Capital Gains Forecasting

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FTA Conference
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News on 2004

• Partial year processing suggests
  – 48% growth in net gains
  – 11% decline in net loss
  – 57% growth in net
• CBO had forecast 23% growth
  – Difference = half of surprise
• Is partial accurate?
Topics to Cover

• Setting

• “Forecasting” year ending

• Forecasting 10 years ahead

The Setting

Sources of Gains
Data & Budget Cycle
Setting Dictates Strategy
% of gross gains by asset type

<table>
<thead>
<tr>
<th>Asset type</th>
<th>1985</th>
<th>1998</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stocks</td>
<td>42</td>
<td>56</td>
</tr>
<tr>
<td>Pass-through</td>
<td>19</td>
<td>24</td>
</tr>
<tr>
<td>Real Estate</td>
<td>26</td>
<td>10</td>
</tr>
<tr>
<td>Other</td>
<td>12</td>
<td>11</td>
</tr>
</tbody>
</table>

Data

- Main variable is net positive gains
- Source is fed. tax returns
- Annual aggregate data
- Available with lags
  - e.g. by Fall 2005 know
  - Final for 2003 (20% growth)
  - Preliminary for 2004 (48% growth)
Budget Cycle

• Report to Congress in January
• Finish Forecast in December
• Need
  – Gains for year ending (e.g. 2005)
  – Gains for 10 years ahead (e.g. 2006-15)
• In states, timing differs,
  – Isn’t problem similar?

Setting Dictates Strategy

• “Forecast” year ending
  – Estimate time-series regression
  – Use data from current year to predict

• Forecast 10 years ahead
  – Various methods
  – Forecast explanatory variables too
“Forecasting” Year Ending

Regression Equation
“Forecasting” Errors

Dependent Variable

• De-trend Net Positive Gains
• Ratio of gains to financial assets
• Ratio of gains to potential output
  – See graph in handout
• Growth Rate
• Both
What Should Explain Gains?

• Outstanding gains
• Decisions to trade assets
• Evidence of trades
  – Trick for year-ending

Outstanding Gains on Stocks

• Depend on
  – How long hold stocks
  – Price change while hold
• See table on holding periods
  – Wide variation
  – Average is 6.5 years
Measuring Outstd. Gains on Stock

• Sophisticated measure
• Simpler measure
  – Price growth over several years
• Simplest measure
  – Price growth over last year
  – S&P 500

Outstanding Gains: Other Assets

• Prices on other assets are inaccessible
• Proxy with economic activity
  – Ratio of actual to potential GDP
  – Housing starts
  – or investment / potential GDP
Factors in Decision to Sell

- All of the above
- Tax rates
  - Permanent rate
  - Transitory rate

Evidence of Sales

- Dollar volume on stock markets
- Other Possibilities
  - IPO volume
  - M/A volume
One Regression Equation

- See table in handout
- Equation used for 2004
  - variables
  - transitory effects
- Fits historical data adequately

Forecast Errors for Year Ending

<table>
<thead>
<tr>
<th>Period</th>
<th>RMSE forecasting growth rate of gains</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986-2003</td>
<td>23.3%</td>
</tr>
<tr>
<td>1991-2003</td>
<td>15.5%</td>
</tr>
</tbody>
</table>
Forecasting Ahead

CBO’s mean reversion method
Alternatives tested
Conclusions so far

Assumption for All Methods

- Explanatory variables must be forecastable
- Stock prices cannot be forecast
  - Random walk in near term
  - Some reversion from decade to decade
- Output, incomes, etc., can be forecast
CBO’s Mean Reversion Method

- Use forecast of GDP
- Assume Gains/GDP reverts to historical avg
  - Reverts from predicted ratio for year ending
  - Revert 20% of way each year
  - Historical average changes with tax rates

Forecasting Errors: Year Ahead

<table>
<thead>
<tr>
<th>Period</th>
<th>RMSE forecasting growth rate of gains</th>
</tr>
</thead>
<tbody>
<tr>
<td>1987-2003</td>
<td>23.7%</td>
</tr>
<tr>
<td>1992-2003</td>
<td>24.0%</td>
</tr>
</tbody>
</table>
Improvements Seem Possible

• More information is available
  – Many more variables are forecast
  – Recent history might help
• Reversion rate could be estimated
• Could forecast response to tax change
  – 2008 & 2009

Alternatives Tested Year Ahead

1 Estimate with forecasts
2 Integrated Macro Model
3 Modify year-ending equation
#1  \[ g = a_0 + a_1 x_1 + a_2 x_2 \ldots \]

- Estimate regression over historical period
- \( g \) is historical growth rate of gains
- \( x_i \) is historical **forecast** of RHS vars.
- Forecast ahead with forecasts of RHS vars
- Little improvement in RMSE

#2: Integrated Macro Model

- Add Gains equation to macro model
- Macro model is BVAR
  - Up to 6 macro variables
- Improved RMSE for period of fit
- Gains forecast was unstable
#3: Modify Year-Ending Eq.

- Dependent var: Gains / Potential GDP
- Explanatory vars:
  - GDP / potential (or Investment / potential)
  - Tax rates
  - Other variables
- Estimate with serial correlation adjustment

#3 continued: Findings

- No new variables helped
- RMSE similar to mean reversion’s
- Estimates reversion rate
- Predicts effect of tax change in 2009
- Stock market bubble destabilizes estimates
Next Steps

• Add stock prices.
  – To improve estimation.
  – But How forecast?
    – Following practice in some states.
• Other Suggestions?

Conclusions

• Mean reversion is hard to beat
• Modified eq. is more sophisticated version
  – estimates reversion rate
  – forecasts response to tax changes
• Knowing distribution of errors helps
References

• Forecasting Capital Gains Realizations, CBO Technical Paper, August 2005
• Estimating and Forecasting Capital Gains with Quarterly Models, CBO Technical Paper, September 2004
• Testing Alternative Methods for Forecasting Capital Gains, CBO Technical Paper, March 2005
Ratio of Gains to Potential GDP (2004 is preliminary)
Equation for Year Ending

Dependent variable: dlog(Gains/GDPFE)
Annual Data from 1952 to 2002
R-squared
Mean of dep var
Std Error of dep var
Std Error of estimate
Durbin-Watson Stat
Jarque-Bera
Significance fo J-B

Independent Variables | Coeffic | Std Error | t-Stat |
--- | --- | --- | --- |
constant | -0.013 | 0.016 | -0.79 |
d(Tax Rate) | -1.871 | 0.712 | -2.63 |
Dummy 1986 | 0.447 | 0.111 | 4.01 |
Dummy 1987 | -0.716 | 0.128 | -5.61 |
dlog(investment/GDPFE) | 1.274 | 0.255 | 4.99 |
dlog(S&P/GDPFE) | 0.466 | 0.145 | 3.21 |
dlog($volume/GDPFE) | 0.329 | 0.097 | 3.41 |

Notes

- d indicates first difference
- log indicates natural logarithm
- QGDPFE is potential GDP
- Tax Rate is top statutory tax rate on long-term gains
- See citations for further information
### Table 4B. -- Tax Year 1998 Short-Term and Long-Term Capital Asset Transactions, By Selected Asset Type and Length of Time Held.

[All figures are estimates based on samples --transactions are in thousands, money amounts are in thousands of dollars]

<table>
<thead>
<tr>
<th>Type of transaction, month of sale</th>
<th>Corporate stock</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gain Transactions</td>
</tr>
<tr>
<td></td>
<td>Number of transactions</td>
</tr>
<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>Short-term transactions</td>
<td></td>
</tr>
<tr>
<td>Total:</td>
<td>26,780</td>
</tr>
<tr>
<td>Under 18 months</td>
<td>3,834</td>
</tr>
<tr>
<td>18 months under 2 years</td>
<td>2,473</td>
</tr>
<tr>
<td>2 years under 3 years</td>
<td>3,046</td>
</tr>
<tr>
<td>3 years under 4 years</td>
<td>1,581</td>
</tr>
<tr>
<td>4 years under 5 years</td>
<td>1,037</td>
</tr>
<tr>
<td>5 years under 10 years</td>
<td>2,078</td>
</tr>
<tr>
<td>10 years under 15 years</td>
<td>773</td>
</tr>
<tr>
<td>15 years under 20 years</td>
<td>342</td>
</tr>
<tr>
<td>20 years or more</td>
<td>388</td>
</tr>
<tr>
<td>Period not determinable</td>
<td>4,335</td>
</tr>
</tbody>
</table>

1. Transactions with no gain or loss are included with gain transactions.
2. Dates showed holding period to be 1 year or more and transactions not reclassified during editing.
3. Includes some transactions where holding period was under 1 year and transactions not reclassified during editing.
5. Real estate includes residential rental property, depreciable business property, farmland and other land.
6. Other asset types includes all other asset categories not included in the above categories, including put and call options; futures contracts; all mutual funds; partnership, S corporation, and estate or trust interests; pass-through gains and losses; livestock; timber; involuntary conversions; depreciable business personal property; residences; unidentifiable assets; and capital gain distributions.

Notes: Only the gain is reported for capital gain distributions from mutual funds and pass-through gains or losses and (b) part of the total gain or loss on certain depreciable assets is treated as ordinary income.