Exam Asset Pricing
Master Finance - Vrije Universiteit Amsterdam
26 October 2018

Question 1: The Basics

One potential explanation for the size premium is that asset management firms are limited in how much capital they can invest in small stocks.

   a. Explain why the size premium represents a mis-allocation of capital (6 points).

Asset management firms are limited in how much they can invest in small cap stocks because of limited liquidity and limited free float. As a result, they mainly invest in large cap stocks, despite the fact that small cap stocks might be more attractive in terms of risk/return. As a result, large cap stocks are overpriced, and small cap stocks are underpriced. Therefore, expected returns of small cap stocks are larger than those of large cap stocks. This means that there is a mis-allocation of capital that is affecting market prices.

In a CAPM world, in equilibrium all stocks should have the same marginal utility k given by $E(r_i) - a\sigma_{im} = k$. Now assume that stock A is 5% overpriced, and stock B is 10% underpriced.

   b. Explain what is the marginal utility for stocks A and B (6 points).

Because the stocks are over/underpriced, the expected return E(r) is affected. The risk of the stocks and the risk aversion of investors does not change, such that a and σ_{im} stay the same. As a result, the marginal utility k of stock A will be *k-0.05* and the marginal utility of stock B will be *k+0.10*.

The most widely used method to test whether certain variables are related to expected stock returns, is the Fama and MacBeth (1973) method. Imagine you want to use the Fama-MacBeth method to test whether an individual stock's liquidity is priced next to a stock's exposure to market-wide liquidity.

c. Explain step-by-step how you would test the liquidity problem (8 points).

1. Estimate liquidity betas per stock in a time-series regression over some initial period (say 4 to 5 years)
2. Form portfolios based on liquidity betas (10 or 20).
3. (re-estimate liquidity betas over next period of 4 to 5 years)
4. Run cross-sectional regressions for all 12 months in the next year over the portfolios with the return in month t+1 as dependent variable and the liquidity beta AS WELL AS THE PORTFOLIO LIQUIDITY ITSELF as independent variables (+control variables such as size, btm, mom, etc).
5. After one year, re-estimate liquidity betas.
6. Repeat step 4
7. At the end of the sample, take average and standard deviation of estimated coefficients from step 4, and calculate their significance.

<PLEASE TURN OVER FOR QUESTION 2>

Question 2: Factor Models

ETF's are typically classified among two dimensions: value versus growth, and large cap versus small cap. Now imagine that I have downloaded the returns of an ETF from iShares, but I forgot what type of ETF it was. To find out how this ETF scores on the two dimensions, I ran the five factor model including momentum. The table below gives the results.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.026433	0.076013	0.347746	0.7284
MKTRF	1.004713	0.021773	46.14397	0.0000
SMB	0.883301	0.030485	28.97451	0.0000
HML	0.283600	0.033873	8.372528	0.0000
RMW	0.214169	0.039978	5.357229	0.0000
CMA	0.026546	0.046611	0.569509	0.5696
MOM	-0.016218	0.015940	-1.017401	0.3101

R-squared	0.963511	Mean dependent var		1.008571
Adjusted R-squared	0.962469	S.D. dependent var		5.384722
S.E. of regression	1.043181	Akaike info criterion		2.954152
Sum squared resid	228.5274	Schwarz criterion		3.063181
Log likelihood	-313.5255	Hannan-Quinn criter.		2.998195
F-statistic	924.2022	Durbin-Watson stat		1.882132
Prob(F-statistic)	0.000000			

a. Explain what the estimated coefficients should be for the CAPM to hold (5 points).

In CAPM, only the market beta is relevant; the market beta is a complete measure of risk. Therefore, other betas should not matter, ánd the intercept should be equal to zero. As such, only the coefficient for MKTRF should be significant. All other coefficients including C should be not significantly different from zero.

A good asset pricing model is able to explain all variation in the returns to an asset.

b. Explain, based on the estimation results, whether the 6-factor model as applied above is a good asset pricing model (5 points).

When an asset pricing model performs well, it explains all expected return. This implies that the intercept should be equal to zero. In this case, C is not significantly different from zero. Therefore, in this case the 6-factor model is a good asset pricing model.

c. Based on the estimation results in the table, explain what type of ETF this is in terms of value versus growth and large versus small cap (7 points).

Regarding value versus growth, we should look at the book-to-market variable, so HML. In this case, the coefficient on HML is positive and significant. This implies that the ETF has a positive exposure to HML and is therefore more similar to the HIGH book-to-market portfolio. So value stocks.

Regarding size, we should look at SMB. The ETF has a positive exposure to SMB, meaning that th ETF is more similar to SMALL cap stocks.

<PLEASE TURN OVER FOR QUESTION 3>

Question 3: Behavioral Finance

Arbitrage is a central concept within finance. Behavioral finance recognizes this, but argues that textbook arbitrage is not always perfect due to certain costs and risks. Noise trader risk is one of them.

    a. Explain how 'noise trader risk' affects market efficiency. Distinguish between the short run and the long run in your answer (6 points).

Noise trader risk is the risk that the non-rational force that created mispricing in the first place might make it worse in the short run. Noise trader risk affects market efficiency because it is a source of risk that is not fundamental (i.e., company related) in nature. Because of this risk, risk averse arbitrageurs will be less inclined to trade against mispricing. As a result, mispricing can be substantial and long-lasting. In the long-run, however, prices will mean revert. This mean-reversion, though, takes longer than without noise trader risk.

One of the limits to arbitrage, 'noise trader risk', is further developed in the study by DeLong, Shleifer, Summer, and Waldman (1990). In their model, the return difference between sophisticated traders and noise trader is given by

$$E(\Delta R_{n-i}) = \rho^* - \frac{(1+r)^2(\rho^*)^2 + (1+r)^2\sigma_\rho^2}{(2\gamma)\mu\sigma_\rho^2}.$$

In which ρ^* is the average misperception of noise traders, r the risk-free rate, σ the variation in the misperception, and γ the risk aversion.

    b. Explain how a higher average misperception ρ^* has both a positive and a negative effect on the return differential (6 points).

The first term on the right-hand-side of the equation represents the 'hold more effect'. Because noise traders are on average overly positive about the risky asset, they will hold more of the risky asset in their portfolio. Because the risky asset has a higher expected return than the risk-free asset, the expected return of the noise traders increases due to the hold more effect.

The average misperception ρ^* also appears in the numerator of the second term on the right-hand-side of the equation. This represents the 'price pressure effect'. Because noise traders buy more of the risky asset, they push up the price. A higher price means a lower expected return.

It is hard to construct an empirical measure for noise trader risk. There are, however, two empirical regularities that a measure of noise trader risk, also called investor sentiment, should have: 1) the measure should have a positive correlation with contemporaneous returns; 2) the measure should have a negative correlation with lagged returns.

    c.   Explain why investor sentiment should have this correlation structure with returns (6 points).

Sentiment should have a positive correlation with contemporaneous returns, because market sentiment should affect market prices, and it should push prices up when positive and down when negative. When investors are overly positive (negative), they buy more (less) thereby pushing prices up (down).

Sentiment should have a negative correlation with lagged returns, because the contemporaneous effect of sentiment on returns is non-fundamental. As a result, there should be mean reversion in the period after. When positive (negative) sentiment pushes prices up (down) in period t, prices should move down (up) in period $t+1$.

<PLEASE TURN OVER FOR QUESTION 4>

Question 4: Utility and Market Microstructure

An investor is checking the value of her portfolio. Now consider the following two situations:
1. Total return is +1%
2. Dividend is +2%, price change is -1%.

    a.   Explain which of the two situations is preferred by the Prospect Theory Investor (5 points).

Prospect Theory investors are loss averse. Therefore, despite the fact that both situations result in a 1% gain, they prefer situation 1 because in that case they are not confronted with the loss of -1%. The capital loss of 1% is weighed double relative to the dividend gain of 2%, such that situation 2 is perceived as a zero total return.

Theoretically, there are two types of markets: order driven and quote driven.

    b.   Explain how liquidity is formed in both types (6 points).

Order driven: Liquidity is formed by the limit buy- and sell- orders of investors or brokers.

Quote driven: Liquidity is formed by the quoted bid-ask spread and inventory of the market maker or dealer.

Due to technological progress, stock exchanges are now (almost) fully digital. This opens the possibility for competition between exchanges. As a result, single stocks are now traded on multiple exchanges. Another consequence, is the rise of dark pools.

    c.   Explain why institutional investors prefer to trade on a dark pool instead of a regular exchange (6 points).

> Institutional investors tend to make very large trades. They prefer dark pools to execute these trades for several reasons:
>
> - There are no HFTs active on dark pools that might take advantage of their trading.
>
> - Because dark pools are opaque, they do not have to hide their orders by splitting them up.
>
> - Because dark pools are effectively OTC, they can negotiate lower fees.
>
> - Because there are only informed traders on dark pools, market makers have no risk of adverse selection.

<PLEASE TURN OVER FOR QUESTION 5>

Question 5: Market Frictions

The following text is an article from Bloomberg.

Fund Carnage Shows Peril of Ignoring Liquidity

Indian equity managers were reckless to pile into thinly traded shares. Brace for worse if investors run for the exits.
By [Andy Mukherjee](#)

October 12, 2018, 1:00 AM GMT+2 Updated on October 12, 2018, 11:39 AM GMT+2
Indian retail investors won't easily forgive their fund managers, nor will they quickly forget this wealth destruction.
Out of 416 open-ended, onshore equity funds, 401 have lost money this year. Tech funds, the only ones to have performed decently, have been helped by Asia's worst-performing currency of 2018. And that's only because Indian software exporters earn revenues in a strong dollar and pay wages in rupees.
Most other mutual funds are down – many of them 20 percent to 40 percent in a flat market. Individual investors started returning to collective investment vehicles after the 2014 general elections, hoping for a reset to an economy held back by corruption scandals and policy paralysis. They doubled down after Prime Minister Narendra Modi's shock November 2016 currency ban pulled 86 percent of people's cash into bank accounts.
But now disappointment is writ large.
Fund managers who'd hoped for private-equity type returns by discovering jewels buried in the haystacks of public markets were essentially souping up performance by forgoing liquidity. Now that the markets are punishing them for that recklessness, the search for the elusive alpha is over — in infrastructure; power; banking and finance; small-, mid- and micro-cap shares; transport and logistics; value stocks; state-owned firms; business cycles; and every other fad.
With fund asset values collapsing, what happens if investors get up and leave?
Since May 2014, investors have put more money into Indian equity funds than they have pulled out in every month except one. Even during last month's brutal sell-off, they poured 111 billion rupees ($1.5 billion) into stock funds, the most since May. However, "buy-on-dips" greed can't last if asset prices don't recover.
A rush for the exits may cause its own problems, especially when it comes to handling redemption pressures. On conservative estimates, it would take more than 30 days to offload a quarter of the net assets of one small Indian infrastructure fund, Bloomberg's liquidity tools show. A fifth of a large tax-saver fund would need more than 180 days to dismantle, so thin is the liquidity of the stocks it holds. (By contrast, a typical index fund tracking the Nifty 50 can be entirely liquidated in less than three days.)
Concerns around liquidity have been elevated ever since IL&FS Group, a highly rated Mumbai-based infrastructure financier, started missing debt payments. The panic from this mini-Lehman moment spread last month to money-market mutual funds, which have been providing most of the credit to housing-finance companies and other non-bank lenders. Then it was the stock market's turn to focus on asset-liability mismatches by pummeling the likes of Dewan Housing Finance Corp.

    a.   Explain the liquidity issues of Indian funds by means of the results of Pastor and Stambaugh (2003) (5 points).

NOTE: because the announced list of papers was missing from the exam, this question was graded very mildly.

P&S study the effect of market risk on the cross-section of stock returns. What we see in the article, is that Indian mutual funds appear to invest a lot in low-liquidity stocks. This might bring some return, but comes with a risk when markets go down. When all investors want to sell these stocks, liquidity might dry up and there might be no buyers left leaving the funds with these stocks.

  b. Explain why there are always short-sale constraints, even without an explicit ban on short selling (5 points).

A short position is always more 'expensive' than a long position due to

   1. Margin requirements. Because potential losses of a short position are infinite, investors need to put up margin to counter credit risk.
   2. A short position always has a certain duration, whereas a long-position can theoretically be forever. Therefore, investors need to do more transactions, and thereby incur higher transaction costs.

Hong and Sraer (2016) try to 'save' the CAPM by taking disagreement and short-sale constraints into account.

  c. Explain how both disagreement and short-sale constraints contribute to the rescue of the CAPM in the study by Hong and Sraer (7 points).

Disagreement and short sale constraints might lead to overpricing and therefore lower expected returns. This because investors with a negative opinion about a stock cannot go short, and therefore their opinion/information is not embedded into prices. Only the positive opinions/news remain, causing overpricing.

Hong and Sraer show that in case of disagreement about the common component of cash flows (i.e., the market factor), high beta stocks will experience higher degrees of disagreement. If this is the case, high beta stocks will have:

   1. HIGHER expected returns because of the risk-sharing motive
   2. LOWER expected returns because of speculative overpricing

It depends on the level of disagreement and the proportion of short-sale constrained market participants whether 1. or 2. dominates.

\<PLEASE TURN OVER FOR QUESTION 6\>

Question 6: Delegated Asset Management

We have seen that the typical mutual fund underperforms relative to typical factor models.

a. Explain why funds are currently focusing on 'factor premia' rather than 'outperformance' (5 points).

> Mutual funds typically underperform relative to factor models. Therefore, they were forced to find an alternative way to market their added value. By focusing on the factor premia, they prevent (implicit) promises of outperformance, but effectively focus on expected returns. Thereby ignoring the question whether the premia pick up risk, or mispricing.

Mutual fund managers have the incentive to grow the size of their fund. This can be done through 1) performance, and 2) capital inflow. The figure below shows the performance-flow relationship.

Panel A: Relative Performance and Growth
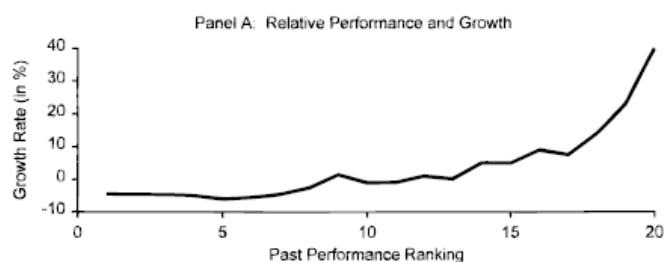
b. Explain which of the two methods is more effective in growing a fund (5 points).

> There are multiple sides to this question:
> - Looking at the figure, it shows that inflow can be as high as 40%. It is virtually impossible to make a 40% return in investments. This implies it is better to focus on inflow by means of, for example, marketing.
> - We know that performance attracts inflow. Therefore, in a multi-period setting it is better to focus on maximizing returns, because that attracts inflow.
> - Finally, we know that funds on average underperform. Therefore, it is better to focus on finding capital inflow.

Throughout the course, we have often discussed the two main schools of thought in finance: 'neo-classical' versus 'behavioral'.

c. Given an informed and motivated opinion whether your view is closer to the neoclassical or behavioral camp (6 points).

Essay question. Necessary components are: 1) an opinion; 2) a reasoning behind the opinion.

<END OF THE EXAM!>