FINM3407 - Behavioural Finance

Tutorial 8 Questions/Answers - Behavioural Explanations for Anomalies

Note: This topic has more questions than can be covered in a 2-hour session. The questions to be covered by your tutor are indicated by an asterisk (*); the rest questions should be viewed as extra practice problems.

In this tutorial, we are going to cover the following topics: Behavioural Explanations for Anomalies and a CFA Question

There are a few references reading for these relevant topics:

AckertDeaves Chapters 13

- **Part One: Behavioural Explanations for Anomalies**

1*. Differentiate the following terms/concepts:

a. Momentum and reversal

Momentum is a positive correlation in returns and reversal is a negative correlation in returns. The former exists empirically over the medium term and the latter over the long term.

b. Mean-reversion and continuation scenarios in the Barberis-Shleifer-Vishny (BSV) model

In the BSV model, under mean-reversion investors expect positive/negative surprises to be followed by negative/positive surprises, while under continuation investors expect positive/negative surprises to be followed by positive/negative surprises.

c. Size factor and book-to-market factor

In the Fama-French three-factor model, size and book-to-market are risk factors, with small-cap stocks and value (i.e., high book-to-market) stocks having higher expected returns.

d. Risk-based and behavioural explanations (for anomalies)

A risk-based (rational) explanation would argue that value stocks do better on average because they are riskier, as in the Fama-French model. On the other hand, a behavioural model would say that anomalies exist because of investor error and limits to arbitrage. The models in the chapter amount to behavioural explanations of anomalies.

2*. In the context of the BSV model, explain intuitively (nontechnically) why two consecutive earnings changes in the same direction make investors less likely to think that they are in regime 1 (mean-reversion) vs. the case of two earnings changes in alternate directions.

Investors, however, being coarsely calibrated, believe that stocks switch between two regimes. Under regime 1, it is believed that earnings mean-revert. This means that a positive/negative earnings change is likely to be followed by a negative/positive earnings change in the next period. More formally, given a positive/negative earnings change, there is a low probability (pr $_L$) of another positive/negative earnings change in the next period. On the other hand, under regime 2, given a positive/negative earnings change, there is a high probability (pr $_H$) of another positive/negative earnings change in the next period. In other words, it is believed that there is a continuation in earnings. Note that pr $_H$ > pr $_L$. Two consecutive earnings changes in the same direction make it appear that Regime 2 is in effect (and Regime 1 is not in effect) since this is what we would expect in Regime 2.

3. In the chapter example of the DHS model, in one of the two cases even rational investors overreacted. This implies that overreaction is rational. Comment.

The key is that on average rational investors do not overreact. Sometimes they will if the signal is noisier than usual, but even then, they will not overreact as much as overconfident investors do.

4*. Again, using the DHS model, suppose that θ=1; σ_θ^2=1; σ_ε^2 =2; σ_C^2=1; and s_1=2.

<u>Describe and comment on the path of prices when overconfident investors determine prices vs. the rational path of prices.</u>

Note: The question is based on the DHS model, which likely refers to the model proposed by Daniel, Hirshleifer, and Subrahmanyam (1998). This model studies how investor overconfidence (OC) affects asset prices.

The parameters given are:

θ=1: This is the true value of the signal or the real fundamental value.

σ_θ^2=1: The variance of the signal.

σ_ε^2 =2: The variance of the noise.

σ_C^2=1: The error variance for overconfident investors.

s_1=2: This could be the received signal.

S1 = θ + ε

2 = 1 + ε

ε = 1

When OC investors determine the path of prices, the price change is:

$$p_1 = \frac{\sigma_\theta^2}{\sigma_\theta^2+\sigma_C^2}(\theta + \epsilon) \text{ where } \epsilon \text{ is a noise term}$$

$$= \frac{1}{1+1}(1+1)$$

Using the given values, we get $p_1 = 1$. This means the overconfident investors fully react to the signal without overreaction.

Substituting in the given values yields $p_1 = 1$. Since $\theta=1$, the true price change is also 1, which means that no overreaction takes place.

As for rational investors, the price changes according to:

$$p_1 = \frac{\sigma_\theta^2}{\sigma_\theta^2 + \sigma_\varepsilon^2} \cdot (\theta + \epsilon)$$

$$= \frac{1}{1+2}(1+1)$$

Substituting in the given values yields $p_1 = 2/3$. This implies that rational investors underreact. This is a single case, however. On average, OC investors overreact, and rational investors get it right. The reason it worked out differently in this one case is there was more information in the signal than usual. Given the relative variances your best guess would have been that 1/3 of the signal (not 1/2) was information.

5*. Momentum is the anomaly that gives those subscribing to efficient markets the most trouble. Explain.

The Fama-French three-factor model has a role for size and value but not momentum. But other risk-based explanations for momentum have been proposed. For example, some research relates momentum to the business cycle and the state of the market, arguing that (non-diversifiable) macroeconomic instruments account for a large portion of momentum profits. If indeed these are risk proxies, then a proper adjustment for risk would seriously reduce the efficacy of trading on prior returns. Another recent rational justification for momentum argues that a simple time-varying CAPM with beta uncertainty can contribute to an explanation of momentum. When the market is doing well, investors, using Bayesian learning, will revise upwards the betas of stocks experiencing positive shocks, and revise downwards those of stocks that have negative shocks. So subsequent momentum "profit" can be largely risk that has not been accounted for.

6*. A series of Questions related to Factor Zoos:

(a) What is Factor Zoo?

The "Factor Zoo" is a term used in the context of asset pricing to describe the proliferation of factors that have been identified as potentially explaining asset returns. As research in this field has evolved, numerous factors have been proposed, tested, and debated, leading to a veritable "zoo" of factors.

(b) What is the development of academic research related to the "Factor Zoo"?

− Factor glut: Cochrane (2011, JF) and Harvey (2016, JF), in their Presidential addresses, have highlighted the issue of the "Zoo of factors" and the "Factor Glut".

− Around 300 factors have been proposed in the literature. − Harvey (2016, JF) asks: Are these myriad of factors really meaningful? Results of multiple hypothesis testing? Genuinely significant? P-hacked?

− Cochrane (2011, JF) asks: Are these factors independent sources of macro risk? Or, simply many correlated proxies for one or two underlying sources of macro (systemic) risk?

− Estimating models with spurious factors (i.e., weak correlation)?

− Are the three (respectively, five) factors of Fama and French (1993, JFE) (respectively, (2015, JFE)) the BEST possible three (five) factors (out of the extant "zoo of factors")?

− Barillas and Shanken (2018, JF) develop Bayesian tests and deduce the best six factors are market (Mkt), investment-to-assets (IA), return on equity (ROE), small-minus-big (SMB), high-minus-low market equity (HMLm), and up-minus-down momentum (UMD).

− Bryzgalova, Huang and Julliard (2023, JF) develop an estimation procedure designed to work even in the presence of "spurious factors". They conclude, after estimating more than two quadrillion regressions, that the best three factor model is {Mkt, SMB∗, HML∗}, where SMB∗ and HML∗ are variants of SMB and HML which hedge out unpriced risk (Daniel, Mota, Rottke, and Santos (2020, RFS)).

In Conclusion:

The landscape of asset pricing factors is complex, with hundreds of proposed factors. Leading researchers have raised concerns about the legitimacy of many of these factors, emphasizing the need for rigorous testing and validation. The quest for the best factors continues, with different studies proposing various combinations based on their methodologies and findings.

- **Part Two: CFA Question - How Behavioural Finance Influences Market Behaviour**

7. Anicée Ly is a portfolio manager for a bank and prepares for meetings with two new clients. Based on a completed risk tolerance questionnaire, Ly concludes that the first client, Rufus Olssen, is moderately risk averse with a mental accounting bias. Olssen desires capital growth with a small amount of income. Ly presents Olssen with the following two portfolios: Portfolio 1: 100% in a global balanced fund that is mean-variance optimized. Portfolio 2: 25% in CDs, 25% in a global bond index fund, 35% in a global equity index fund, and 15% in a high-risk, actively managed, micro-cap equity fund. Both portfolios provide the same level of income and expected return, and the portfolios have the same Sharpe ratio.

a) Determine, assuming Ly's biased conclusion is correct, which portfolio Olssen would most likely select. Justify your response.

Determine, assuming Ly's biased conclusion is correct, which portfolio Olssen would most likely select. (Circle one)	
Portfolio 1	***Portfolio 2***
Justify your response	

● Olssen would most likely select Portfolio 2.
● A mental accounting bias suggests that Olssen might consider his investments in layers.
● Portfolio 2 has the same income, expected return, and Sharpe ratio as Portfolio 1 and is structured in layers.

The results of the risk tolerance questionnaire suggest that Olssen exhibits a mental accounting bias. He likely compartmentalizes his portfolio into discrete layers of low-risk assets versus risky assets without regard to the correlations among the assets. Portfolio 2 is constructed in this way, with discrete layers for each objective, while Portfolio 1 is constructed to be mean variance optimized. As a result, Olssen would most likely select Portfolio 2, particularly because it has the same income, expected return, and Sharpe ratio as Portfolio 1.

The second client, Verochka Calderón, gives Ly a list of the four highest-performing funds in her defined contribution plan and asks Ly to recommend an allocation. After Calderón completes a risk tolerance questionnaire, Ly determines that Calderón likely exhibits framing and regret biases. Using the four funds, Ly suggests two allocations, presented in Exhibit

Exhibit 1

Suggested Defined Contribution Plan Allocations

	Allocation A	Allocation B
Fund 1	25%	50%
Fund 2	25%	30%
Fund 3	25%	10%
Fund 4	25%	10%
Sharpe Ratio	0.4	0.4

b) Determine, assuming Ly's determination of Calderón's biases is correct, which portfolio Calderón would most likely select. Justify your response.

Determine, assuming Ly's determination of Calderón's biases is correct, which portfolio Calderón would most likely select. (Circle one)

Allocation A	*Allocation B*

Justify your response

● Calderón would most likely select Allocation A.
● As a result of a framing bias, Calderón is likely to choose an allocation based on a 1/n naïve diversification strategy.
● As a result of a regret bias, Calderón is likely to choose a conditional 1/n strategy to minimize any potential future regret from one of her funds outperforming another.

Calderón would most likely select Allocation A. Ly believes that Calderón exhibits framing and regret biases. Framing bias may lead an investor such as Calderón to use a 1/n naïve diversification strategy, dividing contributions equally among available funds regardless of the underlying composition of the funds. Given Calderón's selection of the four highest-performing funds in her plan, Calderón can minimize any potential future regret if one fund outperformed another by using a conditional 1/n diversification strategy, investing equally in all four funds. The Sharpe ratios of the two portfolios are the same, so this ratio does not influence the decision to select one allocation over the other.