Value Property Premium: Is It Riskier?

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ABSTRACT

A very few empirical studies based on aggregate market data have concluded the superiority of value property portfolios over growth property portfolios. We therefore revisit the value property premium anomaly by premising our analysis on Tokyo office property market data from 1997Q1 to 2007Q3. Two methods: a simple sorting procedure and a more formal procedure based on the conditional CAPM are used to examine the time-varying risk of value and growth property portfolios. This is followed by a stochastic dominance test to verify the relative performance and risk of value and growth property portfolios. The results of the parametric tests indicate that time-varying risk alone cannot explain all instances of the value premium. However, the results of nonparametric stochastic dominance test clearly show that the risk premium is not a compensation for risk. This implies that office property investors in the Tokyo market could substantially improve their portfolio performance by investing in value office properties.

Key words: Value property, growth property, performance, time-varying expected return, portfolio, superior.

Introduction

The choice of an investment strategy is an important step in the decision-making process of fund managers and large institutional investors (Baumann and Miller, 1997). In view of this, growth stock investment strategy and value stock investment strategy have received considerable attention in the finance literature. Traditionally, many investors have preferred the growth investment strategy (Jegadeesh and Titman, 1993), where they purchased stocks that have performed well in the past and sold stocks that have performed poorly, leading to superior returns. Their rationale follows fundamental efficient market hypothesis (Jagric et al, 2005) of which market prices of securities should fully reflect all available information and provide unbiased estimates of their underlying values. Traditionally, investors prefer the growth investment strategy

(Jegadeesh and Titman, 1993) on the belief that past winners will be future winners. This belief is buttressed in the fundamental efficient market hypothesis (Jagric et al, 2005) that market prices of securities fully reflect all available information to provide unbiased estimates of their underlying values. However, there is overwhelming evidence from the finance literature that value investing provides far superior returns to growth investing (see for example, Fama and French [1993, 1995, 1996, 1998], Capual *et al.* [1993], Lakonishok *et al.* [1994], Haugen [1995], Arshanapali *et al.* [1998], Levis and Liodakis [2001], Badrinath and Omesh [2001] and Chan and Lakonishok [2004]).

Another polemic issue in the debate is the rationale for the value superiority. Several explanations, including the risk-based theory, have been proffered to explain the value premium anomaly. The paper is motivated by the fact that acceptance of the risk-based hypothesis implies that the value strategy has nothing spectacular to offer investors while a rejection of it implies that investors stand to gain by adopting the value strategy. Thus, the objectives of the paper are twofold:

i) To ascertain the comparative advantage(s), in terms of performance, of value office property investing in Tokyo; and

ii) To ascertain whether the value premium anomaly, if any, is a compensation for risk.

In view of this, the next section provides a brief review of the finance literature on the rationale for value supremacy after which, a specific set of research hypotheses are formulated. This is followed by a discussion on data management and sourcing, and model specification. The next section is devoted to the empirical model estimation which is followed by interpretation and discussion of the results. The last section deals with concluding remarks.

Literature Review

Competing explanations for value superiority include risk premiums – traditional view – (Fama and French, 1993, 1995, 1996), systematic errors in investors' expectations and analysts' forecasts – i.e. naïve investor expectations of future growth and research design induced bias – behavioural finance paradigm – (see for example, La Porta *et al*., 1997; Bauman & Miller, 1997; La Porta, 1996; Dechow & Sloan, 1997; Lakonishok *et al*., 1994; Lo and MacKinlay, 1990; Kothari *et al*., 1995) and the existence of market frictions (Amihud and Mendelson, 1986). The traditional view, led by Fama and French (1993, 1995, 1996), is that the superior performance is a function of contrarian investment being relatively risky. This school of thought argues that the expected risk premium for value strategy is higher during bad times and lower during good times as value-firms are more prone to financial distress, and thus, strongly attributes value premium to time-varying risk factors (see also Chan, 1988; Ball and Kothari, 1989; Kothari and Shanken, 1992). However, Lakonishok *et al.* (1994), MacKinley (1995), La Porta *et al*. (1995, 1997), Daniel and Titman (1996) have found that risk-based explanations do not provide a credible rationale for the observed return behaviour (see Jaffe *et al.,* 1989; Chan *et al.,* 1991; Chopra *et al.,* 1992; Capaul *et al.,* 1993; Dreman and Lufkin, 1997; Bauman *et al.,* 1998, 2001; Nam *et al.,* 2001; Gomes *et al.,* 2003 and Chan and Lakonishok (2004)).

The studies which debunked the risk-based explanation have been controverted on methodological grounds. Petkova & Zhang (2005) reason that previous works have sorted the betas of stocks on the basis of realized market excess returns, which is a noisy measure of economic states of the world. They also express concern over the previous methods of classifying good and bad states as they feel that the positive correlation between ex post and ex ante market returns could have led to the classification of good states ex post as bad states ex ante and vice versa.

Similarly, Guo et al. (2005) have found a positive and significant risk-return tradeoff after controlling for covariance of the stock market return with the value premium. They argue that many financial variables used to forecast stock returns are based on the covariance of returns and risk factors in the first place. These results suggest that the value premium cannot be attributed to overreaction or data bias alone. Furthermore Petkova and Zhang (2005) use a more precise classification of economic states by regressing market excess returns of stocks against business cycle predictive variables such as the default premium, the term premium and the short-term Treasury bill rates. They find that the conditional betas of value stocks covary positively with the expected market risk premium, while that of growth stocks covary negatively. These findings concur with Guo et al. (2005) that value stocks carry higher time-varying risk.

Moreover, Lettau and Ludvigson (2001) and Zhang (2005) argue that value is riskier than growth particularly in bad times when the price of risk is higher. They also demonstrate that the expected value premium is higher at times when the value spread is wide. It must be noted, however, that the width of the value spread may not be necessarily syndromic of risk – it is simply value minus growth. Black and Fraser (2004) also find a negative correlation between the value premium and real GDP in the US to conclude that the value premium is a reward for risk during financial distress. Zhang (2005) reasons that since value firms have less flexibility to cut capital during bad times, they tend to be riskier than growth firms. This leads to lower expectation of firms' continuation values in relation to the price of risk. Furthermore, Petkova and Zhang (2005) find that the positive beta-premium sensitivity of value firms were more significant during depression periods (see also Lettau and Wachter, 2007; Gomes et al., 2003; Dechow et al., 2004).

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Once again, this negative correlation and positive beta-premium sensitivity of value firms may be a function of the asymmetric effect of positive and negative earnings surprises on value and growth stocks (Bauman and Miller, 1997; Dreman and Berry, 1995; and Levis and Liodakis, 2001). Negative surprises have been found to have a relatively benign effect on value stocks. This implies that while growth stocks may perform far better than value stocks in good times to narrow the value spread, they perform considerably worse than value stocks in bad times to increase the value spread – value stocks are relatively more resistant to bad news than growth stocks. Thus, negative correlation to GDP and positive value beta- premium sensitivity may not be conclusively probative of the value premium anomaly being a compensation for higher time varying risk.

In relation to investment in real estate, Addae-Dapaah et al. (2005, 2007) argue that the superior performance of value properties could be explained by the extrapolation model, where forecasts tied to past growth rates were found to be too optimistic for growth properties relative to value properties. Thus, contrarian investors enjoyed earnings surprises by the post formation portfolio results – This concurs with most studies in the finance literature (see for example, De Bondt and Thaler, 1985; Lakonishok et al., 1994). Therefore, Addae-Dapaah et al. (2007) proposed that the naive extrapolation of past performance is a credible explanation for the superiority of the contrarian strategy. Therefore, it is hypothesized that:

a) value office properties generate higher returns than growth office properties;
b) value office property is a compensation for risk.

These hypotheses will be operationalized through statistical tests stochastic dominance test.

Data Sourcing and Management

The paper uses quarterly office capital and rental value data from the CEIC database and the Ikoma CB Richard Ellis database in Japan. The data, which relate to 70 districts in Tokyo, are from the first quarter of 1997 to the third quarter of 2007. The data for Tokyo are used for the study as they are the nearest to property-specific data that we could get if the valuation principles of conformity and balance are valid. The data are used to classify the office property sub-markets in Tokyo into value/growth sub-markets on the bases of yields, i.e. E/P ratio.

Decile portfolios are formed on the basis of the end-of-previous-quarter's initial yield. The top decile of the sample with the highest initial yield is classified as value office property (V_p) portfolio while the bottom decile with the lowest initial yield is classified as growth industrial property (G_p). Each decile is treated as a portfolio composed of equally weighted properties. The portfolios are reformulated only at the end of each holding period. This system of classification is consistent with the finance literature (see for example, Chan *et al.* [1991] and Bauman *et al.* [1998, 2001]).

The classification of the office property sub-markets into V_p and G_p portfolios is followed by an examination of the relative performances of the portfolios and time varying risk analysis of the value premium.

The Contrarian Strategy Model

The performances of both the value and growth office properties are compared on a quarterly 5-year, 7-year, and 10 -yearly holding-period horizons. Periodic (i.e. quarter-by-quarter) return measure is used in the evaluation of the relative superiority of the performance of V_p and G_p portfolios. The periodic returns are quantified as simple holding period returns in most of studies. Thus, the simple holding period returns are calculated for each quarter and compounded to obtain the multi-year holding-period (e.g. 5-year investment horizon) returns as defined in equation (1).

$$r_t = [(1+r_1)(1+r_2)...(1+r_m)] - 1 \quad \text{(Levy, 1999),} \qquad (1)$$

where

$r_1, r_2 ... r_m$ = return for each quarter of the period *m.*

m = number of quarters for the holding period.

Compared to simply adding the returns for all quarters of a given period, equation (1) is more accurate (Sharpe *et al.,* 1998). However, Campbell et al. (1997) argue that this method of approximation may break down if the volatility of returns is critical. Simple compounding returns may therefore exaggerate the performance of asset returns. Hence, they propose an additive time-series process to model the behavior of asset returns over time.

$$r_t(k) = \log(1+R_t) + \log(1+R_{t-1}) + ... + \log(1+R_{t-k+1}) \quad \text{(Campbell et al., 1997)} \quad (2)$$

where,

R_t , R_{t-1} … R_{t-k+1} refers to the quarterly returns for each period

Therefore, the holding period returns for the properties over 5-year, 7-year and 10-year holding periods are calculated using the above method. For each period, the difference of the average returns for the value portfolio and the growth portfolio is taken to determine each period's value-growth spread. A positive value-growth spread is an indicator of the superiority of value investing and this shall be observed over different periods for different investment horizons.

The pooled-variance t test and separate-variance t test are then used to determine whether there is a significant difference between the means of the V_p and G_p portfolios. If the p-value is smaller than the conventional levels of significance (i.e. 0.05 and 0.10), the null hypothesis that the two means are equal will be rejected:

$$H_0 : \mu_{value} = \mu_{growth}$$

$$H_1 : \mu_{value} \neq \mu_{growth}$$

The next step is to determine whether any difference in returns is a function of risk.

Correlation of Value Premium against Real GDP

Black and Fraser (2004) observed a negative correlation between the value premium and real GDP in the US. Hence, a least squares regression of the value premiums at quarterly, 5-year and 7-year investment horizons will be performed against Japan's corresponding past change in the log of the real GDP growth. The regression will be expressed in an equation as follows.

$$X_{t+1} - X_t = \alpha + \gamma(Y_{t-1} - Y_{t-n}) + \omega_{t+1} \qquad \text{(Black \& Fraser, 2004)} \qquad (2)$$

where,

$X_{t+1} - X_t$ refers to the value premium

Y refers to the log of real GDP

A negative correlation between the value premium and GDP growth will provide preliminary evidence that the value premium is a reward for greater risk during periods of financial distress.

Expected Market Risk Premium Model

Petkova and Zhang (2005) used the correlation of portfolio betas with the expected market risk premium to find evidence supporting time-varying risk as a possible explanation for the value premium. Adopting the concept behind this model, the correlation between the market excess returns as well as the conditional betas of the value and growth portfolios for the Tokyo office market are observed. The expected market risk premium represents the extent of risk exposure of the portfolios in each time period. This shall be estimated via a least squares regression of market returns and the observed value-growth spreads for different holding periods as follows:

$$RM_{t+1} = \alpha_i + \hat{\gamma}_{it}(VGS_t) + \omega_{it} \tag{3}$$

where,

RM_{t+1} refers to the total market return from period t to t+1

$\hat{\gamma}_{it}$ refers to the estimated market risk premium

VGS_t refers to the value-growth spread for holding period t

Hence, $\hat{\gamma}_{it}$ shall be used as an estimation of the risks attached to achieving the value-premium in each time period. This model then uses this market risk premium as the basis of classification of the observation periods into four economic states. The rationale for this classification is that periods which have greater market risks attached to achieving the value-premium should be considered as a more volatile economic state.

Therefore, the periods with the highest quartile of the market risk premium are sorted as the worst state (trough), with the second highest quartile being the next worst (recession), the third highest quartile being the next best (expansion) and the lowest quartile being the best state (peak).

Thereafter, two conditional betas, the rolling and fitted betas of the value-growth portfolios are calculated for the full sample as well as for each of the economic states to observe their correlation with the expected market risk premium. This methodology will be repeated for the quarterly, 5-year and 7-year holding period portfolios.

The rolling beta is calculated by performing least square regressions of the value-growth premium on the market excess returns using a 20-period moving-average rolling window. The market excess returns are calculated as the premium for the market return over a comparable risk-free investment held for the same period. Given the absence of a short-term treasury-bill in Japan, the next safest investment would be their annual fixed deposits. Hence, the market excess returns shall be a premium of the market return over the 1-year Japanese deposit rate given by the Bank of Japan.

$$mVG_t = \alpha_{ii} + b_1(mRM_{t+1} - mTB_t) + \omega_{iit} \quad (4)$$

where,

mVG_t	refers to the moving average value-growth spread
mRM_{t+1}	refers to the moving average market return from period *t* to *t*+1
mTB_t	refers to the moving average 1-year Japanese deposit rate
b_1	refers to the estimated rolling-beta

The fitted-beta is calculated from performing least square regressions of the market excess returns with various economic and real estate conditioning variables such as rental yields, the value-growth spread, the term-spread between Japan's 10-year bond yield and the 1-year Japanese deposit rate, as well as the 1-year Japanese deposit rate, using a similar rolling window.

$$mRME_t = \alpha_{iii} + b_{i1}mRR_t + b_{i2}mVG_t + b_{i3}mTM_t + b_{i4}mTB_t + \omega_{iiit} \quad (5)$$

where,

$mRME_t$ refers to the moving average market excess returns

mRR_t refers to the moving average mean rental yields

mVG_t refers to the moving average value-growth spread

mTM_t refers to the moving average term-spread

mTB_t refers to the moving average 1-year Japanese deposit rate

The fitted beta will hence be termed β_{it}, which is the sum of the coefficients from b_{i1} to b_{i4}, as expressed in the following equation.

$$\beta_{it} = b_{i0} + b_{i1} mRR_t + b_{i2} mVG_t + b_{i3} mTM_t + b_{i4} mTB_t \qquad (6)$$

The rolling and fitted betas for the value-growth portfolios will be calculated for the different economic states to observe whether they vary across good and bad times. If the conditional betas are higher during bad economic times as compared to the good economic times, then this would substantiate that the portfolio betas covary positively to market risk. Thus, this would provide evidence that time-varying risk could be the explanation for the value-premium.

To better support these observations, the beta-premium sensitivities of the conditional betas and the expected market risk premium is also measured by the generalized method of moments (GMM). The economic and real estate variables [RR_t, VG_t, TM_t, TB_t] as well as a constant term shall be the vector of instrumental variables for the estimation equation below.

$$mRME_t = \alpha_{iv} + \varphi(mRM_{t+1} - mTB_t) + \omega_{ivt} \qquad (7)$$

where,

φ refers to the beta-premium sensitivity

If the value strategy exposes investors to greater risk, the overall beta-premium sensitivity will be positive to reflect greater sensitivity on the value portfolios as compared to the growth portfolios. All these tests will go towards supporting the final hypothesis, that the value-premium is a compensation for time-varying risk.

Stochastic Dominance

The most widely known and applied efficiency criterion for evaluating investments is the mean-variance model. An alternative approach is the stochastic dominance (*SD*) analysis, which has been employed in various areas of economics, finance and statistics (Levy, 1992; Al-khazali, 2002; Kjetsaa and Kieff, 2003). The efficacy and applicability of *SD* analysis, and its relative advantages over the mean-variance approach have been discussed and proven by several researchers including Hanoch and Levy (1969), Hadar and Russell (1969), Rothschild and Stiglitz (1970), Whitmore, 1970, Levy (1992), Al-khazali (2002) and Barrett and Donald (2003). According to Taylor and Yodder (1999), *SD* is a theoretically unimpeachable general model of portfolio choice that maximizes expected utility. It uses the entire probability density function rather than simply summarizing a distribution's features as given by its statistical moments.

Stochastic Dominance Criteria

The SD rules are normally specified as first, second, and third degree *SD* criteria denoted by *FSD*, *SSD*, and *TSD* respectively (see Levy, 1992; Barrett and Donald, 2003; Barucci, 2003). There is also the nth degree *SD*. Given that *F* and *G* are the cumulative distribution functions of two mutually exclusive risky options *X* and *Y*, *F* dominates *G* (*FDG*) by *FSD*, *SSD*, and *TSD*, denoted by FD_1G, FD_2G, and FD_3G, respectively, if and only if,

$$F(X) \leq G(X) \quad \text{for all } X \text{ (FSD)} \qquad (2)$$

$$\int_{-\infty}^{x} [G(t) - F(t)]dt \geq 0 \quad \text{for all } X \text{ (SSD)} \qquad (3)$$

$$\int_{-\infty}^{x} \int_{-\infty}^{\upsilon} [G(t) - F(t)]dtd\upsilon \geq 0 \quad \text{for all } X \text{, and}$$

$$E_F(X) \geq E_G(X)(TSD) \quad (4)$$

The *FSD* (also referred to as the General Efficiency Criterion – Levy and Sarnat, 1972) assumes that all investors prefer more wealth to less regardless of their attitude towards risk. The *SSD* is based on the economic notion that investors are risk averse while the TSD posits that investors exhibit decreasing absolute risk aversion (Kjetsaa and Kieff, 2003). A higher degree *SD* is required only if the preceding lower degree *SD* does not conclusively resolve the optimal choice problem. Thus, if FD_1G, then for all values of x, $F(x) \leq G(x)$ or $G(x) - F(x) \geq 0$. Since the expression cannot be negative, it follows that for all values of x, the following must also hold:

$\int_{-\infty}^{x}[G(t)-F(t)]dt \geq 0$; that is, FD_2G (Levy and Sarnat, 1972; Levy, 1998)

Furthermore, the *SD* rules and the relevant class of preferences U_i are related in the following way:

FSD: $F(X) \leq G(X) \forall X \Longleftrightarrow E_F U(X) \geq E_G U(X) \qquad \forall u \in U_1,$ (5)

SSD: $\int_{-\infty}^{x} F(t)dt \geq \int_{-\infty}^{x} G(t)dt \, \forall X \Longleftrightarrow E_F U(X) \geq E_G U(X) \qquad \forall u \in U_2,$ (6)

TSD: $\int_{-\infty}^{x}\int_{-\infty}^{\upsilon} F(t)dtd\upsilon \geq \int_{-\infty}^{x}\int_{-\infty}^{x} G(t)dtd\upsilon \, \forall X \Longleftrightarrow E_F U(X) \geq E_G U(X)$

$\forall u \in U_3$, and

$E_F(X) \geq E_G(X),$ (7)

where U_i = utility function class (i =1, 2, 3)

U_1 includes all u with $u' \geq 0$;

U_2 includes all u with $u' \geq 0$ and $u'' \leq 0$; and

U_3 includes all u with $u' \geq 0$, $u'' \leq 0$ and $u''' \geq 0$.

In other words, a lower degree *SD* is embedded in a higher degree *SD*. The economic interpretation of the above rules for the family of all concave utility functions is that their fulfilment implies that $E_F U(x) > E_G U(x)$ and $E_F(x) > E_G(x)$; i.e. the expected utility and return of the preferred option must be greater than the expected utility and return of the dominated option.

Performance of Value and Growth Properties

Exhibits 1a to 1d clearly demonstrate the superiority of the value strategy in each of the holding periods under consideration. The value office property portfolio recorded 100% positive value spread for all the investment formation horizons (Exhibits 1-4). In other words, the value office property portfolio outperformed its growth counterpart in every holding period. The mean value/growth office portfolio returns for the quarterly, 5, 7 and 10 years holding periods are 8.18%/4.07%, 89.53%/53.49%, 121.44%/75.66% and 136.78/71.99% respectively. This implies that an investor who adopted the value strategy over the more than 10-year holding period would have earned, on average, 64.79% more on each dollar invested than the one who invested in growth office properties over the same period.

Exhibits 1a-1d

It is worth noting that the differences between the mean returns for both portfolios (i.e. the value premium) are statistically significant at all the conventional levels (Exhibits 2a-2d).

Exhibit 2a -2d

Value Premium and Real GDP Growth

The results of the regression model (equation 3) are presented in Exhibit 3. There exists a statistically significant negative correlation between the value premium and real GDP for every holding period. This means that the value premium is higher in periods of low real GDP growth than in periods of high real GDP growth. According to extant wisdom, this means that the value premium is a function of time varying risk. This means that value property investment in Tokyo is riskier than its growth counterpart as a relatively high value premium is associated with periods of economic distress. We offer an alternative interpretation to the contrary that higher value premium in times of economic hardship may presage a safer investment – value office investments are more resistant to adverse economic circumstances than growth office investments.

Exhibit 3

Conditional Betas and Beta Premium Sensitivity

The figures in Exhibits 4a-4c clearly show that the value spread was positive for all the economic states, This generally implies that that value office investing in Tokyo is not fundamentally riskier than its growth counterpart in any economic state. Furthermore, the value spread is supposed to be higher in bad economic states than in good economic states. The figures controvert the time-varying risk hypothesis as the value spreads are relatively higher in the peak and expansion states than in the recession and trough states of the economy.

Exhibits 4a-4c

Similarly, both rolling and fitted conditional betas (Exhibits 5a-7b) do not appear to support the time-varying risk based explanation as they do not display a countercyclical pattern of risk – The signs for the rolling and fitted betas are supposed to be negative/positive for the good and bad states of the economy respectively. The sign for rolling betas for the quarterly holding period is positive for all "states" while three of the fitted betas, including state "trough" which is supposed to have a positive sign, have negative signs. Moreover, the signs for the rolling betas for the 5-year holding period are reversed while the fitted betas are negative for all "states" (Exhibit 6). Although the rolling and fitted betas are positive for the state "trough", the signs are negative for the remaining "states". Furthermore, notwithstanding the positive V-G beta premium sensitivities for all the holding periods, they contradict the null hypothesis that value portfolios have positive, but growth portfolios have negative beta-premium sensitivities. Thus, the results are somewhat troublesome for the time-varying risk based explanation of the value premium (Petkova and Zhang, 2005). There is no clear evidence from the results to support the time-varying risk hypothesis.

It must be noted, however, that the results are specific to conditional CAPM and do not apply to a general property of efficient markets (Petkova and Zhang, 2005) as the assumptions of the conditional CAPM are restrictive – e.g. investors with quadratic utility but no labour income and exponential utility with normally distributed returns (see

Cochrane, 2001). These restrictive assumptions do not particularly apply to direct real property investment. A nonparametric tests is more appropriate to real property.

Exhibits 5a-7b

Stochastic Dominance Test

It is evident from Exhibits 6a-6d that the cumulative probabilities for the value portfolios are consistently lower than those of their growth counterparts across all investment horizons. This implies that value office investing stochastically dominates growth investing in the first degree for all the holding periods. This means that the value strategy stochastically dominates the growth strategy in the second and third order as well. Thus, notwithstanding the sensitivity of the value premium to periods of economic downturn as suggested by the beta-premium sensitivities, the consistently higher utility derived from any given return makes contrarian investing a far more preferred choice for any investor, regardless of their level of risk adversity. This supports our alternative interpretation of the value-premium being a function of the resilience of value investing.

Conclusion

The paper set out to verify the time-varying risk hypothesis for the value premium in the context of office property investment in Tokyo, Japan. Although the beta-premium sensitivities seem to imply that the value premium is sensitive to economic downturn, there was not enough evidence from the conditional CAPM tests to support the hypothesis. The overall results generally indicate that time-varying risk may not be a credible explanation for the value premium anomaly. It is suggested that a relatively higher value spread during economic downturn could be attributable to the resilience of value investment rather than to time-varying risk. This is supported by stochastic dominance tests which show that value office investing is safer than growth office in Tokyo. Thus, office property investors in Tokyo could improve their portfolio performance at a lower risk by switching from growth to value office property investment.

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Exhibit 1a: Performance of Value and Growth Portfolios (Average Quarterly Returns)

Time Period	Value Portfolio	Growth Portfolio	Value Premium
1997Q1 - 2007Q3	7.89%	4.42%	3.47%
1997Q2 - 2007Q3	8.37%	4.51%	3.86%
1997Q3 - 2007Q3	9.17%	4.28%	4.90%
1997Q4 - 2007Q3	11.81%	4.43%	7.39%
1998Q1 - 2007Q3	8.81%	4.50%	4.31%
1998Q2 - 2007Q3	9.31%	4.37%	4.95%
1998Q3 - 2007Q3	8.08%	4.95%	3.13%
1998Q4 - 2007Q3	7.90%	4.46%	3.44%
1999Q1 - 2007Q3	8.39%	4.39%	3.99%
1999Q2 - 2007Q3	7.97%	4.50%	3.48%
1999Q3 - 2007Q3	7.95%	4.54%	3.41%
1999Q4 - 2007Q3	7.95%	4.27%	3.68%
2000Q1 - 2007Q3	7.83%	4.28%	3.56%
2000Q2 - 2007Q3	7.52%	4.13%	3.39%
2000Q3 - 2007Q3	7.55%	3.98%	3.57%
2000Q4 - 2007Q3	8.03%	3.87%	4.16%
2001Q1 - 2007Q3	7.67%	3.61%	4.06%
2001Q2 - 2007Q3	7.74%	3.64%	4.10%
2001Q3 - 2007Q3	8.00%	3.54%	4.46%
2001Q4 - 2007Q3	8.44%	3.60%	4.84%
2002Q1 - 2007Q3	8.04%	3.52%	4.52%
2002Q2 - 2007Q3	7.68%	3.21%	4.47%
2002Q3 - 2007Q3	7.23%	3.25%	3.97%
2002Q4 - 2007Q3	7.05%	3.37%	3.68%
Mean	**8.18%**	**4.07%**	**4.12%**
Variance	**0.01%**	**0.01%**	**0.01%**

Exhibit 1b: Performance of Value and Growth Portfolios (Average 5-Year Returns)

Time Period	Value Portfolio	Growth Portfolio	Value Premium
1997Q1 - 2002Q1	77.53%	42.04%	35.49%
1997Q2 - 2002Q2	83.44%	45.00%	38.45%
1997Q3 - 2002Q3	84.23%	40.52%	43.71%
1997Q4 - 2002Q4	103.21%	47.88%	55.33%
1998Q1 - 2003Q1	85.80%	44.38%	41.43%
1998Q2 - 2003Q2	81.53%	49.44%	32.09%
1998Q3 - 2003Q3	84.17%	54.24%	29.93%
1998Q4 - 2003Q4	84.74%	54.02%	30.72%
1999Q1 - 2004Q1	85.70%	53.92%	31.78%
1999Q2 - 2004Q2	84.64%	54.94%	29.70%
1999Q3 - 2004Q3	86.42%	53.41%	33.01%
1999Q4 - 2004Q4	85.86%	54.41%	31.46%
2000Q1 - 2005Q1	86.53%	55.52%	31.01%
2000Q2 - 2005Q2	85.49%	57.22%	28.26%
2000Q3 - 2005Q3	86.95%	54.83%	32.12%
2000Q4 - 2005Q4	92.49%	54.27%	38.22%
2001Q1 - 2006Q1	92.70%	57.51%	35.19%
2001Q2 - 2006Q2	94.81%	55.66%	39.15%
2001Q3 - 2006Q3	96.78%	58.41%	38.37%
2001Q4 - 2006Q4	102.76%	60.80%	41.96%
2002Q1 - 2007Q1	100.95%	62.93%	38.03%
2002Q2 - 2007Q2	103.03%	65.40%	37.63%
Mean	**89.53%**	**53.49%**	**36.05%**
Variance	**0.57%**	**0.41%**	**0.38%**

Exhibit 1c: Performance of Value and Growth Portfolios (Average 7-Year Returns)

Time Period	Value Portfolio	Growth Portfolio	Value Premium
1997Q1 - 2004Q1	110.40%	68.14%	42.26%
1997Q2 - 2004Q2	116.43%	69.87%	46.57%
1997Q3 - 2004Q3	116.53%	66.12%	50.41%
1997Q4 - 2004Q4	144.02%	68.08%	75.94%
1998Q1 - 2005Q1	117.77%	69.35%	48.42%
1998Q2 - 2005Q2	116.77%	72.36%	44.40%
1998Q3 - 2005Q3	114.88%	78.60%	36.28%
1998Q4 - 2005Q4	118.06%	75.09%	42.96%
1999Q1 - 2006Q1	122.01%	78.28%	43.73%
1999Q2 - 2006Q2	122.52%	77.91%	44.61%
1999Q3 - 2006Q3	124.73%	85.79%	38.94%
1999Q4 - 2006Q4	123.50%	81.11%	42.40%
2000Q1 - 2007Q1	125.11%	83.42%	41.69%
2000Q2 - 2007Q2	127.43%	85.13%	42.29%
Mean	**121.44%**	**75.66%**	**45.78%**
Variance	**0.64%**	**0.46%**	**0.88%**

Exhibit 1d: Performance of Value and Growth Portfolios (Average 10-Year Returns)

Time Period	Value Portfolio	Growth Portfolio	Value Premium
1997Q1 - 2007Q1	162.26%	104.52%	57.74%
1997Q2 - 2007Q2	172.21%	110.03%	62.18%
1997Q3 - 2007Q3	75.86%	1.43%	74.44%
Mean	**136.78%**	**71.99%**	**64.79%**
Variance	**28.07%**	**37.42%**	**0.75%**

Exhibit 2a: Pooled Variance t-test for Statistical Significance (Quarterly)

Time Period	Pooled Variance	t-stats	p-value	α = 0.05	α = 0.10
1997Q1 - 2007Q3	0.00007	7.09	0.0013	Significant	Significant
1997Q2 - 2007Q3	0.00004	10.65	0.0001	Significant	Significant
1997Q3 - 2007Q3	0.00004	9.82	0.0002	Significant	Significant
1997Q4 - 2007Q3	0.00098	3.48	0.0181	Significant	Significant
1998Q1 - 2007Q3	0.00006	8.88	0.0005	Significant	Significant
1998Q2 - 2007Q3	0.00007	6.93	0.0001	Significant	Significant
1998Q3 - 2007Q3	0.00015	4.84	0.0016	Significant	Significant
1998Q4 - 2007Q3	0.00006	8.08	0.0003	Significant	Significant
1999Q1 - 2007Q3	0.00007	9.02	0.0000	Significant	Significant
1999Q2 - 2007Q3	0.00004	9.81	0.0001	Significant	Significant
1999Q3 - 2007Q3	0.00010	6.25	0.0009	Significant	Significant
1999Q4 - 2007Q3	0.00004	10.64	0.0000	Significant	Significant
2000Q1 - 2007Q3	0.00005	9.79	0.0003	Significant	Significant
2000Q2 - 2007Q3	0.00006	8.29	0.0003	Significant	Significant
2000Q3 - 2007Q3	0.00004	10.04	0.0001	Significant	Significant
2000Q4 - 2007Q3	0.00005	11.25	0.0001	Significant	Significant
2001Q1 - 2007Q3	0.00006	9.62	0.0000	Significant	Significant
2001Q2 - 2007Q3	0.00008	8.81	0.0005	Significant	Significant
2001Q3 - 2007Q3	0.00009	8.92	0.0005	Significant	Significant
2001Q4 - 2007Q3	0.00007	10.86	0.0000	Significant	Significant
2002Q1 - 2007Q3	0.00009	9.14	0.0000	Significant	Significant
2002Q2 - 2007Q3	0.00006	10.40	0.0003	Significant	Significant
2002Q3 - 2007Q3	0.00012	6.76	0.0006	Significant	Significant
2002Q4 - 2007Q3	0.00009	7.21	0.0003	Significant	Significant

Exhibit2b: Pooled Variance t-test for Statistical Significance (5-Year)

Time Period	Pooled Variance	t-stats	p-value	α = 0.05	α = 0.10
1997Q1 - 2002Q1	0.02170	4.17	0.0019	Significant	Significant
1997Q2 - 2002Q2	0.00887	7.07	0.0000	Significant	Significant
1997Q3 - 2002Q3	0.00652	9.37	0.0001	Significant	Significant
1997Q4 - 2002Q4	0.47151	1.40	0.0136	Significant	Significant
1998Q1 - 2003Q1	0.01238	6.45	0.0003	Significant	Significant
1998Q2 - 2003Q2	0.03502	2.97	0.0005	Significant	Significant
1998Q3 - 2003Q3	0.02669	3.43	0.0002	Significant	Significant
1998Q4 - 2003Q4	0.02592	3.57	0.0001	Significant	Significant
1999Q1 - 2004Q1	0.00409	9.30	0.0000	Significant	Significant
1999Q2 - 2004Q2	0.01833	4.10	0.0000	Significant	Significant
1999Q3 - 2004Q3	0.01368	5.28	0.0002	Significant	Significant
1999Q4 - 2004Q4	0.01211	5.35	0.0001	Significant	Significant
2000Q1 - 2005Q1	0.01496	4.74	0.0000	Significant	Significant
2000Q2 - 2005Q2	0.03813	2.71	0.0011	Significant	Significant
2000Q3 - 2005Q3	0.02121	4.13	0.0004	Significant	Significant
2000Q4 - 2005Q4	0.03450	3.85	0.0001	Significant	Significant
2001Q1 - 2006Q1	0.01071	6.36	0.0000	Significant	Significant
2001Q2 - 2006Q2	0.03942	3.69	0.0004	Significant	Significant
2001Q3 - 2006Q3	0.02789	4.30	0.0002	Significant	Significant
2001Q4 - 2006Q4	0.04387	3.75	0.0000	Significant	Significant
2002Q1 - 2007Q1	0.02517	4.48	0.0000	Significant	Significant
2002Q2 - 2007Q2	0.03429	3.80	0.0002	Significant	Significant

Exhibit 2c: Pooled Variance t-test for Statistical Significance (7-Year)

Time Period	Pooled Variance	t-stats	p-value	α = 0.05	α = 0.10
1997Q1 - 2004Q1	0.00458	10.82	0.0001	Significant	Significant
1997Q2 - 2004Q2	0.00607	10.35	0.0001	Significant	Significant
1997Q3 - 2004Q3	0.00845	9.50	0.0001	Significant	Significant
1997Q4 - 2004Q4	0.09995	4.16	0.0134	Significant	Significant
1998Q1 - 2005Q1	0.00687	10.11	0.0001	Significant	Significant
1998Q2 - 2005Q2	0.01214	6.98	0.0006	Significant	Significant
1998Q3 - 2005Q3	0.01977	4.83	0.0006	Significant	Significant
1998Q4 - 2005Q4	0.01409	6.77	0.0003	Significant	Significant
1999Q1 - 2006Q1	0.01542	6.59	0.0002	Significant	Significant
1999Q2 - 2006Q2	0.01415	7.02	0.0002	Significant	Significant
1999Q3 - 2006Q3	0.02266	4.84	0.0007	Significant	Significant
1999Q4 - 2006Q4	0.01509	6.46	0.0001	Significant	Significant
2000Q1 - 2007Q1	0.01294	6.86	0.0000	Significant	Significant
2000Q2 - 2007Q2	0.01784	5.92	0.0002	Significant	Significant

Exhibit 2d: Pooled Variance t-test for Statistical Significance (10-Year)

Time Period	Pooled Variance	t-stats	p-value	α = 0.05	α = 0.10
1997Q1 - 2007Q1	0.02006	7.06	0.0012	Significant	Significant
1997Q2 - 2007Q2	0.01116	10.20	0.0001	Significant	Significant
1997Q3 - 2007Q3	0.01642	10.06	0.0001	Significant	Significant

Exhibit 3: Regression of Value Premium on Past GDP Growth (*t-stat*)

Holding Period	α	γ	Std. Error	$\overline{R}^2$	DW
Quarterly	0.0414 (14.9546)	-0.1501 (-2.1944)	0.0078	0.2109	1.9111
5-Yearly	0.4441 (7.7111)	-2.5310 (-1.8181)	0.0474	0.4384	1.5948
7-Yearly	0.7162 (7.7246)	-6.1703 (-2.9898)	0.0693	0.4903	1.9474

Exhibit 4a: Classification of Economic States (Quarterly Holding Period)

Economic State	Investment Period	Value-Growth Spread
Peak	1997Q1 - 2007Q3	3.47%
Peak	1997Q2 - 2007Q3	3.86%
Peak	1997Q3 - 2007Q3	4.90%
Peak	1997Q4 - 2007Q3	7.39%
Peak	1998Q1 - 2007Q3	4.31%
Peak	2001Q3 - 2007Q3	4.46%
Expansion	1998Q2 - 2007Q3	4.95%
Expansion	1998Q3 - 2007Q3	3.13%
Expansion	2000Q4 - 2007Q3	4.16%
Expansion	2001Q2 - 2007Q3	4.10%
Expansion	2001Q4 - 2007Q3	4.84%
Expansion	2002Q2 - 2007Q3	4.47%
Recession	1998Q4 - 2007Q3	3.44%
Recession	1999Q2 - 2007Q3	3.48%
Recession	1999Q3 - 2007Q3	3.41%
Recession	2000Q2 - 2007Q3	3.39%
Recession	2000Q3 - 2007Q3	3.57%
Recession	2001Q1 - 2007Q3	4.06%
Trough	1999Q1 - 2007Q3	3.99%
Trough	1999Q4 - 2007Q3	3.68%
Trough	2000Q1 - 2007Q3	3.56%
Trough	2002Q1 - 2007Q3	4.52%
Trough	2002Q3 - 2007Q3	3.97%

Trough	2002Q4 - 2007Q3	3.68%

Exhibit 4b: Classification of Economic States (5-Yearly Holding Period)

Economic State	Investment Period	Value-Growth Spread
Peak	1997Q1 - 2002Q1	35.49%
Peak	1997Q2 - 2002Q2	38.45%
Peak	1997Q3 - 2002Q3	43.71%
Peak	1997Q4 - 2002Q4	55.33%
Peak	1998Q1 - 2003Q1	41.43%
Peak	2001Q3 - 2006Q3	38.37%
Expansion	1998Q2 - 2003Q2	32.09%
Expansion	2000Q4 - 2005Q4	38.22%
Expansion	2001Q2 - 2006Q2	39.15%
Expansion	2001Q4 - 2006Q4	41.96%
Expansion	2002Q2 - 2007Q2	37.63%
Recession	1998Q3 - 2003Q3	29.93%
Recession	1998Q4 - 2003Q4	30.72%
Recession	1999Q3 - 2004Q3	33.01%
Recession	2000Q2 - 2005Q2	28.26%
Recession	2001Q1 - 2006Q1	35.19%
Trough	1999Q1 - 2004Q1	31.78%
Trough	1999Q2 - 2004Q2	29.70%
Trough	1999Q4 - 2004Q4	31.46%
Trough	2000Q1 - 2005Q1	31.01%
Trough	2000Q3 - 2005Q3	32.12%
Trough	2002Q1 - 2007Q1	38.03%

Exhibit 4c: Classification of Economic States (7-Yearly Holding Period)

Economic State	Investment Period	Value-Growth Spread
Peak	1997Q1 - 2004Q1	0.423
Peak	1997Q2 - 2004Q2	0.4657
Peak	1997Q3 - 2004Q3	0.5041
Peak	1997Q4 - 2004Q4	0.7594
Expansion	1998Q1 - 2005Q1	0.4842
Expansion	1998Q2 - 2005Q2	0.444
Expansion	1998Q3 - 2005Q3	0.363
Recession	1998Q4 - 2005Q4	0.430
Recession	1999Q3 - 2006Q3	0.389
Recession	2000Q2 - 2007Q2	0.423
Trough	1999Q1 - 2006Q1	0.437
Trough	1999Q2 - 2006Q2	0.446
Trough	1999Q4 - 2006Q4	0.424

Trough	2000Q1 - 2007Q1	0.417

Exhibit 5a: Quarterly Investment Horizons

	Rolling Beta			
	Trough	Recession	Expansion	Peak
Rolling Beta	**0.0011**	**0.0008**	**0.0017**	**0.0003**
t-stat	**4.6881**	**2.0991**	**5.4774**	**1.3086**
R-squared	0.8108	0.9096	0.5985	0.5819
Adjusted R-squared	0.7986	0.9024	0.5734	0.5573
S.E. of regression	0.0005	0.0005	0.0012	0.0020
Durbin-Watson stat	1.8667	1.9008	1.7617	1.9706
	Trough	**Std Error**	**Peak**	**Std Error**
Beta Premium Sensitivity Value	1.1557	0.4516	1.0608	0.7111
Beta Premium Sensitivity Growth	1.1178	0.4326	1.0571	0.7147
Overall Beta Premium Sensitivity	**0.0379**	0.4035	**0.0036**	0.7371
	Fitted Beta			
	Trough	**Recession**	**Expansion**	**Peak**
Fitted Beta	**-56.2851**	**186.2714**	**-133.7890**	**-238.0830**
R-squared	0.9770	0.4682	0.8938	0.8384
Adjusted R-squared	0.9732	0.3416	0.8741	0.8095
S.E. of regression	0.6127	0.1995	0.4033	0.4421
Durbin-Watson stat	1.8744	2.0890	1.9305	1.9210
	Trough	**Std Error**	**Peak**	**Std Error**
Beta Premium Sensitivity Value	108.0852	0.5475	154.5221	0.8093
Beta Premium Sensitivity Growth	-74.4285	0.4549	46.7592	0.7215
Overall Beta Premium Sensitivity	**182.5136**	0.5015	**107.7628**	0.7715

Exhibit 5b: Rolling & Fitted Beta (Quarterly Horizon)

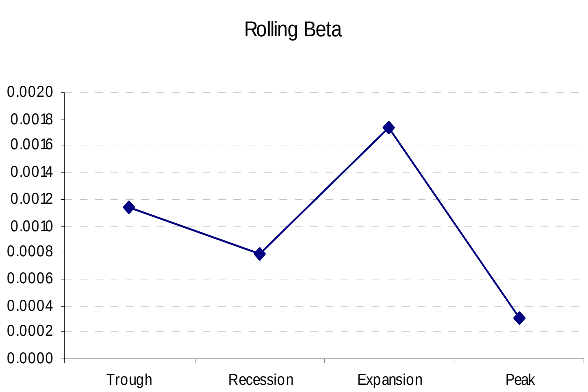
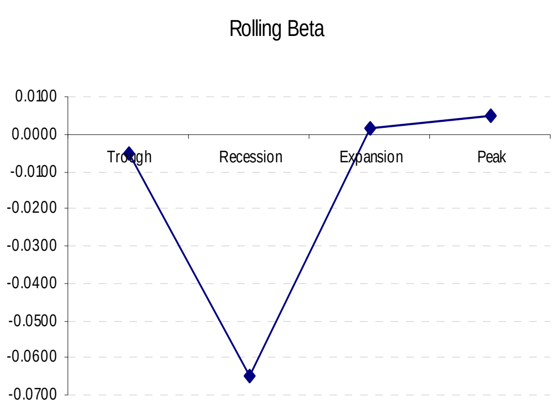


Exhibit 6a: 5-Yearly Investment Horizons

	Rolling Beta			
	Trough	**Recession**	**Expansion**	**Peak**
Rolling Beta	**-0.0054**	**-0.0651**	**0.0015**	**0.0050**
t-stat	**-3.1253**	**-4.4152**	**0.4764**	**3.4774**
R-squared	0.9546	0.8389	0.9419	0.8157
Adjusted R-squared	0.9514	0.8265	0.9383	0.8049
S.E. of regression	0.0057	0.0055	0.0075	0.0107
Durbin-Watson stat	1.9161	1.5963	2.1347	1.6678
	Trough	**Std Error**	**Peak**	**Std Error**
Beta Premium Sensitivity Value	0.9431	0.5046	1.0590	0.7161
Beta Premium Sensitivity Growth	0.0849	0.3959	1.0566	0.7172
Overall Beta Premium Sensitivity	**0.8582**		**0.0024**	
	Fitted Beta			
	Trough	**Recession**	**Expansion**	**Peak**
Fitted Beta	**-6.1619**	**-38.0510**	**-8.3524**	**-7.6455**
R-squared	0.6469	0.6833	0.9510	0.9774
Adjusted R-squared	0.5733	0.6114	0.9422	0.9736
S.E. of regression	0.3881	0.0533	0.4271	0.6075
Durbin-Watson stat	2.0811	2.0038	1.8523	1.9656
	Trough	**Std Error**	**Peak**	**Std Error**
Beta Premium Sensitivity Value	1.9641	0.3342	83.6906	1.0956
Beta Premium Sensitivity Growth	-13.0927	0.4976	43.8126	0.8515
Overall Beta Premium Sensitivity	**15.0568**		**39.8781**	

Exhibit 6b: Rolling & Fitted Beta (5-Yearly Horizon)



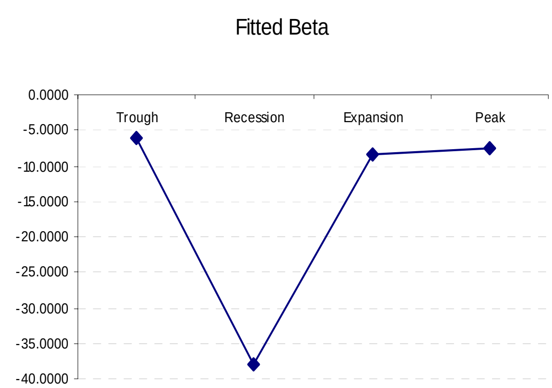


Exhibit 7a: 7-Yearly Investment Horizons

Rolling Beta				
	Trough	**Recession**	**Expansion**	**Peak**
Rolling Beta	**0.0087**	**-0.0005**	**-0.0062**	**-0.0349**
t-stat	**30.2610**	**-0.0453**	**-15.1947**	**-4.9603**
R-squared	0.9882	0.3977	0.8769	0.8712
Adjusted R-squared	0.9869	0.3429	0.8646	0.8576
S.E. of regression	0.0020	0.0051	0.0020	0.0221
Durbin-Watson stat	2.5818	1.7844	1.7024	0.7286
	Trough	**Std Error**	**Peak**	**Std Error**
Beta Premium Sensitivity Value	0.3725	0.5674	-0.8076	1.1469
Beta Premium Sensitivity Growth	0.1499	0.6904	-0.8706	1.2599
Overall Beta Premium Sensitivity	**0.2226**		**0.0630**	
Fitted Beta				
	Trough	**Recession**	**Expansion**	**Peak**
Fitted Beta	**128.5497**	**-1.9520**	**-34.0304**	**-687.9518**
R-squared	0.6848	0.9556	0.8538	0.8444
Adjusted R-squared	0.5863	0.9433	0.8051	0.7888
S.E. of regression	0.5259	0.0381	0.5286	0.8192
Durbin-Watson stat	1.8166	1.9503	1.6600	2.0952
	Trough	**Std Error**	**Peak**	**Std Error**
Beta Premium Sensitivity Value	-28.7051	0.6205	-32.0089	0.6195
Beta Premium Sensitivity Growth	-83.8368	0.6874	-64.8688	0.8728
Overall Beta Premium Sensitivity	**55.1317**		**32.8599**	

Exhibit 7b: Rolling & Fitted Beta (7 Yearly Horizon

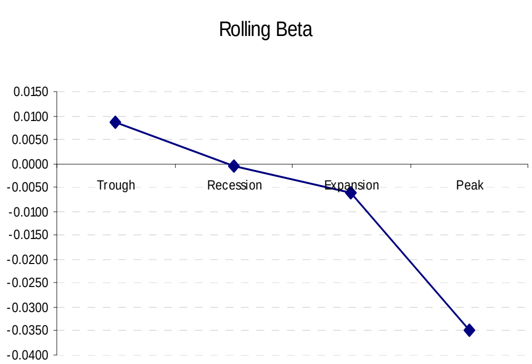


Exhibit 8a: Stochastic Dominance (Quarterly Holding Period)

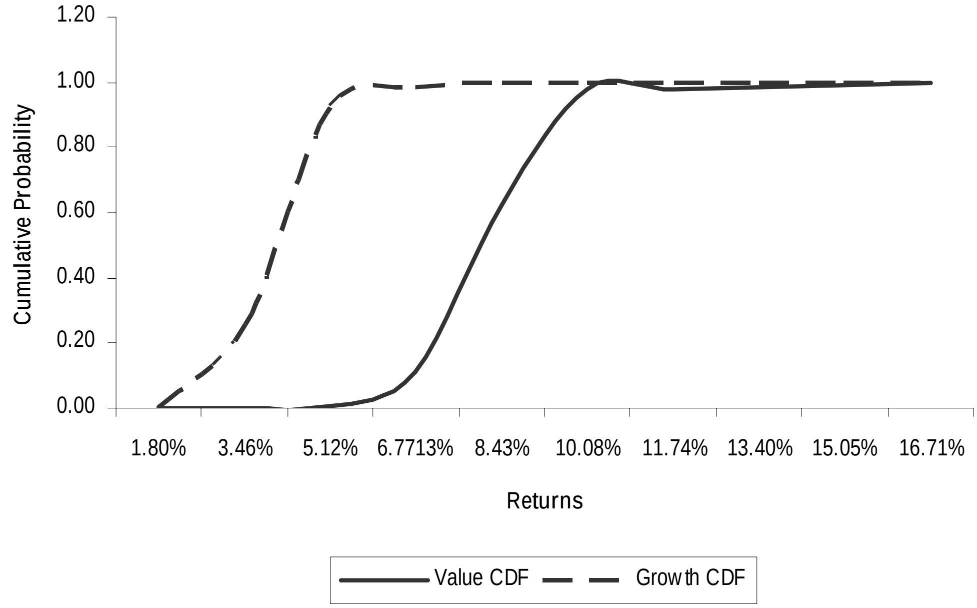


Exhibit 8b: Stochastic Dominance (5-Year Holding Period)

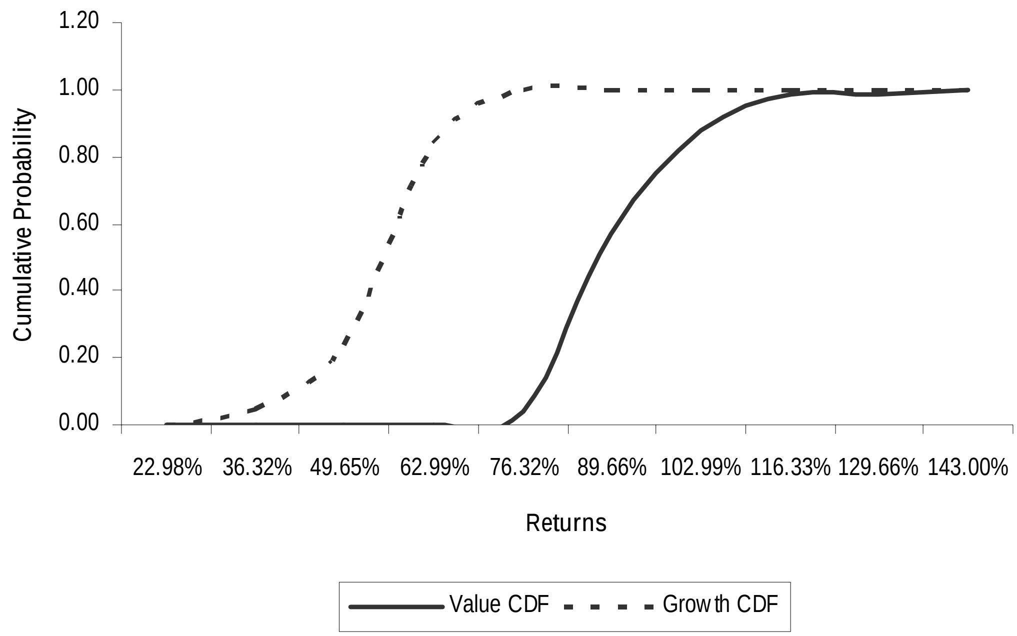


Exhibit 8c: Stochastic Dominance (7-Year Holding Period)

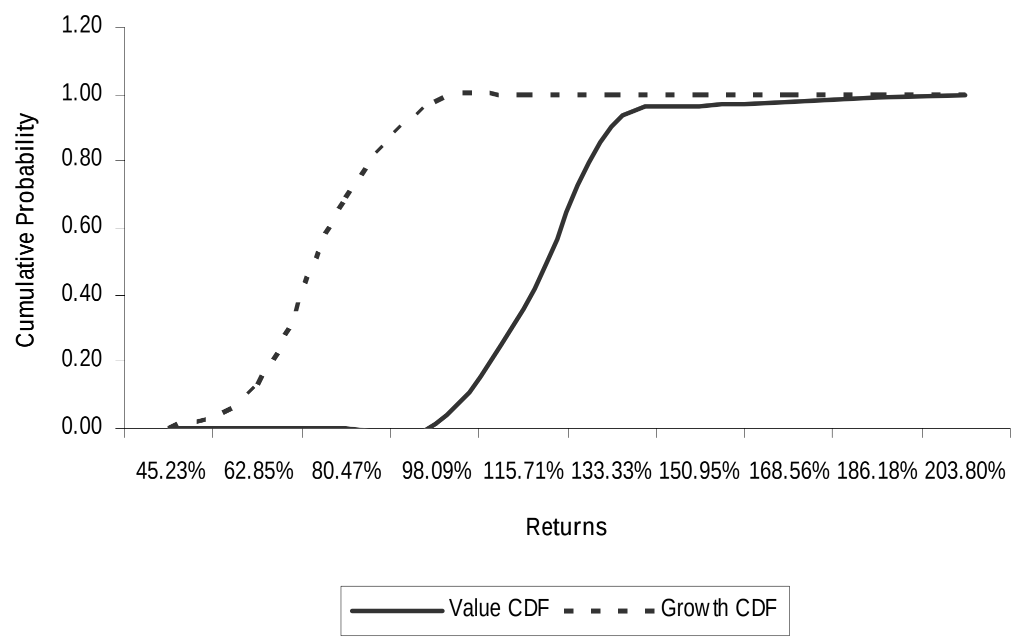


Exhibit 8d: Stochastic Dominance (10-Year Holding Period)