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ABSTRACT

Immigrant Wage and Employment Assimilation: A Comparison of Methods*

We compare alternative methods for estimating immigrant wage and employment assimilation using unique panel data over 2001–2009 for a large, nationally-representative sample of immigrants. Previous assimilation estimates have been mainly based on cross-sectional data and have therefore suffered from a range of potential biases. We find that a fixed-effects model generates estimated employment assimilation profiles that are flatter and significantly different to those produced by cross-sectional and synthetic cohort methods. However, there are no significant differences in the wage assimilation profiles across alternative methods.

JEL Classification: J15, J61

Keywords: immigration, immigrant assimilation, employment, wages, Australia

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1. Introduction

A large literature is devoted to understanding immigrant assimilation. Economists typically define assimilation in terms of relative wages and concentrate on estimating the time it takes for immigrants' wages to catch-up to those of their native-born counterparts. The paucity of panel data for immigrants implies that assimilation profiles are almost always estimated using cross-sectional (or occasionally retrospective) data. Inferring dynamic behavior from cross-sectional data is difficult, however, without strong, often untenable, identification assumptions (Borjas 1985; Chiswick 1980). Specifically, cross-sectional estimates of assimilation profiles rely heavily on the assumption that the unobserved characteristics of immigrants are stable across arrival cohorts (Borjas 1985). Synthetic cohort methods -- i.e. following cohorts over time in repeated cross-sections -- allow this assumption to be relaxed (Borjas, 1985; 1999), but instead assume that the composition of immigrant arrival cohorts are time-invariant. Synthetic cohort estimates of immigrant assimilation will be upwardly biased if less productive immigrants are more likely to return migrate or leave the labor market (Hu 2000).[1]

Surprisingly little evidence exists on the extent to which the biases inherent in alternative methods affect estimated assimilation profiles. Most researchers adopt the single estimation method that is most suitable for their data. In this note, we compare (i) cross-sectional, (ii) synthetic cohort, and (iii) fixed-effects panel estimates of immigrant wage and employment assimilation. The objective is to shed light on the sensitivity of estimates to cohort effects and selective labor market withdrawal (or remigration).

[1] Recent debate also questions whether changing returns to human capital lead wage assimilation profiles to provide a misleading picture of human capital assimilation (Beenstock et al. 2010; Lubotsky 2011). We do not address this issue here.

2. Data

Our data come from the Household, Income and Labour Dynamics in Australia (HILDA) Survey which is a nationally-representative panel study of more than 7,600 Australian households (Summerfield, 2010). These data are ideal for our purposes. First, as nearly one in four Australian residents is foreign-born (ABS 2007), the HILDA sample has a large number of immigrants from many countries. Second, the long panel (2001 - 2009) implies that outcomes can be tracked for nearly a decade. Finally, HILDA data are collected annually, in contrast to decennial censuses, making them better suited to identifying assimilation profiles. Consistent with previous studies (e.g. Antecol et al. 2006), we restrict attention to men aged 25 to 55. Our estimation sample includes 30,316 person-year observations on 4,453 Australian-born and 1,378 foreign-born men.[2]

3. Estimation Approach

We begin with a standard model of immigrant assimilation. Specifically, let labor market outcomes (y_{it}) be given by the following:

$$y_{it} = \alpha + \beta X_{it} + \gamma_1 I_i + \gamma_2(I_i * YSM_i) + \gamma_3(I_i * YSM_i^2) + \varepsilon_{it} \qquad (1)$$

where *i* indexes individuals, *t* indexes time, and X_{it} is a vector of demographic (quadratic in age, number of children, and marital status indicator) and human capital characteristics (disability status indicator, and indicators for educational attainment), I_i is an indicator which equals 1 for immigrants and 0 otherwise, YSM_i captures the number of years since migration, and the estimation error is given by ε_{it}. While γ_1 reflects the disparity in immigrants' relative outcomes at arrival, γ_2 and γ_3 capture the change in immigrants' relative outcomes as they assimilate.

[2] 60 person-year observations were dropped because of missing information on employment status, country of birth or year of arrival in Australia.

The methodological challenges associated with estimating immigrant assimilation can be highlighted through careful consideration of the error structure in equation (1). Specifically, let

$$\varepsilon_{it} = \delta_t + \mu_i + e_{it}$$

where time-specific (period) effects are given by δ_t, μ_i captures time-invariant, individual-specific effects, and e_{it} is a random i.i.d. error term. A single cross-section does not allow either time- or individual-specific effects to be controlled. Borjas (1985), in particular, argues that individual-specific heterogeneity associated with arrival cohort leads cross-sectional estimates of the assimilation profile to be biased. In contrast, estimating synthetic cohort models using repeated cross-sections in which members of the same arrival cohort are represented allows both period and cohort effects to be controlled (Borjas 1989). Thus, synthetic cohort methods produce unbiased estimates of the assimilation profile so long as individual-specific heterogeneity can be completely captured by arrival cohort. Unfortunately, this is a rather heroic assumption. Omitted variables (for example, ability, motivation, etc.) and selective labor market withdrawal (or remigration) imply that synthetic-cohort estimates are likely to be biased upwards.[3] Fortunately, fixed-effects models estimated using panel data allow all sources of time-invariant, individual-specific heterogeneity to be eliminated.

Our objective is to investigate the importance of these biases for assimilation in wage and employment assimilation.[4] Although much of the previous literature focuses strictly on earnings assimilation, in Australia it is employment probabilities, rather than wages, that is the most important dimension of immigrants' labor market assimilation (Antecol et al. 2006; Chiswick et al. 2008). Moreover, focusing on employment probabilities also allows us to

[3] Consistent with this, studies based on panel data methods typically find that assimilation is slower than do those relying on synthetic cohort methods (Duleep and Dowhan 2002; Hu 2000; Lubotsky 2007).

[4] Our two dependent variables are log hourly wages and an indicator for being employment. A linear probability model is used to estimate employment probabilities in order to maintain comparability with our wage analysis.

avoid any issues associated with selective labor market withdrawal. Assimilation profiles for both wages and employment are estimated using three alternative approaches: (i) pooled cross-section; (ii) synthetic cohort; and (iii) fixed effects.[5]

4. Results

Key results (estimated coefficients and standard errors) are presented in Table 1. To facilitate interpretation, we graphically depict the estimated employment and wage assimilation profiles (and confidence intervals) in Figures 1a and 1b respectively.

Based on the pooled cross-section model, immigrants to Australia are estimated to have lower employment rates (13.1 percentage points) and lower wages (12.8 percent) upon arrival than otherwise similar native-born Australians (see columns 1 and 4). The first year since migration is associated with an 0.9 percentage point increase in the probability of being employed and, for those already employed, a 0.8 percent increase in wages. These assimilation profiles are slightly concave in line with the immigrant assimilation hypothesis and the majority of existing studies.

We investigate the extent of potential bias that results from not accounting for unobserved heterogeneity by testing for the equality of estimated coefficients across models (see bottom panel of Table 1). In the case of wages, we cannot reject the null hypothesis that all estimators lead to identical estimates. The wage profile of migrants is flat irrespective of estimation method. The lack of wage assimilation is in contrast to previous estimates of wage assimilation based on longitudinal data in the United States and Germany (Duleep and Dowan 2002; Fertig and Schurer 2007; Hu 2000; Lubotsky 2007). However, it is in line with

[5] We also considered and rejected a number of alternative models. We do not present results from a single cross-section because pooled cross-section estimates are more efficient. Similarly, random-effects estimates would increase efficiency if the independence assumption holds, but would not eliminate heterogeneity bias (Wooldridge 2002). Mundlak's (1978) correction produces coefficients on time-varying variables (ysm, ysm^2) that are identical to the coefficients from the fixed effects model presented here.

studies showing that Australian labor market assimilation occurs primarily in employment (Antecol et al. 2006; Chiswick et al. 2008).

In contrast, accounting for unobserved heterogeneity is important in estimating employment assimilation. Employment assimilation profiles are significantly steeper once arrival cohort-specific effects are controlled. Cohort indicators alone, however, do not completely account for all unobserved heterogeneity in employment probabilities. Eliminating all time-invariant, individual-specific heterogeneity through fixed-effects estimation results in employment assimilation profiles that are flatter than those obtained from a synthetic cohort model.

Finally, as a robustness check, we re-estimated both synthetic-cohort and fixed-effects models using a balanced panel. We would expect the results for the balanced and unbalanced panels to be similar if unobserved heterogeneity is adequately controlled. We find that there are significant differences in synthetic-cohort estimates based on the balanced and unbalanced panels which is consistent with the failure of synthetic cohort method to completely control individual heterogeneity. In contrast, there is no significant difference between the balanced and unbalanced panel, fixed-effects estimates.

5. Conclusions

This note demonstrates that estimated assimilation profiles depend on the methods used to control for unobserved heterogeneity. Accounting for unobserved heterogeneity does not affect estimates of wage assimilation. However, fixed-effects estimates of employment assimilation are significantly different to those derived from methods that either do not (cross-sectional) or only partially (synthetic-cohort) account for unobserved, individual-specific effects. Moreover, a comparison of balanced and unbalanced panel results further underlines the fact that long-term migrants are systematically different from those who leave. Therefore, studies that rely on retrospective longitudinal data for migrants who have reached retirement age in order to control unobserved heterogeneity (e.g. Hu 2000, Lubotsky 2007) are likely to suffer from selection bias when attempting to draw conclusions about the entire population of migrants that arrive in a country. Moreover, our results are particularly important in light of evidence that assimilation into the Australian labor market takes place on the employment rather than the wage margin. It is likely that the particular institutional context will be important in forming views about the extent to which unobserved heterogeneity biases assimilation profiles and the most appropriate method for eliminating those biases.

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Table 1: Effect of Years Since Migration On Employment And Wages - Pooled Cross-Section, Synthetic Cohort Method and Fixed Effects Estimates

	Employment			Wages		
	Coefficients *(Standard Errors)*					
	pooled cross section (1)	SCM (2)	Fixed Effects (3)	pooled cross section (1)	SCM (2)	Fixed Effects (3)
YSM	0.943	1.211	0.615	0.848	0.134	1.221
	(0.105)	*(0.261)*	*(0.031)*	*(0.204)*	*(0.504)*	*(0.052)*
YSM^2	-0.016	-0.011	-0.008	-0.012	0.006	-0.008
	(0.002)	*(0.005)*	*(0.001)*	*(0.004)*	*(0.010)*	*(0.001)*
# obs.		30316			23841	
Test of equality of coefficients ysm, ysm^2*: χ2 (dF); p-value*						
pooled cross-section vs. SCM		7.85 (2); 0.020			1.38(2); 0.501	
SCM vs. Fixed Effects		6.43 (2); 0.040			2.66(2); 0.265	
SCM: balanced vs. unbalanced		13.86 (2); 0.001			0.25 (2); 0.884	
Fixed Effects: balanced vs. unbalanced		0.01 (2); 0.9946			0.05 (2); 0.976	

Notes: Coefficients and standard errors are multiplied by 100. Standard errors are clustered at the individual level. All models control for age, age squared and year dummies. The pooled cross section model and the synthetic cohort model also control for education, health, marital status and children -in the household. The synthetic cohort method includes additional controls for time of arrival in four-year-bands.

Figure 1a: Average Predicted Employment Probability By Years Since Migration

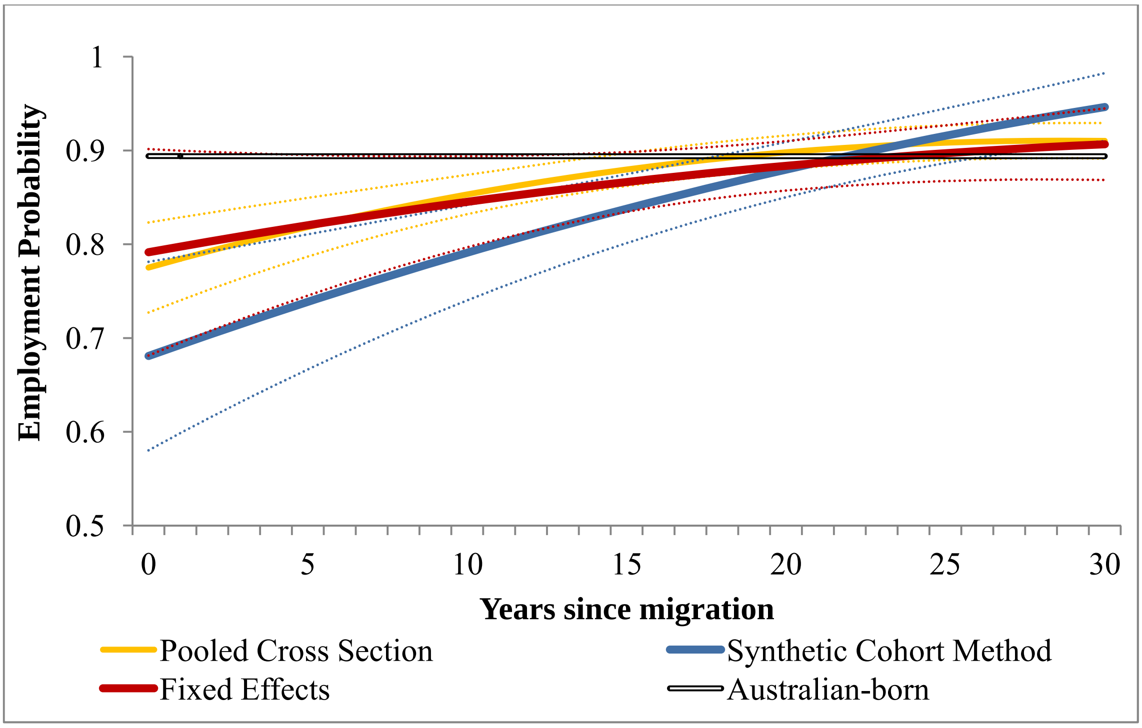
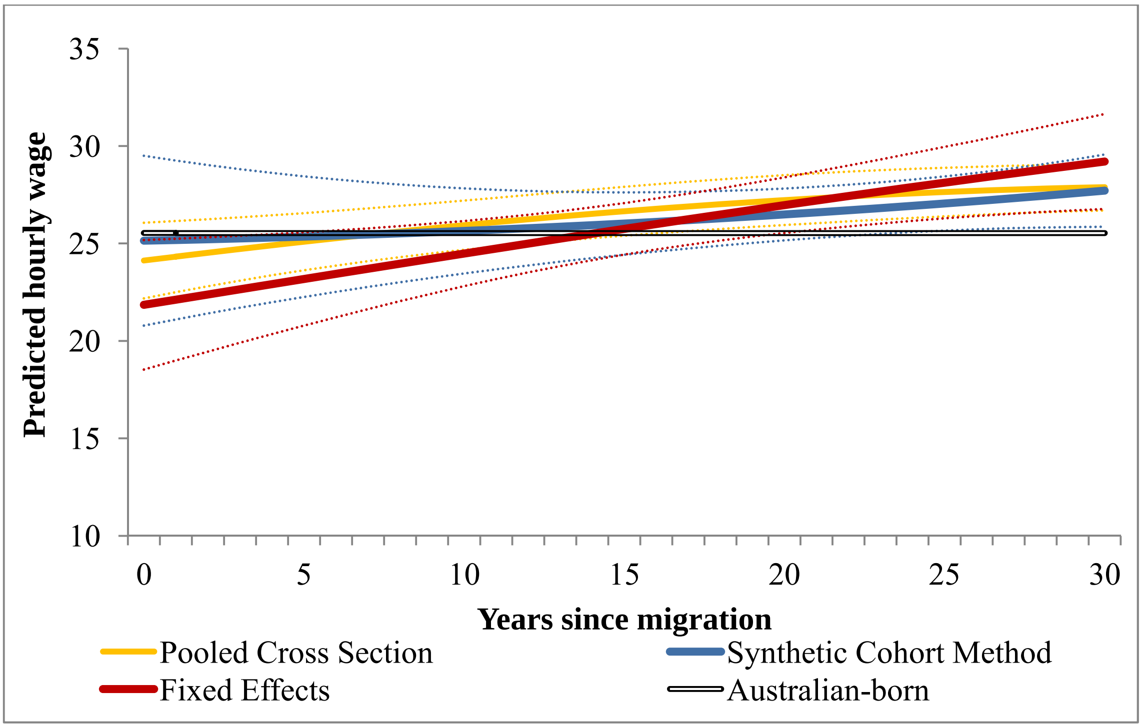


Figure 1b: Average Predicted Hourly Wages By Years Since Migration



Notes: Dotted lines show the upper and lower limit of the 95%-confidence intervals for the predicted profiles. Standard errors are generated using the bootstrap method (100 draws). Point estimates are calculated for each individual in the sample of migrants, holding all individual characteristics controlled in the estimation (see footnote Table 1, including μ_i in the fixed effects model) except years since migration constant, then averaged over all migrants