from Eastern Europe and Mexico, whose origin schooling received the lowest return. It thus seems that approximately one third of the estimated effect of age at arrival is due to a difference in the source composition of the education of older and younger immigrants.

#### **V.C The Effect of Education Source on Earnings (SIE)**

As mentioned above, an advantage of using the SIE is that there is a direct question in that dataset on the number of years of schooling acquired abroad. This should yield more accurate estimates of the effect of schooling source on earnings and the contribution of schooling source to the measured negative effect of age at arrival than the imputed value of origin education used in the PUMS analysis above.

To assess how reasonable the imputation is, I impute origin education in the SIE and then compare it to the years of origin education directly reported. The difference between the imputed and reported values are graphed in Figure One. Since the imputation must assume no breaks in schooling, the mean difference is slightly positive (the mean imputed value is 8.76 years and the mean reported value is 8.08 years). The correlation between the two measures is .78, which is fairly high, considering the

coursenes of the variables used in the imputation.<sup>43</sup>

Because the imputed values are presumably less precise than the reported values of origin education, we would expect them yield a weaker effect on earnings. Table Ten compares these two measures by adding them, in turn and then in combination, to the basic earnings equation. Column one uses the directly reported version of years of origin education. This variable enters negatively, but is of marginal statistical significance. Column two uses the imputed version or origin schooling. Surprisingly, the coefficient on the imputed version of origin education is stronger in magnitude and in statistical significance than the reported version. Correspondingly, the effect on reducing the coefficient on age at arrival is stronger as well. When both reported and imputed origin education are included on the right hand side of the equation, the reported measure is completely insignificant and the imputed measure is strongly negative.

One possible explanation for this result could lie in the reasons that the reported and imputed measures differ. As pointed out above, for people with discontinuous schooling histories, the imputation method tends to overstate the number of years of education which were completed abroad. On the one hand, this would seem to bias toward zero the coefficient on origin education. On the other hand, if people who stop and start their schooling have lower productivity than people who attend school continuously, this selection effect could result in a more negative coefficient on the imputed than the reported measure.

---

<sup>43</sup> It is also worth noting that the SIE has fewer brackets for year of arrival than the PUMS, so that the imputed measure of origin education is probably closer to the true value in the PUMS than in the SIE.



## VI. English Language Proficiency

One of the most obvious reasons why immigrants would command lower earnings than natives is that they lack the language skills necessary to function in the United States labor market. As stated above, there is considerable evidence that English language proficiency is an important determinant of earnings. An inability to communicate clearly lowers workers' productivity. Immigrants unable to communicate in English may also experience more discrimination.

### VI.A Patterns

There are several reasons why immigrants from certain countries might have higher levels of English language ability than others. First is the obvious point that English may be frequently used in that country of origin. Second, in certain countries, English is a standard subject in school, so that most immigrants from those countries have some grounding in it before coming to the United States. The distinction between current English language proficiency and English proficiency upon arrival will be addressed in the next section.

The U.S. Census contains information on a respondent's ability to speak English. It should be noted that this is a self-reported measure, with all the concomitant problems, some of which will be discussed below. The mean current English language proficiency of the six immigrant groups can be seen at the bottom of Table Two. About half of all immigrants report that they speak English "very well" or "well" (as opposed to "not well" or "not at all"). Immigrants from Western Europe have a much higher level of English language proficiency than the average, while among Mexicans, only 1 in 5 reports that he speaks English well or very well. The fact

that 4% of immigrants from Anglophone countries do not speak English is probably due to the fact that most of the immigrants in this category come from Canada, with some fraction of those immigrants speaking only French.<sup>44</sup>

In the SIE (see the bottom of Table Four), fully 88% of immigrants report that they speak English very well or well. Virtually all immigrants from Western Europe, Anglophone countries, and the "Other" category say that they speak very well or well, and they make up the bulk of the sample.

The number of years an immigrant has spent in the United States should be positively associated with his current English language ability. Aside from the opportunity to formally study English, exposure to English in the workplace and in everyday life will surely contribute to his language ability. Second, as discussed above, the younger is an immigrant upon arrival to the United States, the more able he will be to learn English as a second language.

To examine the relationship between current English language ability, years since arrival, and age at arrival<sup>45</sup>, Table Eleven presents estimates of a linear probability model with English language proficiency as the dependent variable, using the PUMS data. The dependent variable equals one if the individual speaks English well or very well and zero if the individual does not speak English well or at all. The independent variables are age at arrival, years since arrival, and the interaction of the two.

The first thing worth noting in this table is that, as we would expect, these variables have no predictive power for immigrants from Anglophone countries.

---

<sup>44</sup> It could also be due to measurement error.

<sup>45</sup> I will return to the question of current ability versus ability on arrival below.

Virtually all of these immigrants speak English upon arrival. None of the coefficients are significant and the  $R^2$  is only .002 (although, as this is a linear probability model, a low  $R^2$  is expected).

For the other origin groups, as hypothesized, age at arrival has a negative effect on English language proficiency. This effect is statistically insignificant for Mexican and other Hispanics, but this is explained in the next paragraph.

The longer an immigrant has been in the United States, the greater his English language proficiency. When this effect is interacted with age at arrival, we obtain the result that younger immigrants also learn English faster than older immigrants. This interaction term is much larger for Mexicans and other Hispanics. What this means is that, among these groups, younger and older immigrants are about equal in their English ability upon arrival, but the younger migrants quickly overtake the older ones.

Table Twelve shows an identical analysis, using data from the Survey of Income and Education. Similar to the pattern found in the PUMS data, the younger is an immigrant upon arrival, the greater is his ability to speak English, with this relation being somewhat stronger in the SIE data than in the PUMS data. The negative coefficient of years since arrival on English language ability is the result of including an interaction of age at arrival with years since arrival, which has a positive coefficient. When this interaction term is omitted, years since arrival has the expected positive sign.

#### **VI.B The Effect of English Language Proficiency on Earnings (PUMS)**

The next step is to examine the effect of English language ability on earnings and the effect its inclusion has on the estimated effect of age at arrival. The results

for immigrants taken as a whole can be seen on the first page of Table Thirteen, in which current ability to speak English is added to the basic PUMS earnings equation. The measure of English speaking ability is a dummy variable which equals one for individuals who speak English well or very well and zero for individuals who do not speak English or do not speak it well. As seen in column one, the coefficient on English language ability is positive and significant, indicating that individuals who are proficient in English earn 9.7% more than individuals who are not.

Of particular interest here is the effect of including language ability in this regression on the estimated effect of age at arrival. The coefficient on age at arrival falls from -.003 (the original result in Table Five) to -.002 once language ability is corrected for. This indicates that approximately one-third of the measured effect of age at arrival is due to the higher level of English language proficiency among younger immigrants.

The area of origin fixed effects in the equation rise somewhat as a result of adding English language ability to the equation. The fixed effect for immigrants from Mexico rises dramatically, from -.06 to zero. This would seem to indicate that poor language skills are largely responsible for the low value of this fixed effect in the basic equation. As might also be expected, the advantage of coming from an Anglophone country is diminished, with the relative advantage falling by about 3 percentage points.

In interpreting the coefficient on English language ability, it is important to bear in mind a few caveats. First, it is quite likely that English ability is correlated with unincluded factors which also positively affect earnings. In other words, knowing English may be a good indicator of progress along other dimensions related to assimilation, such as the accumulation of other U.S. specific skills and attitudes.

Second, it is also possible that an immigrant's degree of economic and social assimilation may affect his propensity to report that he knows English well. Both of these factors would introduce omitted variable bias to the estimates and warn against a causal interpretation of this coefficient.

In the second column of the first page of Table Thirteen, measures of both English ability and education source are included on the right hand side of the earnings equation. English ability again comes in strongly positive and, as above, foreign education again enters with a strongly negative effect. The effect of age at arrival falls to .1% per year of arrival. Thus, it appears that roughly two thirds of the original estimated effect of age at arrival is due to the fact that younger immigrants have superior English language skills and acquired a larger fraction of their education in the United States.

Looking across areas of origin in the remainder of Table Thirteen, we see that English language skills have a strong positive effect on earnings for all immigrants, with an accompanying reduction in the effect of age at arrival<sup>46</sup>, although the magnitude of this effect differs substantially by origin group.

#### **VI.C The Effect of English Language Proficiency on Earnings (SIE)**

In Table Fourteen, the importance of English language ability is investigated using the SIE. As mentioned above, the SIE contains more information on English language skills than exists in the PUMS. Measures of language skills including current English speaking ability, mother tongue, and the language of instruction in the origin country.

---

<sup>46</sup> The one exception is Western Europe.

Parallel to the analysis done in the previous section, in column one of this table, a dummy variable indicating that the individual speaks English well or very well is added to the basic earnings specification. As found above, the ability to speak English well has a positive effect on earnings, although the magnitude of the effect found here is about half as large as that found in the PUMS, and it is only marginally statistically significant. The effect of adding English language ability on the coefficient on age at arrival is similarly weaker.

When English speaking ability and origin schooling<sup>47</sup> are both added to the right hand side of the equation, as in column two, the coefficient on English language ability becomes stronger in both magnitude and significance. The negative effect of origin education is also stronger than when it enters alone.

Turning to the effect of including these variables on the estimated coefficient on age at arrival, we see that it falls from -.0025 (the original result in Table Six) to -.0015. Thus, in the SIE, about 40% of the original effect of age at arrival can be attributed to younger immigrants' greater current English language skills and to their having domestic, rather than foreign, education.

So far, the only measure of English language skill used in this paper has been current speaking ability. It is quite reasonable to imagine, however, that given current English proficiency, an immigrant who learned English only recently would be at a disadvantage in the labor market, relative to one who knew English upon arrival to the United States.

As mentioned above, the SIE contains information on mother tongue and

---

<sup>47</sup> The directly reported measure of origin education is used here.

language of source country schooling<sup>48</sup>. The bottom of Table Four presents the sample means for these variables. Just under a quarter of the immigrants in this sample report that their mother tongue is English. Not surprisingly, this figure is negligible for immigrants from Spanish-speaking countries and low for East Asians<sup>49</sup> and Europeans. The figure of 72% for immigrants from Anglophone countries is somewhat lower than one might have expected. The language of origin schooling is defined as the language of instruction for basic school subjects. Twenty-eight percent of immigrants report that their schooling abroad was conducted in English. This figure is in the single digits for Europeans, Mexicans, and other Hispanics. It is quite high for Anglophone, East Asian<sup>50</sup>, and immigrants in the residual "Other" category.

The last two columns of Table Fourteen investigate the importance of these two additional measures of English language proficiency. This information allows us to sort out whether it is knowing English currently or knowing it on arrival which is most important. In column three, a dummy variable for English being an immigrant's mother tongue is added to the right hand side, along with current English speaking ability and origin education. The mother tongue variable enters positively and significantly. However, the effect is estimated to be only one third as strong as the effect of current speaking ability, which falls somewhat.

Finally, in column four, the number of years of origin education conducted in

---

<sup>48</sup> The actual questions in the SIE are: "How well this adult speaks English?", "Language spoken at home when this adult was a child?", and "In what language taught Arithmetic, Science, and History?".

<sup>49</sup> The 10% figure for East Asians is due to the high percentage of child immigrants who report that their native language is English. For immigrants who arrived after age 20, this figure is less than 3%.

<sup>50</sup> This is something of a puzzle.

English is added to the set of explanatory variables. The coefficient of .0051 on this variable almost cancels out the -.006 coefficient on origin education. What that means is that if origin education was conducted in English, it is as valued in the U.S. labor market at education obtained here. Another interesting way of reading this result is to consider that, since the average immigrant completed eight years of schooling abroad, if that schooling was conducted in English rather than in another language, the immigrant receives a four percentage point increase in earnings<sup>51</sup>. This is considerably larger than the coefficient on being a native English speaker (holding constant current English proficiency) and only slightly lower than the measured effect of current English language ability (holding mother tongue constant).

The results in Table Fourteen thus indicate that both current English proficiency and English proficiency upon arrival are important determinants of immigrant earnings. Since neither mother tongue nor language of foreign schooling is correlated with age at arrival, we would not expect the coefficient on age at arrival to be affected by their inclusion. In fact, the addition of the two measures of English language ability on arrival has a negligible (although negative) effect on the estimate of the estimated effect of age at arrival.

## **VII. Decomposition of the Effect of Age at Arrival**

We now turn to decomposing the overall effect of age at arrival, as measured in Tables Five and Six<sup>52</sup>, into a component attributable to the source of an

---

<sup>51</sup>  $8 * .0051 = .0408$

<sup>52</sup> or in Chapter Two



immigrant's education, a component attributable to English language proficiency, and a residual component. So far, the approach to doing this has been to see how the addition of corrections for education source and language ability affect the estimated coefficient on age at arrival.

An alternative technique is to directly calculate this decomposition, using the following formula:

$$dw_1/d\alpha = dw_2/d\alpha + [dw_2/dR * dR/d\alpha] + [dw_2/dE * dE/d\alpha]$$

Where  $w_1$  is log annual earnings, correcting for basic demographics and years since arrival, but not source of schooling or English ability;  $w_2$  is log annual earnings, correcting for all these factors;  $R$  is the fraction of schooling completed abroad; and  $E$  is English language ability<sup>53</sup>. The term on the left hand side of this equation,  $dw_1/d\alpha$ , is the "overall effect" of age at arrival. This is the measured effect of age at arrival, before any information on education source or language skills is included in the estimation. Estimates of this overall effect are found in Tables Five (PUMS) and Six (SIE) above. The first term on the right hand side of the equation,  $dw_2/d\alpha$ , is the "direct effect" of age at arrival. It is the coefficient on age at arrival once education source and language ability are corrected for in the estimation. Estimates of the direct effect can be found in Tables Thirteen (PUMS) and Fourteen (SIE). The second term on the right hand side of the equation,  $dw_2/dR * dR/d\alpha$ , is an "indirect effect" of age at arrival. It measures how log earnings change with the fraction of schooling which was completed abroad (holding total schooling and other factors constant), multiplied

---

<sup>53</sup> Here I use current English speaking ability because, as shown in the last section, measures of English ability on arrival do not have an impact on the estimated effect of age at arrival.

by how that fraction changes with age at arrival. Estimates of the first part of that expression are found in Tables Thirteen and Fourteen, while estimates of the second part are found in Tables Seven (PUMS) and Eight (SIE). Finally, the third term in the equation above,  $dw_2/dE * dE/d\alpha$ , measures a second "indirect effect" of age at arrival. This calculates the change in log earnings due to English language ability, multiplied by how English language ability changes with age at arrival. The first part of the term is estimated in Tables Thirteen and Fourteen, and the estimates of the second part of the term are found in Tables Eleven (PUMS) and Twelve (SIE).

Using the estimates derived in the paper, we can plug into the equation above to calculate the decomposition of the overall effect of age at arrival into a direct effect and two indirect effects. Doing this for all immigrants in the PUMS yields<sup>54</sup>:

$$\begin{aligned} \text{overall} &= \text{direct} + \text{indirect \#1} + \text{indirect \#2} \\ -.003290 &= -.001068 + (-.006563 * .0178) + (.1032 * -.0096) \\ &= -.00218 \end{aligned}$$

The fact that the two sides of this equation do not add up is somewhat puzzling, and may have to do with the need to use averages in constructing the second part of each indirect term. What this calculation says is that approximately half of the overall effect of age at arrival (measured here as the sum of the factors on the right hand side of the equation) is due to its direct effect on earnings. That older immigrants acquired more of their education abroad is responsible for a miniscule part of the overall effect ( $-.006563 * .0178 / -.00218 = 5\%$ ), while older immigrants' problems with English

---

<sup>54</sup> The coefficients for the direct effect and the first term of each indirect effect are taken from the second column of the first page of Table Thirteen. The second term of the indirect effects is calculated using Table Seven (for education source) and Eleven (for English proficiency). It is calculated by adding the coefficient on age at arrival to the coefficient on the interaction term multiplied by the average years since arrival.

contribute about 46% of the overall effect. Performing this same calculation for the SIE estimates yields the following:<sup>65</sup>

$$\begin{aligned}-.002537 &= -.001498 + (-.004569 * .0142) + (.06521 * -.0058) \\ &= -.00194\end{aligned}$$

This calculation says that 77% of the overall effect of age at arrival is due to its direct effect on earnings. Education source is responsible for only 3% of the effect, while differences in older and younger immigrants' English language proficiency is responsible for 20% of it.

Further work is needed to investigate why the adding up constraining on these calculations does not hold. In particular, the measured contribution of the source of schooling to the "overall effect" of age at arrival is improbably low, given the effect it is seen to have on the coefficient on that variable in the previous sections of the paper.

---

<sup>65</sup> The calculation is parallel to that done above. Information on the direct effect and on the first term of each indirect effect is now taken from the second column of Table Fourteen. The second terms are calculated using information in Table Eight (for education source) and Twelve (for English proficiency).



United States and Israel, and such analysis could shed light on the residual effect of age at arrival not explained by the factors explored in this paper.

**Table One**  
**PUMS Sample Characteristics**

	Native	Immigrant					
		All	W. Euro.	E. Euro.	E. Asian	Mexican	Hispanic
Age	37.9	38.2	42.2	43.9	36.5	33.5	37.0
Non-White (%)	12.0	37.0	1.2	1.3	95.6	51.0	46.1
Married (%)	68.0	71.8	77.4	79.5	69.8	71.2	67.2
High School Graduate (%)	74.7	63.0	66.8	59.9	80.4	24.5	65.1
In Labor Force (%)	83.5	81.4	84.1	83.8	80.3	81.9	80.4
Weeks Worked > = 40 (%)	84.0	82.8	87.0	86.0	81.3	78.7	82.2
Self-Employed (%)	9.3	9.5	12.7	11.5	10.7	3.9	7.8
Annual Earnings (1979 \$)	16,530	16,480	20,444	18,066	16,082	10,308	13,689
Sample Size	89,680	17,782	3,582	3,157	2,960	4,097	3,986

Note: Table taken from Chapter Two. 1980 PUMS data. Values are means and are computed for men aged 18-65. "Sample size", "Weeks Worked > = 40", "Self-Employed", and "Annual Earnings" refer to male labor force participants only. "All Immigrants" includes all immigrants in the five specified origin groups.

**Table Two**  
**Immigrant Skill Characteristics (PUMS)**

	<u>All</u>	<u>W. Eur</u>	<u>E. Eur</u>	<u>E. Asia</u>	<u>Mexico</u>	<u>Hispanic</u>	<u>Anglophone</u>
<b>age at arrival</b>	24.38	20.93	26.44	27.67	21.64	26.18	23.79
<b>years since arrival</b>	13.94	19.16	15.80	10.30	11.41	12.51	16.54
<b>total educ.</b>	11.4	12.11	11.09	14.18	7.46	11.78	13.5
<b>origin educ.</b>	9.4	8.37	9.71	12.77	6.07	10.16	10.7
<b>U.S. educ.</b>	2.0	3.73	1.37	1.40	1.39	1.62	2.8
<b>origin/total education (%)</b>	.85	.72	.89	.90	.87	.87	.70
<b>only origin ed. (%)</b>	73.5	60.2	77.8	78.1	78.7	75.6	67.8
<b>only U.S. ed. (%)</b>	7.4	16.8	3.1	4.1	6.3	3.7	12.8
<b>both origin and U.S education (%)</b>	19.1	23.0	19.2	17.9	15.0	20.7	19.4
<b>know english well</b>	.52	.70	.47	.47	.21	.50	.96
<b>observations</b>	18,135	2,841	2,638	2,803	3,850	3,842	2,161

Note: PUMS data. Male immigrants who immigrated in 1950 or later and who worked more than 39 weeks in 1980.

**Table Three**  
**SIE Sample Characteristics**

	<u>Native</u>	<u>Immigrant</u>	<u>W.Eur</u>	<u>E.Eur</u>	<u>E.Asia</u>	<u>Mex</u>	<u>Hisp</u>	<u>Other</u>	<u>Anglophone</u>
Age	40.0	41.7	40.9	44.5	40.7	36.7	42.6	40.4	45.4
Non-White (%)	7.4	17.2	.2	.6	86.6	2.6	5.7	22.0	.9
Married (%)	81.0	80.9	83.8	85.0	81.5	74.7	83.4	76.9	85.2
Total Educ.	12.5	11.8	13.6	9.8	12.5	8.0	11.6	13.1	12.4
High School Graduate (%)	76.5	65.1	86.3	45.4	69.5	30.5	63.3	77.2	68.9
Annual Earnings (1976\$)	13,749	13,711	16,090	12,856	13,283	9,226	12,209	14,523	15,084
Observations	79,972	3,625	366	609	411	380	139	1,095	625

Note: Survey of Income and Education. Sample includes men aged 18-65 who worked > 39 weeks in 1975 and usually worked > 34 hours per week. Sample excludes immigrants who arrived in the United States before 1920.



**Table Four**  
**Immigrant Skill Characteristics (SIE)**

	<u>All</u>	<u>W.Eur</u>	<u>E.Eur</u>	<u>E.Asia</u>	<u>Mex</u>	<u>Hisp</u>	<u>Other</u>	<u>Anglo.</u>
Age at Arrival	21.8	16.7	22.6	24.4	20.0	28.3	23.3	19.4
Years Since Arrival	20.2	25.0	22.0	16.4	16.9	14.2	17.4	26.5
Total Educ.	11.8	13.6	9.8	12.5	8.0	11.6	13.1	12.4
Origin Educ.	8.0	7.1	6.6	10.0	4.9	9.8	10.0	6.7
U.S. Educ.	3.7	6.4	3.2	2.5	3.0	1.8	3.0	5.6
Origin/Total Education (%)	49.6	53.6	71.0	79.7	67.9	86.3	77.6	54.6
Only Origin Educ (%)	49.7	34.4	54.8	54.5	61.3	66.1	52.2	36.0
Only U.S. Educ (%)	16.9	30.0	12.4	10.3	19.6	2.8	9.8	31.6
Both Origin and U.S. Educ. (%)	33.3	35.5	32.7	35.1	19.0	30.9	37.8	32.3
Origin Education was in English (%)	28.3	5.7	2.7	44.9	1.8	4.4	32.0	77.2
Speak English Well (%)	88.1	100.0	83.2	87.3	58.6	76.2	92.7	98.7
Mother Tongue is English (%)	23.7	15.8	2.9	10.4	2.3	2.1	25.2	72.4
Observations	3,625	366	609	411	380	139	1,095	625

Note: Survey of Income and Education. See note to Table Three.

Table Five  
The Effect of Age at Arrival on Immigrant Earnings

	<u>W. Europe</u>	<u>E. Europe</u>	<u>E. Asia</u>	<u>Mexico</u>	<u>Hispanic</u>	<u>Anglophone</u>
W. Eur	All .04907 ( 2.10)					
E. Eur	-.003593 ( -0.15)					
E. Asia	.001349 ( 0.06)					
Mexico	-.06101 ( -3.09)					
Hispanic	-.1349 ( -6.33)					
Anglophone	.1041 ( 4.37)					
Immigrant	.02732 ( 0.54)	-.02941 ( -0.62)	.1989 ( 4.05)	-.1124 ( -3.17)	-.03619 ( -0.96)	.09956 ( 1.86)
Years Since Arrival	.000727 ( 0.41)	.009377 ( 6.04)	.006294 ( 3.35)	.01073 ( 7.74)	.005912 ( 3.70)	-.001718 ( -0.94)
Education	.07825 (101.01)	.07721 (100.01)	.07925 (102.04)	.07684 (100.10)	.07893 (102.28)	.07892 (100.51)
Age at Arrival	-.003290 ( -6.64)	-.004378 ( -3.64)	-.01019 ( -8.17)	-.003038 ( -2.63)	-.006747 ( -7.13)	.001937 ( 1.53)
R <sup>2</sup>	.24	.23	.23	.24	.24	.24
N	100,496	85,875	86,091	87,027	87,031	85,460

Note: Dataset used is the 1980 PUMS. Dependent variable is log annual earnings. t-statistics in parentheses. The independent variables include weeks worked, race, marital status, and an experience quartic.

**Table Six**  
**The Effect of Age at Arrival on Immigrant Earnings**

	All	Mother Tongue is not English
Immigrant	-.02239 (-0.56)	-.02062 (-0.44)
Years Since Arrival	.004007 ( 4.16)	.004339 (3.86)
Education	.06963 (82.43)	.06966 (81.93)
Age at Arrival	-.002537 (-2.34)	-.003117 (-2.47)
R <sup>2</sup>	.21	.21
N	80,853	79,998

Note: Dataset used is the Survey of Income and Education. Dependent variable is the log of annual earnings. Other independent variables are weeks worked, weeks worked part time, topcoding flag, race, marital status, and an experience quartic. t-statistics are in parentheses.

**Table Seven**  
**Fraction of Schooling Obtained Abroad**

	<b>W. Europe</b>	<b>E. Europe</b>	<b>E. Asia</b>
<b>age at arrival</b>	-.003347 ( -4.04)	-.0008697 ( -1.33)	-.004242 (-11.80)
<b>years since arrival</b>	-.04064 (-36.35)	-.02964 (-27.19)	-.04380 (-63.52)
<b>age at * years since</b>	.001583 ( 40.56)	.001069 ( 28.20)	.001538 ( 59.12)
<b>constant</b>	1.009 ( 39.46)	.9716 ( 47.65)	1.0934 ( 94.26)
<b>R<sup>2</sup></b>	.81	.58	.78
<b>N</b>	2,824	2,562	2,750

	<b>Mexico</b>	<b>Hispanic</b>	<b>Anglophone</b>
<b>age at arrival</b>	-.003791 ( -6.54)	-.002908 ( -5.62)	.0007207 ( 0.91)
<b>years since arrival</b>	-.04335 (-52.92)	-.04016 (-42.01)	-.03664 (-31.17)
<b>age at * years since</b>	.001660 ( 45.51)	.001384 ( 39.15)	.001358 (34.18)
<b>constant</b>	1.085 ( 76.56)	1.035 ( 67.66)	.9076 ( 35.88)
<b>R<sup>2</sup></b>	.69	.64	.80
<b>N</b>	3,583	3,793	2,155

Note: PUMS data. Dependent variable is origin education as a fraction of total education. t-statistics in parentheses.

**Table Eight**  
**Fraction of Schooling Obtained Abroad**

	reported	imputed
age at arrival	.008054 ( 9.86)	.004989 ( 9.04)
years since arrival	-.01321 (-16.72)	-.01832 (-34.32)
age at * years since	.0003446 ( 9.40)	.0009639 ( 38.94)
constant	.6699 ( 28.22)	.6879 ( 42.90)
R <sup>2</sup>	.39	.68
N	3,625	3,625

Note: Dataset used is the Survey of Income and Education. Dependent variable is origin education as a fraction of total education. t-statistics are in parentheses.

**Table Nine**  
**The Effect of Foreign Schooling on Earnings**

	<u>W.Eur</u>	<u>E.Eur</u>	<u>E.Asia</u>	<u>Mexico</u>	<u>Hispanic</u>	<u>Anglophone</u>
<b>W. Eur</b>	<b>All</b> .07868 ( 3.23)					
<b>E. Eur</b>	.02735 ( 1.10)					
<b>E. Asia</b>	.04018 ( 1.65)					
<b>Mexico</b>	-.04154 ( -2.05)					
<b>Hispanic</b>	-.1037 ( -4.61)					
<b>Anglophone</b>	.1402 ( 5.55)					
<b>Immigrant</b>	.04262 ( 0.82)	.1018 ( 2.02)	.1960 ( 3.53)	.03552 ( 0.91)	.0002508 ( 0.00)	.1150 ( 2.06)
<b>Years Since Arrival</b>	.005458 ( 7.80)	.009608 ( 6.19)	.006328 ( 3.32)	.008771 ( 6.25)	.00576 ( 3.60)	-.002042 ( -1.09)
<b>Education</b>	.07604 (102.32)	.07840 ( 99.72)	.07923 (100.46)	.07835 ( 99.92)	.07924 (100.96)	.07899 (100.09)
<b>Age at Arrival</b>	-.002317 ( -4.25)	-.001579 ( -1.26)	-.01023 ( -7.79)	-.001509 ( -1.29)	-.006001 ( -5.96)	.002975 ( 1.76)
<b>Origin Education</b>	-.005052 ( -4.28)	-.02124 ( -7.95)	.0003097 ( 0.11)	-.02462 ( -9.33)	-.00529 ( -2.16)	-.00323 ( -0.92)
<b>R<sup>2</sup></b>	.24	.23	.23	.25	.24	.24
<b>N</b>	100,496	86,067	86,091	87,027	87,031	85,460

Note: PUMS. Dependent variable is log annual earnings. t-statistics in parentheses. See note to Table Five.

**Table Ten**  
**The Effect of Foreign Schooling on Earnings**

immigrant	-.0005308 (-0.01)	.006117 ( 0.14)	-.000532 (-0.01)
years since arrival	.003689 ( 3.72)	.003747 ( 3.87)	.003878 ( 3.90)
education	.06984 (81.45)	.07008 (81.28)	.07006 (81.18)
age at arrival	-.00207 (-1.83)	-.001013 (-0.82)	-.0009535 (-0.77)
origin educ. (reported)	-.003158 (-1.39)		.001869 ( 0.59)
origin educ. (imputed)		-.006430 (-2.60)	-.007849 (-2.28)
R <sup>2</sup>	.21	.21	.21
N	80,853	80,852	80,853

Source: SIE. Dependent variable is log annual earnings. Other independent variables are weeks worked, weeks worked part time, topcoding flag, race, marital status, and an experience quartic. t-statistics are in parentheses. t-statistics in parentheses.

**Table Eleven**  
**English Language Proficiency**

	<b>W. Europe</b>	<b>E. Europe</b>	<b>E. Asia</b>
<b>age at arrival</b>	-.004077 ( -2.05)	-.008147 ( -4.55)	-.004193 ( -2.80)
<b>years since arrival</b>	.01422 ( 5.29)	.02266 ( 7.47)	.01978 ( 6.86)
<b>age at * years since</b>	-.0004428 ( -4.72)	-.0003917 ( -3.73)	-.0002273 ( -2.10)
<b>constant</b>	.6728 ( 10.95)	.4804 ( 8.52)	.4452 ( 9.21)
<b>R<sup>2</sup></b>	.14	.17	.10
<b>N</b>	2,841	2,638	2,803

	<b>Mexico</b>	<b>Hispanic</b>	<b>Anglophone</b>
<b>age at arrival</b>	.001413 ( 1.11)	-.001971 ( -1.29)	.0009242 ( 1.12)
<b>years since arrival</b>	.03098 ( 16.80)	.02544 ( 9.01)	.001979 ( 1.61)
<b>age at * years since</b>	-.001023 ( -12.75)	-.0007858 ( -7.53)	-.0000706 ( -1.70)
<b>constant</b>	.06571 ( 2.09)	.48032 ( 10.66)	.9392 ( 35.68)
<b>R<sup>2</sup></b>	.18	.11	.002
<b>N</b>	3,850	3,842	2,161

Note: PUMS data. Linear probability model:  
 1 = knows English very well or well  
 0 = knows English not well or not at all  
 t-statistics in parentheses.



**Table Twelve**  
**English Language Proficiency**

age at arrival	-.01189 (-15.02)
years since arrival	-.002408 ( -3.14)
age at * years since	.0003628 ( 10.21)
constant	1.064 ( 46.29)
R <sup>2</sup>	.14
N	3,625

**Note:** Dataset used is the Survey of Income and Education. Linear probability model:  
1 = speaks English very well or well  
0 = speaks English not well or not at all.  
t-statistics are in parentheses.

**Table Thirteen**  
**The Effect of Language Proficiency on Earnings**

	<u>All Immigrants</u>	
W. Eur	.07041 ( 3.00)	.1102 ( 4.50)
E. Eur	.03155 ( 1.31)	.07405 ( 2.94)
E. Asia	.03480 ( 1.53)	.08742 ( 3.54)
Mexico	-.005268 ( -0.25)	.02365 ( 1.12)
Hispanic	-.1046 ( -4.87)	-.06223 ( -2.72)
Anglophone	.09724 ( 4.08)	.1436 ( 5.68)
Years Since Arrival	.005101 ( 7.31)	.004594 ( 6.53)
Education	.07353 (104.38)	.07495 ( 99.99)
Age at Arrival	-.002391 ( -4.75)	-.001068 ( -1.92)
English	.09695 ( 10.15)	.1032 ( 10.73)
Origin Education		-.006563 ( -5.52)
R <sup>2</sup>	.24	.24
N	100,496	100,496

Note: Dataset used is the 1980 PUMS. Dependent variable is log annual earnings. t-statistics in parentheses. The independent variables include weeks worked, race, marital status, and an experience quartic.

(Table Thirteen continued)

	<u>W. Europe</u>	<u>E. Europe</u>	<u>E. Asia</u>
Immigrant	.03116 ( 0.61)	-.008696 ( -0.18)	.2516 ( 5.07)
Years Since Arrival	.000574 ( 0.32)	.008615 ( 5.51)	.004669 ( 2.47)
Education	.07785 ( 99.81)	.07681 ( 98.79)	.07861 (100.65)
Age at Arrival	.003282 ( 2.91)	-.003492 ( -2.86)	-.009575 ( -7.67)
English	.06495 ( 4.33)	.06347 ( 4.26)	.1087 ( 7.53)
Origin Education	-.005923 ( -2.10)	-.02308 ( -8.57)	-.001978 ( -0.72)
R <sup>2</sup>	.23	.23	.23
N	86,067	85,875	86,091

(Table Thirteen continued)

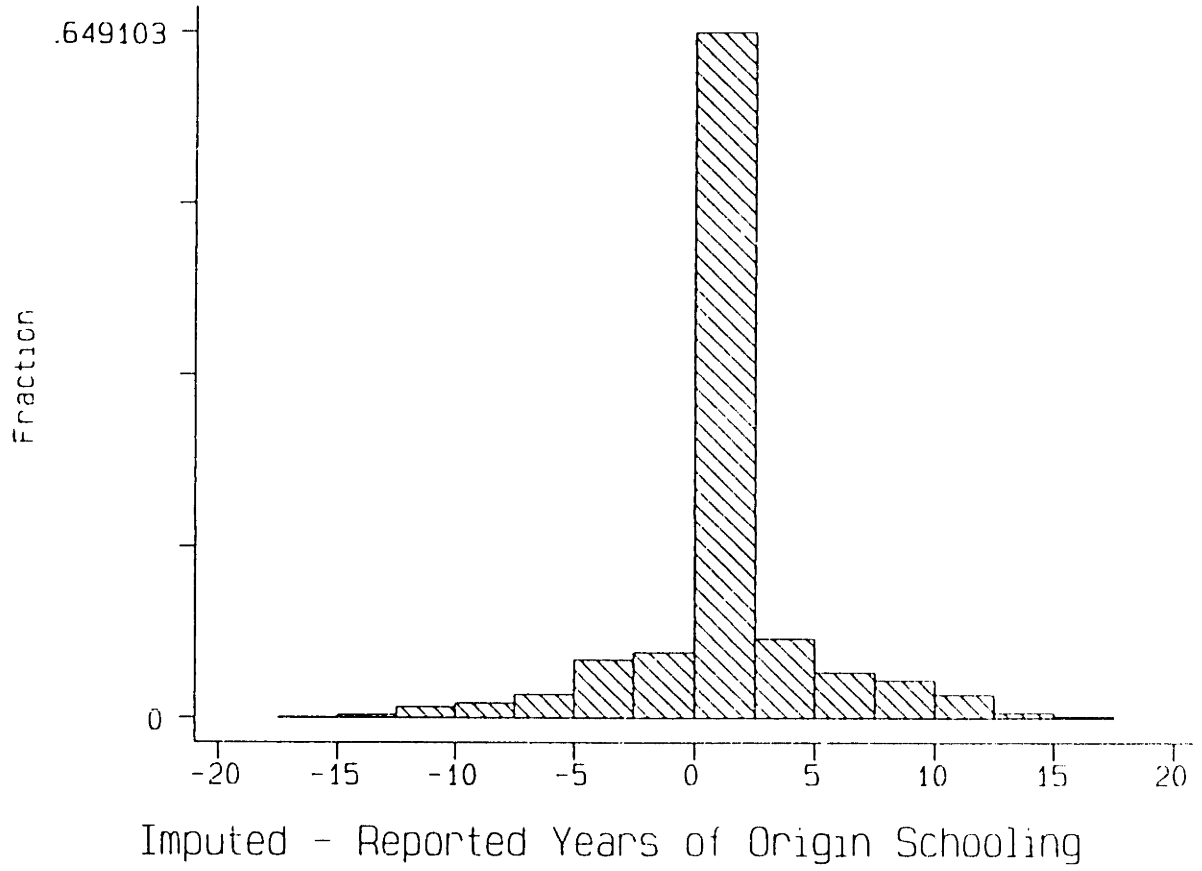
	<u>Mexico</u>	<u>Hispanic</u>	<u>Anglophone</u>
Immigrant	-.0710 ( -1.94)	-.009570 ( -0.25)	.1026 ( 1.92)
Years Since Arrival	.01002 ( 7.19)	.005251 ( 3.28)	-.001783 ( -1.15)
Education	.07642 ( 98.92)	.07817 (100.60)	.07856 ( 99.66)
Age at Arrival	-.002214 ( -1.90)	-.005484 ( -5.72)	.001934 ( 1.53)
English	.07066 ( 4.75)	.1099 ( 8.06)	.08598 ( 4.95)
Origin Education	-.02488 ( -9.43)	-.007145 ( -2.91)	-.003557 ( -1.02)
R <sup>2</sup>	.24	.24	.24
N	87,027	87,031	85,460

**Table Fourteen**  
**The Effect of Language Proficiency on Earnings**

immigrant	-.0190 (-0.47)	.01406 ( 0.32)	.02823 ( 0.64)	.02567 ( 0.58)
years since arrival	.00383 (3.94)	.003291 (3.25)	.003189 ( 3.15)	.003270 ( 3.22)
education	.0694 (81.45)	.06969 (80.97)	.06956 (80.59)	.06954 (80.58)
age at arrival	-.002288 (-2.08)	-.001498 (-1.28)	-.001597 (-1.36)	-.001620 (-1.38)
origin education		-.004569 (-1.91)	-.004318 (-1.80)	-.006185 (-2.43)
English: speaks well	.04481 (1.37)	.06521 ( 1.90)	.05943 ( 1.73)	.05033 ( 1.45)
English: mother tongue			.01861 ( 2.16)	.01522 ( 1.74)
English: origin educ.				.005086 ( 2.17)
R <sup>2</sup>	.21	.21	.21	.21
N	80,853	80,853	80,853	80,853

Source: SIE. Dependent variable is log annual earnings. Other independent variables are weeks worked, weeks worked part time, topcoding flag, race, marital status, and an experience quartic. t-statistics are in parentheses. t-statistics in parentheses.

Figure One



## CONCLUSION

This dissertation studies the labor market performance of immigrants in the United States and Israel. In particular, it examines the determinants of the gap between the earnings of immigrants and those of comparable native-born workers. Several broad conclusions can be drawn from the analysis.

First, human capital is imperfectly transferable across countries. This is found to be true among immigrants to Israel in Chapter One and among immigrants to the United States in Chapter Three. It is likely that both the quality of foreign schooling and the compatibility of education received abroad with skill requirements in the host country play important roles in the relative value placed on foreign education. Further research could profitably investigate the effectiveness of training following migration in increasing the return to origin-country human capital. It could also broaden the analysis to include labor market experience acquired abroad and domestically, in addition to the schooling measures used here.

A second and related conclusion is that a very important determinant of immigrant labor market assimilation is an immigrant's age at migration. Chapter Two demonstrates that there is a large premium associated with migrating to the United States at a young age. As much as one-third of this effect is found, in Chapter Three, to be due to obtaining education in the United States, rather than abroad. As mentioned above, the source of an immigrant's human capital is very important. Another 20-35% of the premium can be attributed to the fact that, the younger is an immigrant upon arrival to the United States, the more easily he becomes proficient in English, and language ability is an important determinant of earnings potential as well.

Accounting for age at arrival is shown to be very important for correctly

estimating the rate at which immigrant earnings converge to those of comparable natives with time since arrival. Previous estimates which fail to account for age at arrival overestimate the speed of assimilation. Taking age at arrival into account is also important for determining patterns in the skill-corrected earnings of immigrants, which are often attributed to differences in their ability or motivation. Earlier findings of a decline in these unobserved attributes among immigrants to the United States over the last thirty years are shown to be partially due to a failure to correct for differences in the typical arrival age of different immigrant groups.

Future research on immigrant assimilation could address the issues examined here, using waves of immigrants for whom there is little or no self-selection, for example, groups of refugees. Such exogenous immigrations can be identified in both the United States and Israel, and such analysis could shed light on the importance of selection for the results found here. In particular, it would make it possible to identify the treatment effect of post-migration training on immigrant labor market performance. It would also make possible a further decomposition of the negative effect of age at arrival on immigrant earnings into a portion due to different selection mechanisms determining the immigration of older and younger immigrants and a portion due to the greater ability of younger people to adapt to new economic environments.



## BIBLIOGRAPHY

Abowd, John and Richard Freeman. Immigration, Trade, and the Labor Market. Chicago: University of Chicago Press, 1991.

Altonji, Joseph and David Card. The Effect of Immigration on the Labor Market Outcomes of Less-Skilled Natives. NBER Working Paper #3123, September, 1989.

Amir, Shmuel. "Trends in Wage Differentials Between Jewish Males of Different Ethnic Origin During the 1970s." Bank of Israel Economic Review, December 1988.

Bailey, Thomas. Immigrant and Native Workers: Contrasts and Competition. Denver: Westview Press, 1987.

Bank of Israel Research Department. Hamidiniut Hakalkalit B'Tkufat Aliya (Economic Policy in a Period of Immigration). May, 1990.

Bartel, Ann. "Where Do the New U.S. Immigrants Live?" Journal of Labor Economics. October, 1989.

Bartel, Ann and Marianne Koch. Internal Migration of Male U.S. Immigrants. in Abowd and Freeman (1991).

Becker, Gary. Human Capital. Chicago: University of Chicago Press, 1975.

Blau, Francine. The Fertility Behavior of Immigrant Women. NBER conference paper, January, 1990.

Bloom, David and Morley Gunderson. An Analysis of the Earnings of Canadian Immigrants. in Abowd and Freeman (1991).

Borjas, George. "Assimilation, Changes in Cohort Quality, and the Earnings of Immigrants." Journal of Labor Economics, October 1985.

----- Friends or Strangers: The Impact of Immigrants on the US Economy. New York: Basic Books, 1990.

----- The Intergenerational Mobility of Immigrants. unpublished manuscript, May 1990.

----- National Origin and the Skills of Immigrants in the Postwar Period. NBER Working Paper #3575, January, 1990.

----- "Self-Selection and the Earnings of Immigrants." American Economic Review, vol.77 no.4, September, 1987.

Borjas, George and Stephen Bronars. Immigration and the Family. unpublished manuscript, January 1989.

Borjas, George and Richard Freeman. Immigration and the Work Force: Economic Consequences for the United States and Source Areas. Chicago: University of Chicago Press, 1992.

Borjas, George, Richard Freeman, and Lawrence Katz, "On the Labor Market Effects of Immigration and Trade," in Borjas and Freeman (1992).

Borjas, George, Richard Freeman and Kevin Lang. Undocumented Mexican-Born Workers in the US: How Many, How Permanent? in Abowd and Freeman (1991).

Bronars, Stephen. Immigration, Internal Migration, and Economic Growth 1940-80. NBER conference paper, January, 1990.

Butcher, Kristin F. "Black Immigrants to the United States: A Comparison with Native Blacks and Other Immigrants." Princeton University Industrial Relations Section Working Paper #268. November, 1991.

Card, David. The Impact of the Mariel Boatlift on the Miami Labor Market. Princeton University Industrial Relations Section Working Paper #253, May, 1989.

Carliner, Geoffrey. "Wages, Earnings, and Hours of First, Second, and Third Generation American Males," Economic Inquiry, January, 1980.

Chiswick, Barry. "The Economic Progress of Immigrants: Some Apparently Universal Patterns," in The Gateway: U.S. Immigration Issues and Policies, Barry Chiswick, editor. Washington: American Enterprise Institute, 1982.

----- "The Effect of Americanization on the Earnings of Foreign-Born Men." Journal of Political Economy, October, 1978.

----- "Is the New Immigration Less Skilled than the Old?" Journal of Labor Economics. April, 1986.

----- "A Longitudinal Analysis of the Occupational Mobility of Immigrants." Proceedings of the 30th Annual Winter Meeting, Industrial Relations Research Association, 1978.

----- "Speaking, Reading, and Earnings Among Low-Skilled Immigrants." Journal of Labor Economics, April, 1991.

Eichengreen, Barry and Henry A. Gemery. "The Earnings of Skilled and Unskilled Immigrants at the End of the Nineteenth Century." Journal of Economic History. 1986.

Filer, Randall. The Impact of Immigrant Arrivals on Migratory Patterns of Native Workers. NBER conference paper, January, 1990.

Freeman, Richard and Lawrence Katz. Industrial Wage and Employment Determination in an Open Economy. Harvard mimeo, September, 1988.

Greenwood, Michael and John McDowell. "The Factor Market Consequences of U.S. Immigration." Journal of Economic Literature, vol. XXIV, November, 1986.

Gregory, Robert, R. Anstie and E. Klug. Why Are Low-Skilled Immigrants in the US Poorly Paid Relative to their Australian Counterparts?. in Abowd and Freeman (1991).

Harley, Birgit. Age in Second Language Acquisition. San Diego: College-Hill Press. 1986.

Israel Central Bureau of Statistics. Immigrants Arrived in 1972/73- 1973/74: The First Three Years in Israel. Special Series #606, 1979.

----- Immigration to Israel 1977. Special Series #580, 1978.

Jasso, Guillermina and Mark Rosenzweig. "How Well Do U.S. Immigrants Do? Vintage Effects, Emigration Selectivity, and Occupational Mobility." Research in Human Capital and Development. 1988.

Kennedy, Barbara, "Adult versus Child L2 Acquisition: An Information Processing Approach," UM Language Learning, vo.38, no.8, Dec. 1988.

Kossoudji, Sherrie. "Immigrant Worker Assimilation: Is It a Labor Market Phenomenon?" Journal of Human Resources, vol. 24, no.3, Summer, 1989.

Kuhn, Peter and Ian Wooton. Immigration, International Trade, and the Wages of Native Workers. in Abowd and Freeman (1991).

----- The Assimilation of Immigrants in the U.S. Labor Market, NBER Working Paper #3573, December, 1990.

LaLonde, Robert and Robert Topel. Labor Market Adjustments to Increased Immigration. Chicago mimeo, March, 1989.

Leonard, Jonathan and Rachel McCulloch. Foreign-Owned Businesses in the US. in Abowd and Freeman (1991).

McManus, Walter, William Gould and Finis Welch. "Earnings of Hispanic Men: The Role of English Language Proficiency." Journal of Labor Economics, April, 1983.

Mincer, Jacob. Schooling, Experience, and Earnings. New York: Columbia University Press, 1974.

Ofer, Gur, Aaron Vinokur, and Yarom Ariav. Klita B'Avoda Shel Olei Brit Hamoatsot B"Yisraei (Work Absorption of Soviet Immigrants in Israel: A Comparative Analysis.), Report to the Ministry of Labor, 1983.

Paliy, Michael, "Acquiring English at Different Ages: the English Displacement Effect and Other Findings," Journal of Psycholinguistic Research, vol. 19, no.1, Jan. 1990.

Passel, Jeffrey and Karen Woodrow. "Change in Undocumented Alien Population in the United States, 1979-83." International Migration Review, vol. 21, 1987.

Piore, Michael. Birds of Passage: Migrant Labor and Industrial Societies. New York: Cambridge University Press, 1979.

Ramos, Fernando. Outmigration and Return Migration of Puerto Ricans. NBER conference paper, January, 1990.

Sabatello, Eitan. "Patterns of Occupational Mobility Among New Immigrants to Israel." International Migration, 1979.

Sjaastad, Larry. "The Costs and Returns of Human Migration." Journal of Political Economy, October, 1962.

Smith, James. Hispanics and the American Dream: An Analysis of Hispanic Male Labor Market Wages 1940-1980. Rand mimeo, 1991.

Spolsky, Bernard. Conditions for Second Language Learning. Oxford: Oxford University Press. 1989.

U.S. Department of Commerce, Bureau of the Census. Census of Population and Housing, 1970: Public Use Microdata Sample (County Group Sample): 5% Questionnaire, 1/100 Sample. Washington D.C., 1970.

----- Census of Population and Housing, 1980: Public Use Microdata Sample (B Sample): 1-Percent Sample. Washington D.C., 1983.

----- Census of Population and Housing, 1980: Public Use Microdata Samples Technical Documentation. Washington D.C.: Government Printing Office, 1983.

----- Public Use Samples of Basic Records From the 1970 Census: Description and Technical Documentation. Washington D.C.: Government Printing Office, 1977.

Warren, Robert and Jeffrey Passel. "A Count of the Uncountable: Estimates of Undocumented Aliens Counted in the 1980 Census." Demography, vol.24, August, 1987.