Wages

Daniel Aaronson
Vice President and Director of Microeconomic Research
Federal Reserve Bank of Chicago

Labor Market Trends Still Positive on Balance

Private Nonfarm Payroll Employment
(change, thousands)

Unemployment Rate
(percent)

Monthly change

3-month average

Jun-2015

2001 '03 '05 '07 '09 '11 '13 '15

-1,000 0 500

2007 '09 '11 '13 '15

-1,000 0 500

Jun-2015

2001 '03 '05 '07 '09 '11 '13 '15

6 9 12

3 6
But Wage Growth Remains Disappointing

Hourly Compensation
(4-quarter percent change)

Average Hourly Earnings

Employment Cost Index

Jun-2015

Q1-2015

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(4-quarter percent change)

Average Hourly Earnings

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But Wage Growth Remains Disappointing

Hourly Compensation
(4-quarter percent change)

Average Hourly Earnings

Employment Cost Index

Jun-2015

Q1-2015

Even With Unemployment at CBO’s U*

Unemployment Rate
(percent)

Actual Unemployment

CBO Short-run Natural Rate

Natural Rate adjusted for age, sex, and education changes to the labor force

Even With Unemployment at CBO’s U*

Unemployment Rate
(percent)

Actual Unemployment

CBO Short-run Natural Rate

Natural Rate adjusted for age, sex, and education changes to the labor force

3

4
Additional Labor Market Slack Measures

- Many other possible measures of slack in addition to standard unemployment rate
  - Labor force participation rate versus its trend
  - Employment to population ratio versus its trend
  - Gap between payroll employment and its trend
  - Involuntary part time
  - Vacancy rate
  - Quit rate
  - Job finding rate


Some topics/questions

- Given labor market conditions, is wage growth lower than we would expect?
  - Why?

- Which measure(s) of wage growth should we use?
  - Relationship to stuff we care about: U
  - The flexibility of micro data (CPS) – leaking into next section.

- When might wage growth accelerate?
  - State-level Phillips Curves
  - Measures of wage rigidity
  - JOLTS quits (more micro data)

- And price inflation...?
  - Relationship to stuff we care about: π
  - Granger causality
Wage Growth Has Been Low
Hourly Compensation (4-quarter percent change)

Why? Decomposing wage growth

- Definition of labor share: 
  \( \alpha_t = \frac{w_t}{p_t A_t} \) where \( w_t \) is the nominal wage per hour, \( p_t \) is the output price, and \( A_t \) is labor productivity (output per hour).

- Decompose nominal wage growth into three pieces:
  \[
  d \ln w_t = \pi_t + d \ln A_t + d \ln \alpha_t \\
  d \ln w^*_t = \pi^*_t + d \ln A^*_t + d \ln \alpha^*_t
  \]

- Estimate nominal wage growth gap = inflation gap, labor productivity growth gap, labor share growth gap, and residual.
  - \( \pi_t \): PCE, SPF 10 year ahead trend PCE inflation
  - \( d \ln A_t \): LP, our own trend estimates spliced with CBO’s
  - \( d \ln \alpha_t \): From Board of Governors (FRB-US)

Productivity growth sucks

Growth in labor productivity, actual and trend

FRB-US trend labor share falling and faster than data. Actually pulling wage gap up!

Growth in labor share, actual and trend
The culprits

Decomposition of the nominal wage growth gap

Which measure should we pay attention to?

Which measure should we pay attention to?

Correlation with unemployment

<table>
<thead>
<tr>
<th>Measure</th>
<th>Unemployment rate 2003Q1-</th>
<th>Unemployment rate 1985Q1-</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHE, P/NS</td>
<td>-0.53</td>
<td>-0.66</td>
</tr>
<tr>
<td>AHE, All</td>
<td>-0.63</td>
<td></td>
</tr>
<tr>
<td>ECI, wages</td>
<td>-0.86</td>
<td>-0.68</td>
</tr>
<tr>
<td>ECI, total comp</td>
<td>-0.81</td>
<td>-0.56</td>
</tr>
<tr>
<td>ECEC, wages</td>
<td>-0.68</td>
<td></td>
</tr>
<tr>
<td>ECEC, bonuses</td>
<td>-0.38</td>
<td></td>
</tr>
<tr>
<td>ECEC, total comp</td>
<td>-0.75</td>
<td></td>
</tr>
<tr>
<td>Comp/hr, prod</td>
<td>-0.60</td>
<td>-0.43</td>
</tr>
<tr>
<td>CPS matched, hourly workers</td>
<td>-0.83</td>
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<td>-0.68</td>
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</table>
Particularly robust applause for the CPS

- **Monthly mini-Census of households**
  - In for 4 months, out for 8, in for 4. Earnings asked twice (mos 4 & 8)

![CPS Matched Median Wage Growth](chart1.png)

Particularly robust applause for the CPS

- **Monthly mini-Census of households**
  - Combined with basic CPS questions about demographics, location, education, occupation, industry, immigration, etc.

![CPS Matched Median Wage Growth](chart2.png)
Particularly robust applause for the CPS

**Monthly mini-Census of households**
- Combined with basic CPS questions about demographics, location, education, occupation, industry, immigration, etc.

![CPS Matched Median Wage Growth](image)

- **Not without its issues**
  - Top coding means can’t say anything about high wage folks. And job growth has been stronger in high wage occupations this expansion. [Graph]
  - Nonsensical wages (< MW) are not uncommon.
  - Selection problem. Who has a wage in two periods, one year apart. (one explanation for high level)
  - Includes the impact of a year of experience and maybe tenure. Should be biased up by rate of return. (another explanation for high level)
  - Doesn’t include non-wage compensation.

- **That said, its flexibility and timeliness is super valuable.**
  - Examples: Heterogeneity, Phillips Curves, Wage rigidity
Neat stuff to do with micro data: States as “mini-economies”

State Phillips Curves

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>UR &lt; 6 weeks</td>
<td>0.014 (0.097)</td>
<td>0.267 (0.216)</td>
<td>0.124 (0.107)</td>
<td>-0.015 (0.105)</td>
</tr>
<tr>
<td>UR 6-25 weeks</td>
<td>-0.723 * (0.102)</td>
<td>-0.598 * (0.144)</td>
<td>-0.539 * (0.102)</td>
<td>-0.671 * (0.104)</td>
</tr>
<tr>
<td>UR 26+ weeks</td>
<td>-0.303 * (0.077)</td>
<td>-0.170 (0.092)</td>
<td>-0.059 (0.098)</td>
<td>-0.235 * (0.087)</td>
</tr>
<tr>
<td>PT for econ</td>
<td>-0.404 * (0.086)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PT for non-econ</td>
<td></td>
<td></td>
<td>0.083 * (0.026)</td>
<td></td>
</tr>
<tr>
<td>&quot;Wage gap&quot; in 2015Q2 Relative to 2005-07 average</td>
<td>-0.3</td>
<td>-0.2</td>
<td>-0.6</td>
<td>-0.3</td>
</tr>
<tr>
<td>Due to UR 6-25 wks</td>
<td>-0.1</td>
<td>-0.2</td>
<td>-0.1</td>
<td>-0.1</td>
</tr>
<tr>
<td>Due to UR 26+</td>
<td>-0.1</td>
<td>-0.1</td>
<td>0.0</td>
<td>-0.5</td>
</tr>
<tr>
<td>Due to PT econ</td>
<td>-0.1</td>
<td>-0.2</td>
<td>-0.1</td>
<td>-0.2</td>
</tr>
</tbody>
</table>

Neat stuff to do with micro data:
Nominal wage rigidity

See, e.g., Mary Daly and Bart Hobijn, FRBSF Economic Letter, January 5, 2015.
Neat stuff to do with micro data: Nominal wage rigidity

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Percent rigid wage</td>
<td>-0.224 *</td>
</tr>
<tr>
<td></td>
<td>(0.035)</td>
</tr>
<tr>
<td>UR &lt; 6 weeks</td>
<td>0.069</td>
</tr>
<tr>
<td></td>
<td>(0.107)</td>
</tr>
<tr>
<td>UR 6-25 weeks</td>
<td>-0.650 *</td>
</tr>
<tr>
<td></td>
<td>(0.115)</td>
</tr>
<tr>
<td>UR 26+ weeks</td>
<td>-0.232 *</td>
</tr>
<tr>
<td></td>
<td>(0.091)</td>
</tr>
<tr>
<td>PT for econ</td>
<td>-0.351 *</td>
</tr>
<tr>
<td></td>
<td>(0.097)</td>
</tr>
</tbody>
</table>

"Wage gap" in 2015Q2 Relative to 2005-07 average

Due to perc rigid wg
Due to UR 6-25 wks
Due to UR 26+
Due to PT econ

Due to perc rigid ws
-0.1
-0.1
-0.1
-0.1
-0.2
-0.2
-0.2
-0.1
-0.1
-0.1
-0.2
-0.2
-0.2

Neat stuff to do with micro data: JOLTS and job switching

Neat stuff to do with micro data: JOLTS

<table>
<thead>
<tr>
<th>Corr Q, ECI(t+k)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.66</td>
<td>0.71</td>
<td>0.76</td>
<td>0.77</td>
<td>0.78</td>
<td>0.69</td>
</tr>
</tbody>
</table>


Which measure should we pay attention to? Relationship with inflation
Which measure should we pay attention to?

Correlation with inflation, unemployment, 2003:Q1-2015:Q1

<table>
<thead>
<tr>
<th>Measure</th>
<th>Unemployment rate</th>
<th>PCE</th>
<th>Core PCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHE, P/NS</td>
<td>-0.53</td>
<td>0.34</td>
<td>0.47</td>
</tr>
<tr>
<td>AHE, All</td>
<td>-0.63</td>
<td>0.43</td>
<td>0.50</td>
</tr>
<tr>
<td>ECI, wages</td>
<td>-0.86</td>
<td>0.63</td>
<td>0.70</td>
</tr>
<tr>
<td>ECI, total comp</td>
<td>-0.81</td>
<td>0.72</td>
<td>0.60</td>
</tr>
<tr>
<td>ECEC, wages</td>
<td>-0.68</td>
<td>0.48</td>
<td>0.42</td>
</tr>
<tr>
<td>ECEC, bonuses</td>
<td>-0.38</td>
<td>0.13</td>
<td>0.30</td>
</tr>
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<td>0.42</td>
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<td>-0.60</td>
<td>0.57</td>
<td>0.46</td>
</tr>
<tr>
<td>CPS matched, hourly workers</td>
<td>-0.83</td>
<td>0.62</td>
<td>0.66</td>
</tr>
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<td>CPS matched, all</td>
<td>-0.85</td>
<td>0.68</td>
<td>0.70</td>
</tr>
</tbody>
</table>
Which measure should we pay attention to?

**Correlation with inflation, unemployment, 1985:Q1-2015:Q1**

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<tr>
<th></th>
<th>Unemployment rate</th>
<th>PCE</th>
<th>Core PCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHE, P/NS</td>
<td>-0.66</td>
<td>0.28</td>
<td>0.16</td>
</tr>
<tr>
<td>AHE, All</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECI, wages</td>
<td>-0.68</td>
<td>0.53</td>
<td>0.61</td>
</tr>
<tr>
<td>ECI, total comp</td>
<td>-0.56</td>
<td>0.71</td>
<td>0.68</td>
</tr>
<tr>
<td>ECEC, wages</td>
<td></td>
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<td></td>
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<td>Comp/hr, prod</td>
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<td>0.33</td>
<td>0.33</td>
</tr>
<tr>
<td>CPS matched, hourly workers</td>
<td>-0.68</td>
<td>0.50</td>
<td>0.58</td>
</tr>
<tr>
<td>CPS matched, all</td>
<td>-0.68</td>
<td>0.53</td>
<td>0.59</td>
</tr>
</tbody>
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Does wage growth cause inflation? Or vice-versa?

- **Granger causality test**
  \[ \Delta \pi_t^i = \alpha (\pi_{t-1}^i - \pi_{t-1}^y) + \lambda (L) \Delta \pi_{t-1}^y + \gamma (L) \pi_{t-1}^y + X_t \beta + \epsilon_t \]

- \( \pi_t^i \) = GDP deflator, \( \pi_t^y \) = Unit labor costs
- Supply/demand shocks
- Error correction
- Own lags

**P-value of Ho: \( \lambda(L) = 0 \).**

<table>
<thead>
<tr>
<th></th>
<th>( \pi^w \rightarrow \pi^p )</th>
<th>( \pi^p \rightarrow \pi^w )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986Q1-2015Q1</td>
<td>0.16</td>
<td>0.00</td>
</tr>
<tr>
<td>2000Q1-2015Q1</td>
<td>0.27</td>
<td>0.05</td>
</tr>
<tr>
<td>1986Q1-2007Q4</td>
<td>0.41</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Conclusion

- Wage growth is another measure of labor market performance.
  - Might be an alternative way to think about how close the economy is to steady-state. But lots of issues.

- There are many wage measures.
  - They don’t all same the same thing at the same time. Nor should they.
  - In the past, some (ECI, CPS?) have performed a little better than others along some metrics.

- Micro data can be quite valuable.

Extra slides
**Employment/Population Ratio**

- **Actual**
- **Trend**

*FRBCHI staff estimates

**Payroll Employment**

- **Actual**
- **Trend**

*FRBCHI staff estimate
Job Openings and Turnovers

Vacancy Rate (JOLTS Survey)
(3A, percent)

Quits Rate (JOLTS Survey)
(3A, percent)

Exit Rate from Unemployment to Employment
(% of Unemployed)
Wage Growth Has Been Low

Real Year-Year Wage Growth in Recovery

Appendix Figure 1
Employment by Occupation

Cumulative Change since 1/1990 (Millions)

High Wage Occupations
Mid Wage Occupations
Low Wage Occupations

From Household Survey via Haver
High: Management, Professional, and Related
Mid: Sales and Office; Construction and Extraction; Installation, Maintenance, and Repair;
Production/Transportation and Material Moving
Low: Service; Farming, Fishing, and Forestry
Does wage growth cause inflation? Or vice-versa?

**Granger causality test**

\[ \Delta \pi_t^P = \alpha (\pi_{t-1}^P - \pi_{t-1}^w) + \lambda (L) \Delta \pi_{t-1}^w + \gamma (L) \pi_{t-1}^P + X_t \beta + \epsilon_t \]

*P*-value of Ho: \( \lambda(L) = 0. \)

<table>
<thead>
<tr>
<th>Period</th>
<th>( \pi^w \rightarrow \pi^P )</th>
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<tbody>
<tr>
<td>1986Q1-2015Q1</td>
<td>0.48</td>
<td>0.71</td>
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<td>0.34</td>
<td>0.56</td>
</tr>
<tr>
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