

# Financial Anomalies

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# Preface

The article is designed to study financial anomalies

# 1 Introduction

Fama and MacBeth (1973) show two-parameter regression model estimates average risk-return relationships based on efficient market portfolio ( $m$ ), that is, the market prices fully reflect the available information. The asset are constructed based on Equation ?? for an asset ( $i$ ) proposed by @Black (1972).

$$x_{im} \equiv \frac{\text{total market value of all units of assets } i}{\text{total market value of all assets}} \quad (1.1)$$

where asset( $i$ )in the portfolio( $m$ )

Excepted return of a security ( $i$ ) is  $E(\tilde{R}_0)$ , the expected return on a security that is riskless in the portfolio  $m$ , plus a risk premium that is  $\beta_i$  times the difference between expected return of the portfolio ( $E(\tilde{R}_m)$ ) and riskless portfolio ( $E(\tilde{R}_0)$ ). is calculated by Equation ??,  $\beta_i$  is the risk of the asset  $i$  of the portfolio  $m$ , measured relative to  $\sigma^2(\tilde{R}_m)$

$$E(\tilde{R}_i) = [E(\tilde{R}_m) - S_m \sum \tilde{R}_m] + S_m \sigma(\tilde{R}_m) \beta_i,$$

where,

$$\beta_i \equiv \frac{\text{cov}(\tilde{R}_i, \tilde{R}_m)}{\sigma^2(\tilde{R}_m)} = \frac{\sigma_{j=1}^N x_{jm} \sigma_{ij}}{\sigma^2(\tilde{R}_m)} = \frac{\text{cov}(\tilde{R}_i, \tilde{R}_m) / \sigma(\tilde{R}_m)}{\sigma(\tilde{R}_m)}$$

$$S_m = \frac{E(\tilde{R}_m) - E(\tilde{R}_0)}{\sigma(\tilde{R}_m)}$$

hence

$$E(\tilde{R}_i) = E(\tilde{R}_0) + [E(\tilde{R}_m) - E(\tilde{R}_0)] \beta_i \quad (1.2)$$

For each period of  $t$ , the cross sectional regression is given by

$$R_{pt} = \tilde{\gamma}_{0t} + \tilde{\gamma}_{1t} \tilde{\beta}_{p,t-1} + \tilde{\gamma}_{2t} \tilde{\beta}_{p,t-1}^2 + \tilde{\gamma}_{3t} \bar{s}_{p,t-1} \tilde{\epsilon}_i + \tilde{\eta}_{pt}, \quad (1.3)$$

$p = 1, 2, \dots, t$