Job Ladders and Growth in Earnings, Hours, and Wages

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Any opinions and conclusions expressed herein are those of the author(s) and do not necessarily represent the views of the U.S. Census Bureau. All results have been reviewed to ensure that no confidential data are disclosed.
Objective

Big picture: What can account for the decline in real earnings growth over the last 20 years?

• Decompose earnings growth in the U.S. since the mid-1990s using new LEHD data
• Examine the contributions of employer-to-employer transitions and flows into/out of nonemployment
• Estimate persistent and transitory drivers of earnings growth
• Investigate the contributions of hours and wages to earnings growth
Average Real Earnings: Last 20 years
Average Real LEHD Earnings: Last 20 years
Data

The Longitudinal Employer-Household Dynamics (LEHD) Program has matched employer-employee administrative records datasets. We use two datasets spanning from 1996 to 2016:

- A 4 state (MN, OR, RI, WA) dataset with non-imputed data on worker hours, whenever available, pooled
- An 11 state (CA, CO, ID, IL, KS, MD, MT, NC, OR, WA, and WI) dataset with imputed hours for timeseries analysis

For those interested in using the Job-to-Job Flows (J2J) public-use files to approximate this analysis, see Hahn, Hyatt, Janicki, and Tibbets (2017).
Concepts

We borrow earnings and employment concepts from the J2J data product.

- Only transitions to and from “dominant” jobs (i.e., maximum earnings) are considered
- We observe full-quarter earnings before and after transitions, as available
Definitions

Workers are divided into four groups:

- **Stayers** are employed at the same employer in times $t - 1$ and $t$

- **Employer-to-employer transitions** involve workers who change jobs and thus have different employers in times $t - 1$ and $t$

- **Entrants** start with no earnings, hours, or wages at time $t - 1$ but have them at time $t$

- **Exiters** have earnings, hours, or wages at time $t - 1$ but not at time $t$
Simple Example

<table>
<thead>
<tr>
<th></th>
<th>t-3</th>
<th>t-2</th>
<th>t-1</th>
<th>t</th>
<th>t+1</th>
<th>t+2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employer J</td>
<td>$3</td>
<td>$5</td>
<td>$2</td>
<td>$1</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>Employer K</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>$1</td>
<td>$4</td>
<td>$6</td>
</tr>
<tr>
<td>FQ Earnings</td>
<td>.</td>
<td>$5</td>
<td>$2</td>
<td>.</td>
<td>$4</td>
<td>.</td>
</tr>
<tr>
<td>Transition</td>
<td>.</td>
<td>Stayer</td>
<td>Stayer</td>
<td>Emp-to-Emp</td>
<td>Stayer</td>
<td>.</td>
</tr>
</tbody>
</table>
All Worker Types

The graph shows the share of employment transitions for different worker types over various quarters from 1996 to 2016. The x-axis represents the quarter, while the y-axis shows the share of employment transitions. The legend indicates the different worker types and their respective share at different times:
- Stayers Share at Time t–1 (right axis)
- Stayers Share at Time t (right axis)
- Emp–to–Emp Share at Time t–1
- Emp–to–Emp Share at Time t
- Exiters Share at Time t–1
- Entrants Share at Time t

The trends indicate variations in the share of employment transitions for these worker types over the given period.
Declining Emp-to-Emp Transitions
Extensive vs. Intensive Margins

The graph shows the share of employment transitions over time from 1996 to 2016. The x-axis represents the quarter, and the y-axis represents the share of employment transitions. The graph includes various categories such as Stayers Share at Time t-1 (right axis), Stayers Share at Time t (right axis), Emp-to-Emp Share at Time t-1, Emp-to-Emp Share at Time t, Exiters Share at Time t-1, and Entrants Share at Time t.
Earnings by Worker Type in Levels

![Graph showing earnings by worker type in levels from 1996 to 2016. The graph compares average quarterly earnings across different worker types, with shaded areas indicating recessions. The x-axis represents quarters from 1996 to 2016, and the y-axis represents average quarterly earnings in real 2014 dollars. The graph includes lines for Stayers Average Earnings at Time t, Stayers Average Earnings at Time t-1, Emp-to-Emp Average Earnings at Time t, Emp-to-Emp Average Earnings at Time t-1, Entrants Average Earnings at Time t, and Exiters Average Earnings at Time t-1.](image)
Earnings by Worker Type in Logs

![Graph showing earnings by worker type over time.](image)

- **Stayers Average Log Earnings at Time t**
- **Stayers Average Log Earnings at Time t–1**
- **Emp-to-Emp Average Log Earnings at Time t**
- **Emp-to-Emp Average Log Earnings at Time t–1**
- **Entrants Average Log Earnings at Time t**
- **Exiters Average Log Earnings at Time t–1**
Earnings of Stayers
Earnings of Emp-to-Emp Transitions

![Graph showing earnings trends over quarters, with different lines representing different groups such as stayers, empir-to-emp, and entrants, with specific periods highlighted.](image-url)
Extensive Margin Earnings
Decomposition

We can look at the change in average earnings, hours, and wages in terms of stayers \( s_{it} \), emp-to-emp transitions \( q_{it} \), entrants \( n_{it} \), exiters \( r_{it} \), and the total employed \( D_t \):

\[
\Delta \bar{y}_t = \frac{\sum_i s_{it} y_{it} + \sum_i q_{it} y_{it} + \sum_i n_{it} y_{it}}{D_t} - \frac{\sum_i s_{it} y_{it-1} + \sum_i q_{it} y_{it-1} + \sum_i r_{it} y_{it-1}}{D_{t-1}}
\]

\( \Delta \bar{y}_t \)
earnings at time \( t \)
earnings at time \( t-1 \)
We rewrite the previous formula so the contributions of each worker type are isolated:

\[
\Delta \tilde{y}_t = \left( \frac{S_t}{D_t} + \frac{S_t}{D_{t-1}} \right) \sum_i s_{it} \Delta y_{it} + \left( \frac{Q_t}{D_t} + \frac{Q_t}{D_{t-1}} \right) \sum_i q_{it} \Delta y_{it} + \\
\frac{N_t}{D_t} \left( \frac{\sum_i n_{it} y_{i t-1}}{N_t} - \tilde{y}_t \right) - \frac{R_t}{D_{t-1}} \left( \frac{\sum_i r_{it} y_{i t-1}}{R_t} - \tilde{y}_t \right)
\]

Note \( \tilde{y}_t \) is the average of \( s_{it} \) and \( q_{it} \) (i.e. workers with earnings in \( t - 1 \) and \( t \)).
Earnings Growth: Stayers Matter
Similar Story for Wages

![Graph showing contribution to change in real log wages over quarters from 1996 to 2016. The graph includes lines for Overall, Stayers, Emp-to-Emp, and Nonemp categories. Grey shaded areas indicate recession periods.](image-url)
Sources of Earnings Growth

- The rates at which workers move into/out of nonemployment or change employers depend on aggregate conditions
- Returns from these worker movements also change with aggregate economic conditions
- Some of these returns reflects persistent employer-employee match quality
- The simplest way of capturing these changes is with a regression
We consider a reduced-form equation based on Bils (1985):

\[ y_{it} = u_t (\gamma_1 + q_{it} \gamma_2 + n_{it} \gamma_3) + x_{it} \beta + \nu_{it} \]

with indicators for emp-to-emp transitions \((q)\) and entrants \((n)\). The residual is composed of:

\[ \nu_{it} = \alpha_{it} + \epsilon_{it}, \]

where \(\alpha_{it}\) is a fixed effect and \(\epsilon_{it}\) is i.i.d. error term.
Persistent and Transitory Sources

Consider two cases where the fixed effect is:

- Person-specific (i.e. $\alpha_{it} = \alpha_i$)
- Employer-employee match-specific (i.e. $\alpha_{it} = \alpha_{ik}$)
Regression Results: Person Effects

<table>
<thead>
<tr>
<th>Variable</th>
<th>Person Effect</th>
<th>Match Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Earnings</td>
<td>Wages</td>
</tr>
<tr>
<td>Baseline</td>
<td>-0.018***</td>
<td>-0.009***</td>
</tr>
<tr>
<td>(γ₁)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>New hire:</td>
<td>-0.019***</td>
<td>-0.006***</td>
</tr>
<tr>
<td>Emp. (γ₂)</td>
<td>(0.001)</td>
<td>(0.001)</td>
</tr>
<tr>
<td>New hire:</td>
<td>-0.014***</td>
<td>-0.005***</td>
</tr>
<tr>
<td>Nonemp. (γ₃)</td>
<td>(0.001)</td>
<td>(0.001)</td>
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# Regression Results: Person vs. Match Effects

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<tr>
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<td>Wages</td>
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<tr>
<td>Baseline $(\gamma_1)$</td>
<td>-0.018***</td>
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</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>New hire: Emp. $(\gamma_2)$</td>
<td>-0.019***</td>
<td>-0.006***</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.001)</td>
</tr>
<tr>
<td>New hire: Nonemp. $(\gamma_3)$</td>
<td>-0.014***</td>
<td>-0.005***</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.001)</td>
</tr>
</tbody>
</table>
Employer-Employee Match Effects Matter

- Workers voluntarily change jobs during expansions because available matches are better.
- Changes in earnings and wages are procyclical, but less so when the quality of employer-employee matches is considered.
- Earnings and wages of emp-to-emp transitions are only weakly more procyclical than those of stayers.
- Much of this observed excess cyclicality is likely due to changes in the quality of employer-employee matches.
Combining Results

• We started with a big picture question: What can account for the decline in real earnings growth over the last 20 years?

• By combining our regression results with our worker type decomposition, we can say which parts of the regression matter the most for the timeseries patterns we observe.
Persistent and Transitory Sources

We first-difference our regression:

$$\Delta y_{it} = \Delta \alpha_{ik} + \Delta u_t(\gamma_1 + q_{it}\gamma_2 + n_{it}\gamma_3) + \Delta x_{it}\beta + \Delta \epsilon_{it}$$

- Average across all workers $i$ for every quarter and worker type
- Combine with the decomposition equation
Earnings Growth of Stayers

The chart illustrates the contribution to change in real log earnings for various factors over time, from 1996 to 2016. The factors include Total, Match Effects, Unemployment, Other Observables, and Residual. The chart shows a fluctuating trend with specific periods highlighted for analysis.
Wage Growth of Stayers
Earnings Growth of Emp-to-Emp Transitions
Contribution of Wages vs. Hours for Emp-to-Emp Transitions
Conclusion

• How have earnings, hours, and wages in the U.S. evolved over the last 20 years?

• Average earnings growth follows the contribution of stayers

• For emp-to-emp transitions, employer-employee match quality plays a large role in driving earnings growth

• Moreover, hours - more so than wages - have a large role in driving earnings growth for emp-to-emp transitions
Feedback Welcome

If you have comments or questions, please contact us at:

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