Class 8: Predicting Stock Market Returns and Market Efficiency

Financial Markets, Spring 2020, SAIF

Jun Pan

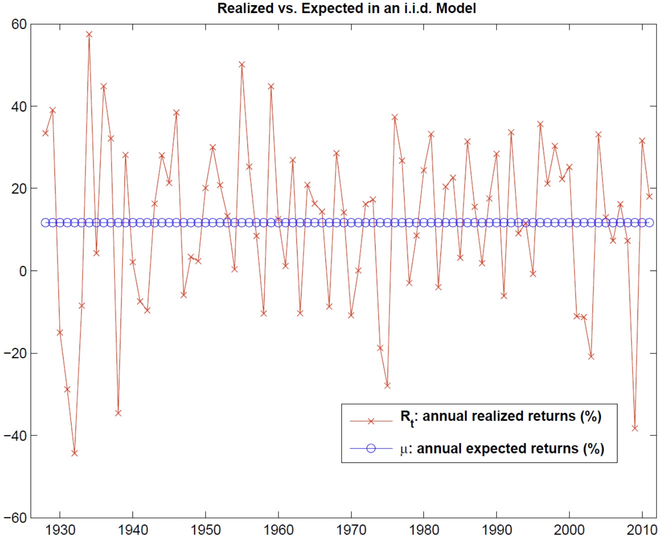
Shanghai Advanced Institute of Finance (SAIF)
Shanghai Jiao Tong University

March 26, 2020

Outline

- The market risk remains the most important and pervasive:
  - Quant investing: market neutral, its alpha comes not from the market risk.
  - Market timing: the consistent ability to get in at bottom, and out at peak.
- What are the evidences?
  - How good are investors at predicting the market?
  - How do professional investors view market timing?
  - Predictors related to business conditions: default spread, term premium, and financial ratios (dividend/price ratio).
- Market efficiency:
  - Price discovery and information.
  - The force of arbitrage.
  - The limits to arbitrage.

Realized Returns vs. Expected Returns



Some Pick the Stock, Others Choose the Moment

nce | The Stock Market

interprets the data as confirming his 80/20 rule: 80% of timers fail over any reasonable period of time. He adds that the performance numbers got a boost from a bear market in the early 2000s. "Bear markets make market timers look like geniuses because they have some money in cash," says Hulbert. Most mutual funds, for instance, stay nearly fully invested in stocks, so take a hit during bear markets.

BusinessWeek, February 19, 2007

Views on Market Timing

Excerpts from "Pioneering Portfolio Management" by David Swensen

- Investment returns stem from decisions regarding three tools of portfolio management: Asset Allocation, Market Timing, and Security Selection.
- Careful investors consciously construct portfolios to reflect the expected contribution of each portfolio management tool.
- Market timing, according to Charles Ellis, represents a losing strategy: "There is no evidence of any large institutions having anything like consistent ability to get in when the market is low and get out when the market is high. Attempts to switch between stocks and bonds, or between stocks and cash, in anticipation of market moves have been unsuccessful much more often than they have been successful."
- "Serious investors avoid timing markets."

How Good are Professional Investors at Predicting the Market?

TABLE 5-3

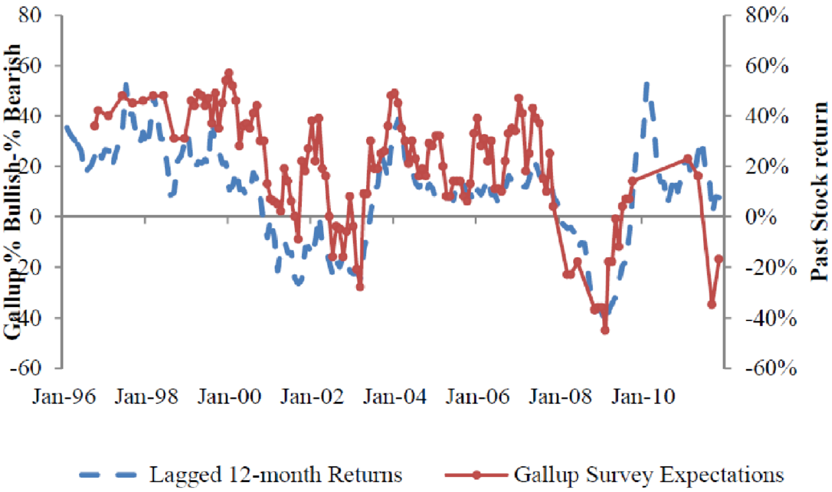
Investor Confidence and Dow Price Returns, Sentiment = Bull/(Bull + Bear)

BULL and BEAR from Investors Intelligence Inc., New Rochelle, NY

		Annualized Returns (January 2, 1970 - May 16, 1997)			
Sentiment	Frequency	Three Month	Six Month	Nine Month	Twelve Month
0.2 - 0.3	1.55%	18.52%	15.40%	22.79%	20.74%
0.3 - 0.4	11.30%	12.23%	13.87%	16.54%	15.81%
0.4 - 0.5	19.35%	16.85%	13.63%	12.07%	12.73%
0.5 - 0.6	27.90%	15.16%	14.06%	10.44%	8.82%
0.6 - 0.7	19.14%	14.03%	8.79%	8.71%	7.27%
0.7 - 0.8	14.76%	11.21%	7.24%	7.38%	7.01%
0.8 - 0.9	5.23%	-0.39%	0.23%	-3.32%	-1.79%
0.9 - 1.0	0.78%	0.35%	-3.87%	-9.17%	-10.18%
Overall	100.00%	13.48%	11.11%	9.99%	9.31%

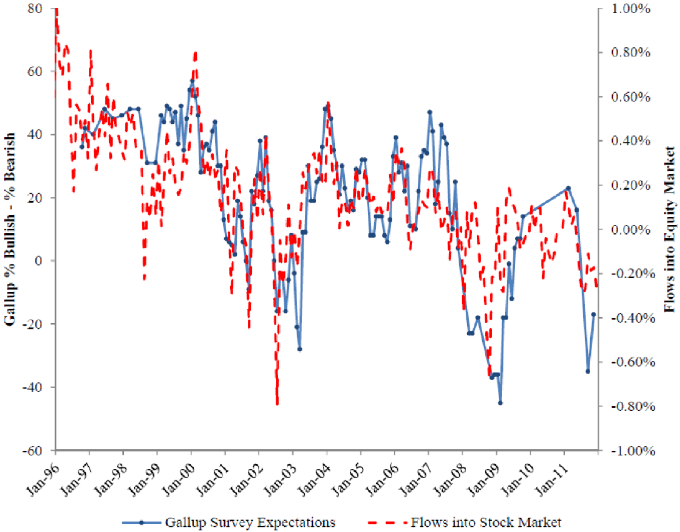
Source: "Stocks for the Long Run" by Jeremy Siegel

Investor Expectations and Past Stock Returns



Source: "Expectations of Returns and Expected Returns" by Greenwood and Shleifer (2012)

Investor Expectations and Equity Mutual Fund Flows



Predictive Regressions

- Let I_t be a candidate predictor, observable at time t:

$$R_{t+1} = a + \mathbf{b}\, I_t + \epsilon_{t+1}\,,$$

  where ϵ_{t+1} is the *unpredictable* component of the stock return.
- If **b** is statistically significant, then we have a potentially useful predictor.
- The best way to gauge the usefulness of a predictor is through the R-squared of the regression:

$$\text{R-squared} = \frac{\text{var}(\mathbf{b}\, I_t)}{\text{var}(R_{t+1})}\,; \quad 1 - \text{R-squared} = \frac{\text{var}(\epsilon_{t+1})}{\text{var}(R_{t+1})}$$

- Much effort has been spent on finding good predictors. Let's take a look at some of them.

Can Past Returns Predict Future Returns?

$$R_{t+1} = a + \rho R_t + \epsilon_{t+1}$$

	rho (%)	t-stat	R-sqr (%)	sample period
S&P 500	11.3	2.28	1.27	1926-1960
CRSP Value Weight	12.1	2.46	1.47	1926-1960
CRSP Equal Weight	15.7	3.20	2.46	1926-1960
S&P 500	3.9	1.01	0.15	1960-2015
CRSP Value Weight	3.9	1.01	0.15	1960-2015
CRSP Equal Weight	10.7	2.77	1.14	1960-2015

- Rho (ρ) measures the *auto-correlation* in the monthly stock returns.
- In Econometrics, this model is called AR(1), with AR for auto-regressive.
- The average rho for individual stocks is *negative* but insignificant.

Predictive Returns at Daily Frequency

$$R_{t+1} = a + \rho R_t + \epsilon_{t+1}$$

	rho (%)	t-stat	R-sqr (%)	sample period
S&P 500	2.0	2.28	0.04	1962-2015
S&P 500	-3.3	-3.02	0.11	1982-2015
S&P 500	-7.7	-4.93	0.60	2000-2015
Yen/Dollar	0.5	0.35	0.0022	1995-2016
Yen/Dollar	0.3	0.30	0.0010	1980-2016
Yen/Dollar	0.3	0.28	0.0007	1970-2016

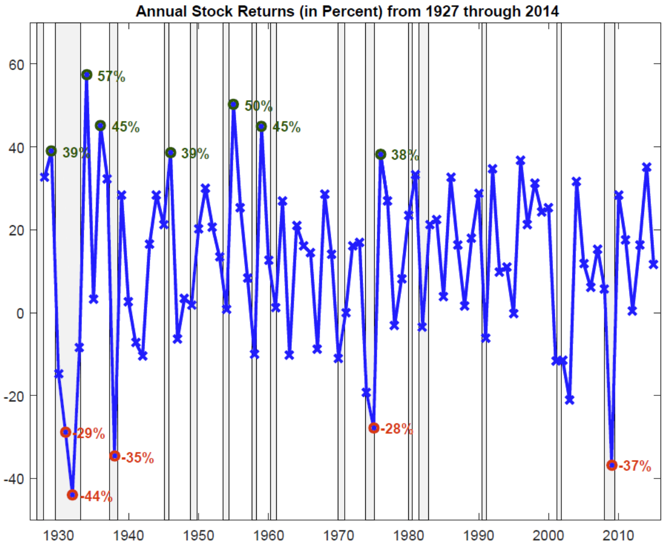
Time-Varying Expected Returns

- Only in an i.i.d. world does predictability mean market inefficiency.
- Otherwise, having a predictive component in market returns does not necessarily mean that markets are inefficient.
- The predictive component could be interpreted as time-varying expected returns:

$$\mu_t = E_t(R_{t+1}) = a + \mathbf{b}\, I_t$$

- For example, time-varying business conditions or time-varying risk appetite could both be a cause for time-varying expected returns.
- Over longer horizons (e.g., business cycles), there is a closer connection between market returns and macroeconomic conditions.

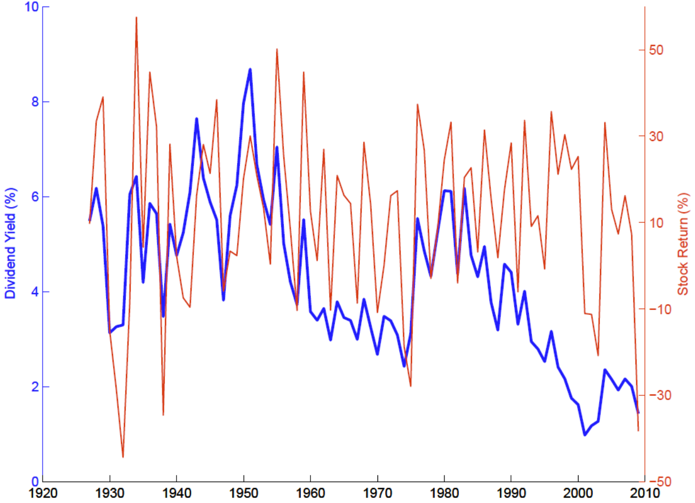
NBER Dated Recessions (shaded areas)



Predictors Related to Business Conditions

- Default Spreads: *differences in yields between defaultable bonds and treasury bonds with similar maturities.* When the business condition is bad, the systematic default risk increases, widening the default spread.
- Term Premiums: *differences in yields between long- and short-term treasury bonds.* This is a forward-looking variable predictive of future inflation, and is found to be important in forecasting real economic activity.
- Financial Ratios: *dividend-price ratio.* Variables that are important in fundamental valuation. Could be proxies for systematic risks that are higher when times are poor, and lower when times are good.

Stock Return and Dividend-Price Ratio



Use Dividend-Price Ratio to Predict Stock Returns

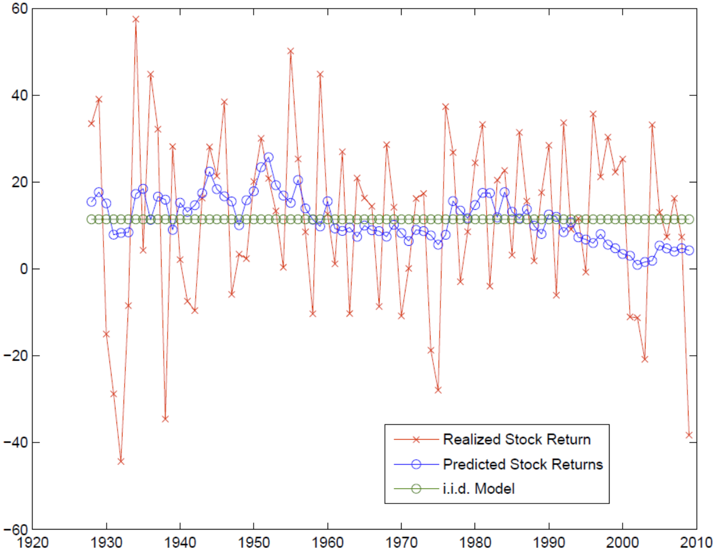
$$R_{t+1} = a + b\left(\frac{D}{P}\right)_t + \epsilon_{t+1}$$

- R_t: annual stock return realized in year t.
- $(D/P)_t$: dividend-price ratio realized in year t.

1927-2008	a	b
estimate	-0.02	3.22
standard error	0.06	1.34
t-stat	-0.36	2.40

- The R-squared of the regression: 6.63%.
- The sample standard deviation of D/P is 1.68%.

Realized vs. Expected Returns



Market Efficiency

- Follow the information:
  - Orange juice and the weather in Orlando, Florida.
  - Speed of price discovery and the value of millisecond.
- The force of arbitrage and traditional convergence trades:
  - Equity: index futures and the cash market.
  - Fixed Income: old and new bonds on the Treasury yield curve.
  - FX: covered interest-rate parity.
- Limits to arbitrage.
  - Limited balance sheet capacity and access to funding.
  - Losing money on arbitrage.