Outlook for the U.S. Economy

Presentation by James Kahn and Simon Potter to the Economic Advisory Panel

May 11, 2007
Overview

• Inflation outlook shows slight improvement
  – Year-over-year core inflation remains elevated
  – Latest core numbers suggest moderation (after unexpected blip up in early 2007)

• Real activity has decelerated further since the first half of 2006
  – Employment and hours growth have slowed (following unexpected strength late in 2006)
  – Large housing ‘correction’ continues

• We still expect GDP growth to recover in ’07, with continued moderation in inflation
Labor Market Update

- Big picture is still a relatively strong labor market juxtaposed with weak output growth
- Latest numbers show some softening
Unemployment steady, participation sluggish

Unemployment Rate (Left Axis)

Participation Rate (Right Axis)

Source: Bureau of Labor Statistics

Note: Shading represents NBER recessions.
Job and hours growth have slowed

3-Month Moving Averages

Total Private Employment
Aggregate Hours (right scale)

Source: Bureau of Labor Statistics
Note: Shading represents NBER recessions.
Employment expansion remains below past norms
(Series Set to 1.0 at Employment Trough)

Average of Previous Cycles excluding 1991

1991 Cycle

Current Cycle

Current Cycle (prior to revisions)

Source: Bureau of Labor Statistics
Productivity, compensation have slowed...

Nonfarm Business Sector

Source: Bureau of Labor Statistics

Note: Shading represents NBER recessions.
...so unit labor costs growth has come down

Nonfarm Business Sector

<table>
<thead>
<tr>
<th>Year</th>
<th>Compensation per Hour</th>
<th>Output per Hour</th>
<th>Unit Labor Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>8</td>
<td>-2</td>
<td>6</td>
</tr>
<tr>
<td>2000</td>
<td>10</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>2002</td>
<td>8</td>
<td>-2</td>
<td>6</td>
</tr>
<tr>
<td>2004</td>
<td>4</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>2006</td>
<td>2</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

Source: Bureau of Labor Statistics

Note: Shading represents NBER recessions.
Average Hourly Earnings growth has also slowed

Source: Bureau of Labor Statistics
Other Releases

• March trade balance: lower than anticipated
• April retail sales: sluggish but Q1 revised up
• April PPI: “core” was -0.1 percent
March Trade Balance Lower than Expected

Source: Census Bureau
Retail Sales off in April, but revised up for Q1

% Change - Year to Year

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Excluding Autos</td>
<td>9</td>
<td>3</td>
</tr>
</tbody>
</table>

Source: Bureau of Labor Statistics

Note: Shading represents NBER recessions.
Monetary Policy and Financial Markets
Expected funds rate path: Stronger downward tilt

Source: Federal Reserve Board
The yield curve has fallen and steepened slightly.
Short- and Long-Term Rates (Intraday)

3-Month

Employment Report


New Home Sales

CPI, Housing Starts

Personal Income

Employment Report

Source: Bloomberg

Note: On-the-run 3-month and 10-year yield, 8 am to 4 pm
10-Year Breakeven Inflation Rate (Intraday)

Employment Report

CPI, Housing Starts

New Home Sales

Employment Report

Personal Income

Source: Bloomberg

Note: Calculated as difference between on-the-run 10-year Treasury and 10-year TIPS yield, 8 am to 4 pm.
S&P 500 (Intraday)

Index Level

Source: Bloomberg

Note: Data between 9:30 am and 4:00 pm
Evolution of the Forecast

Confidential
## Forecast Comparison: October 2006 and May 2007

**FRBNY Central Forecast**

<table>
<thead>
<tr>
<th>Growth Rates</th>
<th>2007 Q1</th>
<th>2007 Q2</th>
<th>2007 (Q4/Q4)</th>
<th>2008 (Q4/Q4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oct. 20</td>
<td>Actual</td>
<td>Oct. 20</td>
<td>May 7</td>
</tr>
<tr>
<td>Real GDP</td>
<td>2.9</td>
<td>1.3</td>
<td>2.9</td>
<td>2.7</td>
</tr>
<tr>
<td>Core PCE Deflator</td>
<td>2.0</td>
<td>2.2</td>
<td>1.9</td>
<td>2.0</td>
</tr>
<tr>
<td>Unemployment</td>
<td>4.8</td>
<td>4.5</td>
<td>4.8</td>
<td>4.6</td>
</tr>
</tbody>
</table>

### Policy Path

<table>
<thead>
<tr>
<th>Policy Path</th>
<th>07 Q2</th>
<th>07 Q3</th>
<th>07 Q4</th>
<th>08 Q1</th>
<th>08 Q2</th>
<th>08 Q3</th>
<th>08 Q4</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 20</td>
<td>5.25</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>4.75</td>
<td>4.75</td>
</tr>
<tr>
<td>May 7</td>
<td>5.25</td>
<td>5.25</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>4.75</td>
<td>4.75</td>
</tr>
</tbody>
</table>

\(^a\) 2007Q4 levels
\(^b\) 2008Q4 levels

Source: FRBNY

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## Forecast Comparison: October 2006 and May 2007

**FRBNY Forecast**

<table>
<thead>
<tr>
<th>Growth Contributions</th>
<th>2007 Q1</th>
<th>2007 Q2</th>
<th>2007 (Q4/Q4)</th>
<th>2008 (Q4/Q4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oct 20</td>
<td>Actual</td>
<td>Oct 20</td>
<td>May 7</td>
</tr>
<tr>
<td>Real GDP</td>
<td>2.9</td>
<td>1.3</td>
<td>2.9</td>
<td>2.7</td>
</tr>
<tr>
<td>Consumption</td>
<td>2.1</td>
<td>2.7</td>
<td>2.1</td>
<td>2.1</td>
</tr>
<tr>
<td>Business Fixed Investment</td>
<td>0.8</td>
<td>0.2</td>
<td>0.7</td>
<td>0.6</td>
</tr>
<tr>
<td>Residential Investment</td>
<td>-0.5</td>
<td>-1.0</td>
<td>-0.2</td>
<td>-0.9</td>
</tr>
<tr>
<td>Government</td>
<td>0.7</td>
<td>0.2</td>
<td>0.5</td>
<td>0.6</td>
</tr>
<tr>
<td>Inventory Investment</td>
<td>0.1</td>
<td>-0.3</td>
<td>-0.1</td>
<td>0.3</td>
</tr>
<tr>
<td>Net Exports</td>
<td>-0.2</td>
<td>-0.5</td>
<td>0.0</td>
<td>-0.2</td>
</tr>
</tbody>
</table>

Source: FRBNY CONFIDENTIAL
## Forecast Comparison: October 2006 and May 2007

**FRBNY Forecast**

<table>
<thead>
<tr>
<th>Growth Rates</th>
<th>2007 Q1</th>
<th></th>
<th>2007 Q2</th>
<th></th>
<th>2007 (Q4/Q4)</th>
<th></th>
<th>2008 (Q4/Q4)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Real GDP</td>
<td>2.9</td>
<td>1.3</td>
<td>2.9</td>
<td>2.7</td>
<td>3.0</td>
<td>2.6</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Nonfarm Output</td>
<td>3.3</td>
<td>1.4</td>
<td>3.4</td>
<td>3.1</td>
<td>3.4</td>
<td>2.9</td>
<td>3.4</td>
<td>3.4</td>
</tr>
<tr>
<td>Hours</td>
<td>0.8</td>
<td>-0.3</td>
<td>0.9</td>
<td>1.0</td>
<td>0.9</td>
<td>0.8</td>
<td>0.9</td>
<td>1.1</td>
</tr>
<tr>
<td>Productivity</td>
<td>2.5</td>
<td>1.7</td>
<td>2.5</td>
<td>2.1</td>
<td>2.5</td>
<td>2.1</td>
<td>2.5</td>
<td>2.2</td>
</tr>
<tr>
<td>Compensation/hour</td>
<td>4.5</td>
<td>2.3</td>
<td>4.1</td>
<td>3.7</td>
<td>4.2</td>
<td>4.0</td>
<td>4.1</td>
<td>4.7</td>
</tr>
<tr>
<td>Unit Labor Costs</td>
<td>2.0</td>
<td>0.6</td>
<td>1.6</td>
<td>1.6</td>
<td>1.7</td>
<td>2.0</td>
<td>1.6</td>
<td>2.4</td>
</tr>
</tbody>
</table>

Source: FRBNY

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Summary

• Central forecast calls for
  – Core inflation to moderate slowly
  – Real activity to recover at a moderate pace for the remainder of 2007
  – Potential still at 3% going forward, pending data revisions

• Still broadly resembles 1994-95 slowdown
  – But without the rate cuts (yet)
  – Downside risk?
# Main Risks to Central Scenario

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Effect on Forecast</th>
<th>Evidence in Favor</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Productivity Slowdown</em></td>
<td><strong>Output</strong>: Down</td>
<td>Recent low productivity</td>
</tr>
<tr>
<td></td>
<td><strong>Inflation</strong>: Up</td>
<td>Sluggish investment</td>
</tr>
<tr>
<td><em>Aftermath of Overheated Economy</em></td>
<td><strong>Output</strong>: Down</td>
<td>Housing correction</td>
</tr>
<tr>
<td></td>
<td><strong>Inflation</strong>: Up</td>
<td>Low savings</td>
</tr>
<tr>
<td><em>Fed Over-Tightened</em></td>
<td><strong>Output</strong>: Down</td>
<td>Yield curve inversion</td>
</tr>
<tr>
<td></td>
<td><strong>Inflation</strong>: Down</td>
<td></td>
</tr>
</tbody>
</table>
Change in Forecast and 90% Probability Interval

% Change – Year to Year

Core PCE Inflation

% Change – Year to Year

Real GDP Growth

% Change – Year to Year

October EAP

Real GDP Growth
Summary

• *Productivity Slowdown* and *Aftermath of Overheating* imply firmer path for policy than priced into markets

Risks to central forecast consistent with

• Low volatility priced around market path
• Negative skewness priced around market path (from presence of *Over-tightening* risk)
• Low probability of Fed Funds Rate above 6% going forward
Are long-term inflation expectations anchored, contained, or unmoored?

Joshua Rosenberg¹
Research and Statistics Group
Federal Reserve Bank of New York

May 11, 2007

¹This is joint work with Simon Potter.
Long-term inflation expectations from surveys appear well anchored
Long-term inflation expectations from markets are centered in the 2.5% to 3.5% range.
3 models of long-term inflation expectations

- **Anchored:**
  - Markets are certain about the CB’s inflation target.
  - Long-term inflation expectations are approximately constant.
  - There is no pass-through from short to long-term expectations.

- **Contained:**
  - Markets believe the CB will push back when inflation reaches the edge of the comfort zone.
  - Long-term inflation expectations are bounded above and below.
  - Pass-through is low and asymmetric at the edge of the comfort zone.

- **Unmoored:**
  - Inflation expectations are neither anchored nor contained.
Market expectations appear weakly anchored

\[ \Delta \pi^{9,10} = 0.16 \Delta \pi^{1,2} \]

- 16% of the change in 1-2 year inflation expectations is passed through to 9-10 year inflation expectations.
- Pass-through is not high.
- Why would there be any pass-through when long-run expectations do not fluctuate widely?
  - Perhaps, markets believe Fed is indifferent inside comfort zone.
  - And, aggressive at boundaries.

Note: Data are daily changes in 1-2 and 9-10 year breakeven inflation rates from 2003 to 2007. The estimated coefficient is significant at the 1% level.
But, market expectations appear well contained

\[
\Delta \pi^{9,10} = 0.29 \Delta \pi^{1,2} - 0.20 \left| \pi^{1,2} - 2.25 \right| \Delta \pi^{1,2}
\]

Pass-through at center of comfort zone

Distance from center of comfort zone

Note: Data are daily changes in 1-2 and 9-10 year breakeven inflation rates from 2003 to 2007. All estimated coefficients are significant at the 1% level.
But, market expectations appear well contained

$$\Delta \pi^{9,10} = 0.29 \Delta \pi^{1,2} - 0.20 |\pi^{1,2} - 2.25| \Delta \pi^{1,2}$$

At the center of the comfort zone, pass-through is 29%.

Note: Data are daily changes in 1-2 and 9-10 year breakeven inflation rates from 2003 to 2007. All estimated coefficients are significant at the 1% level.
But, market expectations appear well contained

\[ \Delta \pi^{9,10} = 0.29 \Delta \pi^{1,2} - 0.20 |\pi^{1,2} - 2.25| \Delta \pi^{1,2} \]

1 percentage point from the center of the comfort zone, pass-through declines by 20% to 9%.

Note: Data are daily changes in 1-2 and 9-10 year breakeven inflation rates from 2003 to 2007. All estimated coefficients are significant at the 1% level.
Asymmetric pass-through keeps long-term expectations bounded

Effect of four 0.25% changes in short-term inflation expectations on long-term expectations

<table>
<thead>
<tr>
<th></th>
<th>Increase 1%</th>
<th>Decline 1%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4th</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Effects are averaged over the duration of the policy regime. Policy change dates are 8/12/03, 5/4/04, and 8/8/06.
Asymmetric pass-through keeps long-term expectations bounded

Effect of four 0.25% changes in short-term inflation expectations on long-term expectations

<table>
<thead>
<tr>
<th>Period</th>
<th>Increase 1%</th>
<th>Decline 1%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Considerable period 8/2003-5/2004</td>
<td>+23 bp</td>
<td>-12 bp</td>
</tr>
<tr>
<td>Measured pace 5/2004-8/2006</td>
<td>+14 bp</td>
<td>-23 bp</td>
</tr>
<tr>
<td>Pause 8/2006-present</td>
<td>+20 bp</td>
<td>-20 bp</td>
</tr>
</tbody>
</table>

Note: Effects are averaged over the duration of the policy regime. Policy change dates are 8/12/03, 5/4/04, and 8/8/06.
Why well contained rather than well anchored?

- CB members might have range of preferences within the comfort zone.
- Difficulties in precisely measuring inflation.
- Cost to micromanaging small fluctuations in inflation expectations.
Questions

1. If we had the perfect measure of inflation expectations, how should policymakers make use of it? What are the pitfalls?

2. Given that we don't, as a practical matter how can policymakers best make use of the information on expectations that we do have?

3. What are the implications of current measures of expectations for current policy?
Additional slides
Pass-through regressions

Panel A. Relationship between 9-10 and 1-2 year breakeven inflation changes

<table>
<thead>
<tr>
<th>Model</th>
<th>Equation</th>
<th>Number obs.</th>
<th>Adjusted $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Linear</td>
<td>$\Delta \pi^{9,10} = 0.00 + 0.16^{***} \Delta \pi^{1,2}$</td>
<td>1084</td>
<td>5.83%</td>
</tr>
<tr>
<td>(2) Nonlinear (center of range = 2.25%)</td>
<td>$\Delta \pi^{9,10} = 0.00 + (0.29^{<em><strong>} - 0.20^{</strong></em>}</td>
<td>\pi^{1,2} - 2.25</td>
<td>) \Delta \pi^{1,2}$</td>
</tr>
<tr>
<td>(3) Nonlinear (estimated center of range)</td>
<td>$\Delta \pi^{9,10} = 0.00 + (0.34^{<em><strong>} - 0.20^{</strong></em>}</td>
<td>\pi^{1,2} - 2.67</td>
<td>) \Delta \pi^{1,2}$</td>
</tr>
</tbody>
</table>

Panel B. Relationship between 5-10 and 1-2 year breakeven inflation changes

<table>
<thead>
<tr>
<th>Model</th>
<th>Equation</th>
<th>Number obs.</th>
<th>Adjusted $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>(4) Linear</td>
<td>$\Delta \pi^{5,10} = 0.00 + 0.14^{***} \Delta \pi^{1,2}$</td>
<td>1084</td>
<td>5.98%</td>
</tr>
<tr>
<td>(5) Nonlinear (center of range = 2.25%)</td>
<td>$\Delta \pi^{5,10} = 0.00 + (0.20^{<em><strong>} - 0.10^{</strong></em>}</td>
<td>\pi^{1,2} - 2.25</td>
<td>) \Delta \pi^{1,2}$</td>
</tr>
<tr>
<td>(6) Nonlinear (estimated center of range)</td>
<td>$\Delta \pi^{5,10} = 0.00 + (0.25^{<em><strong>} - 0.10^{</strong></em>}</td>
<td>\pi^{1,2} - 2.93</td>
<td>) \Delta \pi^{1,2}$</td>
</tr>
</tbody>
</table>

Note: Data are daily changes in 1-2, 5-10, and 9-10 year breakeven inflation rates from 2003 to 2007.
Asymmetric pass-through

Effect of four 0.25% changes in short-term inflation expectations on long-term expectations
Inflation expectations with Fed Funds target

9-10 year inflation expectation
5-10 year inflation expectation

Target federal funds rate

1-2 year inflation expectation
Reference Charts
GDP growth has slowed, expected to recover

Source: Bureau of Economic Analysis and Blue Chips   Note: Dotted lines represent top and bottom ten forecasts.
Monthly indicators: PCE moderate, IP weaker

3-Month Moving Average

% Change – 3-months at an annual rate

Source: Bureau of Economic Analysis and Federal Reserve Board

Note: Shading represents NBER recessions.
Monthly indicators: PCE moderate, IP weaker

3-Month Moving Average

% Change – Annual Rate

Source: Bureau of Economic Analysis and Federal Reserve Board
Note: Shading represents NBER recessions.
Retail Sales

% Change - Year to Year


Source: Bureau of Labor Statistics

Note: Shading represents NBER recessions.
## PCE Deflator
(percentage change at an annual rate)

<table>
<thead>
<tr>
<th></th>
<th>24 Month</th>
<th>12 Month</th>
<th>6 Month</th>
<th>3 Month</th>
<th>1 Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCE Deflator</td>
<td>3.1</td>
<td>3.2</td>
<td>3.8</td>
<td>2.9</td>
<td>3.2</td>
</tr>
<tr>
<td>Market-Based</td>
<td>3.0</td>
<td>3.1</td>
<td>3.9</td>
<td>2.7</td>
<td>3.0</td>
</tr>
<tr>
<td>Durable Goods</td>
<td>-0.7</td>
<td>-0.7</td>
<td>-0.5</td>
<td>-0.6</td>
<td>0.7</td>
</tr>
<tr>
<td>Motor Vehicles and Parts</td>
<td>1.4</td>
<td>1.3</td>
<td>0.6</td>
<td>0.8</td>
<td>1.3</td>
</tr>
<tr>
<td>Nondurable Goods</td>
<td>4.2</td>
<td>4.0</td>
<td>7.2</td>
<td>3.9</td>
<td>4.1</td>
</tr>
<tr>
<td>Clothing and Shoes</td>
<td>-0.6</td>
<td>-0.1</td>
<td>2.8</td>
<td>-0.9</td>
<td>13.9</td>
</tr>
<tr>
<td>Services</td>
<td>3.3</td>
<td>3.6</td>
<td>3.0</td>
<td>3.0</td>
<td>3.3</td>
</tr>
<tr>
<td>Housing</td>
<td>3.2</td>
<td>3.9</td>
<td>4.8</td>
<td>4.3</td>
<td>3.3</td>
</tr>
<tr>
<td>Transportation</td>
<td>4.0</td>
<td>3.7</td>
<td>4.0</td>
<td>3.8</td>
<td>-1.0</td>
</tr>
<tr>
<td>Medical Care</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
<td>3.3</td>
<td>4.4</td>
</tr>
<tr>
<td>PCE Deflator Excluding Food and Energy</td>
<td>2.2</td>
<td>2.4</td>
<td>2.6</td>
<td>2.3</td>
<td>3.2</td>
</tr>
<tr>
<td>Market-Based</td>
<td>1.9</td>
<td>2.1</td>
<td>2.5</td>
<td>1.9</td>
<td>2.9</td>
</tr>
<tr>
<td>Personal Business Services-MB</td>
<td>2.0</td>
<td>0.9</td>
<td>-0.1</td>
<td>-2.8</td>
<td>5.8</td>
</tr>
<tr>
<td>Personal Business Services-NMB</td>
<td>2.2</td>
<td>2.2</td>
<td>1.3</td>
<td>0.4</td>
<td>3.8</td>
</tr>
</tbody>
</table>

Source: Bureau of Economic Analysis

Note: Data through March 2007.
## Consumer Price Data

(percent change at an annual rate)

<table>
<thead>
<tr>
<th></th>
<th>Weights (December 2005)</th>
<th>24 Month</th>
<th>12 Month</th>
<th>6 Month</th>
<th>3 Month</th>
<th>1 Month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Core</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumer Price Index</td>
<td>100.00</td>
<td></td>
<td>3.4</td>
<td>2.1</td>
<td>3.1</td>
<td>0.6</td>
</tr>
<tr>
<td>Energy</td>
<td>8.69</td>
<td></td>
<td>13.6</td>
<td>-4.6</td>
<td>4.5</td>
<td>-17.1</td>
</tr>
<tr>
<td>All Items Ex. Energy</td>
<td></td>
<td></td>
<td>2.5</td>
<td>2.9</td>
<td>3.0</td>
<td>2.8</td>
</tr>
<tr>
<td>Food</td>
<td>13.94</td>
<td></td>
<td>2.5</td>
<td>2.6</td>
<td>2.7</td>
<td>3.3</td>
</tr>
<tr>
<td>Food Away From Home (NSA)</td>
<td>5.95</td>
<td></td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
<td>2.6</td>
</tr>
<tr>
<td>All Items Ex. Food and Energy</td>
<td>77.37</td>
<td>100.00</td>
<td>2.5</td>
<td>2.9</td>
<td>3.1</td>
<td>2.7</td>
</tr>
<tr>
<td>Core Chain-Weight CPI (NSA)</td>
<td></td>
<td></td>
<td>2.2</td>
<td>2.6</td>
<td>2.0</td>
<td>2.1</td>
</tr>
<tr>
<td>Core Goods</td>
<td></td>
<td></td>
<td>22.25</td>
<td>28.76</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Apparel</td>
<td>3.79</td>
<td>4.90</td>
<td>0.1</td>
<td>0.9</td>
<td>2.2</td>
<td>2.0</td>
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<tr>
<td>Medical Care Commodities</td>
<td>1.46</td>
<td>1.89</td>
<td>3.1</td>
<td>3.7</td>
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<td>Durable Goods</td>
<td>11.58</td>
<td>14.97</td>
<td>-0.1</td>
<td>-0.7</td>
<td>-0.9</td>
<td>-1.0</td>
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<tr>
<td>New Vehicles</td>
<td>5.16</td>
<td>6.67</td>
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<td>Used Vehicles</td>
<td>1.80</td>
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<td>Core Services</td>
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<td></td>
<td>55.06</td>
<td>71.16</td>
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<td>Rent of Primary Residence</td>
<td>5.83</td>
<td>7.54</td>
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<tr>
<td>Owners' Equivalent Rent</td>
<td>23.44</td>
<td>30.30</td>
<td>3.1</td>
<td>4.0</td>
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<td>4.1</td>
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<tr>
<td>Lodging Away from Home</td>
<td>2.61</td>
<td>3.37</td>
<td>3.2</td>
<td>8.5</td>
<td>3.3</td>
<td>3.9</td>
</tr>
<tr>
<td>Medical Care Services</td>
<td>4.76</td>
<td>6.15</td>
<td>4.4</td>
<td>4.4</td>
<td>4.2</td>
<td>4.2</td>
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<tr>
<td>Transportation Services</td>
<td>5.71</td>
<td>7.38</td>
<td>2.6</td>
<td>2.1</td>
<td>2.5</td>
<td>1.7</td>
</tr>
</tbody>
</table>

Source: Bureau of Labor Statistics

Note: Data through March 2007.
Total and Core CPI

% Change - Year to Year

Source: Bureau of Labor Statistics
Alternative Measures of CPI

% Change - Year to Year

2003 2004 2005 2006 2007

Source: Bureau of Labor Statistics, Cleveland Fed, and FRBNY
Expectations stable, but above “comfort zone”

5-Day Moving Average

5-10 Year

4-5 Year

May 1: 2.49

May 1: 2.26

Source: 8:40AM quotes and FRBNY Calculations
Producer Price Data  
(percent change at an annual rate)

<table>
<thead>
<tr>
<th></th>
<th>24 Month</th>
<th>12 Month</th>
<th>6 Month</th>
<th>3 Month</th>
<th>1 Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finished Goods</td>
<td>3.8</td>
<td>0.8</td>
<td>1.1</td>
<td>-3.2</td>
<td>-11.9</td>
</tr>
<tr>
<td>Finished Consumer Goods</td>
<td>4.4</td>
<td>0.6</td>
<td>1.0</td>
<td>-4.5</td>
<td>-15.9</td>
</tr>
<tr>
<td>Finished Consumer Goods Ex. Food</td>
<td>5.3</td>
<td>0.1</td>
<td>-0.5</td>
<td>-8.3</td>
<td>-22.5</td>
</tr>
<tr>
<td>Nondurables Ex. Food</td>
<td>7.2</td>
<td>0.1</td>
<td>-0.7</td>
<td>-11.1</td>
<td>-30.7</td>
</tr>
<tr>
<td>Durables</td>
<td>0.7</td>
<td>0.0</td>
<td>0.1</td>
<td>-0.3</td>
<td>6.3</td>
</tr>
<tr>
<td>Capital Equipment</td>
<td>1.9</td>
<td>1.5</td>
<td>1.6</td>
<td>1.1</td>
<td>3.3</td>
</tr>
<tr>
<td>Electronic Computers (NSA)</td>
<td>-22.8</td>
<td>-23.3</td>
<td>-26.7</td>
<td>-25.3</td>
<td>-26.3</td>
</tr>
<tr>
<td>Communication and Related Equipment (NSA)</td>
<td>-0.2</td>
<td>0.5</td>
<td>1.2</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Finished Goods Ex. Food &amp; Energy</td>
<td>1.9</td>
<td>1.3</td>
<td>1.0</td>
<td>0.5</td>
<td>3.1</td>
</tr>
<tr>
<td>Finished Consumer Goods Ex. Food &amp; Energy</td>
<td>2.0</td>
<td>1.2</td>
<td>0.6</td>
<td>0.2</td>
<td>2.9</td>
</tr>
<tr>
<td>Intermediate Materials</td>
<td>6.6</td>
<td>4.7</td>
<td>3.5</td>
<td>-2.9</td>
<td>-14.7</td>
</tr>
<tr>
<td>Intermediate Materials Ex. Food &amp; Energy</td>
<td>5.4</td>
<td>7.3</td>
<td>6.7</td>
<td>3.7</td>
<td>0.0</td>
</tr>
<tr>
<td>Crude Materials</td>
<td>9.1</td>
<td>-8.2</td>
<td>6.1</td>
<td>5.9</td>
<td>-37.3</td>
</tr>
<tr>
<td>Crude Materials Ex. Food &amp; Energy</td>
<td>13.5</td>
<td>20.7</td>
<td>27.6</td>
<td>-2.3</td>
<td>18.0</td>
</tr>
</tbody>
</table>

Source: Bureau of Labor Statistics  
Note: Data through March 2007.
Gasoline Futures

Source: Bloomberg, End-of-Day Quotes
Heating Oil Futures

$/gallon

Source: Bloomberg, End-of-Day Quotes
Natural Gas Futures

$/MMBtu

Source: Bloomberg, End-of-Day Quotes
Crude Oil Futures

March 29, 2006
May 1, 2007
October 18, 2006

Source: Bloomberg, End-of-Day Quotes
Implied Distribution of Petroleum Prices
April 26, 2007

*The implied distribution is calculated using the 'volatility smile' method. The implied volatility is an average of the volatilities comprising the smile. The 2/3 bounds are calculated directly from the distribution. The excess skewness is relative to the lognormal distribution.

Source: Federal Reserve Board
### Real Personal Consumption Expenditures

(Quarterly Percent Change at Annual Rate)

<table>
<thead>
<tr>
<th></th>
<th>2006Q2</th>
<th>2006Q3</th>
<th>2006Q4</th>
<th>2007Q1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Consumption Expenditures</td>
<td>2.6</td>
<td>2.8</td>
<td>4.2</td>
<td>3.8</td>
</tr>
<tr>
<td>Durable Goods</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor vehicles and parts</td>
<td>-1.3</td>
<td>8.6</td>
<td>-4.4</td>
<td>11.4</td>
</tr>
<tr>
<td>Furniture and household equipment</td>
<td>3.3</td>
<td>6.6</td>
<td>13.2</td>
<td>7.3</td>
</tr>
<tr>
<td>Other durable goods</td>
<td>-3.7</td>
<td>1.6</td>
<td>7.5</td>
<td>-0.7</td>
</tr>
<tr>
<td>Nondurable goods</td>
<td>1.4</td>
<td>1.5</td>
<td>5.9</td>
<td>2.9</td>
</tr>
<tr>
<td>Food</td>
<td>2.0</td>
<td>-0.7</td>
<td>6.6</td>
<td>0.8</td>
</tr>
<tr>
<td>Clothing and shoes</td>
<td>-3.7</td>
<td>5.5</td>
<td>6.8</td>
<td>6.8</td>
</tr>
<tr>
<td>Gasoline, fuel oil, and other energy goods</td>
<td>0.6</td>
<td>5.0</td>
<td>1.2</td>
<td>9.1</td>
</tr>
<tr>
<td>Other nondurable goods</td>
<td>3.5</td>
<td>1.9</td>
<td>6.5</td>
<td>2.1</td>
</tr>
<tr>
<td>Services</td>
<td>3.7</td>
<td>2.8</td>
<td>3.4</td>
<td>3.7</td>
</tr>
<tr>
<td>Housing services</td>
<td>2.4</td>
<td>2.5</td>
<td>3.2</td>
<td>2.1</td>
</tr>
<tr>
<td>Household operation services</td>
<td>8.4</td>
<td>9.6</td>
<td>3.6</td>
<td>5.9</td>
</tr>
<tr>
<td>Gas and electric</td>
<td>15.8</td>
<td>21.7</td>
<td>5.3</td>
<td>10.1</td>
</tr>
<tr>
<td>Other</td>
<td>3.4</td>
<td>1.7</td>
<td>2.3</td>
<td>2.8</td>
</tr>
<tr>
<td>Transportation services</td>
<td>1.7</td>
<td>1.4</td>
<td>3.8</td>
<td>2.5</td>
</tr>
<tr>
<td>Medical care services</td>
<td>2.6</td>
<td>2.1</td>
<td>3.5</td>
<td>4.6</td>
</tr>
<tr>
<td>Recreation services</td>
<td>0.8</td>
<td>2.9</td>
<td>3.3</td>
<td>-0.5</td>
</tr>
<tr>
<td>Other</td>
<td>6.1</td>
<td>1.6</td>
<td>3.4</td>
<td>4.8</td>
</tr>
<tr>
<td>Energy goods and services</td>
<td>6.2</td>
<td>11.0</td>
<td>2.6</td>
<td>9.6</td>
</tr>
<tr>
<td>PCE less food and energy</td>
<td>2.4</td>
<td>2.8</td>
<td>4.0</td>
<td>4.0</td>
</tr>
</tbody>
</table>

Source: Bureau of Economic Analysis

Data through March 2007
Total Business Inventory-Sales Ratio

Source: Census Bureau
Housing: Starts and sales both down 20%+

 Millions of Units

1.8

1.6

1.4

1.2

1.0

0.8

0.6

0.4

0.2


Millions of Units

2

1.8

1.6

1.4

1.2

1.0

0.8

0.6

New Single-Family Home Sales

Source: Census Bureau

Note: Shading represents NBER recessions.
Inventories soared, but are now down from peak

Ratio of New Homes for Sale to New Homes Sold (1-family)

Source: Census Bureau

Note: Shading represents NBER recessions.
Price appreciation has slowed

Source: Census Bureau and Office of Federal Housing Enterprise Oversight

Note: Shading represents NBER recessions.
Downturn somewhat steeper than in mid-90s
1-family housing starts--Series set to 1.0 at housing start peak

Source: Census Bureau
Business investment solid, boosted by structures

Source: Bureau of Economic Analysis

Note: Shading represents NBER recessions.
Private Nonresidential Construction

% Change - Year to Year

Source: Census Bureau
Financing gap is capital expenditures less the sum of U.S. internal funds and inventory valuation adjustment (IVA).
Corporate Bond Yield Spread

Source: Bloomberg
Consumer Debt and Home Equity Extraction

% Change - Year to Year

Growth of Total Consumer Debt (Left Axis)

Home Equity Extraction as a Percent of DPI (Right Axis)

Source: Flow of Funds and Bureau of Economic Analysis
Consumer Debt Service over DPI

Source: Federal Reserve Board
Consumer Installment Debt Delinquency Rates

Credit Cards

Total Loans

Other Loans

Source: Federal Reserve Board
Mortgage Delinquency Rates - Prime Loans

30 Days (Right Axis)
Foreclosure Started (Left Axis)

Source: Mortgage Bankers Association
Subprime Delinquencies and Foreclosures

Source: Mortgage Bankers Association and Economy.com
Trade Balance in Goods and Services

Billions of Dollars

Source: Census Bureau
Exports of Goods

% Change - Year to Year

Source: Census Bureau
## Labor Market: Nonfarm Payroll Employment

### Annualized Growth of Nonfarm Payroll Employment

(Percent change at an annual rate)

<table>
<thead>
<tr>
<th></th>
<th>24 Month</th>
<th>12 Month</th>
<th>6 Month</th>
<th>3 Month</th>
<th>1 Month</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>1.7</td>
<td>1.4</td>
<td>1.4</td>
<td>1.0</td>
<td>0.8</td>
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<tr>
<td><strong>Private</strong></td>
<td>1.8</td>
<td>1.4</td>
<td>1.4</td>
<td>1.0</td>
<td>0.7</td>
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<tr>
<td>Goods-Producing</td>
<td>0.8</td>
<td>-0.6</td>
<td>-0.9</td>
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<td>-1.5</td>
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<tr>
<td>Construction</td>
<td>2.9</td>
<td>-0.2</td>
<td>-0.7</td>
<td>-2.0</td>
<td>-1.7</td>
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<tr>
<td><strong>Manufacturing</strong></td>
<td>-0.6</td>
<td>-1.1</td>
<td>-1.3</td>
<td>-1.5</td>
<td>-1.6</td>
</tr>
<tr>
<td>Durables</td>
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<td>-1.7</td>
</tr>
<tr>
<td>Nondurables</td>
<td>-1.3</td>
<td>-0.9</td>
<td>-0.5</td>
<td>-1.5</td>
<td>-1.4</td>
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<tr>
<td><strong>Private Service Providing</strong></td>
<td>2.1</td>
<td>1.9</td>
<td>2.0</td>
<td>1.6</td>
<td>1.2</td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>2.1</td>
<td>1.6</td>
<td>1.9</td>
<td>1.8</td>
<td>2.5</td>
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<tr>
<td>Retail Trade</td>
<td>0.4</td>
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<td>1.0</td>
<td>0.4</td>
<td>-2.0</td>
</tr>
<tr>
<td>Transportation and Warehousing</td>
<td>2.0</td>
<td>1.8</td>
<td>1.3</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Utilities</td>
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<td>0.3</td>
<td>1.4</td>
<td>1.3</td>
<td>2.0</td>
</tr>
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<td>Information</td>
<td>0.2</td>
<td>0.9</td>
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<td>1.2</td>
</tr>
<tr>
<td>Financial Activities</td>
<td>2.0</td>
<td>1.1</td>
<td>0.5</td>
<td>-0.2</td>
<td>-1.6</td>
</tr>
<tr>
<td>Professional and Business Services</td>
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<td>2.4</td>
<td>2.4</td>
<td>1.5</td>
<td>1.6</td>
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<td>Temporary Help Services</td>
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<td>0.1</td>
<td>-2.9</td>
<td>-2.8</td>
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<td>Education and Health Services</td>
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<td>2.8</td>
<td>3.0</td>
<td>3.1</td>
<td>3.6</td>
</tr>
<tr>
<td>Leisure and Hospitality</td>
<td>2.7</td>
<td>3.2</td>
<td>3.2</td>
<td>2.1</td>
<td>2.0</td>
</tr>
<tr>
<td>Food and Drinking Places</td>
<td>3.1</td>
<td>3.6</td>
<td>3.7</td>
<td>2.9</td>
<td>3.2</td>
</tr>
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<td>Other Services</td>
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<td>1.0</td>
<td>2.4</td>
<td>2.9</td>
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<tr>
<td><strong>Government</strong></td>
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<td>1.4</td>
<td>1.1</td>
<td>1.4</td>
<td>1.4</td>
</tr>
<tr>
<td>Federal Government</td>
<td>-0.2</td>
<td>-0.4</td>
<td>-0.3</td>
<td>0.4</td>
<td>1.8</td>
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<td>1.4</td>
<td>2.1</td>
<td>2.1</td>
</tr>
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<td>Local Government</td>
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<td>1.6</td>
<td>1.2</td>
<td>1.4</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Source: Bureau of Labor Statistics

Note: Data through April 2007.
Employment Cost Index: Private Industry

% Change - Year to Year

Wages and Salaries

Total Compensation

Source: Bureau of Labor Statistics
Real Average Hourly Earnings

% Change - Year to Year


Source: Bureau of Labor Statistics
Persons Not in the Labor Force
Six- Month Moving Average
Thousands, NSA

Source: Bureau of Labor Statistics
Average Weekly Hours
Three Month Moving Average

Source: Bureau of Labor Statistics
Median Duration of Unemployment

Source: Bureau of Labor Statistics
Ten-Year Treasury Bond and Wilshire 5000 Index

Source: Federal Reserve Board
Real Interest Rates
Treasury Yield minus Philadelphia Fed Survey Inflation Expectations
Percent


Source: Federal Reserve Board and Philadelphia Fed

*After 2003, calculated using inflation-indexed bonds
Considerable Period
Patient
Measured Pace
Pause

Source: CME and FRBNY Calculations
Implied probability

Alternative Fed Funds Rates: June 2007 FOMC

Source: Cleveland Federal Reserve Bank
By conventional Taylor rule, policy is somewhat tight

"Simple" Taylor Rule: \( i_t^* = [4.0 + 1.5(\Pi_t - 1.5) + 0.5(y_t - y_t^*)] \)

4.0% is the assumed steady state nominal interest rate, \( \Pi_t \) is the yr/yr Core PCE deflator, 1.5% is the assumed target inflation rate, \( y_t \) is the log of real GDP and \( y_t^* \) is the log of the Congressional Budget Office’s estimate of potential GDP.

Source: FRBNY and Author’s Calculations. Future Taylor Rule calculations are based on FRBNY forecasts for output and inflation.
"Simple" Taylor Rule: $i_t^* = [4.0 + 1.5(\Pi_t - 1.5) + .5(y_t - y^*_t)]$

"Gradual" Taylor Rule: $i_t = .8i_{t-1} + .2i_t^*$

4.0% is the assumed steady state nominal interest rate, $\Pi_t$ is the yr/yr Core PCE deflator, 1.5% is the assumed target inflation rate, $y_t$ is the log of real GDP and $y_t^*$ is the log of the Congressional Budget Office’s estimate of potential GDP.

Future Taylor Rule calculations are based on FRBNY forecasts for output gap and inflation (indicated by dotted line). Gradual Taylor Rule uses lagged Fed Funds target through 2004Q2 and its own lagged value from then on.

Source: FRBNY, Author’s Calculations, and Federal Reserve Board.
Euro Area Real GDP Growth

% Change at an Annual Rate

<table>
<thead>
<tr>
<th>Year</th>
<th>% Change at an Annual Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>1.2</td>
</tr>
<tr>
<td>2003</td>
<td>-0.2</td>
</tr>
<tr>
<td>2004</td>
<td>2.5</td>
</tr>
<tr>
<td>2005</td>
<td>1.8</td>
</tr>
<tr>
<td>2006</td>
<td>3.6</td>
</tr>
<tr>
<td>2007</td>
<td>3.5</td>
</tr>
</tbody>
</table>

Source: Eurostat
Japan Real GDP Growth

% Change at an Annual Rate

2002 2003 2004 2005 2006 2007

Source: BIS
Japan Inflation

% Change – Year to Year

Source: BIS and Federal Reserve Board
10-Year German Bond Yield

April 27: 1.62

April 30: 0.67

3-Month Libor Rate

Source: BIS and Federal Reserve Board

Note: Data are monthly averages.
Japan Short-Term and Long-Term Interest Rates

10-Year Government Bond Rate

April 27: 1.62
April 30: 0.67

3-Month Libor Rate

Source: Bloomberg and Federal Reserve Board
Note: Data are monthly averages.
Euro-Dollar Exchange Rates

Dollar per Euro

April 27: 1.37

Source: BIS

Note: Data are monthly averages.
Yen-Dollar Exchange Rate and Narrow Dollar Index

Index, 2000=100

April 27: 119.3

April 27: 78.0

Source: BIS and Federal Reserve Board

Note: Data are monthly averages.
Euro and Yen One-Month Implied FX Option Volatility

Percentage points

Width of a 90% Confidence Interval

Euro

Yen

April 30: 6.81

April 30: 5.24

Source: Reuters

Note: Data are monthly averages.
Euro Area and Japan Equity Indices

April 27:

April 27: 110.0

April 27: 100.5

Source: BIS and Bloomberg

Note: Data are monthly averages.
Three-Month Eurocurrency Futures Rates: Euro

Source: Datastream
Overview

• Inflation outlook shows slight improvement
  – Year-over-year core inflation remains elevated
  – Recent core numbers suggest moderation
• Real activity has decelerated since the first half of 2006
  – Employment and hours growth have slowed
  – Large housing ‘correction’
• We expect GDP growth to recover in ’07, with continued moderation in inflation