A Macroeconomic Primer for Forensic Economists

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Why This Topic?

- It is E, and Ultimately, FE
  - Almost all cases involve projecting future losses and discounting them to the present.
  - Interest rates and expectations for inflation and real growth are linked.
  - The expectations and the ultimate values are driven, to a large extent, by the macro economy.
Why This Topic?

- It is E, and Ultimately, FE
- “Those Who Only Remember the Past May Be Doomed to Repeat Its Mistakes” (Havrilesky, JFE, 3(1), 1990, pp. 23-28)

Is Dave Crossing the Aisle to Current Interest Rates?

HOLY COW
Is Dave Crossing the Aisle to Current Interest Rates?

Not Today.

Why This Topic?

- It is E, and Ultimately, FE

- Havrilesky
  - Well-trained forensic economist should be cognizant of
    - Productivity growth
    - Budget deficits
    - Debt burden
    - Deregulation
    - Monetary Policy
Why This Topic?

Å It is E, and Ultimately, FE

Å Havrilesky

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Å Productivity growth
Å Budget deficits
Å Debt burden
Å Deregulation
Å Monetary Policy

I would add DEMOGRAPHICS and highlight PRODUCTIVITY GROWTH.

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Why This Topic?

- It is E, and Ultimately, FE
- Havrilesky
- Dave can benefit
  - Presenting is thinking (to paraphrase Ireland).
  - Have I misstated or overlooked something?

An Initial Look at History

Post WW-II Recessions & Expansions

- Carter/Volker Double Dip

Post WW-IIAverage
11.1 Months for Recessions
58.4 Months for Expansions
(Average will increase to 64.8 months if current expansion lasts another 26 months.)

Current Expansion 94 months through March 2017
An Initial Look at History

Post WW-II Recessions & Expansions

Since the Carter/Volcker Double Dip
- Expansions are longer (Average ≥ 94.8 months)
- Recessions are about the same (Average = 11.3 months, due to the Great Recession)

Great Moderation
Period starting in early to mid-1980s characterized by stable inflation and economic growth, and by a decline in the volatility of both real GDP growth and inflation.

Another Look at History

Monetary and Fiscal Economic Policy

Can be Described as Either "Rules Based" or "Discretionary"
Rules Based: Less interventionist, more predictable, and more systematic.
Discretionary: More interventionist and less predictable; focus is on the short-term.

Great Deviation (In Monetary Policy)
Discretionary → Rules Based → Discretionary

Also, more vocal.


China’s share of total U.S. trade in goods has since increased 57 BP/year compared to 33 BP/year in 15 years prior.

What’s an FE to Do?
Trendline Employment Growth During Expansions

A More Useful Presentation

Last two are below the rest.
Similar Pattern Seen in More Broad-Based Measures

Last two are below the rest. (Excluding Carter/Volcker Double Dip)

One Reason for the Decline in Growth

Civilian Labor Force Participation Rate
One Reason for the Decline in Growth

Civilian Labor Force Participation Rate

1980-2000
Average Annual Change = +18.2 Basis Points

2001-2016
Average Annual Change = -0.1 Basis Points

Similar Pattern Seen in Employment

Total Nonfarm Employment
1980 to 2016

Growth = 1.97%

Growth = 0.45%
And in Other Measures

<table>
<thead>
<tr>
<th></th>
<th>1980Q1 to 2000Q4</th>
<th>2001Q1 to 2016Q4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Nonfarm Employment</td>
<td>1.97%</td>
<td>0.45%</td>
</tr>
<tr>
<td>Real W&amp;S ECI</td>
<td>0.20%</td>
<td>0.13%</td>
</tr>
<tr>
<td>Real Total Comp ECI</td>
<td>0.51%</td>
<td>0.31%</td>
</tr>
<tr>
<td>Real GDP</td>
<td>3.37%</td>
<td>1.63%</td>
</tr>
<tr>
<td>Real GDP per Capita</td>
<td>2.20%</td>
<td>0.55%</td>
</tr>
<tr>
<td>CPI-U Inflation</td>
<td>3.56%</td>
<td>2.18%</td>
</tr>
<tr>
<td>Population ≥ Age 16</td>
<td>1.12%</td>
<td>1.07%</td>
</tr>
<tr>
<td>Total Factor Productivity</td>
<td>1.77%</td>
<td>0.72%</td>
</tr>
<tr>
<td>(Utilization Adjusted)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Labor Productivity</td>
<td>1.91%</td>
<td>1.65%</td>
</tr>
<tr>
<td>Labor Force Participation</td>
<td>18.2</td>
<td>-30.1</td>
</tr>
</tbody>
</table>

Reasons for the Decline in Growth

Robert Gordon’s Major Headwinds:
- Demography: end of demographic dividend and retirement of baby boomers.
- A plateau in educational attainment in the U.S.
- Rising income inequality.
- The increasing burden of federal, state and local government debt.
- Impact of globalization on both employment levels and earnings.
- Cost of environmental policy.
- High cost of medical care in the U.S.
- Slower technological growth.
Reasons for the Decline in Growth

Å Robert Gordon’s Major Headwinds

Å Larry Summers’ Secular Stagnation Argument

  í The supply of savings has increased while at the same time the investment schedule (i.e., the demand for savings) has decreased.

  í Full-employment required interest rate (FERIR) is negative.

  í Due to zero lower bound on nominal interest rates and a low-inflation environment, the negative FERIR and full employment cannot be attained. *(Except that with 4.7% unemployment we are there, due to increased inflation.)*

Reasons for the Decline in Growth

Å Robert Gordon’s Major Headwinds

Å Larry Summers’ Secular Stagnation Argument

  í Slower population growth.*

  í (Possibly) slower technological growth.*

  í Rising income inequality.*

  í Regulatory burdens raise the wedge between safe rates and rates charged to borrowers.

  í Central bank policies that increases the demand for safe assets, which drives down safe (nominal) interest rates.

  í Hysteresis in the capital and labor markets contributes to a sustained downward shift in potential output.

*Overlap with Gordon
Reasons for the Decline in Growth

- Robert Gordon’s Major Headwinds
- Larry Summers’ Secular Stagnation Argument

Arguments for each position are not mutually exclusive.
Many of the factors cited are persistent (demographics in particular).
Future long-term growth will be determined by increases in the labor force and in productivity.

Future LT Growth Depends on Increases in the Labor Force and in Productivity

- Labor force growth depends on
  - Population Growth
    - Natural Increase
    - Net Immigration
  - Labor force participation rate
Population growth is expected to decline.

Net migration’s share of increase is expected to increase.
The increase in female participation more than offset decline in male participation until the late 1990’s – the end of the demographic dividend.

But for the increase in Age ≥ 55 participation, the decline in the overall rate would have occurred earlier and been steeper.
Share of Age $\geq 55$ is expected to increase. Will be a drag on overall LF participation rate.

U.S. Census Projected Age $\geq 55$ as Percent of Population Age $\geq 16$

Future LT Growth Depends on Increases in the Labor Force and in Productivity

Productivity growth depends on investment in new technology.

Nonresidential Fixed Investment as a Percent of GDP

Drifted downward since 1980 with slightly more pronounced decline since 2000.
1.65% versus 1.91% ≤ 20% less growth over 20 to 30 years

1.04% versus 1.91% > 50% less growth over 20 to 30 years
Even if growth and inflation have slowed since 2001, and even if the slowdown is expected to persist, why is this ultimately FE?

If you rely on historical growth rates, you will be hard-pressed to justify use of data prior to 2001.
Even if growth and inflation have slowed since 2001, and even if the slowdown is expected to persist, why is this ultimately FE?

If you rely on forecasted growth rates, you need to reach a judgment on the validity of the forecast that takes the post-2001 decline in growth into account.

BTW, the fact that current interest rates reflect expectations about future inflation and growth is also an issue.

Is the forecast consistent with the expectations?
BTW, the fact that current interest rates reflect expectations about future inflation and growth is also an issue.

Is the forecast consistent with the expectations?

We are not going to beat that horse today.

How to reach a judgment on the legitimacy of the forecast?

Step 1: Broad-brush look at type of growth we can expect.
What Growth Can We Reasonably Expect?

- Relied on U.S. Census Population Projection
- Three growth rates for productivity:
  - 1.00% (continuation of decline from 2008 on)
  - 1.60% (trendline growth since 2001)
  - 1.30% (middle ground between these two)
- Three assumptions concerning LF participation
  - Continue to decline by 30 basis points per year (59.4% in 2027Q4)
  - Decline at half this rate (61.0% in 2027Q4)
  - No further decline (62.7% in 2027Q4)

2027Q4 is the end of CBO’s forecast horizon

What Growth Can We Reasonably Expect?

- Based CPI-U forecast on the following equation
  \[
  \ln(CPI-U) = \alpha + B_1\ln(\text{Productivity}) + B_2\ln(RGDPS/Potential\ RGDP) + B_3\ln(CPI-U(-1))
  \]

  \[
  (\text{Equation 1})
  \]

  Why is the sign positive?

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>B_1</th>
<th>B_2</th>
<th>B_3</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.002460</td>
<td>0.116147</td>
<td>0.092783</td>
<td>0.902252</td>
</tr>
<tr>
<td>t-Statistic</td>
<td>2.43</td>
<td>1.74</td>
<td>24.62</td>
</tr>
<tr>
<td>P-value</td>
<td>0.964953</td>
<td>0.018157</td>
<td>0.086774</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.995308</td>
<td>Adjusted R-Squared = 0.995073</td>
<td></td>
</tr>
</tbody>
</table>

Sample Period = 2001Q1 to 2016Q4

| MAPE | 0.5241% |

NOB = 64

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What Growth Can We Reasonably Expect?

Â Also relied on this equation
\[
\ln(\text{CPI-U}) = \alpha + B_1 \ln(\text{Productivity}) + B_2 \ln(\text{RGDP/Potential RGDP}) + B_3 \ln(\text{CPI-U}\text{(-1)})
\]
(Equation 2)

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>(B_1)</th>
<th>(B_2)</th>
<th>(B_3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.033295</td>
<td>0.057315</td>
<td>0.085524</td>
<td>0.945973</td>
</tr>
<tr>
<td>t-Statistic</td>
<td>3.04</td>
<td>5.19</td>
<td>3.17</td>
</tr>
<tr>
<td>P-value</td>
<td>0.002825</td>
<td>0.000001</td>
<td>0.001870</td>
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<tr>
<td>R-Squared</td>
<td>0.999630</td>
<td>Adjusted R-Squared = 0.999622</td>
<td></td>
</tr>
</tbody>
</table>

Sample Period = 1980Q1 to 2016Q4
NOB = 148
MAPE = 0.5194%

Same as Equation 1, with sample period starting in 1980

What Growth Can We Reasonably Expect?

Â And on this equation
\[
\ln(\text{CPI-U}) = \alpha + B_1 \ln(\text{Productivity}) + B_2 \ln(\text{RGDP/Potential RGDP})
\]
(Equation 3)

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>(B_1)</th>
<th>(B_2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.644151</td>
<td>1.313235</td>
<td>0.824349</td>
</tr>
<tr>
<td>t-Statistic</td>
<td>-6.96</td>
<td>63.20</td>
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<tr>
<td>P-value</td>
<td>0.000000</td>
<td>0.000000</td>
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<tr>
<td>R-Squared</td>
<td>0.965046</td>
<td>Adjusted R-Squared = 0.964564</td>
</tr>
</tbody>
</table>

Sample Period = 1980Q1 to 2016Q4
NOB = 148
MAPE = 2.4469%

Same as Equation 2, without lagged CPI-U term.
What Growth Can We Reasonably Expect?  
(Annual Growth through 2027Q4 – Same Horizon as CBO)

Overstated because 1.60% > productivity growth underlying potential RGDP

Within Range

Probably Out of Range

Closer Look at CPI-U Inflation

CPI-U Inflation Based on CBO's Underlying Assumptions for Real GDP, Potential Real GDP & Productivity
Closer Look at CPI-U Inflation

CPI-U Inflation Based on CBO's Underlying Assumptions for Real GDP, Potential Real GDP & Productivity

- Cleveland Fed 10-year Expected Inflation = 1.92%
- 01-17-2017 10-Year Nominal/TIPS Spread = 1.96%
- CBO CPI-U Inflation Forecast is Overstated

How to reach a judgment on the legitimacy of the forecast?

Step 2: Examine assumptions underlying
- Population Growth
- LF Participation
- Productivity Growth
Population Growth

![Projected Growth in Population Age >= 16]

Labor Force Participation

![Civilian Labor Force Participation Rate]

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How to reach a judgment on the legitimacy of the forecast?

Step 3: Examine forecast for variables of particular interest to an FE.
Nominal W&S Growth

Private Industry W&S ECI
Trendline vs CBO Forecast

CBO = 3.12% Annual Growth
Trendline = 2.31% Annual Growth

Real W&S Growth

Private Industry W&S ECI
(Deflated by the CPI-U)
Trendline vs CBO Forecast

CBO = 0.74% Annual Growth
Trendline = 0.13% Annual Growth
Conclusions About CBO Forecast

- Population growth is >> than that forecast by U.S. Census, who are presumably more knowledgeable.
- Projected population likely does not reflect effect of increased enforcement of immigration laws.
- Pattern of LF Participation doesn’t reflect the likelihood of a recession between now and 2023Q3.
- Productivity is a tough nut to crack – IF growth rate since 2008 is assumed to increase, then a 1.3% middle ground appears reasonable.
- CPI-U inflation is excessive.
- Projected real growth in W&S ECI is inexplicable.
Conclusions About Relying on a Forecast

- It takes work to reach and maintain an informed opinion on any forecast.
  - There are a lot of moving parts: Monetary and fiscal policy; developments in the global economy; changes in regulation; uncertainty; unknown shocks.
  - Time passes and events occur that are not reflected in the forecast.

- May not work with a production shop business model.
Conclusions About Relying on a Forecast

- It takes work to reach and maintain an informed opinion on any forecast.
- May not work with a production shop business model.
- Hard to defend the use of a specific forecast even if you do the work – there are too many possible scenarios.

Dead horse in the room: Is the forecast consistent with the expectations for inflation and economic growth underlying current interest rates?
What’s an FE to Do?

- It takes work to reach and maintain an informed opinion.
- May not work with a production shop business model.
- Hard to defend the use of a specific forecast even if you do the work – there are too many possible scenarios.
- Dead horse in the room: Is the forecast consistent with the expectations for inflation and economic growth underlying current interest rates?

This is What I’ve Seen

- No analysis of the forecast – just take it, plug into a spreadsheet and go.
This is What I’ve Seen

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- Proffer the thinnest of reasons for using the forecast.
- Run the risk of being accused of speculation (takes both a persistent FE and a willing attorney on the other side).
This is What I’ve Seen

Â No analysis of the forecast – just take it, plug into a spreadsheet and go.

Â Proffer the thinnest of reasons for using the forecast.

Â Run the risk of being accused of speculation (takes both a persistent FE and a willing attorney on the other side).

Â Ignore not only the dead horse in the room, but also the E in FE.

Bonus Topic
(Something to think about)

Consumption Increasing mix towards investment helps moves the curve out, and vice versa.

Production Possibility Curve

Investment
Consumption

Increasing mix towards investment helps move the curve out, and vice versa.

Production Possibility Curve

Investment

- Oldest boomer will be 80 in 2027; median age will be 70.
- Their health will be failing.
- Their demand for medical & ADL care will be increasing.

Medical & ADL care is consumption.