IMMIGRANT EARNINGS PROFILES IN THE PRESENCE OF HUMAN CAPITAL INVESTMENT: MEASURING COHORT AND MACRO EFFECTS

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Considering immigrant earnings in the context of post-arrival human capital investment implies: cohort quality should be defined in terms of the present value of the whole earnings profile; and, an appropriate definition of "macro" effects is obtained using the earnings profile of the native born cohort entering the labour market at the same time as an immigrant cohort. We illustrate this using Canadian immigrant earnings, where there were large cross-cohort earnings declines in the 1980s and 1990s. We find that changes affecting all new entrants play an important role in understanding immigrant earnings. In contrast, earlier approaches imply that "macro" events explain little of immigrant earnings patterns.

JEL Codes: J61 (Immigrant Workers); J31 (Wage Differentials)

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Immigrant contributions to the host economy are at the heart of discussions about immigration policy. If immigrants bring needed skills to an economy then they both help in economic growth and do not need to draw on public resources for support. However, if immigrants are unable to transfer their skills to productive use in the host economy then the opposite might occur: immigrants may become a net drag on both economic growth and the public purse. In light of these arguments, there is considerable concern in a number of countries over large declines in earnings just after arrival for immigrants arriving in recent decades relative to those who arrived earlier. Studies in the US (e.g., Borjas(1995)) and Canada (e.g. Baker and Benjamin (1994)) document substantial declines in entry earnings for immigrants arriving in the 1980s relative to earlier immigrant cohorts. This has often been interpreted as reflecting declines in skill or "quality" across cohorts which are then linked to changes in the source country composition of the inflow.

Recent work by Duleep and Regets(1992, 2002) questions this interpretation. In standard human capital theory, lower entry earnings may reflect greater investment and be rewarded by greater post-arrival earnings growth. Cohorts with the lowest entry earnings may have the highest present value of earnings in the host economy. Duleep and Regets document a strong negative correlation between entry earnings and post-arrival growth for U.S. immigrants. Borjas(1999) demonstrates that this negative correlation depends on conditioning on education and claims that we should focus on unconditional (on education) results where there is a positive correlation between entry earnings and post-arrival growth. Whichever stance one takes on conditioning, Duleep and Regets(1992) are correct that cross-cohort movements in entry earnings form a poor measure of relative cohort performance once we consider the immigrant adjustment problem in the context of a human capital investment model. In this paper, we start from this insight, developing an alternative approach to measuring cohort "quality". We illustrate this approach by examining immigrant earnings performance in Canada, where well-documented, large cross-cohort declines in entry earnings in the 1980s have been followed by even larger declines in the 1990s. The results from our approach, which essentially involves comparing immigrant earnings to those of other new labour

market entrants, imply that changes in the Canadian labour market affecting all new entrants play an important role in understanding immigrant earnings patterns in both the 1980s and 1990s. This is in strong contrast to earlier approaches which lead to the conclusion that "macro" events in host economies tend to explain little of immigrant earnings patterns and, thus, that movements in earnings across cohorts should be interpreted as mainly revealing changes in immigrant skills.

Standard approaches to examining immigrant earnings involve writing single year earnings regressions in terms of cohort, year and time since arrival effects. The well known identification problem arising from the collinearity of these effects is typically addressed by using a comparison group to identify the macro (year) effects. Estimates of the size and direction of differences across immigrant cohorts are well known to vary, in some cases quite substantially, with different comparison groups (Lalonde and Topel(1992), Borjas(1999)). Once we consider the problem within the framework of potential investment in human capital by the immigrant after arrival, however, the very notion of cohort and macro effects become murkier. As Duleep and Regets(1992) argue, differences in single year earnings of the type investigated in standard regression estimation may reflect different investment choices as well as (or in response to) underlying differences in skill levels across cohorts or differences in the macro environment. Trying to decompose, say, entry year earnings into cohort and year effects can be misleading. We argue that in light of this, comparisons of the present value of earnings in the host country provides the appropriate framework for understanding true differences in cohorts, and we use a trick from Mincer(1974) to get estimates of the present values that do not require a reliance on wildly out of sample earnings projections.

We still, of course, need a comparison group to establish whether cross-cohort patterns in the present value of immigrant earnings reflect skill differences across cohorts or general macro effects. The life-cycle approach implies that we need to organize the earnings of the comparison group in cohorts, as well, in order to generate present values for earnings that match those for the immigrants. Further, we argue that the best comparison group is other new labour market entrants since their earnings patterns will reflect macro events in the context of human capital investments that are similar to those undertaken by immigrants. In essence, we argue the post-arrival investment framework points to a preferred comparison group for an immigrant cohort consisting of native born

workers who enter the labour market at the same time as the immigrants.

Using matching native born new entrants as a comparison group also fits with the rather general definition of macro effects we use throughout the paper. We define the macro effects relevant for a particular immigrant cohort as the impact of economy-wide events on the average earnings of any worker entering the Canadian labour market at the same time as the immigrant cohort. Included in the set of economy-wide events we are contemplating are cyclical and growth movements in the economy, but also events such as the movement of the baby boom through the labour force and changes in educational institutions that affect the relative supply of skills in the economy. Moreover, we argue that in examining earnings, one cannot separate the impact of these events from investment response to them and so our definition of macro effects is intended to reflect both overall economic events and the investment decisions of a general set of new entrants in reaction to those events. Immigrant cohort effects are then the movements in an immigrant cohort's earnings profile relative to the profile of other new entrants entering the labour market at the same time and will capture a combination of implicit skill differences and differences in responses to economy-wide events between immigrants and other new labour market entrants.

We examine immigrant earnings using a unique dataset formed by linking immigrant landing records for all immigrants arriving in Canada after 1980 to their tax records in all successive years up to and including 1997. Immigrant landing records contain application information, including source country, age at arrival, gender and education level at arrival. We focus only on males and divide our investigation by education levels and by age at arrival, both of which have important impacts on earnings patterns. Our native born data comes from a large representative annual survey called the Survey of Consumer Finance. We confirm that the earnings patterns we obtain from combining these datasets match those from Census data. The datasets we use have advantages over the Census because we get earnings data at an annual frequency with, for the immigrants, a very large number of observations.

Using these data, we find that, over the past two decades, successive cohorts of immigrants have experienced larger and larger declines in entry earnings. The declines across the 1980s are large (on the order of .28 log points) and well documented (see, Baker and Benjamin(1994), Bloom

et. al.(1995), Grant(1999)). The declines in the 1990s have been larger (.43 log points). Borjas (1995), in an examination of US data, argues that macro events explain little of the observed cross-cohort earnings differences in that country and that, as a result, those differences should be interpreted as reflecting skill differentials. Macro effects defined using standard approaches play a similarly small role when using Canadian data. However, if we assume that macro events may affect new entrants differently from other workers and use native born new entrants to identify macro effects, these effects assume a much greater role. Native born new entrants also experience sizeable declines in earnings over this period and these declines account for half the decline in immigrant earnings in the 1980s. Most of the remainder of the decline is accounted for by changes in the source country composition of immigration. Thus, while about half the decline may be interpreted as resulting from falling "skill" levels across cohorts (due to shifts in source country composition), the other half is related to poorer outcomes for new labour market entrants in general. This implies a re-balancing of policy interest with less emphasis on immigrant specific issues and more on issues relating to outcomes for all new labour market entrants. The former set of issues would be addressed mainly through immigration policies while the latter would, for the most part, not be.[1]

Another key feature of earnings patterns for immigrants in this data is the evaporation of earnings differentials by years of foreign experience between the early 1980s and the 1990s. Thus, for the 1980-82 entry cohort, immigrants in all education groups have earnings patterns reflecting substantial "returns" to foreign experience. By the 1990-92 entry cohort, however, there is no evidence of any differential in entry earnings by years of foreign experience. The finding of a flat foreign experience profile fits with Friedberg(2000)'s results for Israel, but in Canada's case this represents a dramatic shift from earlier periods. The lack of returns to foreign experience is a feature of the earnings patterns for non-English speaking, non-European immigrants in particular and the decline over time in those returns is due largely to shifting source country composition. This is not the whole story, however, as some decline is evident even across cohorts from English speaking countries, suggesting that there may be more general changes in the economy reducing the initial value of foreign experience. In the end, though, these patterns in entry earnings are not nearly as evident in the present values of earnings. Apparently, initial difficulties in transferring foreign

human capital are over-come, at least to some extent, with time in Canada.

The paper proceeds in seven sections. The second section contains a description of the data and of the basic data patterns we are seeking to explain. In the third section, we set out a standard human capital investment model and define macro and cohort effects within the context of that model. In the fourth section, we describe our empirical model and discuss our approach to calculating the present value of earnings. The fifth section contains the main estimation results. In the sixth, we investigate the determinants of the cohort patterns set out in section 5, including a decomposition exercise assigning the cross-cohort changes in the present value of earnings to general new entrant, shifting source country composition, shifting age at arrival composition, and shifting education composition effects. The final section concludes.

II Data and Basic Patterns

II.1 Data Description

We examine earnings patterns using two datasets. For immigrants, we use a special dataset based on immigrant administrative data and tax data called the Immigrant Database (IMDB). For the native born, we use the Survey of Consumer Finances (SCF), a large representative survey similar to the CPS for the United States. We use all available years for the individual level files from the SCF (1981, 1982, 1984-1997) and the IMDB tax year samples for the same set of years.

The IMDB is a remarkable dataset formed by linking the landing records for all the immigrants arriving in Canada after 1980 to their tax records in subsequent years. The landing records contain information taken by immigration officials as part of processing the immigrant application. From this we know their source country, gender, and their education level and age at time of arrival. We also know, and make use of their assessment category: independents (applicants who are assessed based only on their skills - education, experience, language ability, etc); family class (applicants who enter based on family relationships to people living in Canada); and refugees. The information from the landing records is linked to the individual tax records for subsequent years. Given the nature of tax data, we do not know if immigrants obtain extra education or training after arriving in Canada since education is not reported on the tax form and, thus, the education classification we use for immigrants is based on their education at time of arrival.

The SCF is a special survey conducted annually up to 1997 in conjunction with the Labour Force Survey, Canada's general survey for determining labour market stocks and flows. The SCF is designed to elicit answers about income sources and labour market activity. From it, we retrieve data on annual earnings, age, education and gender for native born Canadians in order to generate a benchmark for the immigrant, IMDB, data. We show below that our estimates of standard models using these combined datasets are similar to those obtained from single sources, such as the Census.

The outcome measure we use is real annual earnings, deflated using the CPI. This is dictated by our reliance on tax records, which do not include information on hours or weeks of work during a year. For immigrants arriving in a particular year, we have only their total earnings and no means of pro-rating it according to how long they were actually in Canada. In response, we do not use earnings data from the landing year. Given that we are using annual earnings, our dependent variable will reflect variation in hours and weeks worked as well as wages, which is worth noting for immigrants, who tend to have high unemployment rates just after arrival (Reitz(2001)). For immigrants, earnings patterns for a given education at arrival group may also reflect educational upgrading, though this is not a problem since we are studying the immigrant assimilation process and we view such upgrading as part of that process.

We divide the immigrant sample into cohorts defined by year of landing in Canada. Even though the IMDB is a true panel, in order to match with the SCF, we analyze the data as synthetic cohorts. That is, we treat the data as a series of cross-sections. In each cross-section, we identify the individuals who entered Canada in a given period and calculate their mean earnings. The set of these averages across years provides the average earnings path for the cohort.[2] Through most of the work, we define cohorts by both arrival year and education level. This is simple for immigrants since we can group them according to a time invariant education measure (the education listed on their landing records). However, in the native born data we see only the individual's education level in the current year and, so, need to examine individuals for whom education is unlikely to change in order to use education as a cohort definition dimension. For this reason, we focus our analysis on individuals (either native born or immigrant) whose age is greater than or equal to 25 (which we will call the age of entering the mature labour market). We also specify a maximum age for our

samples of 64. We focus only on men in this analysis, addressing the very different patterns for females in a separate paper.

Immigrants are assigned to a given cohort according to the year in which they obtained landed immigrant status in Canada. We define 5 cohorts: 1980-82, 1983-86, 1987-89, 1990-92, 1993-1996. The cohort groupings are chosen partly to reflect immigration policy regimes and partly to reflect cyclical conditions. Thus, 1980-82 contains the beginning of a recession and a period in which immigration inflows were still relatively large. The period 1983-86 is a period containing the start of economic recovery but is also a period in which the immigration door was essentially shut to independents: applicants could only enter the country through the family or refugee classes or if they had a guaranteed job waiting. In 1986, the latter restriction was removed and the proportion of the inflow accounted for by independents increased again. However, the next 5 to 8 years is still characterized by inflows dominated by family and refugee class immigrants. Thus, the 1987-89 cohort covers a period with this type of immigration policy in an economic boom and the period 1990-93 is a period with similar policy but a recession. The period 1993-96 is a mixed bag in the labour market, with sporadic improvements, and in policy is marked by a move toward giving greater priority to independent class immigrants. In our interpretations, we do not try to relate our results directly to policy regimes, but we do feel it is useful to organize the cohorts so that they are not a muddle of policies and labour market conditions.[3]

In the main part of our investigation, we also organize the native born by cohort, in this case defined by the year of entry into the mature labour market, with cohorts defined using the same year groups as for immigrants. We define the year of mature labour market entry as the year in which they turn 25.

Given access restrictions to the confidential IMDB data, we carried out our estimation in two steps. First, we estimated a log earnings model (using the individual data of the IMDB) with provincial dummy variables as well as dummy variables for each year of arrival/education/survey year combination.[4] Models were estimated separately for the three education groups. Next, the synthetic cohort sample was generated by predicting the log earnings for each cell holding the province of residence effect at the default value (Ontario), thus removing provincial variation in

earnings. For immigrants, we carried this exercise out separately for four separate age-at-arrival categories: 25-29, 30-34, 35-39 and 40-44. The end result was an immigrant synthetic cohort sample containing predicted log earnings for 1800 cells (year of arrival/education/survey year/age-at-arrival combinations). It is this sample we use in subsequent estimation. We also make use of data created in the same way but broken down by visa category or country of origin. Sample sizes for each cell in the various synthetic cohort samples vary but are typically around 200. In all cases, the cell size was above 30. We use weighted least squares based on cell size weights to estimate all our regressions.

II.2 The Pattern to be Explained

To set out the basic patterns of interest, we begin, in Figure 1, with separate, smoothed years since entering the Canadian labour market (YSE)-earnings profiles for each cohort obtained after removing cyclical effects. These plots are for immigrants only and are based on a regression of average log earnings on a set of cohort dummy variables, YSE, YSE squared, interactions of YSE and the cohort dummy variables, education dummy variables, and the de-trended unemployment rate. The latter was included in an attempt to strip out cyclical variation and focus on long term patterns. We normalize the plots relative to the entry earnings for the 1980-82 cohort.

The most striking pattern in figure 1 is the dramatic fall in real earnings at time of arrival across successive cohorts. Earnings at arrival fall by over 50% from the 1980-82 entry cohort to the 1993-96 cohort. However, the cohorts with the lowest starting earnings also have the highest growth rates with time in the Canadian economy and eventually catch up with their earlier counterparts. The overall pattern can be roughly divided into two periods:1) the cohorts entering in the mid and late 1980s earn 20 to 25% less at arrival than the 1980-82 cohort and do not catch up to them within a 20 year window; 2) the cohorts entering in the 1990s have much lower entry earnings but also much more rapid earnings increases and appear to be on paths to catch up to the earnings levels of the first cohort more rapidly. The fact that the 1980s cohorts fell behind earlier cohorts (and the native born) with seemingly little ability to catch back up has been the source of considerable investigation (e.g., Baker and Benjamin (1994), Bloom et. al. (1995), McDonald and Worswick(1998), and Grant(1999)). The 1990s patterns are also described in Li(2003) but have otherwise seen little study. The results also match those for the US, where declines in entry earnings across cohorts has been

the source of considerable debate since it was first identified by Borjas(1985).

All of the earlier literature on Canadian immigrant earnings uses data either from Censuses or the SCFs. If our estimates are substantially different from earlier studies, it would call into question the comparability, and possibly the validity, of our results. We carried out an extensive comparison of mean log annual earnings of recent cohorts of immigrants to Canada using both the IMDB data and the Canadian Census data. Due to grouping of arrival years in the public use samples of the Census, it was not always possible to match cohorts perfectly between the two data sources. However, in general, the differences in entry earnings across arrival cohorts were very similar. For example, we were able to compare the change in earnings of immigrants who had been in Canada for 1 to 5 years in the 1991 and 1996 Canadian Census files and the IMDB (the data actually correspond to 1990 and 1995). We used sample selection rules that mirrored those used in this paper. Using the IMDB, the change in log annual earnings between 1990 and 1995 was -.324 log points, compared to -.291 in the Census data. Thus, we believe that our results are comparable to those based on Census data, though we have presented them in a somewhat different form from earlier papers.

III Defining Cohort and Macro Effects

The much poorer initial earnings levels in the 1990s, shown in Figure 1, raises concerns that Canada is doing worse either in terms of selecting or integrating immigrants. Of course, the period from 1990 to 1997 was a rough time in the Canadian labour market in general and it is possible that what appears to be an immigrant problem when viewed in isolation is actually a macro economic problem when viewed in broader perspective. To understand how to properly evaluate the relative outcomes for immigrants and other workers, we require a framework that can capture their potential differences and similarities.

Estimation in most papers on immigrant earnings is based on a standard human capital regression. For reasons that will become apparent, we begin by re-deriving that regression, mainly using assumptions set out in Mincer(1974). In particular, we will assume that an individual, i, with schooling level, s, starts his working life with an initial stock of human capital, e^{Hsoi} . Each period thereafter, the individual decides on a proportion of time, I_{ix}, to devote to generating more human

capital, spending the remaining time, $(1 - I_{ix})$, in generating earnings. Note that x indexes years of experience. Following Mincer, assume that the human capital stock grows at a rate ρI_{ix}, where ρ is a parameter that the individual takes as given. The human capital stock available at x years of experience is then given by,

$$1)\ H_{ix} = e^{H_{s0i}} e^{\int_0^x \rho I_{i\tau} d\tau}$$

Given period specific rental rates on human capital, R_{st}, and the assuming that $I_{ix} = \gamma_0 - \gamma_1 x$ (where, $\gamma_0 > 0$ and $\gamma_1 > 0$ are parameters chosen by the individual), we can write the log of earnings for an individual with schooling, s, and experience, x, in calendar year, t, as,

$$2)\ \ln Y_{istx} = H_{s0i} + \ln R_{st} + \rho\gamma_0 x - 0.5\rho\gamma_1 x^2 + \ln(1 - I_{ix})$$

Finally, we assume that $H_{s0i} = H_{s0} + \epsilon_i^*$, where H_{so} is the human capital stock a randomly chosen individual would accumulate in s years of schooling and ϵ_i^* is interpreted as ability, written in terms of effective human capital the individual accumulated before entering the labour market. . Given non-random selection into years of schooling, ϵ_i^* will have a non-zero mean, μ_s, and we can write, $H_{s0i} = H_{s0} + \mu_s + \epsilon_i$, where ϵ_i is mean zero. Using this and an approximation to the last term in 2), we arrive at a log earnings regression:

$$3)\ \ln Y_{itx} = \mu_s + H_{s0} - \gamma_0 + \ln R_{st} + (\rho\gamma_0 + \gamma_1)x - 0.5\rho\gamma_1 x^2 + \epsilon_i$$

This type of specification embodies the main conclusions from more rigorous derivations such as those found in the work following Ben-Porath(1967) while still allowing for a simple closed form representation for the earnings regression.[5]

III.1 Cohort Effects

We now use the framework reflected in 3) to examine immigrant cohort effects. Through the first part of this discussion, we focus on immigrants who arrive just after leaving school, so that x indexes both years of host country labour market experience and years of experience in general.

Interest in immigrant cohort effects (where cohorts are defined by year of arrival in the host country and sometimes by level of education at arrival) has been stimulated by findings in various developed countries that more recent immigrant cohorts have lower earnings profiles than earlier cohorts (e.g., Borjas(1985) for the US and Baker and Benjamin(1994) for Canada). Lower earnings

profiles raise the possibility that more recent immigrant cohorts bring fewer skills to the host country. Ultimately, we are interested in the amounts of human capital different cohorts effectively contribute to the host country economy over their working lives. From a policy perspective, we would like to know whether and why cohorts differ in this contribution because such information could help us to design better immigrant selection and adaptation policies.

If we define an immigrant cohort as a set of individuals who arrive in the same period and have the same level of education at arrival, we would expect a prime source of differences across cohorts in their human capital contribution to the host economy to be differences in source country composition(Borjas(1987)). Referring to 3), it seems reasonable to assume that immigrants from different source countries differ in their values of H_{s0} (reflecting differences in transferability of schooling human capital to the host economy) and μ_s (reflecting systematic differences in ability).[6] Both of these elements have received considerable attention, with work as early as Chiswick(1978) emphasizing the importance of skill transferability and the line of work following Borjas(1985) emphasizing the importance of ability selection issues.

Differences across source countries in other elements of the model are also likely. Eckstein and Weiss(2003) propose an immigrant assimilation model in which immigrants learn more about the host country labour market and become better able to implement their human capital in it the longer they live in the host country. We can capture this argument by multiplying R_{st} by $\theta(1 - \exp(-\lambda_0 - \lambda_1 x))$, where $\theta \in [0,1]$ reflects the extent to which the individual is ultimately able to share in the benefits of the labour market, λ_0 reflects how easily immigrants integrate into the labour market when they arrive and λ_1 represents the rate at which they learn about the host country. These parameters may reflect the language acquisition process that has been found to be an important determinant of immigrant success in host labour markets (e.g., Chiswick and Miler(2002)). All of these parameters plausibly differ by source country, leading to differences across cohorts.[7]

Given potential differences in relative skill prices, average ability, the initial human capital stock and learning ability, different cohorts will choose different human capital investment paths, reflected in γ_0 and γ_1. This is a point made by Duleep and Regets (1997, 2002). They argue, for example, that if source country human capital is more useful in generating new human capital than

in generating earnings in the host country, cohorts with less transferable human capital (i.e., with lower values for H_{0c}) will invest more (i.e., have higher values for γ_0). In a similar vein, Eckstein and Weiss(1999) argue that investment paths will differ for immigrants versus the native born under particular assumptions about how human capital stocks and investment time interact in the human capital production function. Baker and Benjamin(1999) provide evidence that these investment decisions are made by families, with trade-offs between husbands' and wives' roles.

Based on these arguments, we can rewrite 3) to reflect differences across immigrant cohorts:

$$4)\ \ln Y^I_{txc} = (\mu^I_c + H^I_{0c} - \gamma^I_{0c} + \ln\theta^I_c + \ln(1-\exp(-\lambda^I_{0c})) + \ln R_{st}$$
$$+ (\ln(1-\exp(-\lambda^I_{0c}-\lambda^I_{1c}x)) - \ln(1-\exp(-\lambda^I_{0c})) + (\rho\,\gamma^I_{0c}+\gamma^I_{1c})x - (0.5\rho\,\gamma^I_{1c})x^2 + \epsilon$$
$$\approx \delta^I_{0c} + \delta_{1st} + \delta^I_{2c}x + \delta^I_{3c}x^2 + \epsilon$$

where the I superscript refers to immigrants, c indexes the entry cohort and the i subscript is suppressed for simplicity.[8] The expression after the second equality represents an approximation to the earnings expression in the first line. [9] Note that even if all immigrants followed the same investment paths, there could still be differences in earnings paths related to the speed of adjustment to the host economy. In the specifications we actually estimate, we include a dummy variable corresponding to the first year after arrival to allow for more non-linear paths than can be captured by a quadratic and, particularly, to allow for very severe adjustment problems just after arrival.

Identification of cohort effects is often based on the assumption that δ_2 and δ_3 do not vary by cohort. Cohort effects are seen as arising because of differences in one or more of: μ_c (average selected ability), H_{0c} (initially transferred human capital) and the combination of $\lambda_{0c}{}^I$ and θ (ability to adapt to the host labour market). If we assume the economic climate is stationary (i.e., R_{st} does not vary with t) and ignore human capital investment then we can identify movements in these types of cohort effects by comparing average log earnings just after arrival for different cohorts. Given that cohort effects shift the earnings-experience profile in a parallel manner in this specification, this fully captures differences in what is often called cohort "quality". However, as we have just argued, there is reason to believe that γ_0 and γ_1 vary by cohort and, thus, that differences in entry earnings across cohorts partly reflect different investment choices. Duleep and Regets (2002) argue that this

distorts our picture of true cohort effects (i.e., α_c, $H_{0c,}$ λ_{0c}^{I} and θ_c) since lower entry earnings for a cohort might reflect low values of α_c, H_{0c}, λ_{0c}^{I} and θ_c (which would mean this is a poor quality cohort) or high values of γ_{0c} (which might mean this is a good quality cohort).

Given these issues, it might appear that our goal should be to either parameterize γ_{0c} and γ_{1c} in terms of observables or eliminate them altogether so that we can identify the non-choice (after arrival) elements of cohort earnings profiles: α_c, H_{0c} , θ_c , λ_{0c} and λ_{1c}. However, if we return to our definition of a relevant cohort effect as reflecting the amount of human capital an individual from a given cohort ultimately transfers to the host economy then γ_{0c} and γ_{1c} are also part of that effect. If two cohorts have the same values for the non-choice parameters but one (perhaps because of differential access to capital markets) invests more and ultimately creates more human capital then we would want to call the higher investing cohort a better cohort. Essentially, we want to identify which cohorts adapt better to the host economy, and that includes their investment decisions.

Based on these arguments, we would like a measure of cohort "quality" that reflects the total amount of human capital implemented by a typical member of a cohort over their working lifetimes in the host economy. Of course, we want to account for the actual value of the human capital to the host economy (i.e., we do not want to count a person who was trained as a surgeon in their source country as contributing more than a person who was a janitor in their source country if both are employed as taxi drivers in the host country). The natural measure for capturing these effects is the present value of earnings in the host country (PVEH), which, in the standard human capital model, reflects human capital actually employed in the economy, priced at the value put on it by the host economy. In a stationary macro environment, we would proceed by comparing PVEH for different cohorts. The cohort with the higher PVEH would be identified as the higher "quality" cohort and we would then proceed to investigate why some cohorts have higher present values of earnings.

III.2 Macro Effects

The direct comparison of PVEH values across immigrant cohorts only provides a clean measure of cohort "quality" if the cohorts face the same macro environment. Otherwise, two identical cohorts would be perceived as having different "quality" just because they faced a different set of rental rates on human capital, for example. These types of concerns motivate the use of

comparison groups to benchmark underlying macro effects in previous papers on immigrant cohort effects (e.g., Borjas(1985,1995), Lalonde and Topel(1992)). A common benchmark is native born workers with the same level of schooling and experience as a given immigrant. Thus, we could use movements in native born earnings over time, holding experience and schooling constant, to identify the R_{st} terms. Differencing movements in immigrant earnings relative to those in native born earnings would then eliminate differences across immigrant cohorts in the macro environment.

The simple approach of differencing native born earnings over time to form a measure of macro effects does not work once we take account of human capital investment decisions made by native born workers. To see this, define native born cohorts as groups of workers with the same schooling level who entered the workforce in the same period. Different native born cohorts will face different R_{st} paths over their lifetime. Assuming the workers can anticipate these differences to some extent (e.g., workers believe that low skilled wages will be lower in the future than they have been in the past), this will cause different cohorts to invest differently, i.e., to choose different values for γ_0 and γ_1. Further, native born cohorts may differ in the quality of schooling based human capital (H_{0c}) and/or in who selects to go to school (μ_c). If different cohorts are able to differentially capture and hold onto any rents in the economy (as might occur if unionization changes across cohorts) or face different returns because of differences in cohort sizes, we might also introduce a θ_c term, similar to that used in the immigrant specification, to capture differences in levels of the returns to human capital across cohorts. Together these imply an earnings expression much like 4):

$$5)\ \ln Y^N_{txc} = (\mu^N_c + H^N_{0c} - \gamma^N_{0c} + \ln\theta^N_c) + \ln R_{st} + (\rho\,\gamma^N_{0c} + \gamma^N_{1c})\,x - (0.5\,\rho\,\gamma^N_{1c})\,x^2 + \epsilon$$
$$\approx \delta^N_{0c} + \delta_{1st} + \delta^N_{2c}\,x + \delta^N_{3c}\,x^2 + \epsilon$$

where the N superscript refers to the native born. Based on 5), differences in native born average log earnings across different years, holding experience constant, will not identify the R_{st} 's. These differences, instead, will include differences in H_{0c} , μ_c and θ_c ,as well as differences in investment choices across cohorts.

Is it plausible that native born earnings patterns differ across cohorts? Beaudry and Green(2000) organize Canadian data by labour market entry cohorts and find approximately 20% falls in real wages for both the high school and university educated between the 1981 and 1993

entry cohorts. MaCurdy and Mroz(1995) find similar patterns for male US workers using CPS data from 1976 to 1993. They show that the US data is characterized by successively lower labour market entry wages and declining slopes of the wage-age profiles for successive birth cohorts, with the patterns being much stronger for less educated males. Thus, in both countries, successive cohorts of labour market entrants fare worse in terms of real earnings. Gosling et. al. (2000) also find strong cohort patterns in UK earnings data. Card and Lemieux(2001) examine educational wage premia in a cohort framework for the US, Canada and the UK and find evidence that the premia differ according to the relative supply of university educated workers in a cohort. Based on these studies, there is good reason to believe that we need to take account of native born cohort effects in any attempt to use the native born as a benchmark for immigrants.

Given these arguments, we need to reconsider our measure of macro effects. One way to define macro effects is in terms of what would happen to an immigrant's earnings if he were a typical worker rather than an immigrant. Having a measure of this would allow us to isolate what is special about immigrants from a specific cohort, which is our goal. Based on our discussion, we need to capture both movements in R_{st}, the pure skill prices, and also factors (captured in θ_c^N) such as cohort size that affect a typical worker entering the labour market, immigrant or not. However, we also want to capture how the human capital investment decisions of a typical worker would respond to movements in these factors since this will allow us to isolate not only how immigrants are special in terms of their initial human capital endowments and the skill prices they face but also in terms of the investment decisions they make. If we only included measures of skill prices in our definition of macro effects then part of what we would assign to immigrant effects would really be the investment decisions any typical worker would make when faced with these price movements. Thus, the best benchmark is the earnings of other workers who enter the labour market at the same time and face similar investment decisions as a given immigrant cohort since their earnings will reflect both the relevant skill price movements and coincident investment decisions. Based on this conclusion, we isolate immigrant cohort effects by using the difference between equations 4) and 5):

$$6)\ Diff_{txc} = (\mu_c^I - \mu_c^N) + (H_{0c}^I - H_{0c}^N) - (\gamma_{0c}^I - \gamma_{0c}^N) + (\ln\theta_c^I - \ln\theta_c^N) + \ln(1 - \exp(-\lambda_{0c}^I - \lambda_{1c}^I x)) + ((\rho\,\gamma_{0c}^I + \gamma_{1c}^I) - (\rho\,\gamma_{0c}^N + \gamma_{1c}^N))\,x - ((0.5\,\rho\,\gamma_{1c}^I) - (0.5\,\rho\,\gamma_{1c}^N))\,x^2$$
$$\approx (\delta_{0c}^I - \delta_{0c}^N) + (\delta_{2c}^I - \delta_{2c}^N)\,x + (\delta_{3c}^I - \delta_{3c}^N)\,x^2$$

The differencing in 6) eliminates the R_{st}, term and includes the difference, ($\ln\theta_c^I$ - $\ln\theta_c^N$), subtracting the factors facing all new entrants from those that are specific to the immigrant cohort. It also isolates differences in the investment behaviour of immigrants relative to typical new entrants. However, equation 6) highlights that our benchmark may also move because of movements in α_c^N and H_{0c}^N (ability and initial human capital stocks of the native born cohort). This may not be desirable since these terms reflect features of the native born earnings experience that are not what one would expect immigrants to experience if they were not immigrants. However, the cross-cohort variation in these factors may be small. To investigate this, we examine literacy differentials across native born birth cohorts using the 1995 Canadian version of the International Adult Literacy Survey (IALS). In the IALS, sample respondents were asked both labour force survey questions of the type found in the SCF and given literacy tests designed to capture quantitative, reading, and document interpretation skills. We run separate regressions of the average of the respondent's scores on the literacy tests on age for high school, post-secondary, and university native born, male graduates. Sine the IALS is a cross-section, age corresponds to birth cohort. The estimated coefficient on age is not significant at conventional levels for any of the education groups.[10] If we assume that adult literacy reflects a combination of innate ability and schooling outcomes then this result indicates that there are no significant differences across native born cohorts in α_c^N and H_{0c}^N (at least as they relate to cognitive skills). Thus, differences in earnings across native born cohorts will reflect differences in what we are trying to isolate: cohort specific prices and investment behaviour.

III.3 Age at Arrival Effects

We have conducted the discussion to this point in terms of immigrants who migrate just after leaving school, so that x measures both experience in the host economy and experience more generally. Immigrants migrating at older ages will have initial human capital, H_{0c}, that reflects not only the transferability of schooling acquired human capital but also that of human capital acquired through experience in the source country. They will also likely have different selection terms (μ_c's) because the decision to migrate at age 40 is different from that at age 25. Further, with less time to reap the rewards of human capital investment in the source country and with different amounts of initial human capital, older age-at-arrival immigrants will make different investment decisions. For

all of these reasons, all the parameters in 4) should be indexed by age at migration, and in our empirical analysis we allow earnings profile parameters to differ by age at migration. This fits with other studies that have investigated the role of age-at-arrival in determining the labour market successes of immigrants (e.g., Friedberg(2000) and Schaafsma and Sweetman(2001)).

Of course, we also need to decide on a benchmark group for the older migrants. Using older cohorts of the native born seems inappropriate because, in contrast to immigrants, they may have virtually stopped investing and so their earning paths will not present skill price paths through the lens of investment. We believe that, for this reason, older immigrants should still be matched to the cohort of native born workers entering the host labour market at the same time. We are able to get some information on what has been happening to older native born workers who are just starting new jobs. While this information on new job starters is not in a form that allows us to use them as a benchmark group, we use it, below, to show that younger, new labour market entrants are likely a good benchmark for older age at arrival immigrants.

III.4 Comparison to Previous Approaches

We are not, of course, the first to match immigrant and native born cohorts. Borjas(1995), for example, presents tables matching birth cohorts of immigrant and native born workers across US Censuses. Moreover, one common estimation strategy (used by, for example, LaLonde and Topel(1992)) involves estimating separate age-earnings profiles for each Census. Allowing age effects to vary over time in this way is equivalent (subject to restrictions implied by the form for the age polynomial) to allowing for birth cohort effects, and thus this approach too implies a matching of immigrant and native born workers from the same birth cohort. Our approach differs in two ways, both stemming from use of a life-cycle human capital model as an organizing framework. First, we argue that the appropriate normalizing group is native born workers in the matching labour market entry cohort rather than the matching birth cohort. Second, we believe that whole earnings-YSE profiles should be compared across cohorts through use of present value calculations. As we will see, both of these differences have an impact on conclusions about how successive immigrant cohorts have fared in the Canadian labour market.

IV Empirical Specification

IV.1 Regression Specifications

Based on the discussion in the previous section, we adopt an estimating equation given by:

$$7)\quad y_{tck} = \beta_{0c}^{N} + \beta_{1c}^{N} YSE_{jt} + \beta_{2c}^{N} YSE_{jt}^{2} + DIMIG * (\sum_{k=1}^{K} D_{ck}^{k} * ((\omega_{0ck}^{I} + \omega_{2ck}^{I} YSE_{jt} + \omega_{3ck}^{I} YSE_{jt}^{2})) + u_{tck}$$

where, k indexes age at arrival, j equals year of entry, DIMIG is a dummy variable equalling one for immigrants and the D^k's are dummy variables taking a value of one for immigrants in the kth age at arrival group. The ω_l (l = 0,2,3) parameters correspond to the differences (δ_l^I - δ_l^N) in equation 6). This specification allows for a different profile for each cohort for natives and each cohort x age at entry group for immigrants. Note that the β parameters correspond to a combination of experience, cohort and year effects for natives (i.e., the $\delta_{0c}{}^N$, δ_{1st}, $\delta_{2c}{}^N$ and $\delta_{3c}{}^N$ terms in 5)). As is well known, the identity x = t - c for a given s, implies that these effects cannot be separated without further identifying assumptions. However, we do not need to achieve that identification to fulfill our goal of identifying the immigrant specific profiles and, so, do not try. In our actual implementation, we also include a dummy variable corresponding to the first year in Canada for immigrants, allowing its coefficient to vary across cohorts and age at arrival groups.

A more common approach to estimation is based on a set of assumptions such as the following: there are no cohort effects for natives; earnings-experience profiles differ across education groups only in their intercepts; macro events affect all workers, regardless of education, experience or immigrant status, in the same way; immigrants earn the same return to experience and education acquired in the source country as that earned by native born workers for Canadian experience and education; all immigrants, regardless of education or foreign experience, face the same relative differences in entry earnings across cohorts; and all immigrants, regardless of education, foreign experience or cohort, face the same earnings assimilation path. Given these assumptions, we obtain an estimating equation given by:

$$8)\ y_{jtks} = \alpha_0 + \alpha_1 EXP_{jtks} + \alpha_2 EXP_{jtks}^2 + \alpha_3 EDN_s + \alpha_4 DIMIG + \alpha_5 YSE_{jt} + \alpha_6 YSE_{jt}^2 + \psi' DCOH_j + \xi' DYR_t + u_{jtks}$$

where: the α's are individual parameters and ψ and ξ are parameter vectors; experience (EXP) is defined as (t - j + k), with k=0 for natives; DIMIG is an immigrant dummy variable; YSE is years since entry for immigrants and equals (t-j) for immigrants and 0 for natives; DCOH is a set of dummy variables corresponding to immigrant entry cohort; DYR is a set of dummy variables corresponding to the current calendar year; and u_{jtks} is an error term. Movements in native born earnings over time identify the experience and year effects, while differences between immigrant and native born earnings identify the immigrant cohort effects and years since entry profile.

It is important to clarify the difference in cohort definitions between 7) and 8). Specification 8) is based on the common concept in the literature of a cohort, denoted by j, being based on a period of arrival. Cohorts in 7), denoted by c, are based on both education and period of arrival.

When considering immigrants and native born workers who enter the host labour market just after leaving school, specifications 7) and 8) are quite similar. In both cases, immigrant earnings are compared to those of native born workers of the same age in the same year. However, 8) does not allow for cohort differences in earnings-experience profiles for the native born. Further, 8) compares the earnings of older age at arrival immigrants to native born workers of the same age while in 7) they are compared to the earnings of native born workers entering the host labour market at the same time. In the following sections, we present results both from the more standard specification, 8), and the cohort comparison specification, 7).

IV.2 Comparing Present Values of Earnings

Once we have estimates of the cohort specific earnings profiles, we are potentially in a position to calculate PVEH, the present values of earnings streams. We argued above that these present values ought to be seen as the true cohort effect measure. We can calculate PVEH for a cohort by projecting cohort average earnings using the estimated intercept and YSE coefficients for the cohort and then taking the present value. The difficulty with this approach is that it requires us to

put faith in profiles that are projected a long way out of sample for recent entry cohorts.

We propose to use a concept from Mincer's 1974 analysis of empirical human capital models: the present value equivalent constant earnings level, which we will call, y_e. The idea is simple but very useful: for any earnings profile y(x) and its associated present value there exists a level of annual earnings, y_e, paid out every year of the working life, which provides the same present value (where both present values are calculated using the same discount rate). In earnings-experience space, the constant earnings path corresponds to a horizontal line at height, y_e, which crosses the upward-sloping y(x) line at a number of years of experience, x*. Thus, if we know x*, we can obtain $y_e = y(x^*)$. Then, we can calculate the appropriate present value using y_e.

The key question in implementing this approach is what value to choose for x*. It is easy to show that if y(x) is linear and increasing in x then x*= (1/r), where r is the discount rate. However, as Mincer points out, if the second derivative of y(x) is negative then x* will be less than (1/r). To find plausible values of x* in our context and to evaluate the sensitivity of x* to variation in the main parameters in our model, we conduct a simple simulation exercise reported in Appendix A. Based on that discussion, and assuming a discount rate of .1, we use an x* value of 8 for our native born calculations and use values ranging between 6.5 and 8 for immigrants in different age at arrival groups to reflect their differing time to retirement horizons. Following Mincer, we use r = .1 to match the typically estimated rates of return on human capital from the schooling literature, thus implying that the present value of earnings can be viewed as the human capital asset an individual brings with them. It is worth noting that if we chose a different x* for each possible earnings profile (letting it vary with the different estimated shapes and curvatures), we would get results no different from taking the present values of the estimated profiles. However, because we pre-select plausible values of x*, our approach yields estimates of PVEH that put less weight on the less well-defined higher order terms in our profile estimates than is implied if we used the entire fitted profile to estimate the present value.[11]

V Estimation Results

V.1 Standard Specifications

We begin with the results from estimating standard specifications. The first two columns of

Table 1 contain results from estimating 8) and a variant of 8) in which the immigrant YSE profile is allowed to vary by cohort. These regressions are based on a sample in which we pool all the native born observations for the years 1981-1997 (i.e., all native born workers aged 25 to 65 in each year) and all the immigrants available in the IMDB (i.e., all the immigrants who arrived after 1980). We include education dummy variables, experience (constructed according to the standard Mincer equation) and experience squared for the native born. For immigrants, we include these same variables plus an immigrant dummy variable, a full set of cohort variables, YSE, and YSE squared. We also include a full set of year dummies to capture overall trends in the labour market.

The results in the first column of Table 1 indicate that male real average earnings fell precipitously in this period for all workers: falling by over 24% from 1981 to 1993 and then recovering somewhat by 1997. Nonetheless, immigrant entry earnings dropped even faster: by approximately 40%, relative to the overall trend, from the first cohort to the last. However, the results from the second specification, in which the YSE profiles are allowed to differ across cohorts, are much like what is observed in figure 1: the 1990s cohorts have much lower entry earnings and much higher post-arrival growth rates than earlier cohorts.

Once we allow for cohort specific slopes, we need to move to present value comparisons. Following the arguments in the previous section, we compare earnings at year 7 after arrival. We choose to use year 7 because average age among working immigrants is close to 35 and, from Table A1, having 30 years of earning life left plus a discount rate of .1 implies an x* value of 7.[12] Based on the results in column 2 of Table 1, comparisons of PVEH for successive immigrant cohorts relative to the 1980-82 cohort are: -.17 log points for the 1983-86 cohort; -.15 log points for the 1987-89 cohort; -.20 for the 1990-92 cohort; and .06 for the 1993-96 cohort. These form an interesting contrast to differences in entry earnings across cohorts. In either the column 1 or 2 specifications, the entry earnings for the 1990s cohorts are substantially worse than those of the 1980s cohorts and this has been the source of considerable policy concern. However, using PVEH comparisons, the 1990-92 cohort is not much different from the 1983-86 and 1987-89 cohorts. The 1993-96 cohort is actually similar to the 1980-82 cohort by this measure though the last cohort should be treated with caution since this is the only cohort for which calculating earnings at x*=7

represents an out of sample prediction. Regardless of this point, using PVEH rather than entry earnings to compare cohorts changes the questions of interest from why are the 1990s cohorts so much worse than those that came before to why do virtually all cohorts fare worse than the 1980-82 cohort and why has the shape of the earnings-YSE profile changed so much in the 1990s?

Column 3 of Table 1 contains estimates for immigrants only - the estimates underlying Figure 1. The PVEH comparisons relative to the first cohort, evaluated at x*=7 are (from the 2nd to the 5th cohort in order): -.23, -.20, -.31, -.05. Thus, controlling for general macro conditions has small impacts in the1980s but more substantial effects in the 1990s. Using a native born comparison group makes it clear that the poorer 1990s immigrant cohort performance is partly due to the general downturn in the 1990s. The 1980s in particular fit with Borjas(1995)'s finding for the US that changes in the wage structure account for a small part of the cross-cohort decline in immigrant earnings in recent decades. Tables in Grant(1999) point to a similar conclusion for Canada.

V.2 Breakdowns by Education

To this point, we have controlled for education in a restrictive manner: not allowing cross-cohort earnings patterns to differ by education. In figures 2a-c, we recreate the plots from figure 1 for each of our three education categories - high school graduate or less, post-secondary less than university, a BA or more.[13] The patterns in these figures are all qualitatively similar to those in figure 1. In each case, the mid and late 1980s cohorts have very similar profiles that are lower than that from the 1980-82 cohort and the 1990s cohorts have much lower initial earnings offset by much higher growth rates after arrival. The declines in entry earnings for the 1980s cohorts are roughly similar for the three education groups but the changes in both entry earnings and the slope of the assimilation profile in the 1990s increase substantially with education. Thus, the 1990-93 cohort has entry earnings that are approximately 42% below those for the 1980-82 cohort for the high school educated but approximately 56% below for the university educated. These differences indicate that an educational breakdown is needed to get a complete understanding of immigrant earnings patterns. In the work that follows, we focus on high school and university educated workers in order to simplify the discussion. All results exist for the post-secondary educated as well and are used in the decomposition exercise at the end of the paper.

V.3 Cohort Based Comparison Specification

We turn now to our preferred specification, involving comparisons of cohorts of immigrants and native born workers who entered the labour market at the same time. We present the education specific cohort plots for the native born in figures 3a-c. The striking point from these figures is that the native born also experienced substantial real declines across entry cohorts. Thus, the high school educated experience over a 20% decline in entry earnings between the 1980-82 cohorts and the 1993-96 cohorts. The declines for the post secondary and university educated are both more on the order of 30% across the same cohorts. As with the immigrants, the entry earnings for the 1990s cohorts are worse than those for the 1980s cohorts, though they are again offset by more rapid subsequent growth rates. In contrast to immigrants, for whom entry earnings become successively lower, the last cohort experiences slightly better outcomes than the 1990-92 cohort among both the high school and university educated. Overall, native born and immigrant new entrants face broadly similar cross-cohort earnings patterns, but with the magnitudes being larger for the foreign born. As discussed earlier, patterns for the native born are very similar to those reported in Beaudry and Green(2000) for Canada and MaCurdy and Mroz(1995) for the US.

In Table 2, we present the cohort PVEH effects derived from figures 2 and 3, where we again use x*=7. The results indicate that both the native born and immigrants face a broadly similar pattern of relative declines across cohorts up to the 1990-92 cohort with some improvement in the last cohort. For the high school educated, the 1980s declines for the native born and immigrant cohorts are relatively similar in size (and are not statistically significantly different from one another at the 5% level) but for the remainder of the period for that education group and for the other education groups in all periods, the native born declines are generally (statistically significantly) smaller than those for the matching immigrant cohorts. Note also that the estimated values for the last cohort are decidedly less precisely estimated than those for the earlier cohorts.

V.3.i Estimation Results

We turn now to our estimates of regression 7). In implementing 7), we run separate regressions for each of twelve immigrant education x age at arrival groupings (the four age at arrival groupings - 25-29, 30-34, 35-39 and 40-44 - interacted with the three education groupings). In each

case, the immigrant data is pooled with data from native born workers with the same education level who are in one of the five cohorts defined earlier (i.e., we do not use native born workers who entered the labour market before 1981). For regressors, we include a full set of cohort dummies, YSE, YSE squared, interactions of YSE with the cohort dummies, the detrended unemployment rate, and interactions of all of these variables plus the intercept with an immigrant dummy variable. We also include a dummy variable corresponding to the first year after arrival for immigrants and fully interact this with the cohort dummy variables. The specification allows for flexible, cohort specific, earnings - YSE profiles for both immigrants and the native born.

The Native Born

Table 3 contains the estimates relating to native born cohort experiences. The first column shows the results for the high school educated. These are actually the estimates that underlie figure 3a and thus reflect the same patterns. In particular, with the exception of the very last cohort, successive cohorts have declining entry earnings. The 1990s cohorts enter at lower earnings than their 1980s counter-parts but they are partially compensated for this by their higher earnings growth rates, shown lower in the table. As Table 2 shows, the higher growth does not offset the lower entry earnings for the 1990-92 cohort but does offset it for the 1993-96 cohort. Finally, the detrended unemployment rate effect shows that earnings in all cohorts fall in high unemployment periods.

The second column of Table 3 presents the results for the university educated. The estimated effects are similar to those for the high school educated - with the 1990s cohorts following a different path from the 1980s cohorts. The university educated have much larger lifetime earnings growth rates and, in contrast to the high school educated, appear impervious to cyclical variation.

High School or Less Educated Immigrants

In Table 4a we present the estimated coefficients from the interactions of the immigrant dummy variable with cohort, YSE, first year after arrival and de-trended unemployment rate variables from the regressions based on high school educated workers. The immigrant dummy, YSE and YSE^2 coefficients correspond to the ω coefficients in equation 7). Each column in the table corresponds to a separate regression run for a different age at arrival group, listed at the top. In each

case, the results for the comparison group of the native born are given in column 1 of Table 3.

Examining the results for the youngest entry group first, we find that immigrants from the 1980-82 entry cohort who were age 25-29 at time of entry earned approximately 21% less than native born workers with the same education and in the same age group (obtained by adding the intercept - Immigrant Dummy - coefficient and the first year dummy coefficient). In the model presented earlier, this 21% shortfall represents either difficulties in transferring source country human capital, selection effects, differences in investment choices or difficulty in adapting to the new labour market. The data contains two distinct cross-cohort patterns: little difference between immigrants and native born in the changes that occur in the 1980s in either entry earnings or earnings growth rates; and sharply worse entry earnings declines for the 1990s immigrant entrants.

Table 5 contains PVEH numbers for each education - age at arrival - arrival cohort combination.[14] Each age at arrival - cohort group is compared to the PVEH value for native born workers from the same cohort and education group. Thus, from the first column of the high-school educated panel, immigrants from the 1980-82 cohort who are age 25-29 at arrival have a present value of lifetime earnings that is about 9% less than that for native born workers from the 1980-82 cohort. From the third row in that same column, young immigrants entering in 1987-89 have a PVEH that is 13% lower than native born workers from the same cohort. Comparing this to the 1980-82 difference implies that immigrant earnings fell by between 3 and 4% more across the 1980s cohorts than the fall across the same native born cohorts. Since, from Table 2, the present value of native born earnings fell by 11% between the 1980-82 and 1987-89 cohorts, this means that immigrant earnings fell by a total of about 15% across these cohorts and that almost 3/4 of this fall is accounted for by the fall in earnings for all new entrants in the 1980s. In contrast, while earnings improved across the 1990s native born cohorts, cross cohort movements for immigrants continued to be negative. Thus, while general new entrant patterns provide an important explanation for the immigrant experience in the 1980s, a different explanation is needed for the 1990s.

The results for the older age at entry groups in the remaining columns of Table 4a and Table 5 tell much the same tale. In general, we observe relatively small cross-cohort changes in PVEH for immigrants relative to the native born over the 1980s. A general new entrant earnings decline, as

identified from the native born, explains at least 2/3 of the declines in PVEH for all age groups in this decade. In contrast, the declines from the last 1980s immigrant cohort to the first in the 1990s immigrant are much larger and are matched against an increase for the native born.

Perhaps the most interesting aspect of Table 4a is the patterns across age at entry groups. For ease of examination, we form fitted differences between entry year earnings for immigrants and the native born using the coefficients in Table 4a and plot those differences in Figure 4. As discussed earlier, for the 1980-82 cohort, the youngest age group faced a 21% short fall in initial earnings compared to native born new entrants from the same cohort. Meanwhile, those aged 40-44 had similar entry earnings to the young native born entrants. The extra 15 years of foreign labour market experience was associated with 17% higher earnings. This is in strong contrast to the outcomes for the 1993-96 cohort. For the latter cohort we get net immigrant effects of -.49, -.48, -.61 and -.43 for the age 25-29, 30-34, 35-39 and 40-44 entry groups, respectively. The outcomes for the 1990-92 cohort are similarly flat across age groups. Thus, by the 1990s, entry earnings do not vary with foreign experience. The finding of a flat foreign experience profile fits with Friedberg(2000)'s results for Israel, but in Canada's case this represents a dramatic shift from earlier periods.

Patterns in the returns to Canadian labour market experience for immigrants are also of interest. For the 1980s cohorts, the return to Canadian experience is higher for younger than older entrants. Recall that these estimates represent differences relative to the experience of native born labour market entrants. Given our discussion based on the human capital model, these estimates plausibly suggest that younger immigrants make a greater investment in skills in Canada and receive a greater return in consequence than their native born counterparts. In contrast, the oldest age group in the early cohorts was apparently able to transfer the value of their foreign experience to Canada and this, plus the fact they are older and have less time to realize returns on human capital investments, may induce them to invest less. Interestingly, the two oldest groups of workers have YSE profiles that are very similar to that of the native born new entrants. Thus, it is not the case that they are not investing at all - they are investing like younger native born workers. For the most part, the YSE slope changes very little across cohorts for the various age groups. Thus, falling entry earnings are not associated with steepening YSE profiles. In estimations excluding the First Year

dummy variable there is an increase in the YSE slope coefficient across cohorts. However, this turns out to be a mainly a reflection of movements in first year earnings. Whether these reflect changes in speed of adjustment to the host economy or changes in investment just after arrival is impossible to say with this data. What we can say is that cross-cohort patterns seem to be driven more by events just after arrival than by more permanent differences in earnings growth.

The net impact of these changes in entry earnings and experience profiles is shown in the PVEH values in Table 5. In all cohorts apart from the last one (for which the values are again less precisely estimated), the PVEH values roughly follow an inverted U-shaped pattern, with the present values of earnings for the middle two age at arrival groups being either the same or slightly higher than those for the youngest age group. The oldest age group has the lowest present value of earnings. The cross-age differences, however, are dominated by the large decline in PVEH values between the 1980s and early 1990s cohorts, which is shared across age groups.

Finally, the youngest entry groups are more sensitive to cyclical variation than comparable native born workers. The cyclical effect diminishes with age to the point where the oldest group experiences cycle effects in a manner nearly identical to native born new labour market entrants. Thus, older immigrants are almost certainly more sensitive to the cycle than older native born workers. This supports claims that a defining feature of immigrants of all ages is their greater flexibility in reaction to labour market conditions (e.g., Green(1999)).

Taken together, these results indicate that for the high school educated, much of the decline in immigrant present value cohort effects in the 1980s can be attributed to patterns experienced by all new entrants to the Canadian labour market. However, the large decline in immigrant cohort effects in the early 1990s is more specific to immigrants themselves. This change across decades is accompanied by the elimination of the foreign experience profile in entry earnings. Sporadic movements in Canadian experience profiles imply that changes in the present values of earnings are different from those in entry earnings.

University Educated Immigrants

The results for university educated immigrants, are presented in Table 4b. We again observe a substantial differential in initial earnings across age at arrival groups in the 1980-82 cohort,

plotted in the second panel of figure 4. As with the high school educated, this all changes by the 1990s. The strong positive age at arrival effects in the early 1980s cohorts are transformed to a flat effect by the last cohort. In contrast to the high school educated, university immigrants show a greater tendency for increases in the slope of the YSE-earnings profile to offset falls in entry earnings across cohorts and age groups. This is the type of negative correlation between the intercept and slope of the YSE profile that Duleep and Regets interpret as fitting with a human capital investment model.

One interesting feature of the patterns in Table 4b is that the 25-29 year old entrants in the 1980-82 cohort have a nearly identical earnings path to that of the native born entering at the same time. By the late 1980s, the pattern is more one of lower initial earnings with recovery after the first year, and by the 1990s cohorts entry earnings are even lower. In contrast to the native born in Table 3, immigrants entering before age 40 all experience significant cyclicality in their earnings.

The lower panel in Table 5 contains the PVEH values by age at arrival and cohort. Note that in both the 1980-82 and 1987-89 cohorts, the PVEH values for the youngest age at arrival group are nearly identical to and not statistically significantly different from those for the matching native born new entrants. Thus, general new entrant effects completely explain the cross-cohort declines for the youngest immigrant arrival group over the 1980s. However, the same is not true of older immigrants. In the first two immigrant arrival cohorts, there is a positive relationship between age at arrival and PVEH. Indeed, the older age at arrival immigrants have a higher PVEH than the matching cohort of young native born workers. For the 1987-89 and 1990-92 cohorts, in contrast, the relationship turns negative. Thus, any steepening of post-arrival profiles in the cohorts entering after the mid-1980s fall well short of offsetting lower relative entry earnings for the older groups. Overall declines across university educated immigrant cohorts are partly due to general declines for all immigrants and partly due to differential patterns across age at arrival groups. Finally, for the last cohort the outcomes are mixed and not terribly precisely defined, with steepening YSE profiles implying improvements in PVEH for the middle two age groups while the lack of such steepening leads to continuing declines for the youngest and oldest groups.

VI Investigating Determinants of the Cohort Patterns

We turn now to explaining the immigrant earnings patterns described to this point. For both high school and university immigrants we are interested in understanding the substantial declines in PVEH across the 1980s and the mixed bag of further declines and some improvements in the 1990s. It already appears that declines in earnings facing all new entrants can provide a substantial part of the answer for the 1980s but we would like to quantify that contribution. We would also like to investigate the changes over time in the post arrival earnings profiles, with the university educated in particular shifting toward larger first year shortfalls and somewhat steeper YSE-earnings profiles in the 1990's relative to the 1980's.

VI.1 Visa Class

In an earlier version of the paper, we investigated the explanatory power of changes in the entry class composition of immigration. Thus, if the inflow shifted away from assessed, independent class immigrants and toward the unassessed family and refugee classes then one might predict worsening outcomes across entry cohorts. Two sets of facts mediate against visa class composition changes as an explanation for the patterns set out above. First, the composition of the inflow shifted toward not away from the independent class over our sample period, and particularly in the 1990s. Second, when we replicate the exercises presented above for independent class immigrants alone, the results are very similar to those for immigrants as a whole. Independent class immigrants suffer smaller shortfalls in entry earnings and PVEH relative to the native born among the high school educated and have generally superior PVEH values relative to the native born among the university educated. However, the cross-cohort patterns in PVEH are qualitatively similar to those presented in Table 5 for all immigrants. Shifts in composition toward a group who have higher earnings but similar over time patterns cannot explain a general pattern of decline.

VI.2 Differing Macro Effects by Age

Our results may reflect changes in the Canadian labour market more than changes in the immigrant inflow. Reitz(2001) argues that restructuring induced by a shift toward the “new economy” is particularly harmful to immigrants. Our use of native born new entrants as a comparison group is in part an attempt to address this issue. However, differences relative to native born new entrants have been particularly large for the older age at entry immigrants, raising the

possibility that our native born new entrant sample does not provide an adequate benchmark for the older immigrants. This might occur if experience (whether obtained in Canada or abroad) is less valued in finding a new job than was previously the case.

To investigate this latter possibility, we rearranged our samples of native born workers by job tenure. In particular, we calculated average annual earnings for males with less than 1 year of job tenure in the period 1981-82 and then did the same for males in the 1993-97 period.[15] In each case, we calculated average earnings separately by twelve possible education/age groups defined by our three education categories and the four age ranges, 25-29, 30-34, 35-39, and 40-44. This provides us with a picture of the experiences of new job entrants of different ages in the early 1980s and in the mid 1990s. Using these averages, we calculate that average annual earnings for males aged 25 to 29 with a high school education and one year or less of job tenure fell by 9.6% between the 1981-82 and the 1993-97 periods. The same figure for 35 to 39 year old high school educated males is a fall of 9.2% and for 40 to 44 years olds, a fall of 7.2%. For the university educated, the average annual earnings of 25 to 29 year olds with less than one year of tenure fell by 6.8%, those of 35 to 39 year olds fell by 7.3% and those of 40-44 year olds fell by 14.8% between 1981-82 and 1993-97. Thus, within each education group, annual earnings for new job starters fell by about the same amount for different age groups, with the exception of the oldest university educated workers. Our conclusion is that the age-at-entry patterns for high school immigrants described earlier cannot be explained as reflecting a larger decline in job start earnings for all older workers.[16] Even for the university educated, general declines for older workers have limited explanatory power since the fall for the older new job starters in the SCF is much smaller than the declines for the oldest immigrant group in the IMDB. We believe that, overall, this evidence suggests that younger labour market entrants can be used as a good benchmark even for older job starters.

VI.3 The Role of Shifts in the Country of Origin Composition

Shifts in the source country composition of immigration toward countries where the skills acquired in the labour market may be harder to match to the Canadian labour market provide a potentially credible explanation for the cross-cohort patterns. Table 6 contains the proportion of immigrants in our sample who are from either the US, the UK, Australia or New Zealand by cohort

and education level. We chose this grouping to highlight a set of source countries from which it would likely be easy for immigrants to transfer human capital.[17] While the proportions vary across education levels, the pattern is much the same in each column: the proportion of immigrants from these English countries falls by about 50% from the first to the last of the 1980s cohorts and falls further, though at a slower rate, over the 1990s. Thus, shifts in country composition may be useful in explaining the 1980s declines in entry earnings and, to some extent, the 1990s shifts as well.

A necessary condition for shifts in source country composition to be important is that the earnings outcomes differ across country. To check this, we re-estimated equation 7) for three source country groups: English (US, UK, Australia and New Zealand); North-Western Europe (France, Germany, Holland, Denmark, Belgium, Switzerland, Sweden, Norway); and Others. Rather than presenting complete versions of Table 4 for each grouping, we summarize our results by recreating Figure 4 for each group to show how entry earnings patterns differ and recreating Table 5 for each group to show how PVEH results differ by source region.

We begin by considering the English source country group. Figure 5 shows the entry earnings for various cohort x age at arrival groups for the high school and the university educated, separately. The height of the bars in this graph can be used both to see cross-cohort movements in entry earnings and to examine movements in the foreign experience profile. Cross-cohort movements in entry earnings for the youngest age at arrival group can be seen in the left-most bar in each cohort grouping. For the high school educated, these bars indicate a drop between the first cohort and all subsequent cohorts, but otherwise suggest that these immigrants had cross-cohort earnings patterns that match closely those of other workers entering the mature labour market at the same time. The foreign experience profile in entry earnings maintains a strong positive slope until the very last cohort. For the university educated, these results are stronger: there are no cross-cohort differences between the youngest immigrant and native born cohorts; and the slope of the foreign experience profile, while declining somewhat in the very last cohort, does not become zero as it does for the overall set of immigrants represented in figure 4.

The plots of entry earnings for the Northern European immigrants in Figure 6 follow a generally similar pattern. Earnings for the youngest age group again show little trend across cohorts

and there is a strong positive effect with respect to foreign experience up until the last cohort. The main difference between the English and European immigrants is that the entry earnings of the youngest groups are much smaller for the latter. Interestingly, this is not true for older immigrants: they enjoy a similar magnitude advantage over native born new entrants. In contrast, the immigrants from the rest of the world (shown in Figure 7) have lower entry earnings in most age groups and have much flatter foreign experience profiles even in the earlier years. Thus, shifts in composition toward this latter group will generate both lower overall entry earnings and a tendency for the overall foreign experience profile to flatten. But the flattening of the foreign experience profile is not due solely to this: immigrants from all regions face some such flattening, particularly in the last cohort. One interpretation of these patterns is that the Canadian labour market has always placed little value on foreign experience from non-English speaking countries outside Europe and that changes in the 1990s have reduced the valuation of foreign experience from all countries.

Table 7 contains differences in PVEH values between high school educated immigrants and the native born broken down by region of origin. Comparing the patterns in this table to those in the preceding figures tells us something about how post-arrival earnings growth differs across age and region groups. For the English region immigrants in the first cohort, for example, the difference between the oldest and youngest immigrants in terms of PVEH is close to zero. In contrast, Figure 6 shows that the oldest immigrants had much higher entry earnings. The difference between entry earnings and PVEH values reflects the fact that the youngest immigrants have much stronger post-arrival growth rates. The same pattern is observed for the North-West European immigrants in the first cohort: a positive age differential in entry earnings is converted into a flat age profile in PVEH. For immigrants from the rest of the world, this same effect converts a flat age at arrival profile in entry earnings into a negatively sloped profile in PVEH.

The PVEH values move sporadically across cohorts for the English immigrants, making it difficult to make generalizations. A word of caution is in order with respect to the values for the last cohort. These values are sensitive to inclusion or exclusion of the First Year dummy variables, particularly for the English and Northern European groups. This suggests that smaller sample sizes for these groups combined with the short observation window for the last cohort serve to make the

results for that cohort less reliable and the standard errors reflect that. For the Northern European immigrants, PVEH values decline somewhat over the 1980s and then fall precipitously in the 1990s. For immigrants from the rest of the world, there is little change in PVEH across the 1980s but sharp drops from the last cohort of the 1980s to the first of the 1990s. In general, the PVEH values follow a more muted pattern than entry earnings, particularly for the oldest age at arrival immigrants. This has implications for what we need to explain. If we focus on entry earnings then what might be interpreted as a fall in returns to foreign experience is very concerning. But the PVEH movements suggest that this fall has been offset by changes in earnings growth after arrival, implying that cross-age patterns are less of a concern when considering immigrant earnings over the life cycle.

Table 8 repeats the exercise in Table 7 for university educated workers. As with the high school immigrants, age at arrival profiles in entry earnings are flattened when we convert to PVEH values. Further, in contrast to the high school immigrants, the PVEH values for university immigrants from non-English countries adopt a negatively sloped age at arrival profile for the 1990s and some of the earlier cohorts. Thus, these university immigrants do not make the same adjustments in terms of post-arrival growth patterns and declining outcomes for older immigrants are a source of concern.

One interesting element of the patterns in these figures and tables is the generally large positive values for both PVEH and entry earnings for immigrants from English speaking countries relative to native born new entrants. At first glance, this is difficult to reconcile with a standard formulation of Roy's selection model. If unobservable dimensions of earnings (after controlling for education and age) reflect abilities and the rewards for those abilities are strongly positively correlated across a set of countries (as would be plausible for the set of countries in our English group) then self-selection arguments imply that immigrants from countries with less equal earnings distributions than Canada should be of below average ability (and thus earnings) relative to native workers (Borjas(1985)). Both the US and the UK had more unequal distributions than Canada in this period yet immigrants from those countries have high entry earnings and PVEH values relative to the native. This is particularly true for the university educated.[18] The source of the confusion may lie in the assumption that the earnings distribution, conditioning on education and experience,

reflects an ability distribution. Standard earnings regressions have low R^2's even after including ability related test scores, suggesting that such an assumption may not be entirely reasonable. Suppose, instead, that the distribution reflects idiosyncratic matching between workers and firms. Suppose, further, that educated immigrants from English speaking countries essentially view all English speaking countries as one labour market. In that case, the correlation in individual earnings across countries would be close to zero (because earnings in the various countries represent independent random match quality draws for each individual). Combined with positive mobility costs, a standard selection model would then imply that immigrants from these countries would be observed with above average earnings in Canada.

VI.4 Decomposing the Cross-Cohort Movements in PVEH

The results in the previous sections imply that both general new entrant effects and shifts in the source country composition of immigration provide potentially strong explanations for shifts in immigrant earnings across cohorts. We turn now to a simple Oaxaca type decomposition to get a measure of the relative importance of these forces. In this decomposition exercise, we first use estimates in Table 3 and the versions of Table 4 that are broken down by source country groups to form fitted PVEH values for a set of cohort x age at arrival x source country groups. We do this separately for each education level.[19] We combine these estimated PVEH values according to the proportion of a given cohort accounted for by a given age group from a given source country then combine the results according to the proportion from each source country group in the cohort. This creates fitted PVEH values for each cohort which we normalize to express the movements relative to the first cohort in our sample . In the first stage of the decomposition, we subtract from these relative immigrant cohort PVEH values the change in the PVEH for the matching native born cohort (again measured relative to the first cohort). The resulting counterfactual series shows the change in immigrant earnings that would have happened if the general changes for all new labour market entrants had not occurred. In the second stage, we recreate the counterfactual but use the source country proportions from the first cohort in creating the fitted earnings for all cohorts. Since we again subtract the native born cohort effects, the resulting counterfactual series shows what would have happened to immigrant PVEH values if neither the changes in general new entrant conditions

nor the changes in source country composition had occurred. In the third stage, we repeat this exercise but also hold the distribution across age at arrival groups constant at their initial period value. Comparing the second and third counterfactuals shows the impact of changes in the age at arrival distribution while holding the country composition and new entrant effects constant.

We present the results from the decomposition exercise conducted for the high school educated in Table 9a.. In the1980s, declines in earnings for all new entrants explain nearly 60% of the overall decline in PVEH across immigrant cohorts. This is in strong contrast to the results obtained with the standard specification earlier and to the types of conclusions drawn in earlier papers, i.e., that general macro conditions explain little of observed cross-cohort declines and, thus, that these declines largely represent declines in immigrant "skills". The large shifts in country composition described earlier also played a significant role in the 1980s, accounting for about 1/3 of the overall decline. In contrast, shifts in age composition across cohorts plays a very small role. In total, we can explain over 90% of the decline in the present value of earnings across the 1980s cohorts. New entrant effects and country composition shifts provide less complete answers for the 1990s, with the sum of effects accounting for about 2/3 of the decline. For the whole period, declines in the present value of earnings for all new entrants account for nearly half the total fall for high school immigrants while shifts in country composition account for just under 1/3. Overall, the results imply that much of the immigrant "problem" was actually a more general problem for new entrants to the labour market, though this is less true in the 1990s than the 1980s.

The decomposition for the university educated in the 1980s, shown in the first column of Table 9b, is similar to the high school decomposition except that country composition is of greater significance. For the 1990s, though, new entrant and source country effects work in opposite directions. University educated new entrants experience improvements in earnings in the 1990s such that new immigrants would be expected to have their PVEH increase by 10% in the absence of other changes. However, continuing shifts in country composition lead to offsetting changes in the overall PVEH. For the whole period, we again explain about 80% of the decline. For the university educated, though, new entrant effects play a much smaller role (explaining around 20% of the decline) compared to country shifts. Also, shifts toward younger age at arrival groups in the 1990s

offset these two declining factors to some extent.

Table 9c contains a decomposition of the overall cross-cohort movements in PVEH. To get the overall movements, we combine the previous PVEH values using the proportions of a given immigrant entry cohort with each education level. We then create an extra decomposition step in which we hold those proportions constant at their values for the 1980-82 cohort. The educational composition changes substantially over time, with the proportion who are university educated rising from .28 in the first cohort to .32 in the 1987-89 cohort to .39 in the last cohort. This occurs mostly at the expense of declines in the proportion with some post-secondary education. To aid in interpretation, we also plot the results of the decomposition in Figure 8. The results again point to new entrant and country composition effects providing quite a complete explanation for the 1980s decline. New entrant and country composition effects each account for nearly 50% of the decline. Shifts in the age at arrival and education compositions, in contrast, have limited effects. Results for the 1990s resemble those for the university educated. New entrant effects are offset by negative effects deriving from shifts in the country composition. Both age at arrival and education shifts had positive effects on PVEH values. The net effect is quite small (only -.02), leading to some very large proportion numbers associated with the various effects. For the period as a whole, new entrant effects account for .19 of the observed decline with source country accounting for another .69. Thus, together, these two forces explain almost 90% of the decline. These negative effects are offset by positive age and education shifts such that all factors together account for about 60% of the decline.

One element of immigrant entry earnings declines that is often discussed but is not directly addressed in our decomposition is changes in returns to foreign educational credentials (e.g. Reitz(2001)). We can get a measure of the impact of changing returns to foreign education by comparing our last counterfactual earnings declines for each of our education groups. Thus, if, after controlling for new entrant, country composition and age composition effects, the declines for the university educated are greater than those for the high school educated, we could attribute this extra decline to falls in returns to foreign education.[20] For the entire period, after accounting for new entrant, country and age composition effects, there is still a -.05 decline in high school educated immigrant earnings that are unaccounted for (calculated by taking the difference between the top

and bottom numbers of the third column in Table 9a). For the university educated the comparable number is -.04. Thus, changes in returns to foreign education account cannot account for any of the portion of the overall cross-cohort decline left unexplained by our decomposition.

The decomposition results in Tables 10 correspond to PVEH calculations in which we assume a discount rate of .1. However, this may not be the right discount rate for policy purposes. Politicians, worried about shorter term impressions among the electorate, may focus more heavily on the entry earnings outcomes. Alternatively, they may implicitly consider a longer horizon than that implied by a discount rate of .1. To investigate outcomes under these alternatives, we recreated our decomposition using discount rates of 1.0 and .06. Table 10 contains the results of the overall decomposition when the discount rate equals 1.0. Assuming this discount rate means, in fact, that we are examining movements in entry year earnings. The results for the 1980s are substantively similar to those in Table 9c: new entrant and country composition effects are of approximately equal magnitude and explain a majority of the decline in the decade. However, with r = 1.0, general new entrant effects play a very important role in the decomposition for both the 1990s and the period as a whole. Declines in native born new entrant earnings match the declines in immigrant entry earnings across the period quite well.

Table 11 contains decomposition results with r = .06. A comparison with Table 9c reveals that lowering the discount rate has virtually no effect on the decomposition in the 1980s. This is potentially surprising given that, as shown in Table A1, the lower rate raises x* value by over 2 years. By this point in the YSE profiles, however, the squared term in the YSE polynomial is having an impact and the various profiles flatten and become more parallel. As a result, relatively large changes in x* do not change the decomposition very much. The 1990s decomposition with r= .06 matches that for r=.1 very well in terms of country, age and education composition effects. However, it tends to inflate improvements related to general new entrant effects. This derives from relatively steep increases in the YSE for the university educated native born across the 1990s cohorts. Nonetheless, the conclusions are similar to those obtained with r = .1: new entrant effects explain about half the decline in PVEH across the 1980s cohorts and imply improvements in the 1990s that are offset by country composition effects.

VII Conclusions

Following discussions in Duleep and Regets(1992,2002) and Borjas(1999), we argue that immigrant earnings profiles in the host country should be viewed in the context of a life-cycle model of human capital acquisition. Within that context, we argue that the best comparison group defining the impact of general macro events on immigrants consists of native born workers who enter the host labour market at the same time as the immigrants. We present evidence suggesting that native born new entrants provide an appropriate comparison for both older and younger age at arrival immigrants. Further, we argue that a true representation of cross-cohort differences in immigrant contributions of human capital to the host economy must be done in the context of the present value of earnings in the host economy rather than, as is typically done, by comparing earnings at the time of arrival.

We examine the importance of these comparison group and earnings measure decisions using a unique Canadian dataset that matches immigrant arrival records with tax data. Using a standard estimation approach we find, as is well known, that entry earnings for successive immigrant cohorts fell substantially over the 1980s. Further, we find that entry earnings fell even faster in the 1990s. The standard approach also yields a common conclusion in the literature: that general macro events explain little of the cross-cohort decline. This leads to the implication that much of the decline is immigrant specific, relating perhaps to declines in immigrant skill levels. However, when we use native born new entrants, also organized into cohorts, as our comparison, we find that general earnings patterns for new entrants explain a substantial portion (approximately 50% in the 1980s) of the immigrant cross-cohort changes. Moreover, focussing on present values rather than entry earnings, we find that the 1990s cohorts were not dramatically worse than the 1980s cohorts. Shifts in the country composition of the inflow also play a large role in cross-cohort movements, with these shifts plus the general new entrant effects accounting for over 90% of the 1980s decline. Zero returns to foreign experience in terms of entry earnings for immigrants from non-English speaking, non-European immigrants play an important role in this, as shifts in composition toward these countries leads to returns to foreign experience falling from substantial positive values in the early 1980s to essentially zero in the 1990s. This points to potential policy

concerns over transferability of experience acquired human capital, though steeper post-arrival earnings profiles for these workers suggest that some transfer may occur with a delay . But the fact that general new entrant effects account for so much of the immigrant earnings patterns indicates that part of our concern over immigrant earnings should be redirected to the broader issue of difficulties facing all new entrants.

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Appendix A: Establishing Values for the Present Value Crossing Point, x*

To obtain values for x*, we derive the present value for an earnings path given by equation 3) with R_{st} not varying over time. We set that present value equal to y_e/r (the present value of the constant earnings profile) and solve for an expression for y_e. Setting that expression equal to the right hand side of 3) allows us to solve for x*.[21] The x* expression is a function of ρ, r, T (the time remaining in working life), $(\rho\gamma_0 + \gamma_1)$, and $(-0.5\ \rho\gamma_1)$. The latter two terms correspond to the experience and experienced squared coefficients in a standard earnings regression (see 4)). We use estimated values for those two coefficients for the native born cohort entering the labour market in the middle of our sample period (the 1990-92 cohort). We first assume that ρ takes a value of 0.1 (a standard rate of return on human capital from the schooling literature) and solve for values of γ_0 and γ_1 using the estimated coefficient values and the expressions for those coefficients from equation 4). Table A1 presents calculated values for x* and the value x* would take if the earnings profile were linear for various combinations of underlying parameters.

The first rows of Table 1 indicate that x* varies very little with ρ, γ_0 and γ_1. It also does not vary with differing values of H_{0c} and μ_c, which do not enter the x* formula. This means we can compare earnings at the same x* value for immigrant and native born cohorts who are facing and/or choosing different basic parameter values in their human capital decisions. In contrast, the x* value falls by over a year when time remaining in the working life is cut from 40 to 20 years. This will be important when we consider older age at arrival immigrant cohorts. It also changes with changes in r, though it is worth noting that the curvature in the experience profile results in x* varying much less with r than one might expect from the rough rule of assuming x* equals 1/r. Combining Mincer's suggestion of r=.1 with T=40 implies an x* value of approximately 8 years, which is the value we use in our calculations for native born cohorts. A final complication is introduced by the dummy variable corresponding to the first year after arrival in the immigrant earnings specification. It is easy to show that this shifts x* in a manner directly related to the size of the estimated first year effect. Since we allow the first year effect to vary by cohort, age of entry and, ultimately, region of origin, we recalculate x* for each immigrant sub-group defined by these dimensions. This typically results in x* being reduced by about half a year or less relative to calculations that do not take the first year effect into account. The x* values for immigrants vary from about 7.8 (for immigrants who are in the youngest age at arrival group and have small first year effects) to about 6.5 (for older immigrants who have large first year effects).

Table A:1Calculated Present Value Cross Point (x*) Values

ρ	γ_0	γ_1	r	T	x*	1/r
0.1	0.6	0.03	0.1	40	7.64	10
0.12	0.6	0.03	0.1	40	7.51	10
0.08	0.6	0.03	0.1	40	7.8	10
0.06	0.6	0.03	0.1	40	8.01	10
0.1	0.8	0.03	0.1	40	8.01	10
0.1	0.6	0.02	0.1	40	8.14	10
0.1	0.6	0.03	0.08	40	8.69	12.5
0.1	0.6	0.03	0.06	40	9.94	16.7
0.1	0.6	0.03	0.1	30	7.29	10
0.1	0.6	0.03	0.1	20	6.3	10

Table 1
Standard Log Wage Regressions

Variables	Standard Regression (Immigrants + Natives)	Regression with YSE Varying by Cohort (Immigrants + Natives)	Regression with YSE Varying by Cohort (Immigrants Only)
Immigrant Variables			
Immigrant Dummy	-.22 (.019)*	-.12 (.025)*	-
YSE	.065 (.0040)*	.035 (.0058)*	.052 (.0083)*
YSE Squared	-.0039(.00024)*	-.0014 (.00031)*	-.0020 (.00046)*
1983-86 Cohort	-.18 (.0087)*	-.22 (.020)*	-.28 (.033)*
1987-89 Cohort	-.16 (.012)*	-.21 (.028)*	-.25 (.036)*
1990-92 Cohort	-.35 (.016)*	-.54 (.033)*	-.61 (.042)*
1993-96 Cohort	-.41 (.023)*	-.64 (.044)*	-.71 (.046)*
YSE - Cohort Interactions			
1983-86 Cohort	-	.0068 (.0026)*	.0078 (.0042)+
1987-89 Cohort	-	.0089 (.0044)*	.0071 (.0058)
1990-92 Cohort	-	.048 (.0068)*	.043 (.0091)*
1993-96 Cohort	-	.10 (.016)*	.094 (.019)*
Other Controls			
High School Education	-.23 (.0065)*	-.23 (.0064)*	-
University Education	.26 (.0082)*	.26 (.0078)*	-
Experience	.034 (.0015)*	.034 (.0015)*	-
Experience Squared	-.00057 (.000032)*	-.00057 (.000031)*	-
Year Dummies			
1982	-.077 (.026)*	-.082 (.023)*	-
1984	-.13 (.024)*	-.13 (.022)*	-
1985	-.11 (.024)*	-.10 (.022)*	-
1986	-.12 (.024)*	-.11 (.023)*	-
1987	-.11 (.024)*	-.097 (.022)*	-
1988	-.078 (.024)*	-.067 (.022)*	-
1989	-.082 (.024)*	-.071 (.022)*	-

1990	-.11 (.024)*	-.094 (.023)*	-
1991	-.18 (.024)*	-.16 (.022)*	-
1992	-.22 (.023)*	-.20 (.022)*	-
1993	-.24 (.024)*	-.21 (.023)*	-
1994	-.22 (.023)*	-.20 (.022)*	-
1995	-.20 (.024)*	-.19 (.022)*	-
1996	-.20 (.024)*	-.20 (.022)*	-
1997	-.16 (.024)*	-.19 (.023)*	-
Detrended Unemployment Rate	-	-	-.027 (.0040)*
Constant	10.23 (.027)*	10.22 (.025)*	10.28 (.034)*
# Observations	2442	2442	1800
R^2	.85	.86	.64

* (+) Significantly different from zero at the 5 (10)% level of significance.
Standard errors in parentheses.
All regressions are estimated from yearxcohortxeducationxage -at - arrival cell means obtained from first stage regressions that included provincial dummy variable. The first stage regressions were run separately for each natives and immigrants and by education category. Standard errors are White standard errors. Note that the omitted category for the education variables is high school, the omitted cohort group is 1980-82, and the omitted year in estimating the year effects is 1981.

Table 2
Present Value Cohort Effects for Immigrant and Native Born Cohorts

Immigrants			
Cohort	High School	Post-Secondary	University
1983-86	-0.095 (.012)*	-0.34 (.014)*	-0.19 (.017)*
1987-89	-0.14 (.014)*	-0.20 (.013)*	-0.24 (.014)*
1990-92	-0.28 (.018)*	-0.27 (.018)*	-0.32 (.020)*
1993-96	-0.17 (.063)*	-0.11 (.20)	0.084 (.70)
Native Born			
Cohort	High School	Post-Secondary	University
1983-86	-0.067 (.013)*	-0.044 (.017)*	-0.090 (.025)*
1987-89	-0.11 (.019)*	-0.063 (.018)*	-0.14 (.033)*
1990-92	-0.14 (.041)*	-0.14 (.032)*	-0.10 (.043)*
1993-96	-0.046 (.16)	0.12 (.082)	-0.048 (.10)

Log differences compared to 1980-82 cohort in each case. Based on estimates in Table 4. Using an $x^* = 7$.
* (+) Significantly different from zero at the 5 (10)% level of significance.
Standard errors in parentheses.

Table 3
Cohort Based Regression Estimates of Average Log Annual Earnings:
Native Born Men by Education Group

Variables	**High School Educated**	**University Educated**
Constant	10.13 (.024)*	10.20 (.071)*
Cohort Dummies:		
1983-86 Cohort	-.11 (.024)*	-.18 (.062)*
1987-89 Cohort	-.16 (.030)*	-.074 (.083)
1990-92 Cohort	-.28 (.037)*	-.30 (.084)*
1993-96 Cohort	-.20 (.053)*	-.29 (.078)*
Years Since Labour Market Entry (YSE)	.026 (.0063)*	.091 (.016)*
YSE Squared	-.00059 (.00035)+	-.0028 (.00080)*
Cohort - YSE Interactions		
1983-86 Cohort	.0063 (.0033)+	.012 (.0073)+
1987-89 Cohort	.0080 (.0051)	-.010 (.013)
1990-92 Cohort	.019 (.0096)*	.028 (.014)*
1993-96 Cohort	.021 (.028)	.034 (.022)
Detrended Unemploy. Rate	-.022 (.0037)*	.0051 (.0084)
R^2	0.8	0.83

Notes: * (+) significantly different from zero at the 5 (10) % level of significance.

Table 4a
Cohort Based Regression Estimates of Average Log Annual Earnings:
Differences Between Immigrant and Native Born Men With High School Education

Variables	Age 25-29 at Entry	Age 30-34 at Entry	Age 35-39 at Entry	Age 40-44 at Entry
Immigrant Dummy	-.16 (.067)*	-.18 (.050)*	.0060 (.075)	.035 (.068)
First Year Dummy	-.049 (.054)	.016 (.035)	-.066 (.076)	-.060 (.097)
Cohort Dummies:				
1983-86 Cohort	-.044 (.051)	-.016 (.052)	.0010 (.062)	.0088 (.071)
1987-89 Cohort	-.068 (.071)	.19 (.058)*	-.024 (.083)	-.14 (.069)*
1990-92 Cohort	-.13 (.072)+	-.12 (.064)+	-.24 (.083)*	-.30 (.10)*
1993-96 Cohort	-.20 (.097)*	-.28 (.080)*	-.49 (.097)*	-.26 (.14)+
Years Since Canadian Labour Market Entry (YSE)	.018 (.014)	.034 (.012)*	-.0037 (.019)	-.012 (.019)
YSE Squared	-.0012 (.00067)+	-.0019 (.00073)*	-.00037 (.0010)	-.00019 (.0011)
Cohort - YSE Interactions				
1983-86 Cohort	.0063 (.0059)	-.0032 (.0062)	-.0070 (.0078)	-.0036 (.010)
1987-89 Cohort	.0045 (.010)	-.030 (.0089)	.00072 (.013)	.019 (.011)
1990-92 Cohort	-.0017 (.014)	-.0029 (.015)	.0097 (.017)	.028 (.022)
1993-96 Cohort	.0098 (.036)	-.0069 (.033)	.061 (.037)+	-.050 (.054)
Cohort - First Year Dummy Interactions				
1983-86 Cohort	-.078 (.051)	-.071 (.048)	-.011 (.12)	-.047 (.11)
1987-89 Cohort	.055 (.074)	-.072 (.054)	-.097 (.13)	.096 (.12)
1990-92 Cohort	-.049 (.059)	-.034 (.060)	.0079 (.087)	.0067 (.11)
1993-96 Cohort	-.026 (.066)	-.034 (.051)	-.064 (.085)	-.14 (.12)
Detrended Unemploy. Rate	-.019 (.0054)*	-.012 (.0064)+	-.017 (.0085)	-.0016 (.0098)
R^2	0.92	0.89	0.86	0.83

Notes: * (+) significantly different from zero at the 5 (10) % level of significance. The reported coefficients correspond to interactions between the relevant variables and an immigrant dummy variable.

Table 4b
Cohort Based Regression Estimates of Average Log Annual Earnings:
Differences Between Immigrant and Native Born Men With University Education

Variables	Age 25-29 at Entry	Age 30-34 at Entry	Age 35-39 at Entry	Age 40-44 at Entry
Immigrant Dummy	-.059 (.098)	.23 (.089)*	.42 (.080)*	.53 (.10)*
First Year Dummy	.10 (.056)+	.056 (.054)	.032 (.080)	-.045 (.098)
Cohort Dummies:				
1983-86 Cohort	-.048 (.079)	-.0086 (.074)	-.049 (.083)	.051 (.10)
1987-89 Cohort	-.080 (.11)	-.15 (.097)	-.31 (.094)*	-.37 (.11)*
1990-92 Cohort	-.26 (.11)*	-.30 (.10)*	-.47 (.11)*	-.62 (.11)*
1993-96 Cohort	-.072 (.12)	-.34 (.12)*	-.68 (.10)*	-.59 (.19)*
Years Since Canadian Labour Market Entry (YSE)	.0096 (.021)	-.035 (.019)+	-.054 (.019)*	-.054 (.023)*
YSE Squared	-.00035 (.0010)	.0013 (.00098)	.0018 (.00099)+	-.0007 (.0011)
Cohort - YSE Interactions				
1983-86 Cohort	-.0052 (.0091)	-.0089 (.0087)	-.0054 (.0094)	-.022 (.011)*
1987-89 Cohort	.0091 (.016)	.014 (.015)	.022 (.014)	.0097 (.017)
1990-92 Cohort	.013 (.019)	.017 (.018)	.021 (.020)	.018 (.019)
1993-96 Cohort	-.025 (.035)	.051 (.033)	.11 (.033)*	.0071 (.054)
Cohort - First Year Dummy Interactions				
1983-86 Cohort	-.17 (.050)*	-.20 (.055)*	-.088 (.11)	.036 (.11)
1987-89 Cohort	-.14 (.067)*	-.14 (.063)*	-.15 (.097)	-.081 (.12)
1990-92 Cohort	-.15 (.064)*	-.17 (.063)*	-.12 (.12)	.047 (.12)
1993-96 Cohort	-.21 (.072)*	-.26 (.086)*	-.096 (.088)	-.17 (.16)
Detrended Unemploy. Rate	-.032 (.0099)*	-.016 (.0092)+	-.033 (.010)*	-.015 (.012)
R^2	0.94	0.93	0.91	0.88

Notes: * (+) significantly different from zero at the 5 (10) % level of significance.The reported coefficients correspond to interactions between the relevant variables and an immigrant dummy variable.

Table 5
Differences in Present Values of Earnings
Immigrant Cohorts Relative to Matching Native Born Cohorts

		High School		
Cohort	25-29 at Arrival	30-34 at Arrival	35-39 at Arrival	40-44 at Arrival
1980-82	-0.094 (.016)*	-0.045 (.020)*	-0.080 (.034)*	-0.14 (.039)*
1983-86	-0.094 (.017)*	-0.089 (.020)*	-0.13 (.027)*	-0.16 (.038)*
1987-89	-0.13 (.025)*	-0.083 (.028)*	-0.11 (.035)*	-0.16 (.030)*
1990-92	-0.24 (.057)*	-0.19 (.060)*	-0.26 (.059)*	-0.26 (.080)*
1993-96	-0.22 (.22)	-0.38 (.21)+	-0.15 (.22)	-0.76 (.28)*
		University		
Cohort	25-29 at Arrival	30-34 at Arrival	35-39 at Arrival	40-44 at Arrival
1980-82	-0.015 (.015)	0.020 (.055)	0.089 (.034)*	0.070 (.019)*
1983-86	-0.12 (.027)*	-0.071 (.023)*	-0.011 (.011)	-0.044 (.069)
1987-89	-0.033 (.041)	-0.027 (.029)	-0.061 (.032)+	-0.22 (.048)*
1990-92	-0.20 (.061)*	-0.18 (.050)*	-0.26 (.052)*	-0.46 (.057)*
1993-96	-0.31 (.18)+	0.0087 (.050)	0.17 (.17)	-0.52 (.23)*

* (+) Significantly different from zero at the 5 (10)% level of significance.
Standard errors in parentheses.

Table 6
Proportion of Immigrants from US, UK, Australia or New Zealand by Cohort for Different Schooling Levels

Cohort	High School	Post-Secondary	University
1980-82	0.23	0.49	0.44
1983-86	0.13	0.19	0.31
1987-89	0.11	0.26	0.17
1990-92	0.068	0.18	0.11
1993-96	0.068	0.13	0.11

Source: Calculations using IMDB dataset.

Table 7
Differences in Present Values of Earnings
Immigrant Cohorts Relative to Matching Native Born Cohorts
By Region of Origin
High School

English				
Cohort	25-29 at Arrival	30-34 at Arrival	35-39 at Arrival	40-44 at Arrival
1980-82	0.35 (.026)*	0.24 (.026)*	0.16 (.026)*	0.34 (.032)*
1983-86	0.11 (.040)*	0.036 (.032)	0.34 (.043)*	0.080 (.053)
1987-89	0.10 (.043)*	0.28 (.042)*	0.13 (.033)*	0.18 (.066)*
1990-92	0.36 (.082)*	0.18 (.087)*	-0.082 (.18)	0.29 (.10)*
1993-96	-0.018 (.25)	0.25 (.28)	-0.29 (.53)	0.77 (.45)+
		Northern	**European**	
Cohort	25-29 at Arrival	30-34 at Arrival	35-39 at Arrival	40-44 at Arrival
1980-82	-0.030 (.021)	0.014 (.030)	0.035 (.010)*	0.035 (.014)*
1983-86	-0.087 (.099)	-0.12 (.093)	-0.19 (.95)	0.064 (.031)*
1987-89	-0.094 (.031)*	-0.11 (.12)	-0.12 (.17)	0.044 (.028)+
1990-92	-0.045 (.070)	-0.10 (.58)	-0.21 (1.48)	-0.18 (.16)
1993-96	-0.49 (.57)	-0.39 (1.05)	-0.51 (.53)	-0.013 (.090)
		Other		
Cohort	25-29 at Arrival	30-34 at Arrival	35-39 at Arrival	40-44 at Arrival
1980-82	-0.16 (.017)*	-0.15 (.019)*	-0.18 (.030)*	-0.27 (.029)*
1983-86	-0.14 (.017)*	-0.16 (.018)*	-0.23 (.025)*	-0.29 (.041)*
1987-89	-0.14 (.025)*	-0.14 (.026)*	-0.14 (.041)*	-0.25 (.029)*
1990-92	-0.24 (.054)*	-0.25 (.056)*	-0.26 (.065)*	-0.32 (.075)*
1993-96	-0.19 (.20)	-0.39 (.22)+	-0.19 (.23)	-0.69 (.27)*

* (+) Significantly different from zero at the 5 (10)% level of significance.
Standard errors in parentheses.

Table 8
Differences in Present Values of Earnings
Immigrant Cohorts Relative to Matching Native Born Cohorts
By Region of Origin
University

English				
Cohort	25-29 at Arrival	30-34 at Arrival	35-39 at Arrival	40-44 at Arrival
1980-82	0.24 (.027)*	0.26 (.027)*	0.31 (.028)*	0.46 (.026)*
1983-86	0.15 (.026)*	0.18 (.027)*	0.35 (.030)*	0.35 (.035)*
1987-89	0.23 (.049)*	0.38 (.039)*	0.29 (.042)*	0.51 (.052)*
1990-92	0.25 (.10)*	0.44 (.072)*	0.28 (.086)*	0.24 (.11)*
1993-96	-0.25 (.22)	0.32 (.29)	0.69 (.32)*	1.038 (.25)*
		Northern	**European**	
Cohort	25-29 at Arrival	30-34 at Arrival	35-39 at Arrival	40-44 at Arrival
1980-82	0.010 (.058)	0.20 (.029)*	0.26 (.035)*	0.20 (.033)*
1983-86	-0.026 (.047)	0.25 (.031)*	0.26 (.041)*	0.29 (.046)*
1987-89	0.26 (.044)*	0.27 (.050)*	0.20 (.043)*	0.12 (.041)*
1990-92	0.16 (.066)*	0.076 (.078)	-0.32 (.11)*	-0.066 (.25)
1993-96	-0.056 (.28)	0.46 (.17)*	-0.25 (.28)	-0.052 (.74)
Other				
Cohort	25-29 at Arrival	30-34 at Arrival	35-39 at Arrival	40-44 at Arrival
1980-82	-0.13 (.022)*	-0.10 (.024)*	-0.12 (.029)*	-0.17 (.046)*
1983-86	-0.23 (.026)*	-0.18 (.028)*	-0.16 (.033)*	-0.30 (.041)*
1987-89	-0.092 (.042)*	-0.11 (.045)*	-0.17 (.043)*	-0.34 (.045)*
1990-92	-0.22 (.057)*	-0.25 (.058)*	-0.39 (.053)*	-0.56 (.052)*
1993-96	-0.26 (.17)	-0.058 (.34)	-0.081 (.20)	-0.65 (.19)*

* (+) Significantly different from zero at the 5 (10)% level of significance.
Standard errors in parentheses.

Table 9a
Counterfactual Results, High School

Component	1980s (1980-82 to 1987-89 Cohort)	1990s (1987-89 to 1993-96 Cohort)	Whole Period (1980-82 to 1993-96 Cohort)
Total	-.17 (1.0)	-.10 (1.0)	-.27 (1.0)
New Entrant Effect	-.097 (.57)	-.027 (.26)	-.12 (.45)
Country Composition Effect	-.057 (.34)	-.027 (.25)	-.084 (.31)
Age at Arrival Composition Effect	-.0031 (.018)	-.012 (.11)	-.015 (.055)
Sum of Counterfactual Effects	-.16 (.93)	-.066 (.66)	-.22 (.81)

Number in parentheses is proportion of the total decline accounted for by the given component.

Table 9b
Counterfactual Results, University

Component	1980s (1980-82 to 1987-89 Cohorts)	1990s (1987-89 to 1993-96 Cohorts)	Whole Period (1980-82 to 1993-96 Cohorts)
Total	-.28 (1.0)	.06 (1.0)	-.21 (1.0)
New Entrant Effect	-.15 (.53)	.10 (1.78)	-.045 (.21)
Country Composition Effect	-.14 (.49)	-.068 (-1.21)	-.20 (.94)
Return to Foreign Experience Effect	.0023 (-.0085)	.069 (1.20)	.071 (-.33)
Sum of Counterfactual Effects	-.29 (1.01)	.10 (1.77)	-.18 (.83)

Number in parentheses is proportion of the total decline accounted for by the given component.

Table 9c
Counterfactual Results, All Education Groups

Component	1980s	1990s	Whole Period
Total	-.21 (1.0)	-.024 (1.0)	-.23 (1.0)
New Entrant Effect	-.11 (.51)	.053 (-2.21)	-.053 (.23)
Country Composition Effect	-.088 (.42)	-.061 (2.56)	-.15 (.65)
Age at Arrival Composition Effect	-.0017 (.0085)	.025 (-1.06)	.023 (-.10)
Education Composition Effect	.0085 (-.042)	.039 (-1.62)	.047 (-.21)
Sum of Counterfactual Effects	-.19 (.90)	.056 (-2.33)	-.14 (.59)

Number in parentheses is proportion of the total decline accounted for by the given component.

Table 10
Counterfactual Results, All Education Groups
Discount Rate = 1.0

Component	1980s	1990s	Whole Period
Total	-.30 (1.0)	-.42 (1.0)	-.72 (1.0)
New Entrant Effect	-.12 (.39)	-.25 (.59)	-.37 (.51)
Country Composition Effect	-.11 (.37)	-.056 (.13)	-.17 (.23)
Return to Foreign Experience Effect	.011 (-.037)	-.014 (.032)	-.0025 (.0035)
Education Composition Effect	.0017 (-.0057)	.0050 (-.012)	.00067 (-.0093)
Sum of Counterfactual Effects	-.22 (.72)	-.31 (.74)	-.54 (.74)

Number in parentheses is proportion of the total decline accounted for by the given component.

Table 11
Counterfactual Results, All Education Groups
Discount Rate = 0.06

Component	1980s	1990s	Whole Period
Total	-.21 (1.0)	.074 (1.0)	-.13 (1.0)
New Entrant Effect	-.10 (.49)	.11 (1.44)	.0054 (-.041)
Country Composition Effect	-.086 (.42)	-.056 (-.76)	-.14 (1.07)
Return to Foreign Experience Effect	-.010 (.049)	.037 (.50)	.027 (-.20)
Education Composition Effect	.010 (-.047)	.043 (.58)	.053 (-.39)
Sum of Counterfactual Effects	-.19 (.91)	.13 (1.81)	-.055 (.42)

Number in parentheses is proportion of the total decline accounted for by the given component.

Endnotes

1. It is, of course, possible that it is the immigrant inflows themselves that are generating the worsening outcomes for all labour market entrants (see Card(2001) for an examination of this issue for the US). We do not address this issue in this paper.

2. Movements in these averages will partly reflect selection through emigration. We do not attempt to address this issue here

3. See Antecol et. al. (2003) for a discussion of the impact of different immigration and labour market policy regimes on immigrant experiences in host economies.

4. These regressions were actually run inside Statistics Canada by Craig Dougherty of Citizenship and Immigration Canada. We are very grateful for Craig's help in this and other elements of the project.

5.In the empirical work below we estimate separate experience profiles by schooling level, which could be represented here by a subscript, s, on the γ parameters.

6. Note that parameters are not indexed by s from this point forward since our definition of cohort involves s and, hence, schooling levels will be captured in the cohort index. In our empirical work, we allow for completely separate earnings-experience profiles by schooling level, implying that all of the parameters in the underlying model vary with s.

7.It is also possible that immigrants differ in their ability to learn, as captured in the ρ parameter above. However, differences in ρ imply earnings-experience profiles with different slopes but the same present value in these type of models so they cannot be the source of differences in the present value of lifetime earnings, which is what we define as relevant cohort effects below.

8. Note that we model adaptation to the host economy by multiplying θ_c, the extent to which cohort c's source country human capital is ultimately transferrable to Canada, by a cumulative distribution function evaluated at x. The latter function takes values running from a base value at time of entry (x=0) given by $(1 - \exp(-\lambda_{0c}^{I}))$ up to a value of 1 as x increases. Thus, the extent which a cohort can transfer its human capital at arrival depends on the λ_{0c}^{I} parameter and the rate at which it adapts after arrival depends on λ_{1c}^{I}. We would like to include the λ_{0c}^{I} related effect in the regression intercept and allow the post-arrival profile to reflect λ_{1c}^{I}. Given our specifications, we cannot separate the components cleanly and so include $\ln(1 - \exp(-\lambda_{0c}^{I}))$ in the intercept and then subtract it from the adjustment function to get a term capturing the post-arrival effects.

9. We maintain the s subscript on R because we are assuming that skill prices movements over time are the same for different entry cohorts apart from issues related to adaptability to the host economy. This assumption of schooling related returns to human capital that essentially may differ across cohorts in levels (because of differences in θ_c) but are similar in over-time movements appears to us to fit with the results in Card and Lemieux(2001), who find evidence of differences in returns to schooling related to cohort size but also find that the elasticity of substitution among cohorts is very high.

10. See Green and Riddell(2002) for a discussion of the IALS data. The result that literacy does not vary with age mirrors their finding that it does not vary with Mincerian experience.

11. This approach can be interpreted, instead, as providing an alternative point of comparison given that there are reasons to distrust comparisons of entry earnings.

12.Experimenting with higher values of x* changes these results very little for the 1980s cohorts since their profiles are nearly parallel shifts down relative to the first cohort profile, but does reduce the difference of the 1990-92 cohort PVEH relative to that of the first cohort.

13. These figures are constructed in the same way as figure 1, i.e., as fitted profiles from a regression including a detrended unemployment variable.

14. In calculating these numbers we assume that the 25-29 age at arrival group has 40 years left to earn in the Canadian economy, the 30-34 age group has 35 years, and the 35-39 and 40-44 age groups have 30 and 25 years respectively. We calculate the cross-over points based on these working life numbers. We also generate PVEH values adjusting for the remaining working life. In particular, we multiply the earnings value at the cross-over point by $(1 - \exp(-rT))/r$, where T is the working life remaining and we set $r = .1$.

15. We know weeks worked in the previous year and use this to pro-rate the reported earnings so that they are on an annualized basis.

16. Potentially, we could use this data to construct "job entry" cohorts, i.e., groups of workers who started their jobs in a given period. Older job starters could then be used as a benchmark for older age-at-arrival immigrants. However, tenure is not reported as a continuous variable in the public use version of the SCF, making such an exercise impossible.

17.The proportion of immigrants from these countries in our sample are higher than those seen in tables on the source country composition of the total immigrant inflow because we select for prime-age males who have positive earnings and because immigrants from other source countries tend to have larger accompanying families.

18. Canada's immigrant selection system cannot provide an explanation for these patterns since university educated immigrants from these countries are virtually guaranteed to get enough points to obtain entry.

19. We recalculate the cross-over YSE value, x*, separately for each group, using their estimated year of arrival effect.

20. Note that when we remove the native born cohort effects we remove cross-cohort movements in educational returns for the native born. Thus, our measure will represent the added movements in returns to foreign education.

21. Note that x* is solved for from a quadratic formula and so has two solutions corresponding to the two roots. We use the smaller of the two roots in each case because the curvature of the earnings profile implies that the x* value associated with the larger root is typically beyond the end of immigrant or native born working lives.

Figure 1: Earnings – Canadian Experience Profiles by Entry Cohort
All Male Immigrants

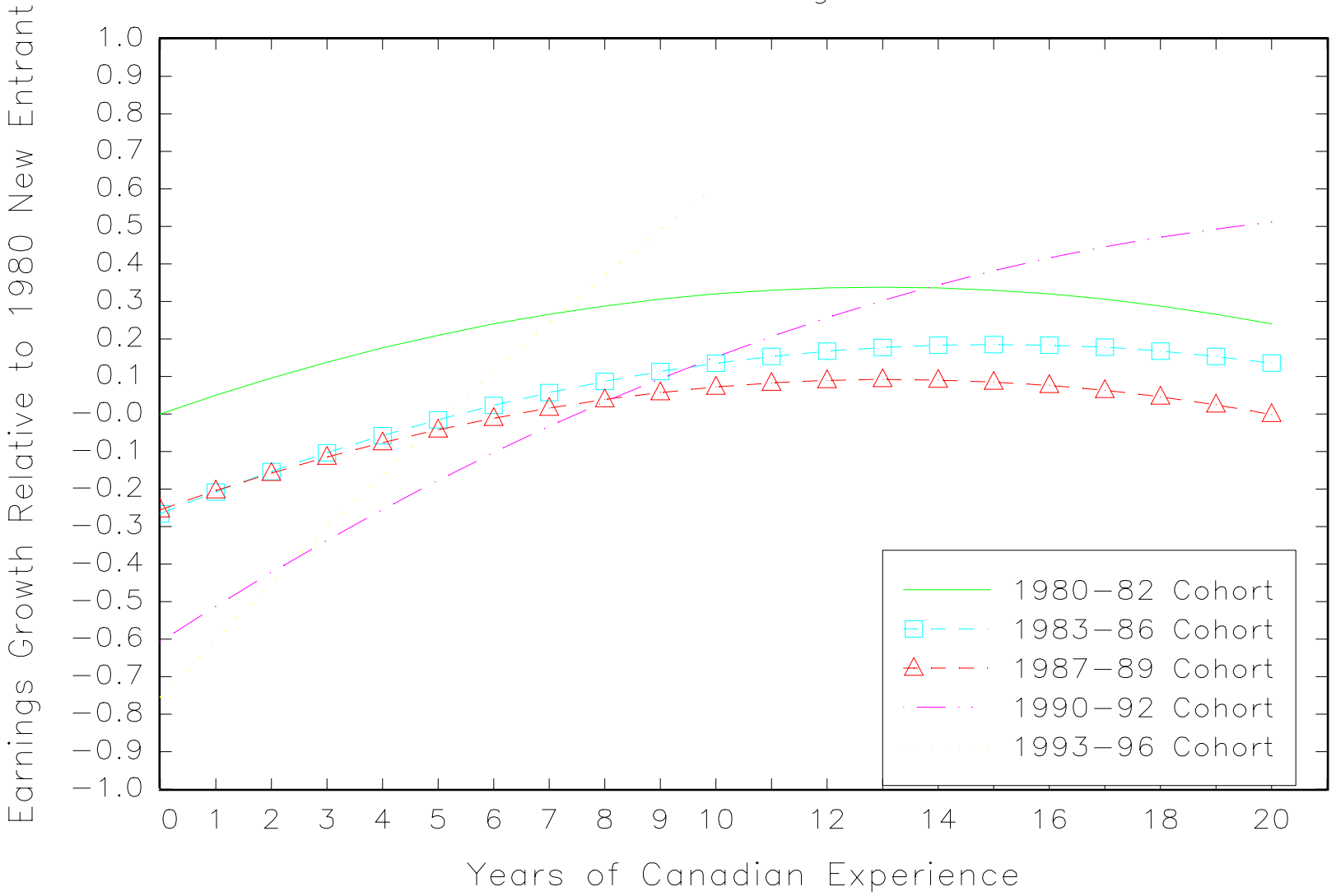


Figure 2a:LEarnings – Canadian Experience Profiles by Entry Cohort
Immigrants with High School Education

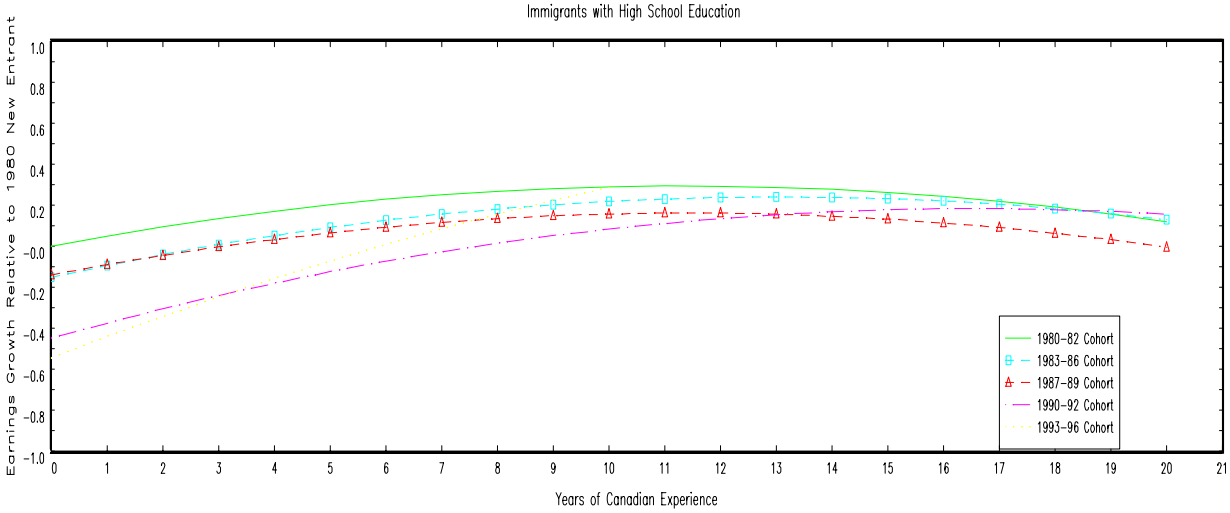


Figure 2b:LEarnings – Canadian Experience Profiles by Entry Cohort
Immigrants with Post-Sec. Education

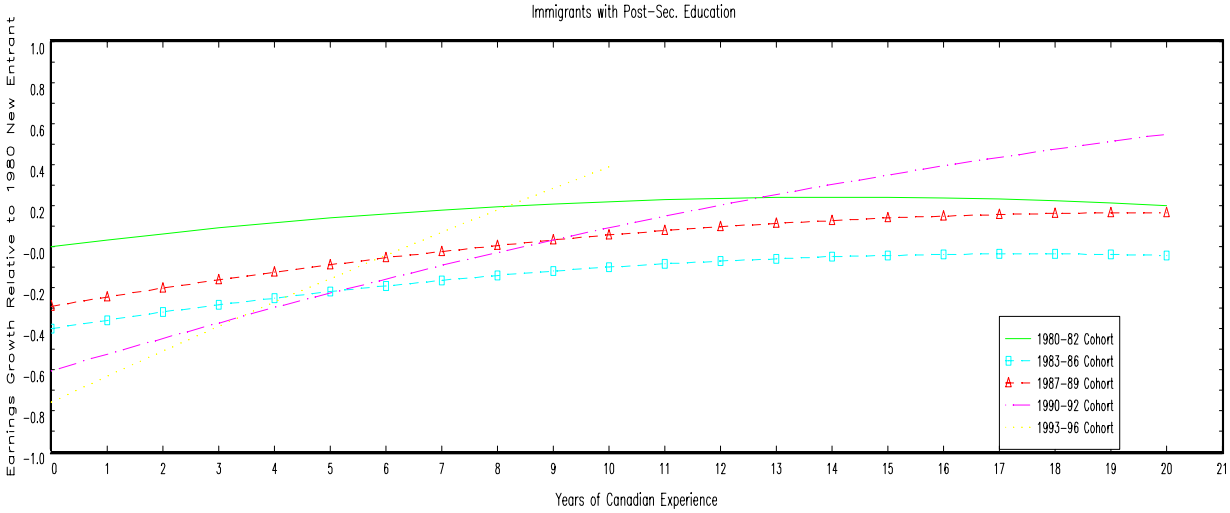


Figure 2c:LEarnings – Canadian Experience Profiles by Entry Cohort
Immigrants with University Education

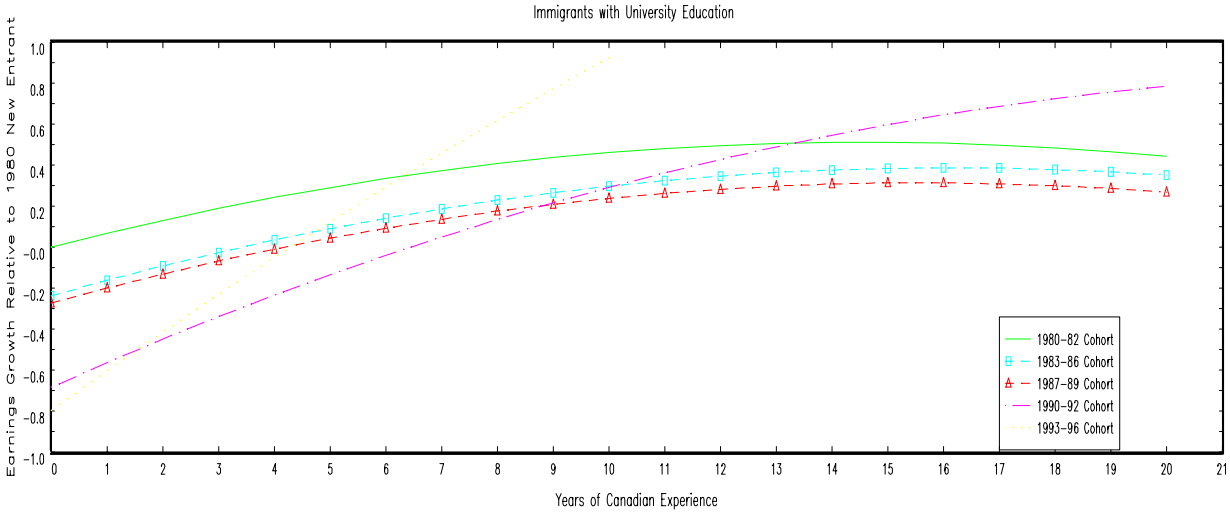


Figure 3a: Earnings – Canadian Experience Profiles by Entry Cohort
Native Born with High School Education

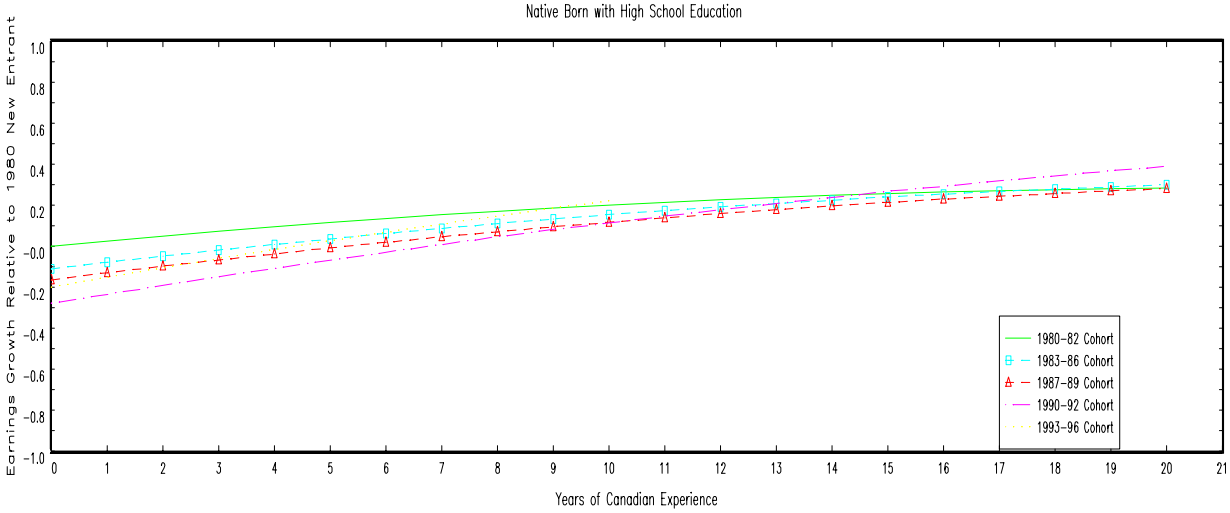


Figure 3b: Earnings – Canadian Experience Profiles by Entry Cohort
Native Born with Post-Sec. Education

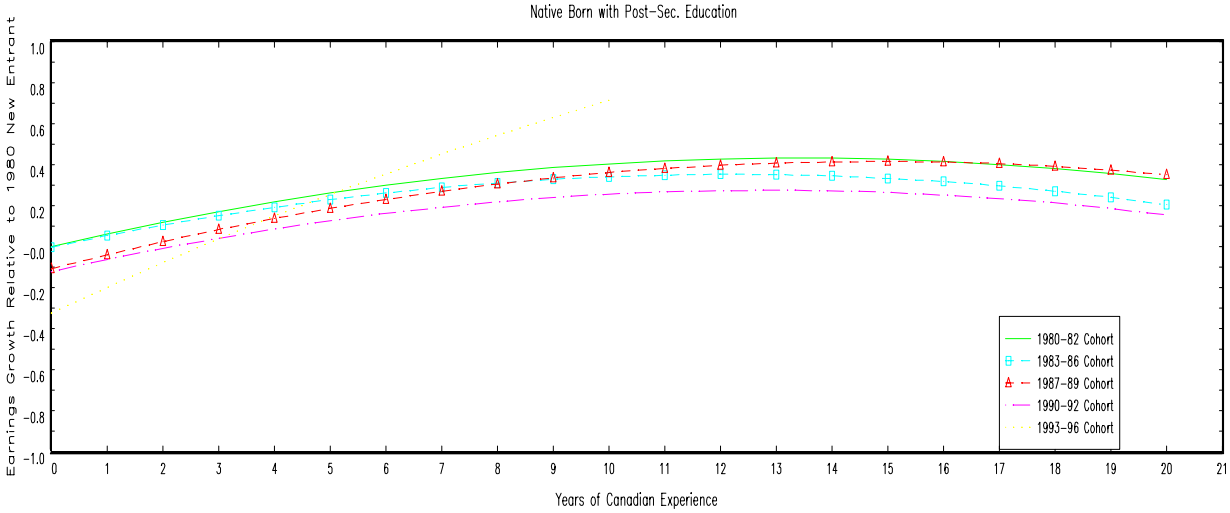


Figure 3c: Earnings – Canadian Experience Profiles by Entry Cohort
Native Born with University Education

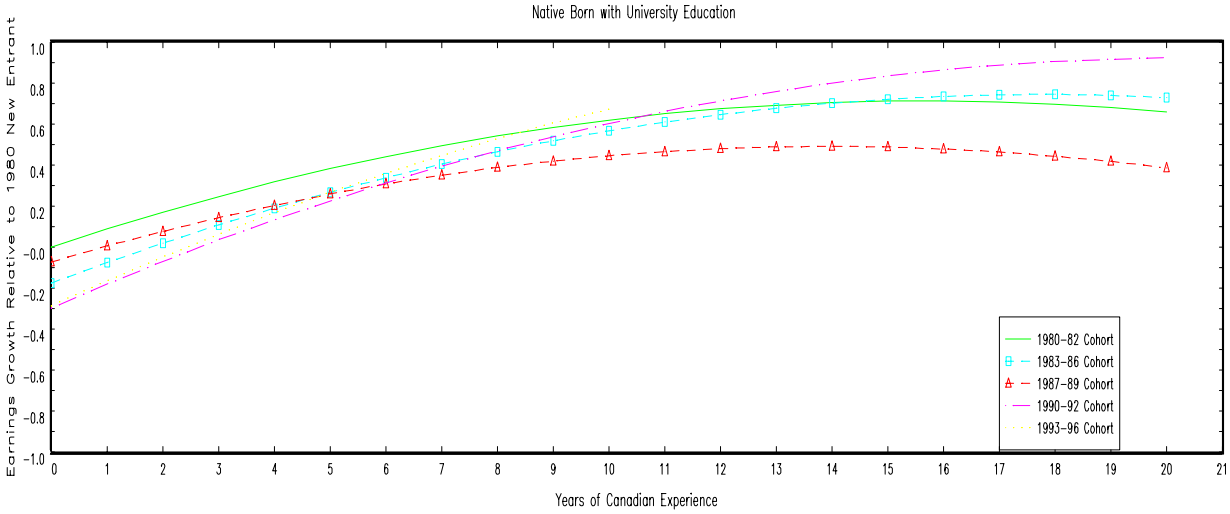
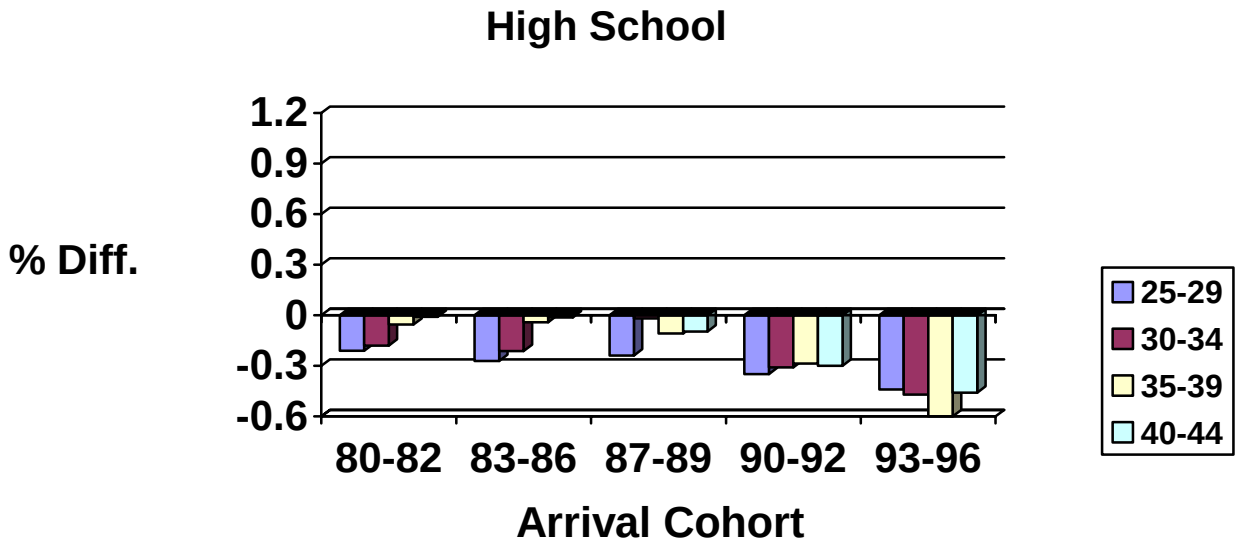


Figure 4
Immigrant/Native-Born Log Earnings Differences
In First Year after Arrival



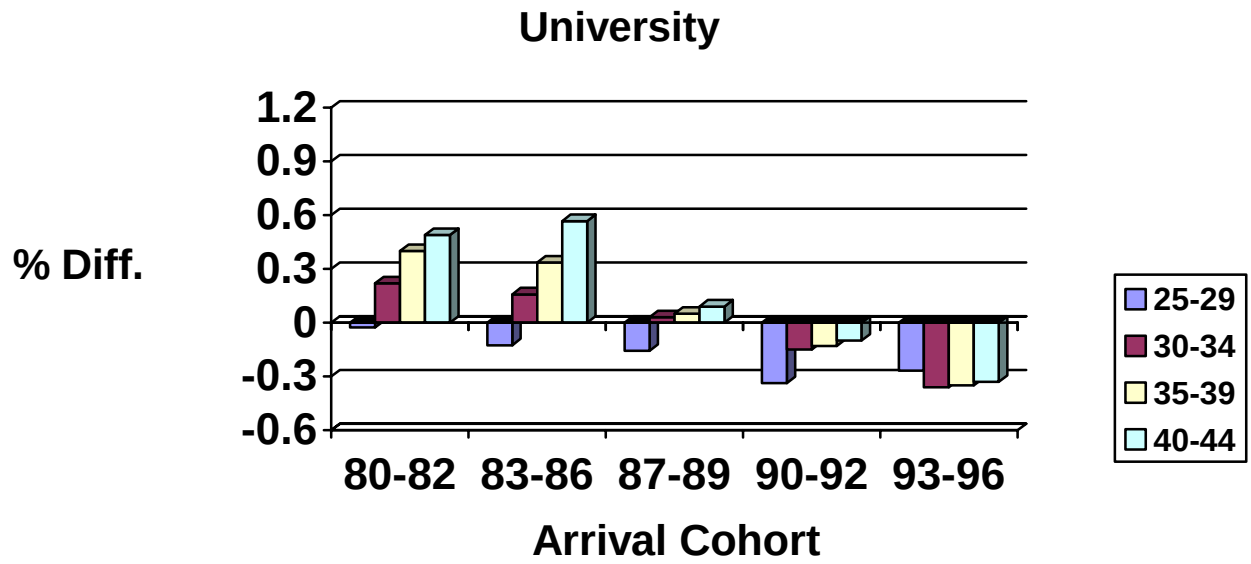
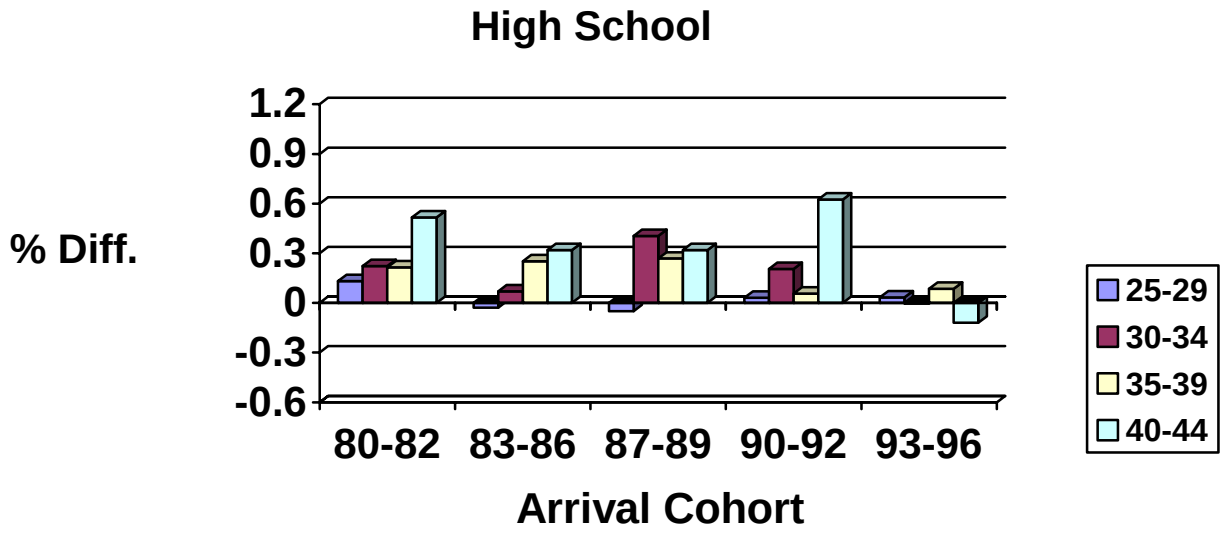


Figure 5
Immigrant/Native-Born Log Earnings Differences
In First Year after Arrival:
English-Language Countries



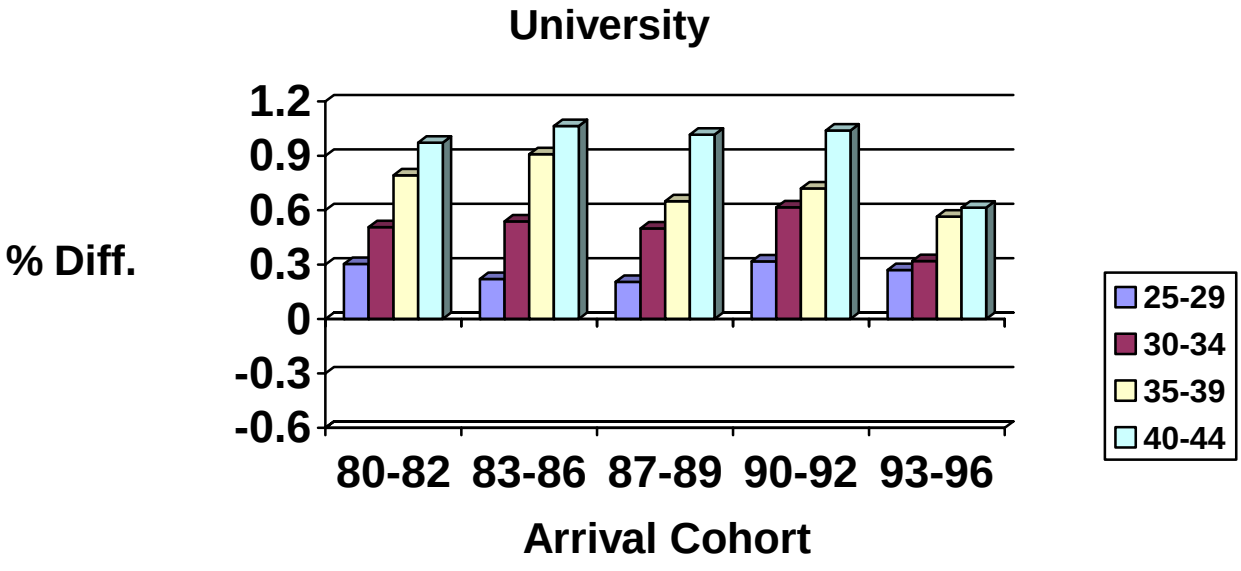
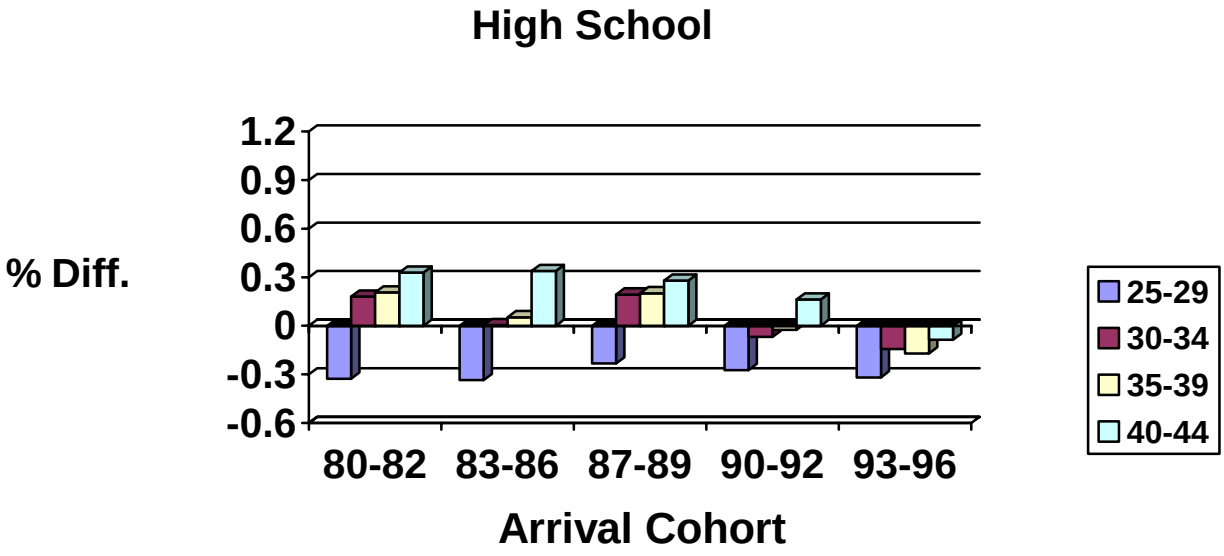


Figure 6
Immigrant/Native-Born Log Earnings Differences
In First Year after Arrival:
Non-English-Language Countries in
North-West Europe



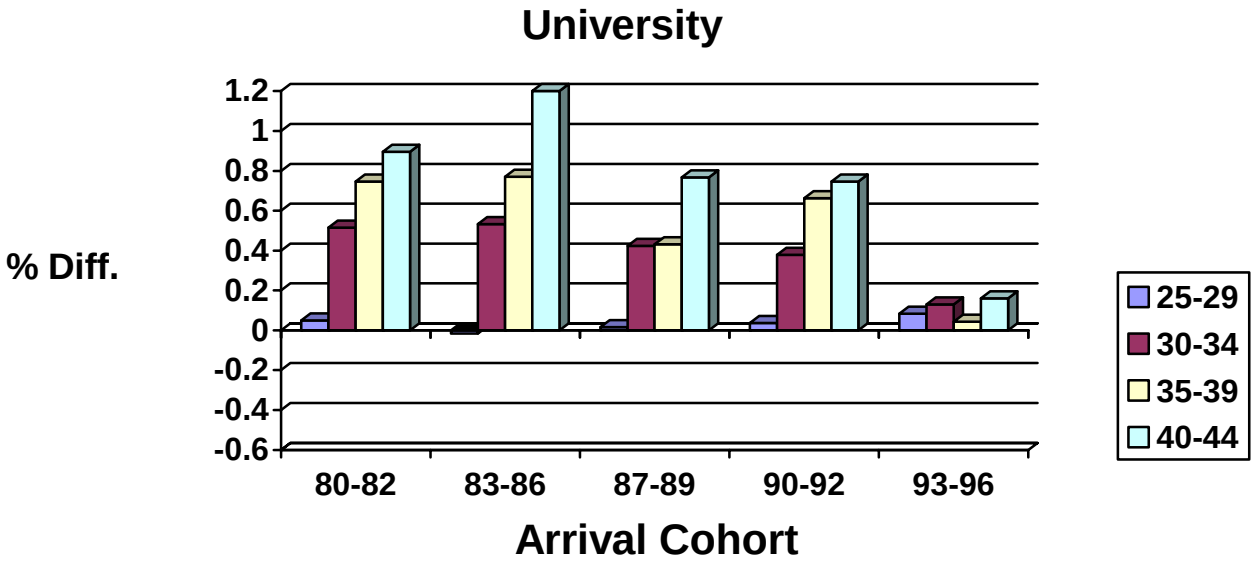


Figure 7
Immigrant/Native-Born Log Earnings Differences
In First Year after Arrival:
Non-English-Language Countries
Outside of North-West Europe

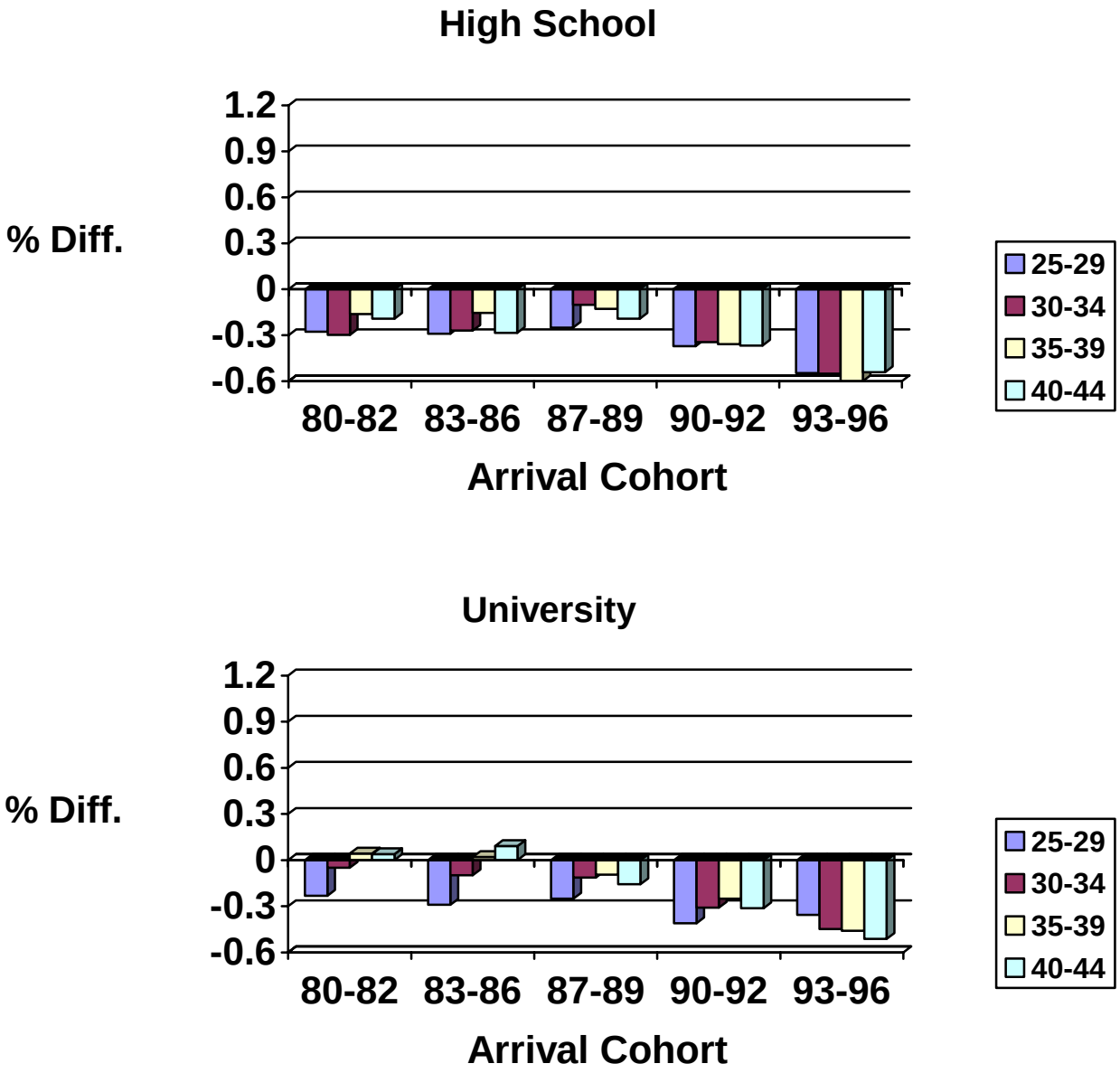


Figure 8: Immigrant Cohort Effect Decompositions:
All Education Levels Combined