Payroll employment increases have averaged 150,000 per month over the last six months. Is that

A: Good

B: Bad

C: Mediocre

D: Not enough information to say
Payroll employment increases have averaged 150,000 per month over the last six months. Is that

A: Good

B: Bad

C: Mediocre – 150,000 per month was about the trend

D: Not enough information to say
Payroll employment increases have averaged 150,000 per month over the last six months. Is that

A: Good – Trend is now more like 100,000

B: Bad

C: Mediocre

D: Not enough information to say
Factors Affecting Growth in Available Workers

- Population Growth
  - Recently about 1.2% per year
  - Projected to slow slightly

- Labor Force Participation
  - Well off its peak
  - Argue here that it is likely to go lower
Labor Force Participation Is Below Old Trend

Civilian Labor Force Participation Rate
(percent of age 16 and over non-institutionalized population)
But the Trend Has Likely Changed

Civilian Labor Force Participation Rate
(percent of age 16 and over non-institutionalized population)
A Decomposition

Let

\[ p_t = \text{LFP at time } t \]

\[ p_{dt} = \text{LFP for demographic group } d \text{ at time } t \]

\[ f_{dt} = \text{Share of population in group } d \text{ at time } t \]

Then

\[ p_t = \sum_d f_{dt} p_{dt} \]

And

\[ \Delta p_t = \sum_d f_{dt} \Delta p_{dt} + \sum_d (p_{dt-1} - p_{t-1}) \Delta f_{dt} \]

\[ \text{Behavior} \quad \text{Demographics} \]
## Decomposition of LFP Change

(Percentage points per year)

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Total Change</td>
<td>0.24</td>
<td>0.12</td>
<td>-0.10</td>
<td>-0.26*</td>
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<tr>
<td>Behavioral</td>
<td>0.20</td>
<td>0.08</td>
<td>-0.04</td>
<td>-0.17*</td>
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<tr>
<td>Demographic</td>
<td>0.04</td>
<td>0.04</td>
<td>-0.06</td>
<td>-0.10*</td>
</tr>
</tbody>
</table>

* = Projection
Participation by Age and Sex

2005 Labor Force Participation Rates

age

percent

men
women
## Decomposition of Demographic Contribution

(Percentage points per year)

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Total</td>
<td>0.04</td>
<td>0.04</td>
<td>-0.06</td>
<td>-0.10</td>
</tr>
<tr>
<td>Age 16-25</td>
<td>-0.00</td>
<td>-0.02</td>
<td>0.01</td>
<td>-0.00</td>
</tr>
<tr>
<td>Age 26-55</td>
<td>0.11</td>
<td>0.07</td>
<td>-0.06</td>
<td>-0.05</td>
</tr>
<tr>
<td>Age 56-65</td>
<td>0.00</td>
<td>0.03</td>
<td>-0.01</td>
<td>-0.04</td>
</tr>
<tr>
<td>Over age 65</td>
<td>-0.07</td>
<td>-0.04</td>
<td>0.01</td>
<td>-0.00</td>
</tr>
</tbody>
</table>
Labor Force Participation: Age 16-19

Civilian Labor Force Participation Rate
(percent of age 16 and over non-institutionalized population)
Civilian Labor Force Participation Rate
(percent of age 16 and over non-institutionalized population)
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(percent of age 16 and over non-institutionalized population)
<table>
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</thead>
<tbody>
<tr>
<td>Total</td>
<td>0.20</td>
<td>0.08</td>
<td>-0.04</td>
<td>-0.17*</td>
</tr>
<tr>
<td>Men</td>
<td>-0.13</td>
<td>-0.10</td>
<td>-0.03</td>
<td>-0.05*</td>
</tr>
<tr>
<td>Age 16-25</td>
<td>-0.04</td>
<td>-0.04</td>
<td>-0.06</td>
<td>-0.05*</td>
</tr>
<tr>
<td>Age 26-55</td>
<td>-0.03</td>
<td>-0.07</td>
<td>-0.01</td>
<td>-0.05*</td>
</tr>
<tr>
<td>Age 56-65</td>
<td>-0.04</td>
<td>-0.00</td>
<td>0.01</td>
<td>0.00*</td>
</tr>
<tr>
<td>Over age 65</td>
<td>-0.02</td>
<td>0.01</td>
<td>0.02</td>
<td>0.04*</td>
</tr>
</tbody>
</table>

* = Projection
### Decomposition of Behavioral Contribution

(Percentage points per year)

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>0.20</td>
<td>0.08</td>
<td>-0.04</td>
<td>-0.17*</td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td>0.33</td>
<td>0.18</td>
<td>-0.02</td>
<td>-0.12*</td>
</tr>
<tr>
<td>Age 16-25</td>
<td>0.03</td>
<td>-0.01</td>
<td>-0.06</td>
<td>-0.03*</td>
</tr>
<tr>
<td>Age 26-55</td>
<td>0.30</td>
<td>0.13</td>
<td>-0.05</td>
<td>-0.13*</td>
</tr>
<tr>
<td>Age 56-65</td>
<td>0.00</td>
<td>0.05</td>
<td>0.04</td>
<td>0.01*</td>
</tr>
<tr>
<td>Over age 65</td>
<td>-0.00</td>
<td>0.01</td>
<td>0.04</td>
<td>0.04*</td>
</tr>
</tbody>
</table>

* = Projection
Question: What will happen to participation rates for 50-54 year old women between now and 2010?

BLS Method: Extrapolate the time series for 50-54 year old women

Cohort Method:
- Note that women who will be 50-54 in 2010 were born 1955-60
- Compare the LFP of the 1955-60 birth cohorts to those of the 1950-54 birth cohorts at ages up to 45-49
- Assume cohort differences will persist at higher ages
Example (Based on Model Fit)

If 1960 Cohort follows 1955 Pattern at Higher Level …

![Graph of White Female Labor Force Participation Log Odds for 1955 and 1960 Birth Cohorts](image-url)

- **1960 Birth Cohort**
- **1955 Birth Cohort**
Example (Based on Model Fit)

... Then can predict 1960 cohort LFP five years from now:
Cohort-Based Projections

- Above projections based on extensions of Aaronson and Sullivan, Chicago Fed Economic Perspectives, 2001
  - Work in progress

- Somewhat similar to Aaronson, Fallick, Figura, Pingle, and Washer, Brookings, 2006

- Differences
  - Estimates at individual level (CPS Outgoing Rotation Groups 1979-2005)
  - Everything conditional on educational levels
  - Many details
A Basic Logistic Cohort Model

\[ P_{sba} = \text{Prob individual } i \text{ of sex } s \text{ born in year } b \text{ is in LF at age } a \]

\[ \log\left(\frac{P_{sba}}{1 - P_{sba}}\right) = \beta_s + \alpha_{sa} + x_{sba} \gamma_s \]

\( \beta_s \) \hspace{1cm} \text{Birth year cohort dummies}

\( \alpha_{sa} \) \hspace{1cm} \text{Age dummies}

\( x_{sba} \) \hspace{1cm} \text{Race group dummies}
Cohort Effects

Coefficients on Birth Years: Males
(1960 normalized to 0)

Projections
Age Effects

Coefficients on Age Dummies: Males
(30 normalized to 0)
Age Profile

Predicted LFP: Males
(1960 Birth Cohort)
Age Profile

Predicted LFP: Females
(1960 Birth Cohort)
Extension: Condition on Education

\[ \mathcal{P}_{\text{sebai}} = \text{Prob individual } i \text{ of sex } s \text{ and education } e \text{ born in year } b \text{ is in LF at age } a \]

5 education categories: <HS, =HS, Some College, College, > College

\[ \log \left( \frac{\mathcal{P}_{\text{sebai}}}{1 - \mathcal{P}_{\text{sebai}}} \right) = \beta_{\text{seb}} + \alpha_{\text{sea}} + x_{\text{sebai}} \gamma_{se} \]
Extension: Condition on Education

To forecast LFP, need educational attainment forecasts

\[ q_{sba}^e = \text{Prob individual } i \text{ of sex } s \text{ born in year } b \text{ has attainment of at least } e \text{ at age } a \text{ given attainment of at least } e - 1 \]

\[
\log\left( \frac{q_{sba}^e}{1 - q_{sba}^e} \right) = \beta_{sb}^e + \alpha_{sa}^e + x_{sba} \gamma_s^e
\]
Extension: Allow for Business Cycle Effects

\[ P_{seba} = \text{Prob individual } i \text{ of sex } s \text{ and education } e \text{ born in year } b \text{ is in LF at age } a \]

\[ \log\left(\frac{P_{seba}}{1 - P_{seba}}\right) = \]

\[ \beta_{seb} + \alpha_{sea} + \nu_{sea,b+a} \lambda_{se} + x_{seba} \gamma_{se} \]

\[ \nu_{sea,b+a} = \text{Current and two quarterly lags of CBO unemployment gap (actual – NAIRU) interacted with 4th order polynomial in age} \]
Extension: Allow for Shifts in Age Profiles

\[ P_{\text{sebai}} = \text{Prob individual } i \text{ of sex } s \text{ and education } e \text{ born in year } b \text{ is in LF at age } a \]

\[
\log\left(\frac{P_{\text{sebai}}}{1 - P_{\text{sebai}}}\right) =
\]

\[
\beta_{\text{seb}} + \alpha_{\text{sea}} + \nu_{\text{sea,}b+a} \phi_{\text{se}} + \omega_{\text{sea,}b+a} \lambda_{\text{se}} + \chi_{\text{sebai}} \gamma_{\text{se}}
\]

\[
\nu_{\text{sea,}b+a} = \text{Linear year } (b+a) \text{ interacted with } 4^{th} \text{ order polynomial in age}
\]

Change in age profile happens linearly over time, but the changes happen at different rates for different ages.
Example of Shifting Age Profile

Females with HS education
Results: Model Based Trend Falling

[Diagram showing labor force participation rate over years, with symbols indicating data (+) and model trend (*).]

+ = data     * = model trend
Caveats

- Modest statistical parameter uncertainty
- Substantial model uncertainty
- Models have no economics: Trends can change
- E.g., persistent labor market tightness could push up wages, which could increase labor supply (or decrease labor supply)
- E.g., policy changes on SS, taxes, tuition, etc could affect labor force participation
Implication for Employment Growth

- 1.20% per year population growth plus
- 0.20 percentage point per year drop in LFP implies
- 0.90% per year labor force growth rate (LF roughly 2/3 of Pop)
- If nonfarm employment is a constant share of LF, this implies about 100,000 employment increase per month (135 million * 0.009 / 12)
- (Non farm employment / Civilian employment trending up over last several decades, trending down over last several years -- could imply an adjustment of 10,000 either way)
Labor Composition (AKA Labor Quality)

- Not all workers are equally productive.
- Observable characteristics like education and (potential) experience predict wage rates.
- If wages are proportional to productivity, changes in the distribution of education and experience predict effects on productivity.
- Aaronson and Sullivan predict contributions to productivity growth from labor composition falling from 0.3 to 0.1 percentage points.
Potential Output Growth

- Swing from 0.1% increases (mid 1990s) in LFP to 0.2% decreases in LFP (mid 2000s) implies 0.45 percentage points slower growth of available workers.

- Slowing in labor composition improvements implies roughly 0.15 percentage points slower growth of labor productivity.

- Combined slowing of labor input growth implies 0.6 percentage points less growth in potential output.

- Of course, other factors (TFP, capital deepening) matter as well.