# INTEREST RATES AND STOCK PRICES

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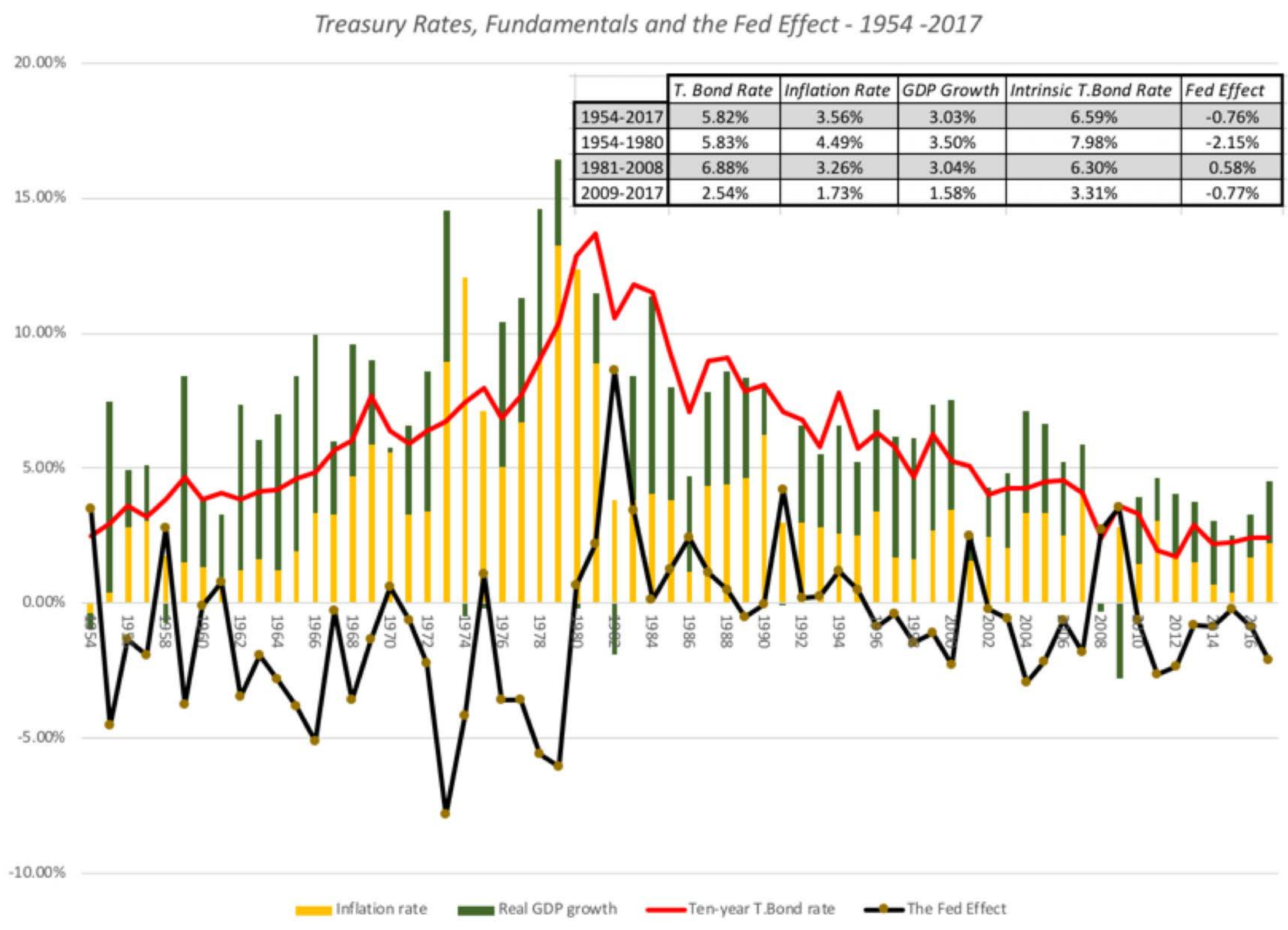
# Interest Rates and Stock Prices

- If interest rates go up, what happens to equity value?
  a) Equity value will decrease
  b) Equity value will increase
  c) Equity value will remain unchanged
  d) Any of the above, depending upon why interest rates increased in the first place

# 1. The Fed's power to set interest rates is limited

| | Federal Funds | | | US Treasury Rates | | |
|---|---|---|---|---|---|---|
| Month Start | Lower Limit | Upper Limit | Effective | 3-month T.Bill | 10-year T.Bond | TIPS |
| 11/1/16 | 0.25% | 0.50% | 0.41% | 0.45% | 2.37% | 0.91% |
| 12/1/16 | 0.50% | 0.75% | 0.54% | 0.51% | 2.45% | 0.99% |
| 1/1/17 | 0.50% | 0.75% | 0.65% | 0.51% | 2.45% | 0.93% |
| 2/1/17 | 0.50% | 0.75% | 0.66% | 0.52% | 2.36% | 0.87% |
| 3/1/17 | 0.75% | 1.00% | 0.79% | 0.74% | 2.40% | 0.94% |
| 4/1/17 | 0.75% | 1.00% | 0.90% | 0.80% | 2.29% | 0.90% |
| 5/1/17 | 0.75% | 1.00% | 0.91% | 0.89% | 2.21% | 0.92% |
| 6/1/17 | 1.00% | 1.25% | 1.04% | 0.98% | 2.31% | 0.99% |
| 7/1/17 | 1.00% | 1.25% | 1.15% | 1.07% | 2.30% | 1.00% |
| 8/1/17 | 1.00% | 1.25% | 1.16% | 1.01% | 2.12% | 0.87% |
| 9/1/17 | 1.00% | 1.25% | 1.15% | 1.03% | 2.33% | 0.94% |
| 10/1/17 | 1.00% | 1.25% | 1.15% | 1.07% | 2.38% | 0.92% |
| 11/1/17 | 1.00% | 1.25% | 1.16% | 1.23% | 2.42% | 0.88% |
| 12/1/17 | 1.25% | 1.50% | 1.30% | 1.32% | 2.40% | 0.73% |
| 1/1/18 | 1.25% | 1.50% | 1.41% | 1.41% | 2.72% | 0.80% |
| 2/1/18 | 1.25% | 1.50% | 1.42% | 1.57% | 2.87% | 0.99% |

# The real drivers of interest rates are macro economic fundamentals




| | T. Bond Rate | Inflation Rate | GDP Growth | Intrinsic T.Bond Rate | Fed Effect |
|---|---|---|---|---|---|
| 1954-2017 | 5.82% | 3.56% | 3.03% | 6.59% | -0.76% |
| 1954-1980 | 5.83% | 4.49% | 3.50% | 7.98% | -2.15% |
| 1981-2008 | 6.88% | 3.26% | 3.04% | 6.30% | 0.58% |
| 2009-2017 | 2.54% | 1.73% | 1.58% | 3.31% | -0.77% |

# And more evidence that the Fed follows markets, does not lead them…

*Regressions of Monthly Changes in Fed Funds Rates and Interest Rates – January 1962 – February 2018*

| *Dependent Variable* | *Regression* | *$R^2$* |
|---|---|---|
| Change in T.Bill $Rate_t$ | = -.10% + 0.617 Change in Fed Funds $Rate_t$<br>(0.09) (29.55**) | 56.5% |
| Change in T.Bond $Rate_t$ | = -.20% + 0.190 Change in Fed Funds $Rate_t$<br>(0.12) (6.99**) | 6.7% |
| Change in T.Bill $Rate_{t+1}$ | = -.10% + 0.248 Change in Fed Funds $Rate_t$<br>(0.09) (8.21**) | 9.0% |
| Change in T.Bond $Rate_{t+1}$ | = -.20% + 0.024 Change in Fed Funds $Rate_t$<br>(0.11) (0.87) | 0.0% |
| Change in Fed $Funds_{t+1}$ | = -.03% + 0.595 Change in T. Bill $Rate_t$<br>(0.02) (14.48**) | 23.7% |
| Change in Fed $Funds_{t+1}$ | = -.001 + 0.617 Change in T.Bond $Rate_t$<br>(0.01) (11.58**) | 16.6% |

*T statistics in brackets*

*** Statistically significant at 99% confidence level*

# 2. The relationship between interest rates & value is complicated

**Earnings growth**
Average CAGR over last 10 years = 3.03%
Analyst forecasted growth = 7%-7.5%

**Cash Payout**
In 2017 = 91.59%
Average over last 10 years = 89.35%

**Value of growth for next 5 years**
The future cash flows will reflect expectations of how quickly after-tax earnings will grow in the future (as a positive) and how much of the earnings will be returned to stockholders in the form of dividends and buybacks
*Expected Cash Flow = E(CF$_n$) = f(Expected Growth Rate in Earnings, Cash Payout Ratio)*

**Cash flows from existing assets**
The base earnings will reflect the earnings power of the existing assets of the firms in the index, after taxes and maintenance reinvestment.

$$Value\ of\ Business = \frac{E(CF_1)}{(1+r)} + \frac{E(CF_2)}{(1+r)^2} + \frac{E(CF_3)}{(1+r)^3} \dots + \frac{Terminal\ Value_n}{(1+r)^n}$$

**Terminal Value**
This is the value that you attach to the companies in index at the end of high growth.

$$Going\ Concern\ Value_n = \frac{E(CF_{n+1})}{r-g}$$

**Cost of Equity**
The cost of equity for the market is the rate of rerturn that investors demand for investing in stocks collectively

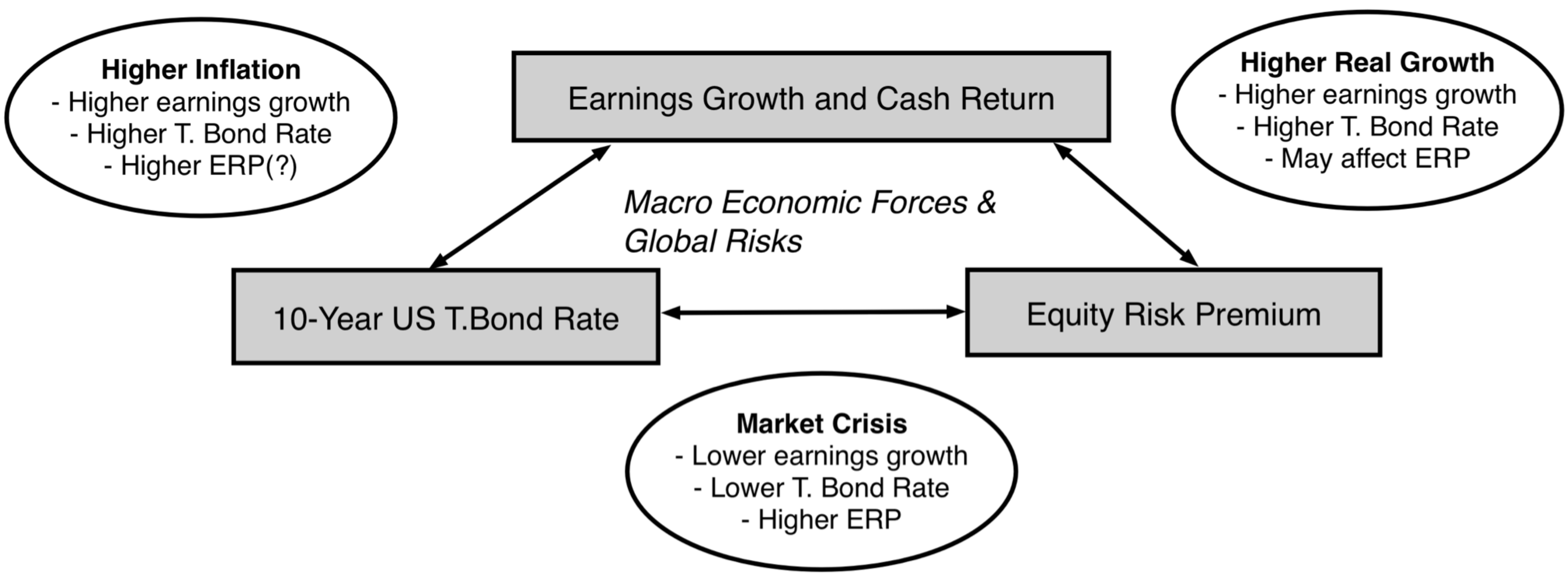
**Riskfree Rate**
The riskfree rate is what you can make on a long term, default free investment

10-year US T.Bond is currently 2.87%

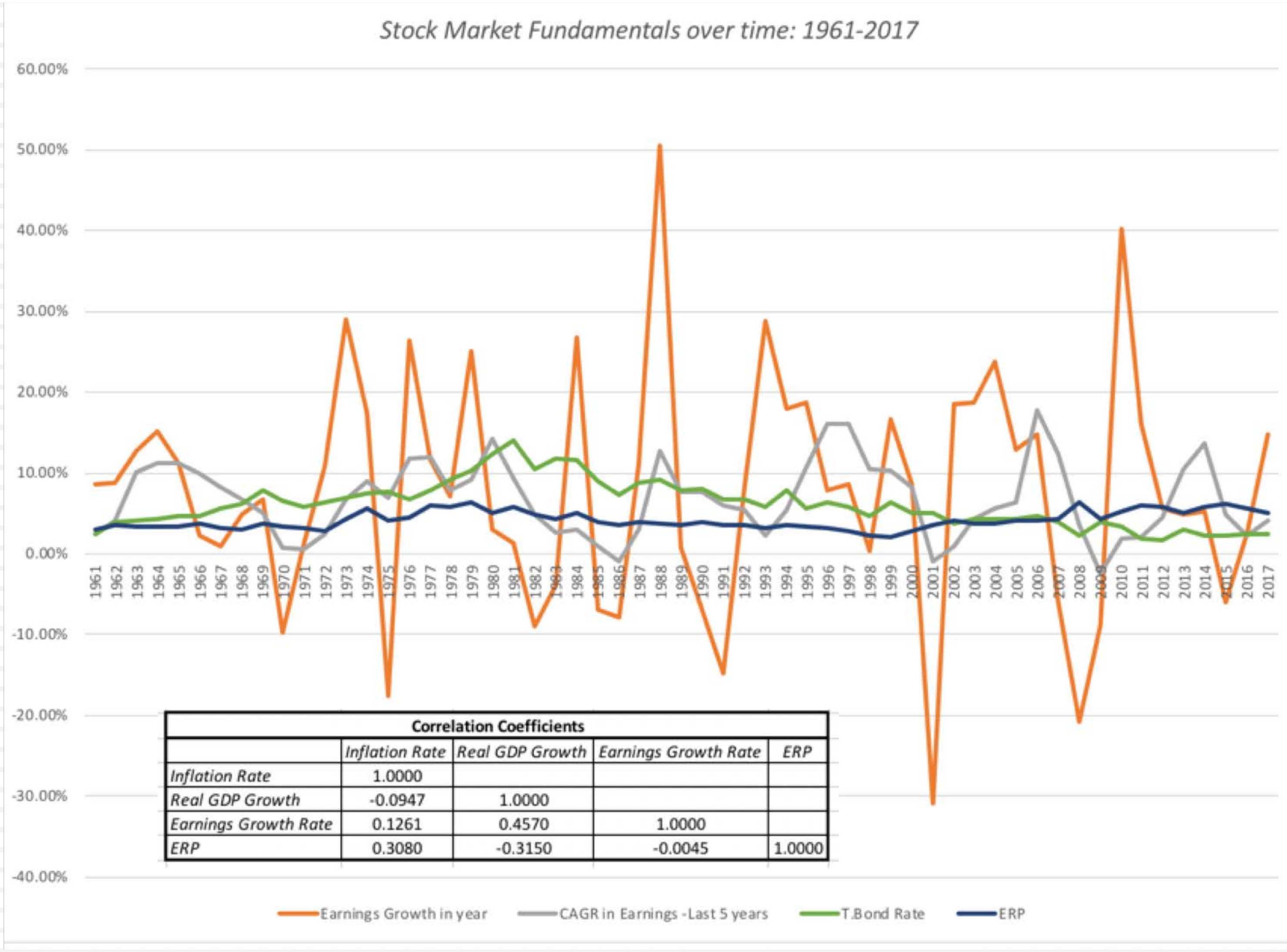
**Equity Risk Premium**
The ERP is what you would demand over and above the risk free rate to invest in equities

Historical Average from 1928-2017 = 4.77%

# And the drivers are interconnected..



# History reflects this..




**Correlation Coefficients**

| | Inflation Rate | Real GDP Growth | Earnings Growth Rate | ERP |
|---|---|---|---|---|
| *Inflation Rate* | 1.0000 | | | |
| *Real GDP Growth* | -0.0947 | 1.0000 | | |
| *Earnings Growth Rate* | 0.1261 | 0.4570 | 1.0000 | |
| *ERP* | 0.3080 | -0.3150 | -0.0045 | 1.0000 |

# 3. Value has to be built around a consistent narrative..

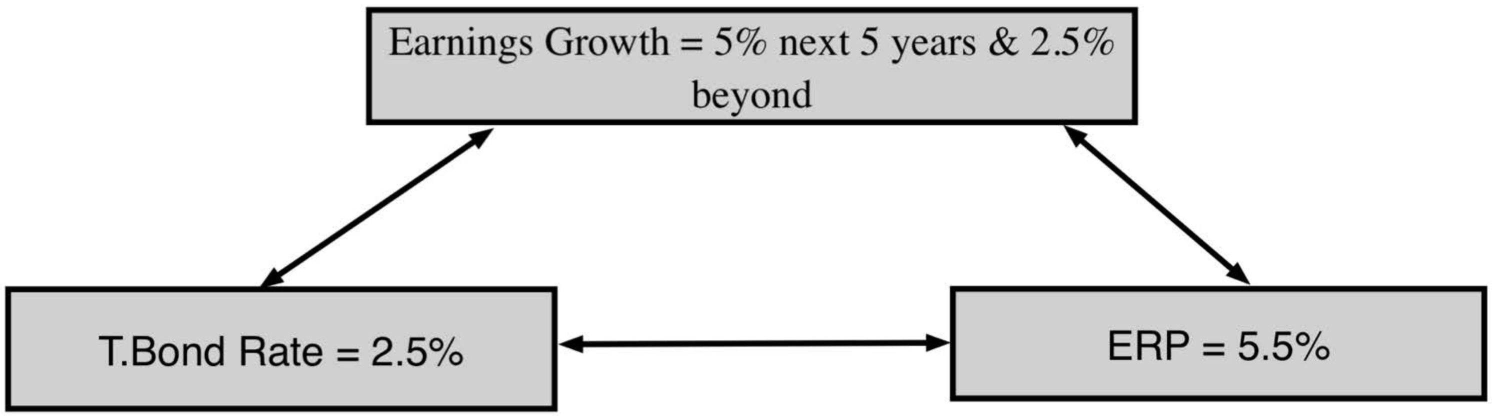
- Your assessed value for equities will depend upon your assumptions about earnings growth, equity risk premiums and risk free rates.
- Your assumptions about risk premiums, earnings growth and the treasury bond rate should have a macro and market story underlying your numbers, and this story has to be internally consistent and fully worked through.
- If you don’t have a story, you can make assumptions about growth, risk and interest rates that are internally inconsistent.

# Two inconsistent narratives

- In the bearish version, which is call the *Interest Rate Apocalypse*, all of the inputs (earnings growth for the next five years and beyond, equity risk premiums) into value are held constant, while raising the treasury bond rate to 4% or 4.5%.
- In the bullish version, which I will term the *Real Growth Fantasy*, all of the inputs into value are left untouched, while higher growth in the US economy causes earnings growth rates to pop up.

# a. More of the Same

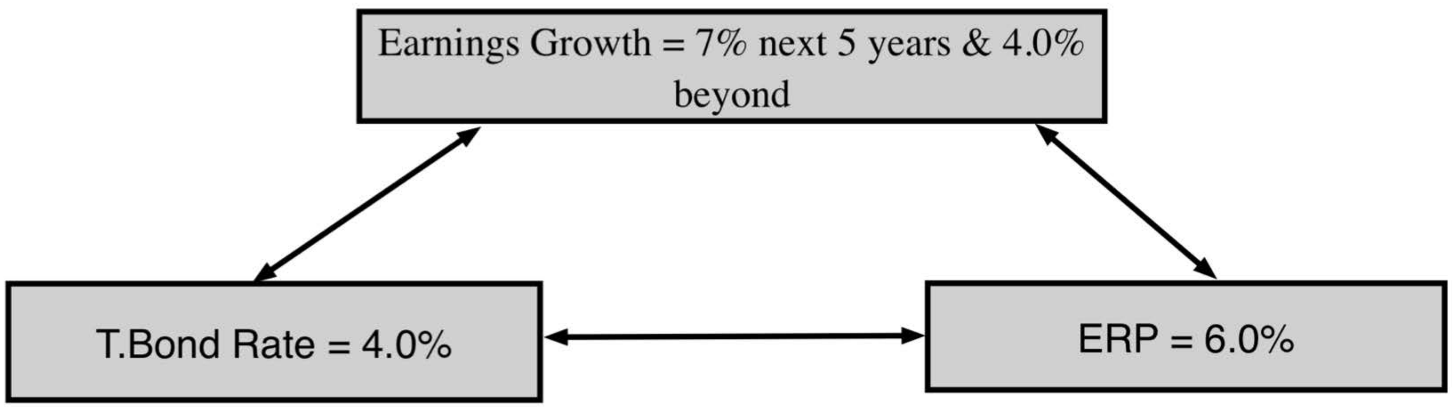
More of the Same




| | 1 | 2 | 3 | 4 | 5 | *Terminal Year* |
|---|---|---|---|---|---|---|
| Earnings Growth Rate | 5.00% | 5.00% | 5.00% | 5.00% | 5.00% | 2.50% |
| Expected Earnings | 124.13 | 130.34 | 136.85 | 143.70 | 150.88 | 154.65 |
| Expected Dividends + Buybacks = | $ 113.69 | $ 119.37 | $ 125.34 | $ 131.61 | $ 138.19 | 141.65 |
| Expected Terminal Value = | | | | | $ 2,575.38 | |
| Risk free Rate | 2.50% | 2.50% | 2.50% | 2.50% | 2.50% | 2.50% |
| ERP | 5.50% | 5.50% | 5.50% | 5.50% | 5.50% | 5.50% |
| Present Value = | $ 105.27 | $ 102.34 | $ 99.50 | $ 96.74 | $ 1,846.81 | |
| Intrinsic Value of Index = | **$ 2,250.66** | | | | | |

# b. Inflation Returns

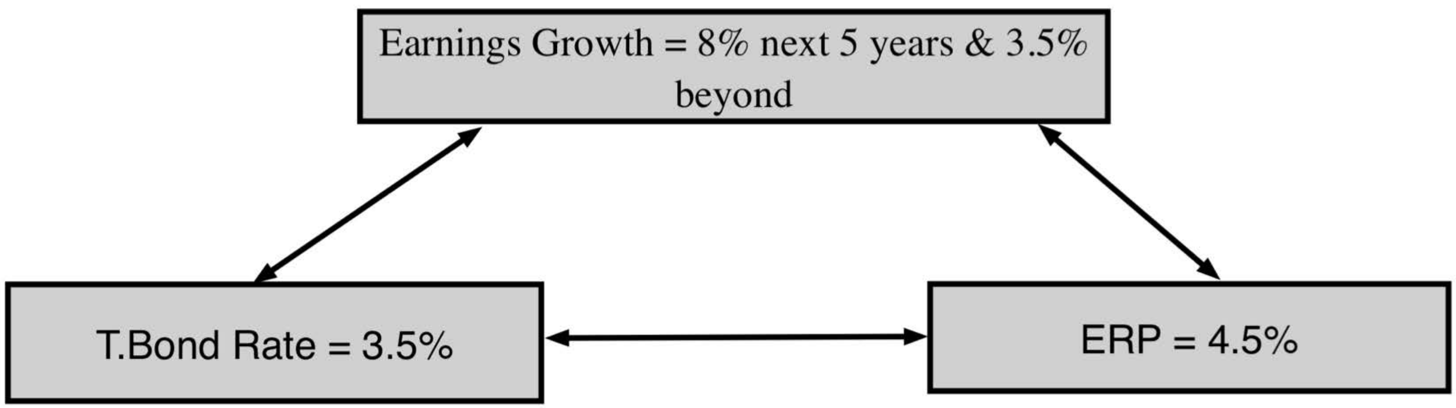
## Inflation Returns




| | 1 | 2 | 3 | 4 | 5 | *Terminal Year* |
|---|---|---|---|---|---|---|
| Earnings Growth Rate | 7.00% | 7.00% | 7.00% | 7.00% | 7.00% | 4.00% |
| Expected Earnings | 126.49 | 135.35 | 144.82 | 154.96 | 165.81 | 172.44 |
| Expected Dividends + Buybacks = | $ 115.86 | $ 123.97 | $ 132.64 | $ 141.93 | $ 151.86 | 157.94 |
| Expected Terminal Value = | | | | | $ 2,632.29 | |
| Risk free Rate | 4.00% | 4.00% | 4.00% | 4.00% | 4.00% | 4.00% |
| ERP | 6.00% | 6.00% | 6.00% | 6.00% | 6.00% | 6.00% |
| Present Value = | $ 105.32 | $ 102.45 | $ 99.66 | $ 96.94 | $ 1,728.74 | |
| Intrinsic Value of Index = | $ 2,133.11 | | | | | |

# c. The Growth Engine Revs up

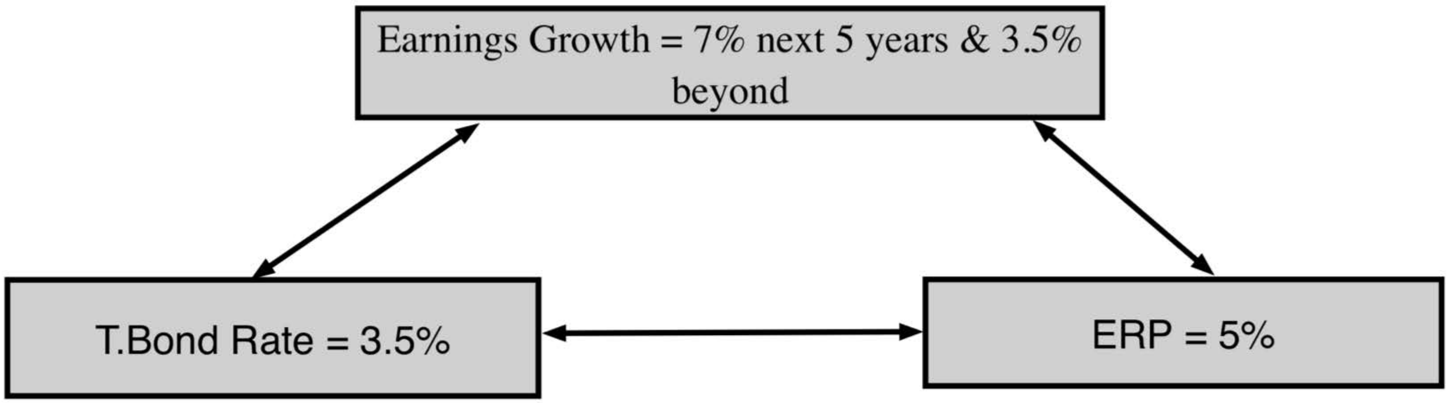
## The Growth Engine Revs Up




| | 1 | 2 | 3 | 4 | 5 | *Terminal Year* |
|---|---|---|---|---|---|---|
| Earnings Growth Rate | 8.00% | 8.00% | 8.00% | 8.00% | 8.00% | 3.50% |
| Expected Earnings | 127.68 | 137.89 | 148.92 | 160.84 | 173.70 | 179.78 |
| Expected Dividends + Buybacks = | $ 116.94 | $ 126.29 | $ 136.40 | $ 147.31 | $ 159.09 | 164.66 |
| Expected Terminal Value = | | | | | $ 3,659.15 | |
| Risk free Rate | 3.50% | 3.50% | 3.50% | 3.50% | 3.50% | 3.50% |
| ERP | 4.50% | 4.50% | 4.50% | 4.50% | 4.50% | 4.50% |
| Present Value = | $ 108.28 | $ 108.28 | $ 108.28 | $ 108.28 | $ 2,598.63 | |
| Intrinsic Value of Index = | **$ 3,031.74** | | | | | |

# My Melded Version

## My Melded Scenario




| | 1 | 2 | 3 | 4 | 5 | *Terminal Year* |
|---|---|---|---|---|---|---|
| Earnings Growth Rate | 7.00% | 7.00% | 7.00% | 7.00% | 7.00% | 3.50% |
| Expected Earnings | 126.49 | 135.35 | 144.82 | 154.96 | 165.81 | 171.61 |
| Expected Dividends + Buybacks = | $ 115.86 | $123.97 | $132.64 | $141.93 | $ 151.86 | 157.18 |
| Expected Terminal Value = | | | | | $3,143.56 | |
| Risk free Rate | 3.50% | 3.50% | 3.50% | 3.50% | 3.50% | 3.50% |
| ERP | 5.00% | 5.00% | 5.00% | 5.00% | 5.00% | 5.00% |
| Present Value = | $ 106.78 | $105.30 | $103.85 | $102.41 | $2,191.61 | |
| Intrinsic Value of Index = | $2,609.95 | | | | | |

# The Bottom Line

- Reject half-baked narratives: If a market prediction is based upon a half baked story, where everything else is held constant, and only one variable is moved, be suspicious.
- Develop your own narrative: You can listen to the narratives that others have, but it is your money that you are investing, and ultimately, it has to be based upon your narrative.
- Be open to feedback: You will get signals from the world, in the form of macroeconomic data or market reactions, that should lead you to fine tune, adjust or even abandon your narrative.