Labor market returns to adult literacy and numeracy: a focus on migrant assimilation over the lifecycle

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Motivation

- Recent research has shown that returns to education are biased when estimates do not factor in direct measures of skill (Hanushek *et al*., 2015)
  - Important ramifications for estimates of the return on human capital investments
  - Also, for understanding lifecycle earnings profiles for migrant workers in host countries
- Our focus is on foreign-born worker "assimilation" in the labor market
  - That is, whether they "catch-up" for native-born workers, and if so, how long does it take

(Very) Brief Review of Literature

- Hanushek *et al.* (2015)
  - Included direct measures of literacy and numeracy in Mincerian earnings functions
  - Demonstrated that the returns to schooling were significantly lower when such measures were included
- Chiswick (1978)
  - The seminal study of migrant worker assimilation in the labor market
  - Results shown that foreign-born workers were initially penalized in the labor markets, but caught up to native-born workers between 10-15 years

Contribution

- As far as we know, this is the only study of labor market assimilation across several OECD countries
  - Focus on the *speed* of assimilation, conditional on literacy and numeracy skills, is novel in the literature
- Minor point:
  - We account to the complex survey design of PIAAC by using replicate weights in the estimation of sampling variances
  - This does make a difference when we compare estimates to Hanushek et al. (2015)

Research Questions

1. What are the estimated lifecycle earnings profiles for migrant workers in 22 OECD countries?

2. How do estimates of assimilation change when we include direct measures of skill?

3. Do relatively high skilled migrants assimilate quicker compared to migrants with lower skill proficiencies?

Data

- OECD's restricted-use Programme for International Assessment of Adult Competencies (PIAAC)
  - Largest source of key information-processing skills collected at the country level
  - Direct measures of literacy and numeracy skills for those aged 16-65
  - Representative samples from 36 OECD member countries
  - Collected in three rounds: round one in 2011-2012; round two in 2014-2015; and round three in 2017

Data

- OECD's restricted-use Programme for International Assessment of Adult Competencies (PIAAC)
  - Limit sample to those reporting a wage at the time of the survey, giving us roughly 49,000 observations
  - 12 countries were tossed out (less than 5% migrant workers)
    - Chile, Czech Republic, Denmark, Hungary, Japan, Korea, Lithuania, Mexico, Peru, Poland, Slovak Republic, Turkey
  - Russia was tossed due to suspect data
  - Australia doesn't include years since migration

Data

- Due to time constraints, and not to overwhelm the audience, here we focus on just a few OECD countries:
  - Canada
  - Germany
  - Israel
  - New Zealand
  - United Kingdom
  - United States

Data

Table 1. Descriptive Statistics for Select Countries, PIAAC Survey

Country	Canada	Germany	Israel	New Zealand	United Kingdom	United States
Gross Hourly Wage[1]	23.4 (10.8)	22.3 (10.9)	15.3 (9.0)	20.6 (10.2)	22.0 (12.1)	27.7 (16.7)
Wage Inequality[2]	1.41	1.52	1.48	1.04	1.26	1.54
Numeracy	272.3 (53.0)	282.6 (50.8)	263.0 (60.1)	279.2 (53.3)	277.3 (49.9)	262.6 (58.8)
Literacy	278.8 (48.6)	275.4 (46.2)	262.3 (52.0)	286.5 (47.1)	284.4 (45.8)	276.8 (52.3)
Schooling (Years)	13.9 (2.5)	14.1 (2.5)	13.8 (2.5)	14.2 (2.6)	13.2 (2.3)	14.5 (2.7)
Experience (Years)	23.8 (7.8)	23.3 (7.4)	22.4 (7.4)	23.5 (8.0)	24.74 (7.4)	24.2 (7.7)
Female Share	.45	.36	.48	.42	.40	.45
Migrants Share	.28	.15	.24	.31	.15	.17
Observations	7,004	1,294	887	1,195	1,660	649

[1] Gross hourly wage is measured in the national currency. [2] Wage inequality is defined as the log differential between the 90th and 10th percentiles of the wage distribution.

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Empirical Model

- See Chiswick (1978) for detailed derivation of the econometric specification
  - We add numeracy skill (standardized), gender, and marital status to the Chiswick model

$$\ln(Y_i) = \ln(Y_0) + r_i S_i + C_1 T_i + C_2 T_i^2 + C_3 YSM_i + C_4 YSM_i^2 + C_5 FOR_i + C_6 NUM_i + C_7 FEM_i + C_8 MAR_i + U_i$$

γ: gross hourly wage
S: years of formal schooling
T: potential work experience
YSM: years since migration
NUM: numeracy score
FEM: female indicator
MAR: married indicator
U: idiosyncratic error term

Results w/o direct skill measures

Table 2. Modified Chiswick (1978) models of labor market assimilation of migrant workers, numeracy skills included

	Canada	Germany	Israel	New Zealand	United Kingdom	United States
Foreign	-.374*** (.04)	-.503*** (.14)	-.881*** (.019)	-.180*** (.06)	-.405** (.16)	-.362*** (.13)
H.S. Equiv.	.215*** (.03)	.189*** (.06)	.273*** (.06)	.177*** (.03)	.142*** (.04)	.351*** (.04)
> H.S. Equiv.	.541*** (.02)	.602*** (.06)	.715*** (.06)	.476*** (.03)	.491*** (.04)	.876*** (.04)
Experience	.015*** (< .01)	.018* (.01)	.038*** (.01)	.027*** (.01)	.019** (.01)	.015* (.01)
Experience^2	-.0002*** (< .01)	-.0003* (< .01)	-.0006*** (< .01)	-.0005*** (< .01)	-.0004* (< .01)	-.0002 (< .01)
Female	-.186*** (.02)	-.186*** (.02)	-.176*** (.03)	-.165*** (.02)	-.201*** (.02)	-.249*** (.03)
Married	.094*** (.02)	.040 (.03)	.128*** (.04)	.128*** (.03)	.091*** (.02)	.119*** (.03)
Mig. Years	.012*** (< .01)	.018 (.01)	.048*** (.01)	.006 (.01)	.033** (.01)	.025** (.01)
Mig. Years^2	-.0001 (< .01)	-.0001 (< .01)	-.0006** (< .01)	-.0001 (< .01)	-.0005* (< .01)	-.0004*** (< .01)
Observations	7,004	1,297	887	1,195	1,660	649
Years to “catch-up”	31.76	-	27.93	-	16.78	24.25

Results w/ direct skill measures

Table 3. Modified Chiswick (1978) models of labor market assimilation of migrant workers, numeracy skills included

	Canada	Germany	Israel	New Zealand	United Kingdom	United States
Numeracy	.138*** (.01)	.197*** (.02)	.175*** .(02)	.145*** (.02)	.170*** (.02)	.161*** (.02)
Foreign	-.323*** (.04)	-.251* (.15)	-.686*** (.019)	-.125** (.05)	-.330** (.15)	-.348*** (.12)
Num. x For.	.018 (.02)	-.060 (.04)	-.0318 (.03)	-.002*** (.03)	.080* (.05)	.030 (.04)
H.S. Equiv.	.109*** (.03)	.065 (.06)	.148*** (.05)	.102*** (.03)	.068 (.04)	.245*** (.05)
> H.S. Equiv.	.353*** (.03)	.360*** (.07)	.454*** (.06)	.325*** (.03)	.341*** (.04)	.622*** (.06)
Experience	.010*** (< .01)	.017** (.01)	.029*** (.01)	.024*** (.01)	.008 (.01)	.010 (.01)
Experience^2	-.0001 (< .01)	-.0002 (< .01)	-.0004** (< .01)	-.0004*** (< .01)	-.0001 (< .01)	-.0001 (< .01)
Female	-.147*** (.02)	-.137*** (.02)	-.123*** (.03)	-.139*** (.02)	-.144*** (.02)	-.210*** (.03)
Married	.077*** (.02)	.028 (.03)	.110*** (.04)	.100*** (.03)	.060** (.02)	.085*** (.03)
Mig. Years	.016*** (< .01)	.008 (.01)	.040*** (.01)	.005 (.01)	.036*** (.01)	.031*** (.01)
Mig. Years^2	-.0001 (< .01)	-.0001 (< .01)	-.0005** (< .01)	.0001 (< .01)	-.0007*** (< .01)	-.0005*** (< .01)
Observations	7,004	1,297	887	1,195	1,660	649
Years to “catch-up”	20.07	-	24.59	-	10.84	14.62

Conclusions

- Foreign wage penalties are overstated when direct measures of skill are omitted
- Speed to labor market assimilation reduces when direct measures of skill are included
  - Canada: 32 to 20 years
  - Israel: 28 to 25 years
  - U.K.: 17 to 11 years
  - U.S.: 24 to 15 years

Conclusions

- Results for the full set of 22 OECD countries are a bit all over the place
  - We have proposed categorizing countries by the prevalence and skill level of immigrants (e.g., NZ v. USA)
  - Also considering pooling all 22 countries and including country fixed effects to account for national immigration policies
  - Controlling for match between assessment language and primary language
  - Employment selection models

Policy Implications

- Results demonstrate how most modern knowledge-based economies value high-skill immigration
- The labor market successes of migrant workers is directly linked to the quality of schooling in their home country

Thank You

- For full country estimates, contact me at the email below
- Thank you for your time
- Contact:
  - christopher.erwin@aut.ac.nz