Economics Letters 118 (2013) 351–354

Contents lists available at SciVerse ScienceDirect

Economics Letters

journal homepage: www.elsevier.com/locate/ecolet

Reconsidering psychic return in art investments

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ARTICLE INFO

Article history:
Received 24 August 2012
Received in revised form
7 November 2012
Accepted 11 November 2012
Available online 23 November 2012

JEL classification:
G11
Z11

Keywords:
Psychic return
Art investment
Portfolio theory

ABSTRACT

Measuring the psychic return of art investments is a debated issue in cultural economics. Several works suggest Jensen's alpha as a measure of the psychic return. Since Jensen's alpha is defined in the CAPM framework, its uncritical application as a measure of the psychic return may be problematic when the CAPM hypotheses do not hold. Applying an opportunity cost framework and the analytical tools of portfolio theory, we propose a new psychic return measure, which is not affected by the same issues as Jensen's alpha. Psychic return estimates based on our measure are provided for several art market indexes as an empirical application.

1. Introduction

Measuring the psychic return (r_P) – also known as the aesthetic dividend – is a debated issue in the cultural economics literature (Anderson, 1974; Baumol, 1986; Candela and Scorcu, 1997; Frey and Eichenberger, 1995; Throsby, 1994). The opportunity cost framework can be used to measure r_P.

Consider a portfolio of artworks (A) and a risky asset (F) chosen to match exactly the same systematic risk as A, measured by β_A. Let μ_M be the expected excess return of the market portfolio, M, over the free risk rate. According to the Capital Asset Pricing Model (CAPM), $\mu_A = \mu_F = \beta_A \mu_M$. If A provides, however, a supplementary bonus in aesthetic value to (a share of) investors, these investors would buy A reducing μ_A, so that $\mu_A < \mu_F = \beta_A \mu_M$. Jensen's alpha can be used to accommodate this difference. Formally, $\mu_A = \alpha + \beta_A \mu_M < \mu_F$, with $\alpha < 0$.

Within this framework, several empirical studies suggest to estimate $r_P = -\alpha$ in linear models (Chanel et al., 1994; Hodgson and Vorkink, 2004; Stein, 1977). Further studies used naïve measures for r_P. These naïve measures are implied by α after certain assumptions on the systematic risk of A are made. In particular, two naïve measures of r_P emerge.

i. Assuming that $\beta_A = 0$, then $r_P = -\alpha = -\mu_A$. In this case, r_P can be estimated by the negative of the average excess return of A over a free risk rate in a defined period of time (Baumol, 1986; Stein, 1977).
ii. Assuming that $\beta_A = 1$, then $r_P = -\alpha = -(\mu_A - \mu_M)$. In this case, r_P can be estimated by the negative of the average difference between the excess return of A and M, that is the difference between the return of A and M (Anderson, 1974; Stein, 1977).

Since α is defined in the CAPM framework, its uncritical application may be problematic when the CAPM hypotheses do not hold. These hypotheses are, however, unlikely to hold when considering art investments.

i. The CAPM framework assumes that idiosyncratic risk can be neglected, because it can be eliminated through diversification by choosing portfolio weights in order to minimize risk. Portfolio weights are free in principle to assume any real value. The choice of the share of wealth invested in A (ω_A) is, however, generally driven by "art passion" and not by the principle of risk minimization. For this reason, art investors choose $\omega_A > 0$. Thus, the idiosyncratic risk may not be completely diversified and cannot be neglected.
ii. Furthermore, the CAPM assumes that short-selling on each asset is allowed. This assumption generally holds for financial assets, but does not hold for A (also institutional investors cannot short-sell A). For this reason, even investors who are not driven by art passion choose $\omega_A \geq 0$.

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doi:10.1016/j.econlet.2012.11.010

iii. Finally, the definition of r_P itself implies $\alpha < 0$. Several empirical studies find, however, null (Chanel et al., 1994; Hodgson and Vorkink, 2004) or positive (Bryan, 1985) αs, implying null or negative r_Ps. Ownership costs (e.g., transaction, insurance, or maintenance costs) can be used to explain $\alpha \geq 0$ (Hodgson and Vorkink, 2004).

For all these reasons we believe that $-\alpha$ is an inadequate measure for r_P. In this paper, we propose a new measure for r_P.

2. A measure of psychic return

To measure the psychic return, we use an opportunity cost framework and the analytical tools of portfolio theory.

Consider a generic portfolio composed by N risky assets with weights $\boldsymbol{\omega} = [\omega_i]$, a risk free asset with weight ω_f, and A with weight ω_A. Without loss of generality, we can impose $\boldsymbol{\omega}'\boldsymbol{\iota} + \omega_f + \omega_A = 1$, where $\boldsymbol{\iota}$ is a vector of ones. The expected excess return of this portfolio can be expressed by $\mu = \boldsymbol{\omega}'\boldsymbol{\mu} + \omega_A\mu_A$, where $\boldsymbol{\mu} = [\mu_i]$ is the vector of expected excess returns of the N risky assets. The variance of this portfolio is given by $\sigma^2 = \boldsymbol{\omega}'\boldsymbol{\Sigma}\boldsymbol{\omega} + 2\omega_A\sigma_A^2\boldsymbol{\omega}'\boldsymbol{\sigma}_A$, where $\boldsymbol{\Sigma} = \lfloor\sigma_{ij}\rfloor$ represents the positive-definite $N \times N$ covariance matrix of the excess returns of the risky assets, and σ_A^2 and $\boldsymbol{\sigma}_A = [\sigma_{Ai}]$ are the variance of the excess return of A and the vector of covariances between the excess return of A and the excess returns of all the other N risky assets.

Suppose that an investor wants to hold a portfolio with $\omega_A = \bar{\omega}_A \geq 0$, and this *a priori* decision implies she is willing to accept an additional risk with respect to the null risk investment in order to satisfy her need of a psychic return. This art investor faces, then, the following problem

$$\begin{cases} \min_{\boldsymbol{\omega}} \dfrac{1}{2}\begin{bmatrix}\boldsymbol{\omega}' & \bar{\omega}_A\end{bmatrix}\begin{bmatrix}\boldsymbol{\Sigma} & \boldsymbol{\sigma}_A \\ \boldsymbol{\sigma}_A' & \sigma_A^2\end{bmatrix}\begin{bmatrix}\boldsymbol{\omega} \\ \bar{\omega}_A\end{bmatrix} \\ \begin{bmatrix}\boldsymbol{\omega}' & \bar{\omega}_A\end{bmatrix}\begin{bmatrix}\boldsymbol{\mu} \\ \mu_A\end{bmatrix} = 0. \end{cases} \tag{1}$$

Note that the constraint $\boldsymbol{\omega}'\boldsymbol{\mu} + \bar{\omega}_A\mu_A = 0$ – i.e., imposing the expected excess return equal to zero – implies an expected return equal to the risk free rate.

If we assume that the N assets are all the risky assets in the universe of investments, and that all investors have the same expectations about $\boldsymbol{\mu}$ and $\boldsymbol{\Sigma}$ (these are standard assumptions in portfolio theory), a solution of Problem 1 can be expressed in terms of μ_M (Elton et al., 2008; Pattitoni and Savioli, 2011). The market portfolio is the optimal portfolio of risky assets that all investors who cannot access A would select. The optimal solution of the problem is, therefore,

$$\begin{bmatrix}\boldsymbol{\omega}^* \\ \omega_f^*\end{bmatrix} = \begin{bmatrix}-\bar{\omega}_A\boldsymbol{\Sigma}^{-1}\left(\dfrac{\alpha}{S^2}\boldsymbol{\mu} + \boldsymbol{\sigma}_A\right) \\ 1 - \boldsymbol{\iota}'\boldsymbol{\omega}^* - \bar{\omega}_A\end{bmatrix} \tag{2}$$

where S is the Sharpe ratio, or the market price of risk. Note that both α and S depend on μ_M, as $\alpha = \mu_A - \beta\mu_M$ and $S = \frac{\mu_M}{\sigma_M}$.

Once defined the optimal portfolio weights, the variance of the portfolio can be defined as

$$\sigma^{*2} = \boldsymbol{\omega}^{*\prime}\boldsymbol{\Sigma}\boldsymbol{\omega}^* + 2\bar{\omega}_A\sigma_A^2\boldsymbol{\omega}^{*\prime}\boldsymbol{\sigma}_A = \bar{\omega}_A^2\left(I + \frac{\alpha^2}{S^2}\right) \tag{3}$$

where $I = \sigma_A^2 - \boldsymbol{\sigma}_A'\boldsymbol{\Sigma}^{-1}\boldsymbol{\sigma}_A > 0$ is the unhedgeable idiosyncratic component of A total risk.

An objective measure of psychic risk (σ_P) – i.e., the incremental risk an investor should face to get the same return as the risk free rate with a portfolio that includes a predetermined investment in A – can be defined as $\sigma_P = \sigma^* - \sigma_f = \sigma^*$, given that $\sigma_f = 0$ by definition.

Then, we can obtain the opportunity cost of the art investment, r_P, by multiplying σ_P by the market price of risk

$$r_P = S\sigma_P = \bar{\omega}_A\left(IS^2 + \alpha^2\right)^{\frac{1}{2}}. \tag{4}$$

If A has an idiosyncratic risk, then $r_P > 0$ and $\frac{dr_P}{d\bar{\omega}_A} > 0\ \forall\alpha$. Furthermore, to make comparisons among different portfolios of artworks, a weight-free measure of r_P can be expressed as

$$r_{PN} = \frac{dr_P}{d\bar{\omega}_A} = \frac{r_P}{\bar{\omega}_A} = \left(IS^2 + \alpha^2\right)^{\frac{1}{2}} \tag{5}$$

Table 1
Quarterly psychic return estimates for artistic period and techniques.

	Estimate (%)	C.I. 2.5% (%)	C.I. 97.5% (%)
Old Masters			
PR_1	0.64	−1.36	2.64
PR_2	1.37	−1.14	3.88
PR_3	0.74	−1.27	2.74
PR_4	1.76	0.47	4.03
19th Century			
PR_1	1.07	−0.12	2.26
PR_2	1.80	−0.13	3.72
PR_3	1.17	−0.01	2.35
PR_4	1.26	0.38	2.59
Modern			
PR_1	1.15	0.09	2.22
PR_2	1.88	−0.04	3.80
PR_3	1.22	0.16	2.28
PR_4	1.30	0.44	2.46
Post-War			
PR_1	1.40	−0.89	3.68
PR_2	1.40	−0.89	3.68
PR_3	0.75	−0.92	2.42
PR_4	1.01	0.26	3.13
Contemporary			
PR_1	0.66	−1.42	2.74
PR_2	1.38	−1.29	4.06
PR_3	0.69	−1.41	2.79
PR_4	1.10	0.31	3.73
Paintings			
PR_1	0.98	−0.11	2.06
PR_2	1.70	−0.18	3.58
PR_3	1.06	−0.01	2.14
PR_4	1.15	0.32	2.38
Sculptures			
PR_1	0.62	−0.39	1.63
PR_2	1.35	−0.36	3.05
PR_3	0.76	−0.19	1.72
PR_4	0.86	0.23	1.89
Drawings			
PR_1	0.21	−1.11	1.54
PR_2	0.94	−1.07	2.94
PR_3	0.31	−1.00	1.63
PR_4	0.62	0.19	2.21
Prints			
PR_1	1.30	0.12	2.47
PR_2	2.02	0.04	4.01
PR_3	1.36	0.19	2.54
PR_4	1.44	0.49	2.78
Photographs			
PR_1	0.09	−1.91	2.09
PR_2	0.82	−1.84	3.48
PR_3	0.10	−1.92	2.12
PR_4	0.83	0.27	3.31