Worker income level, mobility, and income growth

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Introduction

- In the labor economics framework, workers engage in employer transitions (mobility) as they maximize utility with respect to monetary and non-monetary considerations (Ehrenberg, Smith, & Hallock, 2023).
- Workers evaluate their current position relative to alternative positions and seek better matches given their skills and objectives (Latzke, Kattenbach, Schneidhofer, Schramm, & Mayrhofer, 2016).
- On average, mobility has been found to increase income relative to staying with the same employer, particularly in early career stages (Hahn, Hyatt, & Janicki, 2021; Latzke et al., 2016).

Introduction

- Present focus on mobility for lower income workers in particular. They may benefit the most from mobility, as they seek positions that better match (and reward) their skills, offer more work hours, or both.
- Though less common than studies of career stage as a predictor, studies indicate that lower income workers achieve greater income gains from transition than do higher income workers (Latzke et al., 2016).
- Evaluations of this relationship in the hospitality and tourism (hereafter tourism) context were not found – hence the present focus.

Introduction

- Most empirical evaluations of wage growth in tourism have occurred in Europe and with fewer longitudinal time periods than the present.
- Factors affecting wage growth grouped into (Shu et al., 2022):
  - Characteristics of broader economy, such as proportion of region's economy comprised of tourism.
  - Personal characteristics, such as gender, education, and age.
  - Employment characteristics, such as firm size.
  - Personal career actions, such as ongoing training and job mobility.

Introduction

- Context – mobility common in many industries, but especially in tourism.
- In tourism, voluntary mobility typically viewed as a positive and necessary component of career advancement.
- Knowledge and experiences gained at each new workplace seen as helping in future career moves. Intra- and inter-firm mobility considered central to “climbing the career ladder” (Cassel, Thulemark, & Duncan, 2018).

Methods

- Oregon Employment Department UI data.
- Present data reflect all workers:
  - With third quarter dominant employer being in tourism across all years from 2001 to 2019.
- Data from 2020 onward were not analyzed in order to avoid idiosyncratic pandemic effects.
- Data reflect the population of all 7,376 workers meeting the criteria, so inferential statistics do not apply.
  - 18 year-to-year pairs for each worker, for a total of 132,768 observations.

Methods

- A dynamic structural equation model approach is used, which includes autoregression and multilevel analysis of within- and between-worker equations (Hamaker, Asparouhov, & Muthén, 2023).
- At the within level (time series analysis), mobility may affect income growth across years for individual workers.
- At the between level (cross-sectional analysis), income level may affect income growth across workers, as well as via cross-level interaction with mobility.
- Estimation using Mplus v. 8.10 with Bayesian estimation based on a Markov chain Monte Carlo algorithm.

Methods

Within level / time series (person i, time t)

Eq. 1: $Inc_{it} = \beta_{0i} + \varphi(Inc)_{it-1} + \beta_{1i}(Trans)_{it} + \beta_2(Size)_{it} + \beta_3(Jobs)_{it} + \beta_4(Per)_{it} + \zeta_{it}$

Between level / cross-sectional / time invariant (predicting random parameters)

Eq. 2: $\beta_{0i} = \gamma_{00} + \gamma_{01}(Low)_i + \gamma_{02}(High)_i + \gamma_{03}(Lodg)_i + \gamma_{04}(Food)_i + \gamma_{05}(Air)_i + u_{0i}$

Eq. 3: $\beta_{1i} = \gamma_{10} + \gamma_{11}(Low)_i + \gamma_{12}(High)_i + u_{1i}$

Substitution leads to:

Eq. 4: $Inc_{it} = \gamma_{00} + \gamma_{01}(Low)_i + \gamma_{02}(High)_i + \gamma_{03}(Lodg)_i + \gamma_{04}(Food)_i + \gamma_{05}(Air)_i + \varphi(Inc)_{it-1} + \gamma_{10}(Trans)_{it} + \gamma_{11}(Low)_i(Trans)_{it} + \gamma_{12}(High)_i(Trans)_{it} + \beta_2(Size)_{it} + \beta_3(Jobs)_{it} + \beta_4(Per)_{it} + \zeta_{it} + u_{0i} + u_{1i}(Trans)_{it}$

Methods

Within level / time series

Eq. 1: $Inc_{it} = \beta_{0i} + \varphi(Inc)_{it-1} + \beta_{1i}(Trans)_{it} + \beta_2(Size)_{it} + \beta_3(Jobs)_{it} + \beta_4(Per)_{it} + \zeta_{it}$

- Year-to-year percentage growth in inflation-adjusted income for each worker *i* in year *t* (Inc_{it}) predicted by time-varying variables:
  - Same measure in the previous year *t-1* (Inc_{it-1}).
  - Whether a year-to-year employer transition occurred (Trans).
  - Year-to-year change in firm size (Size).
  - Year-to-year percentage change in the number of tourism jobs in Oregon (Jobs).
  - Whether destination year had 53 (versus 52) Thursdays, Fridays, or both, as a reflection of pay periods (Per).
- Intercept (β_{0i}) and slope coefficient (β_{1i}) on the transition variable treated as random across workers, as indicated by the coefficient subscript *i*.

Methods

Between level / cross-sectional

Eq. 2: $\beta_{0i} = \gamma_{00} + \gamma_{01}(Low)_i + \gamma_{02}(High)_i + \gamma_{03}(Lodg)_i + \gamma_{04}(Food)_i + \gamma_{05}(Air)_i + u_{0i}$

Eq. 3: $\beta_{1i} = \gamma_{10} + \gamma_{11}(Low)_i + \gamma_{12}(High)_i + u_{1i}$

- Random intercept (β_{0i}) and random slope (β_{1i}) predicted by time-invariant variables:
  - Whether the worker was in the lowest or highest income tertile in their industry category during the first four years of the study period (Low, High; reference level was middle tertile).
  - Whether the worker was primarily in the lodging, food and drink, or air transport category (Lodg, Food, Air; reference level was all other tourism categories).

Results

	Coefficients (medians)
Within	
Eq. 1. Income (Inc_{it})	
$Income_{it-1}$ (φ)	-0.149
Size (β_2)	0.014
Jobs (β_3)	0.145
Pay periods (β_4)	0.696
Between	
Eq. 2. Intercept (β_{0i})	
Intercept (γ_{00})	1.963
Low (γ_{01})	3.245
High (γ_{02})	-1.148
Lodging (γ_{03})	0.559
Food and drink (γ_{04})	1.527
Air transport (γ_{05})	1.380
Eq. 3. Transition slope (β_{1i})	
Intercept (γ_{10})	2.510
Low (γ_{11})	9.013
High (γ_{12})	-4.539
Within R^2	
Eq. 1. Income (Inc_{it})	0.066
Between R^2	
Eq. 2. Intercept (β_{0i})	0.960
Eq. 3. Slope (β_{1i})	0.002

- Coefficient on autoregressive $Income_{it-1}$ (φ) indicates that large increases in income in the previous year predict smaller increases (or decreases) in income in the current year.
- Income growth tends to be higher as firm size increases, within a firm or due to transition to a new firm.
- Income growth higher when statewide tourism employment is growing.
- Years with 53 pay periods have more positive income growth than years with 52 pay periods.
- Income growth higher for food and drink workers than for others.

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- Eq. 2 intercept (γ_{00}) indicates middle income workers (reference category) tend to experience income gains regardless of whether they stay with an employer or transition to a new one.
- Eq. 3 intercept (γ_{10}) indicates that transition tends to further increase wage gains for middle income workers.

Results

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Within	
Eq. 1. Income (Inc_{it})	
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- Eq. 2 coefficients indicate that, when staying with a current employer, lower income workers achieved higher year-to-year income gains than did middle and higher income workers (γ_{01} is positive and greater than γ_{02}).
- Eq. 3 coefficients suggest inter-firm income growth opportunities are greater than intra-firm opportunities for lower income workers (the sum of γ_{10} and γ_{11} is positive).
- Inter-firm income growth opportunities greater for lower income workers than for either middle or higher income workers (γ_{11} is positive and greater than γ_{12}).

Discussion

- When staying with their current employer, lower income workers achieved higher year-to-year income gains than did middle and higher income workers, suggesting intra-firm income growth opportunities through skills matching, additional work hours, or other factors.
- Income growth opportunities resulting from employer transition were greater for lower income workers than either middle or higher income workers.
- Results within the context of substantial intra- and inter-worker variability in annual income growth. Almost half (45%) of all observations reflected no change or negative growth (year-to-year decreases in income). The income measure is inflation-adjusted, such that many of these 45% experienced gains in nominal income.

Discussion

- Workers who received unemployment benefits were excluded (Trans = 0) given the focus on voluntary transitions.
- However, receipt of unemployment benefits is imperfect method for identifying involuntary transition; some transitions with negative income growth may reflect involuntary transition without unemployment benefits.
- Analysis can be viewed as exploratory and reflective of the experiences of long-term tourism workers in a specific context. Pandemic-era data were excluded to avoid distorting effects, but further analysis will be fruitful once the pandemic's longer-term effects become more clear.
- The data is the most intensive in tourism employment reported to date, but more intensive data (more time periods) will be beneficial for dynamic structural equation modeling analysis.

Questions, Comments

References / Reading

- Cassel, S. H., Thulemark, M., & Duncan, T. (2018). Career paths and mobility in the Swedish hospitality sector. *Tourism Geographies*, *20*, 29-48.
- Ehrenberg, R. G., Smith, R. S., & Hallock, K. F. (2023). *Modern labor economics: Theory and public policy* (14th ed.). Routledge.
- Hahn, J. K., Hyatt, H. R., & Janicki, H. P. (2021). Job ladders and growth in earnings, hours, and wages. *European Economic Review*, 133, 103654.
- Hamaker, E. L., Asparouhov, T., & Muthén, B. (2023). Dynamic structural equation modeling as a combination of time series modeling, multilevel modeling, and structural equation modeling. In R. H. Hoyle (Ed.), *Handbook of Structural Equation Modeling (2nd ed.)*. Guilford.
- Latzke, M., Kattenbach, R., Schneidhofer, T., Schramm, F., & Mayrhofer, W. (2016). Consequences of voluntary job changes in Germany: A multilevel analysis for 1985–2013. *Journal of Vocational Behavior*, 93, 139-149.
- Shu, H., Yu, Q., Liu, K., Wang, A., & Zha, J. (2022). Understanding wage differences across tourism-characteristic sectors: Insights from an extended input-output analysis. *Journal of Hospitality and Tourism Management*, *51*, 88-104.

Additional Details

- The within-model outcome variable ($Income_{it}$) was year-to-year (*t-1* to *t*) percentage change in inflation-adjusted annual income; sum of income received from dominant employer in each of the four calendar quarters.
- For quarters in which unemployment benefits were greater than income paid by employers, the unemployment benefit was used as the income; this was uncommon.
- Year-to-year income variation may reflect changes in annual salary or hourly wage. Alternatively, it may reflect changes in hours worked or idiosyncrasies associated with calendar pay periods or other factors. The Pay periods variable accounts for some idiosyncrasies. Multi-year longitudinal data sets such as this one help "smooth out" additional idiosyncrasies.
- The $Income_{it-1}$ independent variable was a one-year lag of the $Income_{it}$ outcome variable. Thus, if the $Income_{it}$ variable for 2004 took the value of 2.0, the $Income_{it-1}$ variable for 2005 also took the value of 2.0.

Additional Details

- Transition was a dummy variable that reflects worker mobility across year-to-year pairs, with a focus on voluntary transition.
- It takes the value 0 if the employer in year *t* is the same as in *t-1*. For example, if Worker A was employed by Firm X in 2001 and 2002, the value of Transition for Worker A in 2002 is 0. It also takes the value 0 if the employer in year *t* was different than in *t-1* and the worker received unemployment benefits between the third quarter of *t-1* and the second quarter of *t*, inclusive (such cases represent fewer than 0.4% of the observations).
- If Worker A transitioned from Firm X in 2001 to Firm Y in 2002, and unemployment insurance benefits were not received, the value of Transition for Worker A in 2002 is 1.
- The Transition variable is intended to reflect voluntary transitions. However, it is possible that workers have involuntary transitions yet do not receive unemployment insurance benefits. Thus, the Transition variable may reflect a combination of both voluntary and involuntary transitions.

Additional Details

- Size was year-to-year change in the absolute number of employees at the firm, with the firm in *t* being different than the firm in *t-1* if the worker had a transition. Thus, a value of 20 for the Size variable could reflect growth at a given firm from *t-1* to *t* or a worker transitioning to a new firm that had 20 employees more than the previous firm.
- Firm size reflects the number of employees a firm paid in each quarter, based on OED records for covered employees. The values for this variable were winsorized at |100|, with values greater than 100 converted to 100, and values less than -100 converted to -100.

Additional Details

- The Jobs variable was an alternative to the unemployment rate as a predictor of income growth. It reflects the year-to-year percentage change in the number of jobs in Oregon in the NAICS 72 Accommodation and Food Services category based on Bureau of Labor Statistics data (https://www.bls.gov/cew/downloadable-data-files.htm), with a reference period of January to January.
- Thus, the value for Jobs for 2002 is the percentage change in jobs from January 2002 to January 2003 (1.6%). It is assumed that firms evaluate expected economic trends and adjust pay levels accordingly. For example, in the first six months of 2002 a firm may expect industry employment growth and therefore raise 2002 pay levels; that affects the percentage increase in a worker's income between 2001 and 2002.
- Some workers are paid on a weekly or bi-weekly basis, with Thursdays and Fridays being common pay days (Hahn, Hyatt, & Janicki, 2021). The Pay periods variable is a dummy variable that takes the value of 1 when the destination year (*t*) is 2004, 2009, 2010, 2015, or 2016. These years have 53 Thursdays, Fridays, or both.

Additional Details

- For the industry category variables, the third quarter was the quarter with the largest number of tourism employees, so the dominant employer in the third quarter was used to select workers for the analysis (i.e., if that employer was in tourism) and to identify tourism industry category.
- The industry category variables were dummy variables with miscellaneous tourism serving as the reference category. Each worker was allocated to one industry category based on the most frequent Q3 dominant employer. If Worker A worked for a lodging firm for 15 years and for a food and drink firm for four years during the study period, Worker A was classified as a lodging worker and would have the value of 1 for Lodg and 0 for Food and for Air.

Category	NAICS codes
Lodging	721110 through 721310
Food and drink	722110 through 722515
Air transport	481111 and 481211
Misc. tourism	487110 through 487990, 532111, 561510, 561520, 561591, 561599, 713110 through 713930, 713990

Additional Details

- The Low and High variables were dummy variables reflecting mean income over the first four years of the study period. For each of the four industry categories, workers were grouped into tertiles based on this mean. The middle tertile serves as the reference, and workers had a value of 1 for Low or High if they fell into the lowest or highest tertiles, respectively.
- Note that these income categories only reflect income relative to other workers meeting the criteria (employed in tourism during Q3 of every year from 2001 to 2019, and in the same industry category), not relative to all persons who worked in the tourism industry at any time during this period.

Additional Details

- Variable characteristics. Income growth as the outcome variable included the years 2003 to 2019, with 2003 reflecting percentage change from 2002 to 2003. Income growth as an independent variable (one-year lag) included the years 2002 to 2018, with 2002 reflecting percentage change from 2001 to 2002. The mean of the outcome variable is lower than that of the lagged independent variable because income growth was particularly high from 2001 to 2002, a data point that appears in the independent variable but not the outcome variable.

	Mean	Standard deviation	Percent = 1
Income growth outcome variable, $(Inc)_{it}$	3.93	34.6	
Income growth lagged independent var., $(Inc)_{it-1}$	4.78	43.2	
Transition, $(Trans)_{it}$			7.6
Size, $(Size)_{it}$	1.26	44.0	
Jobs, $(Jobs)_{it}$	2.18	2.47	
Pay periods, $(Per)_{it}$			27.8
Low, $(Low)_{i}$			33.3
High, $(High)_{i}$			33.3
Lodging, $(Lodg)_{i}$			20.9
Food and drink, $(Food)_{i}$			60.2
Air transport, $(Air)_{i}$			8.3

Additional Details

- Histograms of the outcome variable, year-to-year percentage change in inflation-adjusted income. Full range and for values from -50 to 100 to show detail.