

## **FIN 411 -- Investments: Portfolio Performance Evaluation**

### **Types of Abnormal Performance:**

- (1) Stock Selectivity**
- (2) Market Timing**

## **Portfolio Performance Evaluation**

**Estimate market model in risk premium form:**

$$[R(pt) - R(ft)] = \alpha(p) + \beta(p) [R(mt) - R(ft)] + \varepsilon(pt)$$

**where**

- **R(pt) is the mutual fund return, including dividends, subtracting fees & expenses,**
- **R(mt) is the CRSP value-weighted portfolio return (or the S&P 500 index with dividends),**
- **and R(ft) is the default-free interest rate over the time interval t (e.g., 1 month Tbill yield)**

## Portfolio Performance Evaluation: Risk Premium Market Model

$$[R(pt) - R(ft)] = \alpha(p) + \beta(p) [R(mt) - R(ft)] + \varepsilon(pt)$$

If the Sharpe-Lintner CAPM is true, then

$$E[R(pt) - R(ft)] = \beta(p) E[R(mt) - R(ft)],$$

so  $\alpha(p)$  should equal 0.

- If the estimate of  $\alpha(p)$  is significantly greater (less) than 0, then the mutual fund has out-(under-) performed the risk-adjusted benchmark

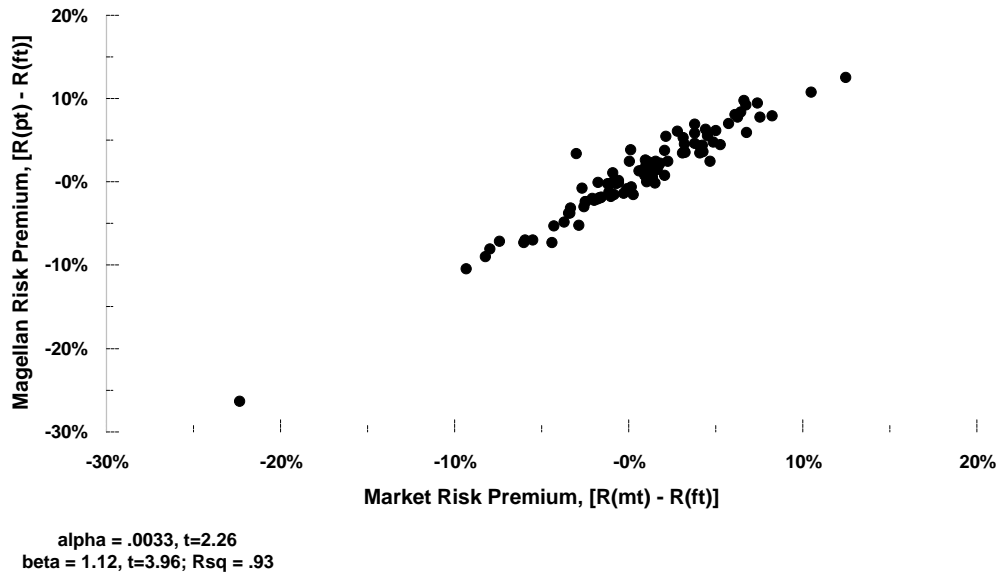
This is sometimes called Jensen's alpha

## Portfolio Performance Evaluation: Fidelity's Magellan Fund

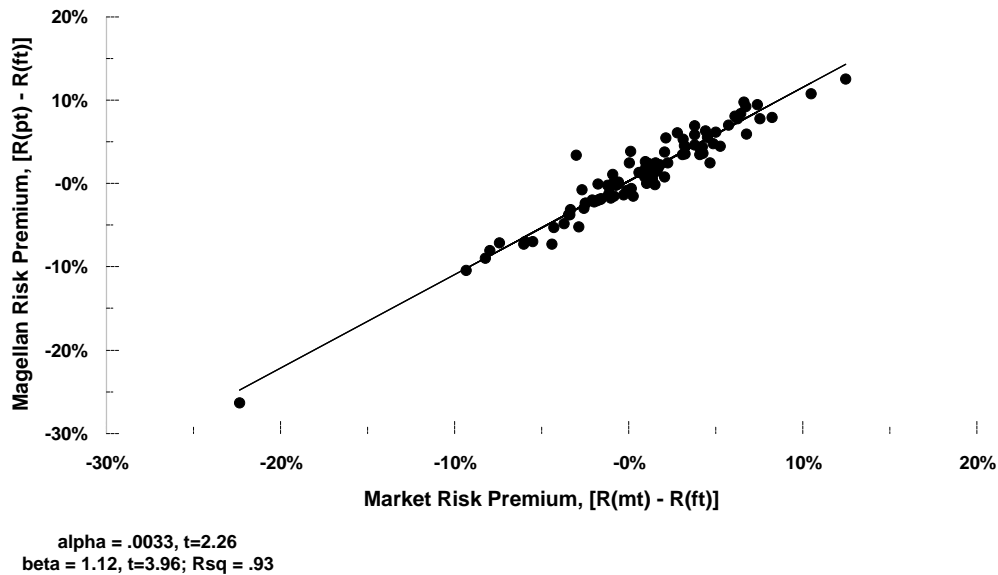
Fidelity's Magellan Fund has been advertised for many years as having had outstanding performance

- by testing this fund we are probably biased in favor of finding abnormal performance
  - else why would Fidelity spend so much on advertising?
- using monthly data from 1983-90, and ignoring the 3% up-front load fee (i.e., you get \$.97 of investments when you send them \$1),
  - $\beta(p)$  is 1.12 (t = 3.96 for  $\beta=1$ ),  
 $\alpha(p)$  is .0033 (t = 2.26), and Rsquared is .93

## Portfolio Performance Evaluation: Fidelity's Magellan Fund, 1983-90



## Portfolio Performance Evaluation: Fidelity's Magellan Fund, 1983-90



## Testing for Market Timing Ability

If you thought you had market timing ability (i.e., you could tell when stock returns would be higher than Tbill returns), you should be more heavily invested in stocks in those periods

- This would imply that the beta of your portfolio would be higher when market risk premiums were positive (and lower when they were negative):

$$[R(pt) - R(ft)] = \alpha(p) + \beta(p) [R(mt) - R(ft)] + \beta^p(p) D(t) [R(mt) - R(ft)] + \varepsilon(pt)$$

where  $D(t) = 1$  if  $[R(mt) - R(ft)] > 0$ , and 0 otherwise

## Fidelity's Magellan Fund: Market Timing?

$$[R(pt) - R(ft)] = \alpha(p) + \beta(p) [R(mt) - R(ft)] + \beta^p(p) D(t) [R(mt) - R(ft)] + \varepsilon(pt)$$

where  $D(t) = 1$  if  $[R(mt) - R(ft)] > 0$

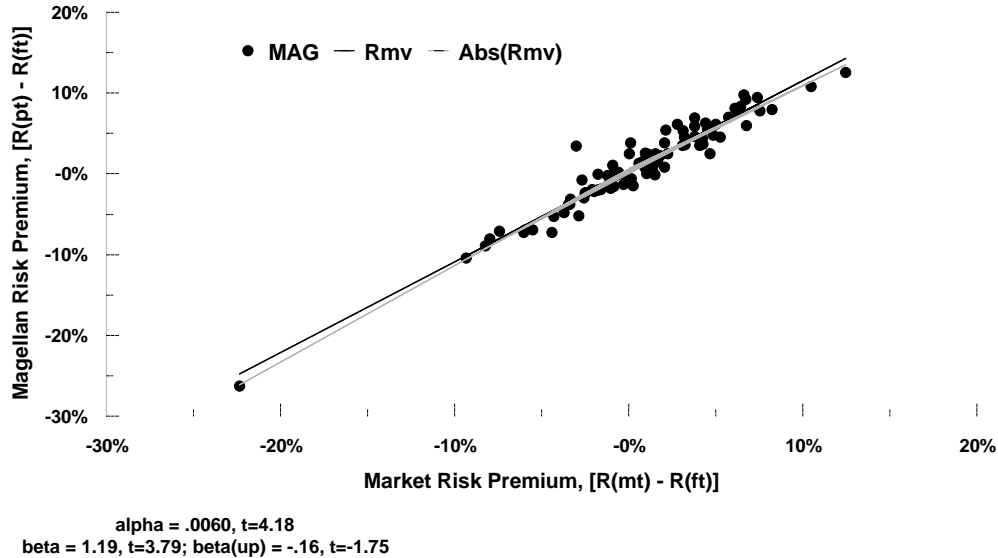
For 1983-90,  $\alpha(p) = .0060$ ,  $t=4.18$

$\beta(p) = 1.19$ ,  $t=3.79$  for  $\beta = 1$

$\beta^p(p) = -.16$ ,  $t=-1.75$  for  $\beta^p = 0$

so it looks like Magellan has negative market timing ability, but stronger positive selectivity ability using this method

## Portfolio Performance Evaluation: Fidelity's Magellan Fund, 1983-90

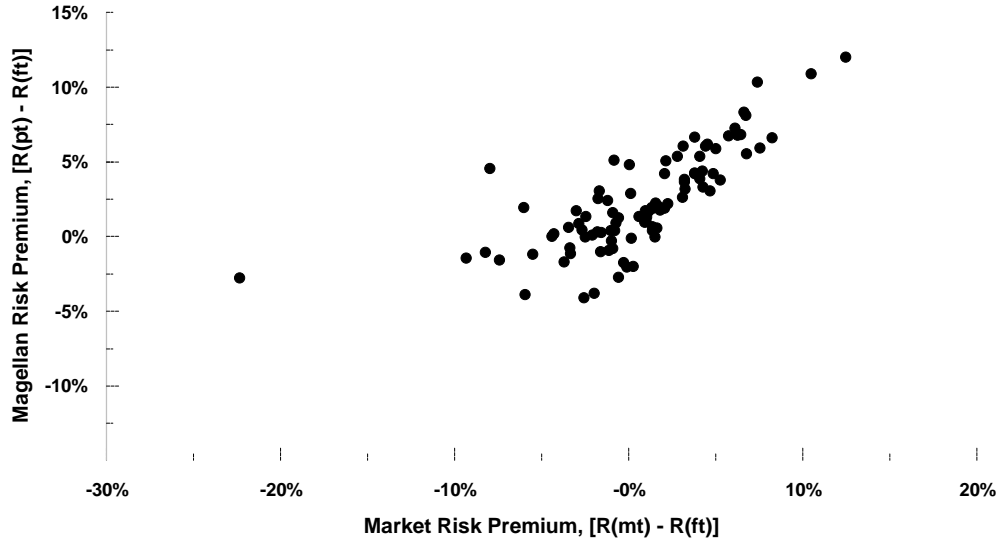


## Portfolio Performance Evaluation: Market Timing Fund

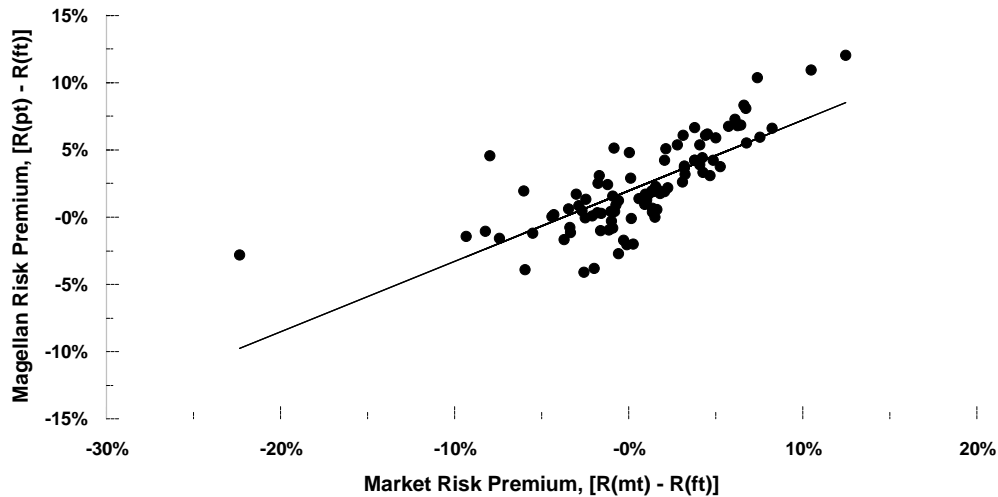
A (hypothetical) Market Timing Fund makes investments in either long-term Corporate bonds, or in the stock market (S&P index fund) depending on whether the fund managers feel "Bullish" or "Bearish" about the stock market

- using monthly data from 1983-90,  
 $\beta(p)$  is .52 (t = -10.07 for  $\beta=1$ ),  
 $\alpha(p)$  is .0195 (t = 8.77), and Rsquared is .57
- it looks like this fund has strong "selectivity" ability (about 2% per month)!!

## Portfolio Performance Evaluation: Fidelity's Magellan Fund, 1983-90



## Portfolio Performance Evaluation: Fidelity's Magellan Fund, 1983-90



alpha = .0195, t=8.77  
beta = .52, t=-10.07

## Market Timing Fund: Market Timing?

$$[R(pt) - R(ft)] = \alpha(p) + \beta(p) [R(mt) - R(ft)] + \beta^p(p) D(t) [R(mt) - R(ft)] + \varepsilon(pt)$$

where  $D(t) = 1$  if  $[R(mt) - R(ft)] > 0$

For 1983-90,  $\alpha(p) = .0048$ ,  $t=2.74$

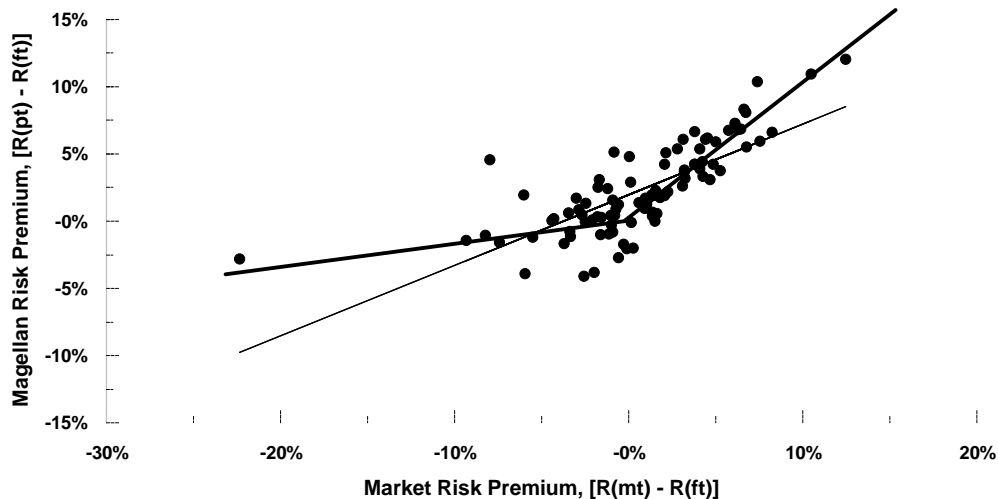
$\beta(p) = .14$ ,  $t=-13.83$  for  $\beta = 1$

$\beta^p(p) = .84$ ,  $t= 7.72$  for  $\beta^p = 0$

so it looks like the Market Timing Fund still has small positive selectivity ability (.5% per month), but strong positive market timing ability

- $\beta$  is .84 higher in months when  $[R(mt) - R(ft)] > 0$

## Portfolio Performance Evaluation: Fidelity's Magellan Fund, 1983-90



alpha = .0048,  $t=2.74$   
beta = .14,  $t=-13.83$ ; beta(up) = .84,  $t=7.72$

## Style Analysis

- **Recently, many people have become interested in determining the "style" used by investment managers**
  - "growth" - stocks that have high earnings growth rates
    - presumably high capital gains, lower dividend yields, higher risk
  - "value" - stocks that have assets that are undervalued by the market
    - high book/market ratios
    - Graham & Dodd; Buffett?

## Style Analysis

- **Some managers specialize by:**
  - industry (sector funds)
  - country
  - equity capitalization
    - large cap; small cap; etc.
  - asset class
    - stocks; bonds; high-risk bonds
  - age of company
    - recent IPOs

## Style Analysis

- **Two approaches to analyzing style:**
  - **compare with other funds similarly identified (self-determination)**
    - **Lipper**
  - **use correlations with passive portfolios of different types to determine similarities in return patterns**
    - **Bill Sharpe's web page**
    - **use Fama-French three factor risk model [market, size, B/M]**

## Style Analysis

- **The general point for performance evaluation is to compare an actively managed fund with a passive fund that holds similar types of stocks**
  - **compare international stock fund with Morgan-Stanley World Index**
  - **compare a small-cap fund with the DFA small cap index fund**
  - **compare growth or value funds with the Vanguard growth or value index funds**

## **Performance Evaluation: Summary**

- (1) Straightforward to measure abnormal performance on a risk-adjusted basis**
- (2) Most studies of mutual funds find that the average  $\alpha$  across funds is not different from 0**
  - it is debatable whether, net of fees and load charges, mutual fund managers can beat a passive, no-load well-diversified fund (e.g., S&P 500 index fund)**
- (3) Typical large mutual fund is well-diversified (R-squared between .85 and .95)**

## **Performance Evaluation: Questions**

- (1) Suppose you tested for selectivity and timing for a mutual fund of Eastern European stocks. Do you think that the results are as reliable as for the Magellan Fund (for example)?  
Why, or why not?**
- (2) If you wanted to analyze the performance of mutual funds that specialized in small cap stocks, do you think your estimate of selectivity ( $\alpha$ ) would be significantly different from 0?  
Why, or why not?**