Industrial Real Estate Investment: Does the Contrarian Strategy Work?

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Abstract

The superiority of the contrarian investment strategy, though well attested to in the finance literature, has received scant attention, if any, in the real estate literature. This study uses empirical industrial real estate investment return data from 1985Q1 to 2005Q3 for the US, and some Asia Pacific cities in order to ascertain the relative superiority of "value" and "growth" industrial real estate investments. The results show that "value" industrial property investment outperformed "growth" industrial property investment in all the holding periods under consideration. Furthermore the industrial property investments exhibit return reversal. This implies that the superiority of the contrarian strategy is sustainable. The results of stochastic dominance tests validate the relative superiority of "value" over "growth" industrial property investment. This implies that fund managers who traditionally have been favoring prime (i.e. growth) industrial property investment may have to reconsider their investment strategy if they want to maximize their return.

Keywords: contrarian investment strategy, value-growth spread, value properties, growth properties, stochastic dominance, means reversion.

Introduction

The choice of an investment strategy is an important step in the decision-making process of fund managers and large institutional investors. In view of this, growth stock investment strategy and value stock investment strategy have received considerable attention in the finance literature. The growth stock investment strategy is frequently associated with investments in "glamour" stocks that have relatively high price-to-earnings ratios (i.e. high gross income multiplier in real estate terms[1]). On the other hand, value stock investment strategy usually involves investing in "gloomy" stocks that characteristically have relatively low market prices in relation to earnings per share (EPS), cash flow per share, book value per share, or dividend per share (i.e. low gross income multiplier). They are often less popular stocks that have recently experienced low or negative growth rates in corporate earnings. Notwithstanding their relative unpopularity with investors, studies have shown that investments in value stocks, commonly known as contrarian investment strategy, have outperformed growth stocks in major markets (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; Chan and Lakonishok 2004).

However, Jones (1993) reports that the profitability of contrarian portfolios is a pre-WW II phenomenon that has since largely disappeared. Furthermore, Kryzanowski and Zhang (1992) find that the Canadian stock market exhibits significant price inertia, which negates the relative superiority of contrarian investments. Similarly, Jedadeesh and Titman (1993), Rouwenhorst (1998, 1999) and Grundy and Martin (2001) conclude that a momentum strategy (which contrasts with the contrarian strategy) is profitable.

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[1] Boykin and Gray (1994) trace the historical development of GIM in real estate appraisal and relate GIM to the price/earnings ratio that is frequently used in stock valuation and serves as a benchmark in the value approach to investing.

These contrary findings have been refuted in the extant literature (see for example, Bauman and Miller 1997).

Given the significance of the contrarian hypothesis in the finance literature, it is surprising that the contrarian hypothesis hardly exists in the extant real estate literature. Thus, the first motivation of this study is to remedy this gap in the real estate literature. Secondly, the fact that the contrarian hypothesis is hardly found in the extant real estate literature could mean that real estate fund managers may be making sub-optimal investment decisions, which then generate sub-optimal performances. Therefore the second motivation of this study is to provide evidence on contrarian real estate investment strategy to help fund managers make better informed real estate investment decisions and therefore improve the performance of their portfolios.

In view of the overwhelming evidence in support of the superior performance of contrarian investment in the finance literature, there appears to be a prima facie case for expecting contrarian real estate investment to do likewise (Addae-Dapaah et al. 2002). Growth stock is analogous to prime properties, since both have relatively low earnings-to- price ratios (i.e. low initial yield) and investors in both investment media pin their hopes on a relatively high potential price or capital appreciation. Similarly, value stock, which provides high income, is comparable to high income-producing properties. In relation to real property, the contrarian strategy implies that value properties with high yields could outperform growth properties with low yields. Thus, the objectives of the study are:

i) to ascertain the comparative advantage(s), in terms of performance, of contrarian real estate investment;
ii) to evaluate the relative riskiness of value properties and growth properties;
iii) to establish whether excessive extrapolation and expectational errors characterize growth and value strategies; and
iv) to ascertain the sustainability of the relative superiority (the "win") of contrarian real estate investment if such superiority is established.

In view of this, the next section provides a brief review of the finance literature on the contrarian investment strategy, after which a specific set of research hypotheses are formulated. This is followed by a discussion on data management and sourcing, and the contrarian strategy model. The next section is devoted to the empirical model estimation which is followed by a post-model estimation. The last section deals with concluding remarks.

Literature Review

According to Dreman (1982) a contrarian investor is an investor who goes against the "grain". Thus, contrarian investment strategy simply refers to investments which have lost favor with investors. It covers various investment strategies based on buying/selling that are priced low/high relative to accounting measures of performance – earnings-to-price ratios (E/P), cash flow-to-price ratio (C/P) and book value-to-price ratio (B/P) – as well strategies based on low/high measures of earning per share (EPS) growth (Capual 1993). In simple terms, the contrarian investment strategy refers to the value/growth stock paradigm.

While there is substantial empirical evidence supporting the efficient market hypothesis that security prices provide unbiased estimates of the underlying values, many still question its validity. Smidt (1968) argues that one potential source of market inefficiency is inappropriate market responses to information. The inappropriate responses to information implicit in Price-Earnings (P/E) ratios may be indicators of future investment performance of a security. Proponents of this price-ratio hypothesis claim that low P/E stocks tend to outperform high P/E stocks (Williamson 1970). Basu (1977), Jaffe et al. (1989), Fama and French (1992, 1998), Davis (1994), Lakonishok et al. (1994), Bauman et al. (1998), Badrinath and Omesh (2001) and Chan and Lakonishok (2004) show a positive relationship between earnings yield and equity returns. However, as a result of the noisy nature of earnings (i.e. the category of stocks with low E/P also include stocks that have temporarily depressed earnings), value strategies based on E/P give narrower spreads compared to other simple value strategies (Chan and Lakonishok 2004). Furthermore, in view of the noise in reported earnings that results from Japanese accounting standards (i.e. distortions in the earnings induced by accelerated depreciation allowances), Chan et al. (1991) find no evidence of a strong positive earnings yield effect after controlling for the other fundamental variables.

Rosenberg et al. (1985) show that stocks with high Book Value, relative to Market Value of equity (BV/MV), outperform the market. Further studies, e.g. Chan et al. (1991) and Fama and French (1992), confirm and extend these results. In view of the highly influential paper by Fama and French (1992), academics (e.g. Capaul et al. 1993; Davis 1994; Lakonishok et al. 1994; La Porta et al. 1997; Fama and French, 1998; Bauman et al. 1998, 2001; Chan et al. 2000; Chan and Lakonishok, 2004) have shifted their attention to the ratio of BV/MV as one of the leading explanatory variables for the cross-section of average stock returns.

Although BV/MV has gained much credence as an indicator of value-growth orientation, it is by no means an ideal measure (Chan and Lakonishok 2004). BV/MV is not a ‘clean’ variable uniquely associated with economically interpretable characteristics of the firm (Lakonishok et al. 1994). Many different factors are reflected in this ratio. For an example, low BV/MV may describe a company with several intangible assets that are not reflected in accounting book value. A low BV/MV can also describe a company with attractive growth opportunities that do not enter the computation of book value, but do enter the market price. A stock whose risk is low and future cash flows are discounted at a low rate would have a low BV/MV as well. Finally, a low BV/MV may be reminiscent of an overvalued glamour stock.

The shortcomings of accounting earnings have motivated a number of researchers to explore the relationship between cash flow yields and stock returns. High Cash Flow to Price (CF/P) stocks are identified as value stocks because their prices are low per dollar of cash flow, or the growth rate of their cash flows is expected to be low. Chan et al. (1991), Davis (1994), Lakonishok et al. (1994), Bauman et al. (1998), Fama and French (1998), and Chan and Lakonishok (2004) show that a high ratio of CF/P predicts higher returns. This is consistent with the idea that measuring the market's expectations of future growth more directly gives rise to better value strategies (La Porta 1996).

Fama and French (1998) and Bauman et al. (1998) use the ratio of Dividends to Price (D/P) as a proxy for the market's expectations of future growth. Firms with higher ratios have lower expected growth and are considered to be value stocks. They show that the performance of the value stocks based on dividend yields is quantitatively similar to the performance based on the prior categorizations (i.e. P/E, BV/MV and CF/P). Finally, instead of using expectations of future growth to operationalize the notions of glamour and value, Davis (1994) and Lakonishok et al. (1994) use past growth to classify stocks. Davis (1994) and Lakonishok et al. (1994) measure past growth by Growth in Sales (GS) to conclude that the spread in abnormal returns is sizeable.

To the extent that the different valuation indicators of value-growth orientation are not highly correlated, a strategy based on information from several valuation measures may enhance portfolio performance. Lakonishok et al. (1994) explore sophisticated two-dimensional versions of simple value strategies. According to the two-way classification, value stocks are defined as those that have shown poor growth in sales, earnings and cash flow in the past, and are expected by the market to continue growing slowly. Expected performance is measured by multiples of price to current earnings and cash flow. La Porta et al. (1997) form portfolios on the basis of a two-way classification based on past GS and CF/P introduced by Lakonishok et al. (1994). Using robust regression methods, Chan and Lakonishok (2004) use cross-sectional models to predict future yearly returns from beginning-year values of the BV/MV, CF/P, E/P and the sales to price ratio. The use of the multiple measures in the composite indicators boosts the performance of the value strategy (see Gregory et al. 2003).

Jegadeesh and Titman (1993) controvert the above findings by showing that a momentum strategy (i.e. buying/selling past winners/losers) generates better returns. This conclusion has been concurred by Rouwenhorst (1998, 1999) and Grundy and Martin (2001). Jones (1993) reports that the profitability of contrarian portfolios is a pre-WW II phenomenon that has since largely disappeared. However, this has been refuted by later studies which include post-war data. Also, Kryzanowski and Zhang (1992) suggest that positive profits resulting from the use of the contrarian investment strategy are limited to the U.S. stock market. When applied to the Canadian stock market, the DeBondt and Thaler (1985) model does not produce favorable results. Instead of finding significant price reversals, Kryzanowski and Zhang (1992) find that the Canadian stock market exhibits significant price continuation behavior, which does not support contrarian investments. This is also refuted by later studies that include mean-reversion tendency (see for example, Bauman and Miller 1997).

In view of the accumulated weight of the evidence from past studies, the finance academic fraternity agrees that value investment strategies, on average, outperform growth investment strategies. The only polemical issue about the contrarian strategy is the rationale for its superior performance (see Gregory et al. 2003; Badrinath and Omesh 2001).

Rationale for Superior Performance of Contrarian Strategies

Competing explanations include risk premiums (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 (see for example, La Porta et al. 1997; Bauman and Miller 1997; La Porta 1996; Dechow and 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 (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 behavior (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; Gregory et al. 2003; Chan and Lakonishok 2004).

The behavioral finance paradigm recognizes psychological influences on human decision-making in which experts (in this case, investors) tend to focus on, and overuse, predictors of limited validity (i.e., earnings trend in the recent past) in making forecasts (see Covel and Shumway 2005). In view of systematic errors in investors' expectations and analysts' forecasts, it has been argued that a significant portion of value stocks' superior performance is attributable to earning surprises (see De Bondt and Thaler 1985; Lakonishok *et al*. 1994; La Porta 1996; Chan et al. 2000, 2003; Chan and Lakonishok 2004; Jegadeesh et al. 2004). According to Dreman and Berry (1995) and Levis and Liodakis (2001), positive and negative earnings surprises have an asymmetrical effect on the returns of value and growth stocks. Positive earning surprises have a disproportionately large positive impact on value stocks while negative surprises have a relatively benign effect on such stocks (see also Bauman and Miller 1997).

Furthermore, analysts and institutional investors may have their own reasons for gravitating toward growth stocks. Analysts have self-interest in recommending successful stocks to generate trading commissions and more investment banking business. Moreover, growth stocks are typically in 'promising' industries, and are thus easier to promote in terms of analyst reports and media coverage (Bhushan 1989; Jegadeesh et al. 2004). These considerations play into the career concerns of institutional money managers (Lakonishok et al. 1994). Another important factor is that most investors have a shorter time horizon than is required for value strategies to consistently pay off (De Long et al. 1990; Shleifer and Vishny 1990). In addition, institutional investors act in a fiduciary capacity. Pension fund trustees, in particular, are expected to behave as an "ordinary man of prudence". This implies that they must go with the crowd (i.e. opt for glamour stocks. The result of all these considerations is that value stocks/glamour stocks become under-priced/overpriced relative to their fundamentals. Due to the limits of arbitrage (Shleifer and Vishny 1997), the mispricing patterns can persist over long periods of time.

A third hypothesis that has been postulated for the superiority of the contrarian value strategy is that the reported cross-sectional return differences is an artifact of the research design and the database used to conduct the study (Black 1993; Kothari et al. 1995). Thus, the abnormal returns would be reduced or vanish if a different methodology and data were used. Such researchers argue that the superior returns are the result of survivor biases in the selection of firms (Banz and Breen 1986), look-ahead bias (Banz and Breen 1986), and a collective data-snooping exercise by many researchers sifting through the same data (Lo and MacKinlay 1990). Other problems include model specification (i.e. the appropriateness of parametric analysis and single factor capital asset pricing model) and misestimation of systematic risk (Mun et al. 2001; Badrinath and Omesh 2001]). Finally, it is argued that the database is limited to a relatively short sample period (Davis 1994). The data-snooping explanation has been controverted by Lakonishok et al. (1994), Davis (1994, 1996), Fama and French (1998), Bauman and Conover (1999), Bauman et al. (2001), and Chan and Lakonishok (2004) who used databases that are free of survivorship bias and/or fresh data that previously have not been used for such analysis to confirm the superior performance of value strategy. Mun et al. (2001:635) refute the model specification criticism to conclude that the result of nonparametric analysis "is a distilled and pure Contrarian Strategy effect" – The parametric analysis confirms contrarian superiority although it provides a more conservative yield estimate of excess returns than nonparametric estimates. Similarly, Badrinath and Omesh (2001) conclude that misestimation of systematic risk cannot explain the abnormal profitability of the contrarian strategy (see Gregory et al. 2003). Thus, the superiority of the contrarian strategy is not a function of the mathematical/statistical models used for the analysis.

Furthermore, two features of value investing distinguish it from other possible anomalies. According to Chan and Lakonishok (2004), many apparent violations of the efficient market hypothesis, such as day-of-the-week patterns in stock returns, lack a convincing logical basis and the anomalous pattern is merely a statistical fluke that has been uncovered through data mining. The value premium, however, can be tied to ingrained patterns of investor behavior or the incentives of professional investment managers.

In view of the analogy between value stock (high dividend yielding) and high income producing property (henceforth called value property[2]), the features of the contrarian investment strategy may apply to industrial property investment. Therefore, it is hypothesized that:

a) value industrial properties generate higher returns than growth industrial properties;
b) value industrial property investment is riskier than growth industrial property investment;
c) investors naively extrapolate past performance into future expectations; and
d) the returns of value and growth industrial properties are mean-reverting.

These hypotheses will be operationalized through statistical tests, and where possible, stochastic dominance test.

2

Data Sourcing and Management

A growth real estate investor prefers properties with a low initial yield to properties with high initial yield. The investor chooses to exchange immediate cash flows for higher future cash flows (in the form of potential capital appreciation and/or rental growth) that are worth more at the date of the purchase, depending on the investor's opportunity cost of capital. On the other hand, a value property investor prefers to receive a high initial yield rather than to wait for future income or uncertain capital growth (see Marcato 2004). This study uses data from the Property Council of New Zealand, the Property Council of Australia and NCREIF property databases[3] to classify 52 (1, 3, and 48, respectively) industrial property sub-markets into value/growth sub-market cities on the bases of yields (see Appendix A-1), i.e. E/P ratio, which is analogous to the capitalization rate in appraisal and real estate investment.

The data from the Property Council of New Zealand and the Property Council of Australia are based on market rentals and valuations. The quality of these data is attested by the fact that they have been subsumed by the IPD. All the datasets are extensively used by researchers. The only caveat about the use of different datasets is that one cannot guarantee that the quality of all the datasets is the same. However, the datasets are of very good quality to provide credible results.

The other classification methods discussed in the literature review are not used to classify the data into value/growth properties because of the dearth of information on these accounting measures of classification. However, this is not a serious handicap as the finance literature shows that the results of studies based on these classification methods do not only confirm, but make the research results based on the E/P classification more astounding (see Lakonishok et al. 1994; Chan and Lakonishok 2004]). Furthermore, Badrinath and Omesh (2001:387) state that "as a measure of value, strategies based on the E/P ratio are particularly popular in the investment community" and demonstrate the robustness of the abnormal profitability of the earnings' yield (E/P)-based contrarian investment strategy. The data are from 1985Q1 through 2005Q3. However, some of the submarkets do not have data over the entire period. For example, data for Indianapolis and San Francisco start from 1990Q4 and 1997Q1 respectively while data availability for Australia is from 1993Q2. Thus, markets are included in the analysis as, and when they become available. This explains why the portfolio composition (Appendix A-2) changes over time.

The initial yields are measured in U.S. dollars. Decile portfolios are formed using one-way sorts on the basis of the end-of-previous-quarter's initial yield. This is in consonance with the extant finance literature (see for example Badrinath and Omesh 2001; Gregory et al. 2003). The top decile of the sample with the highest initial yield (i.e. lowest GIM) is classified as value industrial property (V_p) portfolio, while the bottom decile with the lowest initial yield (i.e. highest GIM) is classified as growth industrial property (G_p).

[2] Marcato (2004)uses the terms "value" and "growth" properties in his paper on creating style indexes in real estate markets.

[3]

Each decile is treated as a portfolio composed of equally weighted properties (Chan et al. 1991; Lakonishok et al. 1994; Bauman et al. 1998, 2001). The portfolios are reformulated only at the end of each holding period.

The classification of the industrial property sub-markets into V_p and G_p portfolios is followed by an examination of the relative performances of the portfolios. If there is evidence of a value premium, the underlying reasons for the relative superiority of V_p will be discussed.

The Contrarian Strategy Model

The performances of both the value and growth industrial properties are compared on a 5-year, 10-year, 15-year and entire holding-period (of up to 83 quarters) horizons. Medium and long term investment horizons are the focus of analyses since real estate investors usually invest for the long term (Ball 1998). Periodic (i.e. quarter-by-quarter) return measures are used in the evaluation of the relative superiority of the performance of the V_p and G_p portfolios. The periodic returns are quantified as simple holding period returns. 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).

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

Where:

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

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). The periodic quartile returns for each holding- period horizon are averaged across the full period of study to determine the time-weighted average return. Arithmetic mean is most widely used in forecasts of future expectations and in portfolio analysis (Geltner and Miller 2001). Each value-growth spread (i.e. value premium) is then computed by subtracting the mean return for a G_p portfolio from that for the corresponding V_p portfolio. This is strictly in accordance with the procedure in the finance literature. Moreover, the median value premium is also reported.

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:

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

[3] The choice of cities (markets) used for the study is constrained by the datasets and therefore data availability. Other Asia Pacific cities are not included in the study simply because of want of data.

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

The next step is to determine whether any difference in returns is a function of variation in risk, using a more direct evaluation of the risk-based explanation that focuses on the performance of the value and growth properties in 'bad' states of the world. Traditional measures of risk, such as standard deviation of returns, risk-to-return ratio (i.e. coefficient of variation – CV) and return-to-risk ratio will be utilized.

Levene's Test is used to test the equality of the variances for the value and growth properties:

$$H_0 : \sigma^2{}_{value} = \sigma^2{}_{growth}$$
$$H_1 : \sigma^2{}_{value} \neq \sigma^2{}_{growth}$$

Performance in 'Bad' States of the World

According to Lakonishok et al. (1994), value strategies would be fundamentally riskier than glamour strategies if:

i) they under-perform glamour strategies in some states of the world; and

ii) those are on average 'bad' states of the world, in which the marginal utility of wealth is high, making value strategies unattractive to risk-averse investors.

Periods of severe stock market declines are used as a proxy for 'bad' states of the world. This is because they generally correspond to periods when aggregate wealth is low and thus the utility of an extra dollar is high. The approach of examining property performance during down markets also corresponds to the notion of downside risk that has gained popularity in the investment community (Chan and Lakonishok 2004). If the above tests confirm the superiority of value properties, stochastic dominance will be used to ascertain the optimality of the value property investment strategy.

Stochastic Dominance

The most widely known and applied efficiency criterion for evaluating investments is the mean-variance model. Thus, some researchers (e.g. Campbell and Vuolteenaho 2004; Petkova and Zhang 2005) have used the CAPM to examine the relative risk of value and growth stocks. While this may be appropriate for stocks, it is doubtful whether a mean-variance approach based on the assumptions of quadratic utility functions for investors and the normal distribution of investment returns is suitable for real property returns, which often are not normally distributed. An alternative approach, 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) may be more appropriate for property investment returns and is thus employed for this study. *SD* neither assumes normal probability distribution of returns nor quadratic utility functions (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,

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

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

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

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

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:

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

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

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

$$\forall u \in U_3, \text{ and}$$

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

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.

Empirical Model Estimation – A Test of the Extrapolation Model

Following the evaluation of the risk characteristics of the V_p and G_p portfolios, the next task is to investigate the relationship between the past, the forecasted, and the actual future growth rates. This relationship is largely consistent with the predictions of the extrapolation model. The essence of extrapolation is that investors are excessively optimistic about growth properties and excessively pessimistic about value properties. A direct test of extrapolation (Lakonishok et al. 1994), then, is to look directly at the actual future rental income and capital growth rates of value and growth properties, and compare them to:

a) past growth rates and
b) expected growth rates as implied by the initial yields.

If naïve extrapolation is established, the variance ratio test will be used to show that naïve extrapolation is a credible explanation to the relative superiority of the contrarian strategy.

Variance Ratio Test

The variance ratio, which measures the randomness of a return series, is calculated by dividing the variance of longer intervals' returns by the variance of shorter intervals' returns (for the same measurement period). The result is normalized to 1 by dividing it by the ratio of the longer to the shorter interval. The test assumes that if a return series follows a random walk, the variance of its *k*-differences should be *k* times the variance of its first difference (Poterba and Summers 1988).

Assuming that y_t denotes a time series consisting of *T* observations, the variance ratio of the *k*-th difference is calculated as follows (see Lo and MacKinlay 1988; Poterba and Summers 1988; Belaire-Franch and Oppong 2005):

$$VR(k) = \frac{\sigma^2(k)}{\sigma^2(1)}, \quad (8)$$

Where:

VR(k): is the variance ratio of the series *k*-th difference,

$\sigma^2(k)$: is the unbiased estimator of 1/*k* of the variance of the series *k*-th difference,

$\sigma^2(1)$: is the variance of the first–differenced return series, and

k: is the number of the days of the base observations interval, or the difference interval.

The estimator of the *k*-period difference, $\sigma^2(k)$, is computed as:

$$\sigma^2(k) = \frac{1}{T}\sum_{t=k}^{T}\left(y_t + \ldots + y_{t-k+1} - k\hat{\mu}\right)^2 \quad (9)$$

Where:

$\hat{\mu} = \frac{1}{T}\sum_{t=1}^{T} y_t$; while the unbiased estimator of variance of the first difference, $\sigma^2(1)$, is:

$$\sigma^2(1) = \frac{1}{T}\sum_{t=1}^{T}(y_t - \hat{\mu})^2 \quad (10)$$

A variance ratio greater than 1 suggests that the shorter-interval returns trend within the duration of the longer interval (i.e. the return series is positively serially correlated). Conversely, a variance ratio less than 1 implies that the return series is negatively serially correlated (i.e. the shorter-interval returns are mean reverting within the duration of the longer interval).

Performance of the Contrarian Strategy

Figures 1 to 4 clearly demonstrate the superiority of the contrarian strategy in each of the holding periods under consideration. The value industrial property portfolio recorded 100% positive value-growth spread for all the investment formation horizons (Figures 1-4). In other words, the value industrial property portfolio outperformed its growth counterpart in every holding period. The mean value/growth industrial portfolio returns for the 5, 10, 15 and more than 15 years holding periods are 169.92%/40.62%, 405.03%/105.46%, 1051.21%/184.75% and 1992.30%/258.69% respectively (Table 1a – full details are obtainable from authors). The corresponding median value/growth portfolio returns (see Table 1b) are 139.52%/45.66%, 339.16%/89.80%, 1110.88/178.72% and 1720.27%/221.25. While the mean return overstates the contrarian superiority for the 5, 10 and more than 15-year holding periods, it understates the value superiority for the 15-year holding period. These figures imply that an investor who adopted the contrarian strategy over the more than 15-year holding period would have earned 1499.02% (based on median) or 1733.60% (based on mean) more on each dollar invested than the one who invested in glamour industrial properties over the same period (see Table 1a & 1b).

Figures 1-4 & Tables 1a & 1b

It is worth noting that the differences between the mean returns for both portfolios (i.e. the value premium) are statistically significant at both the 0.01 and 0.05 levels (Table 2a).

Tables 2a & 2b

The relative superiority of the industrial value portfolios is confirmed by the results of stochastic dominance test presented in Figures 5a, b, c, and d.

Figures 5a-d

Figures 5a, b, c, and d clearly demonstrates that $V_pD_1G_p$ for all the holding periods under consideration – i.e. the value industrial portfolios are the most efficient (and therefore the optimal) choice. This implies that value industrial portfolios stochastically dominate growth portfolios in the first, second and third order. In other words, the value portfolios statistically presaged a higher probability of success than the growth portfolios. For example, there was almost 64% and 3% probability that the 5-year cumulative holding period return for the value and growth portfolios, respectively, was equal to, or greater than, 100% (Figure 5a). Similarly, Figure 5b shows that there was almost 98% and 7% probability that the 10-year cumulative holding period return for the value and growth portfolios respectively was greater than or equal to 200%. The value-growth probability of success gap widened with increased duration of the holding period. Thus, value industrial portfolio investment should have been preferable to both risk averters and risk lovers (Kjetsaa and Kieff 2003; Levy and Sarnat 1972).

Is the Superior Performance of the Contrarian Strategy Compensation for Higher Risk?

According to the traditional school of thought (see literature review), the superiority of the contrarian strategy is a compensation for higher systematic risk (i.e. higher return is a reward for higher risk). If the value strategy is fundamentally riskier, it should under-perform the growth strategy during undesirable/bad states of the world – i.e. times of severe market decline when the marginal utility of consumption is high (Lakonishok et al. 1994). This section is therefore aimed at ascertaining if there is any correlation between "value" underperformance and "bad" states of the world. Furthermore, traditional measures of risk (i.e. standard deviation) and risk-adjusted performance indicators (i.e. coefficient of variation) are used to compare "value" and growth strategies.

Figures 1-4 show that the value strategy virtually never under-performed the growth strategy in any holding period. Thus, there is no underperformance of the value portfolios to be associated with severe market declines as defined by some pay-off relevant factor.

The performance of the value and growth properties in four states of the world (i.e. Worst, Next Worst, Next Best, and Best 20 quarters) based on Datastream Indices (a composite of REITs and publicly traded real estate stocks) for the Pacific Basin Real Estate Stock Market from 1985Q1 to 2005Q3 is presented in Figure 6. The choice of any real estate stock market for this analysis is controversial as there is no single market that mirrors the Asian and US markets. Furthermore, the study relates to industrial real estate, but it is hardly possible to get an industrial real estate stock market for the analysis. Moreover, although the Asian markets only make up four of the 52 markets under consideration, they feature prominently in almost every portfolio to justify the use of the Pacific Basin Real Estate Stock Market as a proxy for the analysis. It must be conceded that given the foregoing anecdotes, the use of this proxy (or any other alternative proxy such as the US REITS market) is an "inevitable" limitation which may bias the results for this section. This limitation is counterbalanced by the stochastic dominance test which is neutral to the market index.

Furthermore, the prominence of the Pacific Rim markets in the value portfolios, in particular, could create the misconception that the results are more Pacific Rim strategy than contrarian.

Such a possible misconception is dispelled by the results of the US only data analyses presented in Appendix C[4]. The results are still contrarian when the Pacific Rim markets are excluded from the analyses, i.e. value statistically outperforms growth industrial property portfolio at both the 0.01 and 0.05 levels of significance.

After matching the quarterly returns for the growth and value portfolios with the changes in the real estate stock market return, the mean value-growth spread in each state is reported together with the corresponding t-statistics for the test that the difference in returns is equal to zero (Table 3), i.e.

$$H_o : \mu_{value} - \mu_{growth} = 0$$
$$H_I : \mu_{value} - \mu_{growth} \neq 0$$

Figure 6 & Table 3

Table 3 shows that the value strategy did notably better than the growth strategy in all 4 states of the world. The null hypothesis is therefore rejected for all 4 states of the world to conclude that there is statistical difference between the means of the two populations. It is evident from Table 3 that the superior performance of the value strategy was skewed towards negative market return months rather than positive market return months. The evidence indicates that there are no significant traces of a conventional asset pricing equilibrium in which the higher returns on the value strategy are compensation for higher systematic risk.

The volatility of the portfolios' returns during the period of study is presented in Table 1a. The results show that value portfolios recorded a higher standard deviation of returns than growth portfolios for all the holding periods. The results presented in Table 2b indicate that the value industrial property portfolio standard deviations are higher and significantly different, at the 0.01 level, from those of the growth industrial properties. However, since the mean returns and variances of the two portfolios are different, the coefficient of variation (CV) is a more appropriate risk measure for comparison. The CVs in Table 1a imply that the value industrial portfolios were safer than the growth industrial portfolios for all the holding periods, except the more than 15-year holding period. However, since value industrial property portfolios stochastically dominate growth industrial property portfolios in all the holding periods (Figure 5), the latter is riskier than the former (Biswas, 1997). Hence, a risk model based on differences in standard deviation alone may not be a credible explanation for the superior performance of value properties.

Post-Model Estimation – A Test of the Extrapolation Model

This part of the study provides empirical evidence to verify whether excessive extrapolation and

[4]

expectational errors characterize growth and value strategies. First, the study period is divided into two: past (pre-portfolio formation) and future (post-formation) performances (see Panels B and C respectively of Table 4). Table 4 presents some descriptive characteristics for the growth and value portfolios with respect to their initial yields, past growth rates, and future growth rates. Panel A of Table 4 reveals that the value portfolios had higher initial yields than growth portfolios. This is supposed to signify lower expected growth rates for value properties. Panel B shows that, using several measures of past growth, including rental income and capital value, the growth portfolio performance grew faster than the value portfolios over the pre- portfolio formulation period. Panel C shows that over the subsequent post-formulation years, the relative growth of rental income and capital value for growth properties was generally quite below expectations.

It must be noted that the figures in Panels B and C represent the incremental growth in performances between the returns for the preceding and successive quarters' portfolios, since the analysis is based on the assumption that portfolios are reformulated at the beginning of each quarter. Thus, the 401.62% capital growth for the value portfolio in 2001Q2 reflects the growth in the performance of the 2001Q2 portfolio, relative to that of the 2001Q1 portfolio. These assumptions, which are in consonance with the finance literature, are merely to test the plausibility of naïve extrapolation being a credible explanation for the value superiority. They certainly are not intended in any way to imply/suggest that real estate investors do/should reformulate their portfolio quarterly.

Table 4

Recall that the Gordon's formula (Gordon and Shapiro (1956)) can be rewritten as $k_p \left(\equiv \frac{I}{P} \right) = R_N - g_p = d$, where k_p is the initial yield for property, *I* is the current rental income, *P* is the market price, R_N is the required nominal return, and ($g_p - d$) is the rental growth for actual, depreciating properties. These formulae literally imply that, holding discount rates constant, the differences in expected rental growth rates can be directly calculated from differences in initial yields. Since the assumptions behind these simple formulae are restrictive (e.g. constant growth rates, etc.), this study does not calculate exact estimates of the differences in expected rental growth rates between value and growth portfolios. Instead, we are trying to ascertain whether the large differences in initial yields between value and growth properties can be justified by the differences in future rental growth rates.

Panel B of Table 4 reveals that the average quarterly incremental portfolio growth rate for rental income for the growth industrial property portfolio was 20.43% compared to -1.47% for the value industrial property portfolio over the pre-portfolio formation period.

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[4] The results are presented in the appendix as a regional analysis of the topic is beyond the scope of this paper. We are currently working on a forthcoming paper, "Contrarian Real Estate Investment: A Regional Analysis" (to be submitted to JREFE) which deals with the topic on both regional and property type bases.

Every dollar invested in the value portfolio in 1994Q3 had a claim to 5.16 cents of the then existing corresponding rental income, while a dollar invested in the growth portfolio was a claim to 2.05 cents of the rental income (Panel A of Table 4). Ignoring any difference in required rates of return, the large differences in initial yields have to be justified by an expectation of higher incremental rental growth rates for growth than value portfolios over a period of time. Thus, the expected rental income for the growth portfolio must be higher than the value portfolio at some future date. In view of this, investors might like to know the number of quarters it would take for the rental income per dollar invested in the growth portfolios (0.0205) to equate to the rental income of the value portfolio (0.0516), assuming that the differences in past incremental rental income growth rates would persist. It would take approximately five quarters for such equalization to occur (see Table 5). This is good news for naïve extrapolators who can foresee their glamour investments catching up and far outperforming value investments after only five quarters. Note that this equality is based on a flow basis. It would require a longer time period over which growth properties should experience superior growth to affect this equality if the analysis is on a present value basis.

Table 5

Unfortunately, a comparison of Panels B and C (Table 4) show that the relatively higher expected incremental future growth (implied by the higher incremental growth rate in the pre-formation period) for the glamour portfolios during the post-formation period was a far cry from reality. The actual post-formation incremental rental growth rate for glamour industrial property portfolios plummeted by 91.39% from 20.43% to 1.76% per quarter. Alternatively, the post-formation incremental rental growth rate for the value industrial property portfolios increased by 197.28% from -1.47% to 1.43%. These results are consistent with the extrapolation model. Contrarian(value)/growth investors were pleasantly/unpleasantly surprised by the post formation portfolio results. Rental is, however, a portion of portfolio performance. Capital value is an important portion of a portfolios performance and thus, must be analyzed in relation to the extrapolation model.

During the pre-formation period, the incremental capital value growth rate for the glamour industrial portfolio of -1.21% was higher than that for value industrial portfolio of -7.45% (Table 4). The results in Table 4 (Panels B and C) reveal that while the incremental capital value growth rate for the growth industrial portfolio increased by 108.26% from -1.21% to 0.10%, that for the value industrial portfolio also increased by 165.5% from -7.45% to 4.88% per quarter during the post-formation period. Once again, the results are consistent with the extrapolation model.

The pertinent question that needs to be addressed at this juncture is whether, given the post-formation performance of increased capital value growth rates for the growth and value industrial portfolios, the growth portfolio can outperform the value portfolio at some time in the future. This is addressed via a mean reversion analysis.

Variance Ratio Test

The results of the variance ratio tests are presented in Table 6. The returns for both the growth and value portfolios display mean reversion in all the holding periods under consideration. These results imply that the superior performance of the contrarian value strategy is not a flash in the pan – and that it will persist in future years.

Table 6

Conclusions

This study set out to investigate the comparative advantage(s) of the value and growth investment strategies to ascertain the sustainability of the superior performance (if any) of the contrarian (value) strategy for industrial property. The results indicate that the value industrial property portfolios out-performed (in both absolute, and in most cases, risk-adjusted bases) the growth industrial property portfolios over all the holding periods under consideration. A dollar invested in the value industrial property portfolio over 10 years earned 299.57% (based on mean return) or 249.38% (based on median return) more than a dollar invested in the growth industrial property portfolios. Similarly, a dollar invested in the value industrial property portfolios over the entire period of study earned 1733.60% (based on mean return) or 1499.01% (based on median return) more than a similar investment in the growth industrial property portfolios. The difference between the performances of the value and the growth portfolios are statistically significant at the 0.01 level. Thus, the null hypothesis that there is no difference between the mean returns for the two portfolios is rejected. It must be cautioned though that the analyses did not account for management considerations and trading costs. However, it is doubtful whether these considerations could materially change the results.

Furthermore, the superior performances of value portfolios occurred in all the four "states of the world". The superior performance is not a compensation for higher risk as measured by the coefficient of variation (CV) for investment horizons of up 15 years. These findings are consistent with the contrarian strategy in finance. It must be noted, however, that the superior performance of the contrarian (value) strategy for investment horizons of more than 15 years could be a compensation for higher risk, as measured by the CV. Notwithstanding this caveat, the relative superiority of the value portfolio for each holding period is confirmed by stochastic dominance tests, which indicate that the value strategy is the optimal choice for both risk averters and risk lovers. In addition, the variance ratio test reveals that returns for both value and growth portfolios exhibit mean reversion at medium and long investment horizons. This means that the superior performance of the contrarian strategy is sustainable. The consistency of the results with the finance literature cannot be attributed to data snooping, as the studies in the finance literature are based on different data.

Notwithstanding the consistency of the above results with the finance literature, one should note the significant differences between the studies in finance (based on stocks) and this study which is based on real property. Apart from the difference in liquidity of assets, studies in the finance literature are based on prices while this study is based on valuation estimates (capital values) and market rentals. Furthermore, while the studies in finance are based on prices of individual stocks, this study is based on sub-market averages. Although one may argue about the validity of results based on averages, the fact that the results are consistent with the finance literature may imply that it may not be prudent for one to tersely underestimate the validity of the results. After all, all studies that are based on market indices are based on average market figures. More research is, however, needed before any firm conclusion can be made.

The findings imply that high initial yield industrial property portfolios in the sample outperformed their low yield counterparts during the period under investigation. The fact that value investment provides a statistically significant abnormal value premium, vis-à-vis the fact that the price of a growth property could, perhaps, buy two or more value properties implies that it may be doubly advantageous to invest in value properties. If the results can be generalized in any way, one may safely conclude that industrial property investors should seriously consider the contrarian (value) real estate investment strategy to improve the performance of their portfolios.

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Table 1a: Descriptive Return Statistics						
Holding Period	Mean Return (%)		Standard Deviation		Coefficient of Variation	
	Value	Growth	Value	Growth	Value	Growth
5 Years	169.92	40.26	129.40	34.34	0.76	0.85
10 Years	405.03	105.46	186.90	58.90	0.46	0.56
15 Years	1051.21	184.75	232.23	51.40	0.22	0.28
> 15 Years	1992.29	258.69	964.00	88.99	0.48	0.34

Table 1b: Median versus Mean Returns

Holding Period	Cumulative Median Return (%)			Cumulative Mean Return (%)		
	Value (V)	Growth (G)	V-G Spread	Value (V)	Growth (G)	V-G Spread
5 Years	139.52	45.66	93.86	169.92	40.26	129.66
10 Years	339.16	89.90	249.36	405.03	105.46	299.57
15 Years	1110.88	178.72	932.16	1051.21	184.75	866.46
>15 Years	1720.27	221.25	1499.02	1992.29	258.69	1733.60

Table 2a: Equality of Means Test

Holding Period	Value-Growth Spread	t-test	Test statistic t	p-value	$\alpha = 0.01$	$\alpha = 0.05$
5 Years	129.66	Pooled-variance	7.75	0.000	Reject	Reject
		Separate-variance	7.75	0.000	Reject	Reject
10 Years	299.57	Pooled-variance	10.14	0.000	Reject	Reject
		Separate-variance	10.14	0.000	Reject	Reject
15 Years	866.46	Pooled-variance	17.85	0.000	Reject	Reject
		Separate-variance	17.85	0.000	Reject	Reject
> 15 Years	1733.60	Pooled-variance	8.21	0.000	Reject	Reject
		Separate-variance	8.21	0.000	Reject	Reject

Table 2b: Equality of Variance Test

Holding Period	Standard Deviation		F-test statistics	p-value	$\alpha = 0.01$	$\alpha = 0.05$
	Value	Growth				
Quarterly	5.27	2.29	5.30	0.000	Reject	Reject
5 Years	129.40	34.34	64.89	0.000	Reject	Reject
10 Years	186.90	58.90	22.64	0.000	Reject	Reject
15 Years	232.23	51.40	28.11	0.000	Reject	Reject
> 15 Years	964.00	88.99	56.01	0.000	Reject	Reject

Table 3: Performance of Portfolios in Different States of the World							
States of the World	Mean value	Mean Growth	Mean Spread	Tests for equality of Means			
				t-test	Test statistic t	p-value	$\alpha = 0.05$
Worst period	4.41	-0.23	4.64	Pooled-variance	4.31	0.000	Reject
				Separate-variance	4.31	0.000	Reject
Next worst Period	5.69	-0.32	6.01	Pooled-variance	4.55	0.000	Reject
				Separate-variance	4.55	0.000	Reject
Next best Period	6.17	2.14	4.04	Pooled-variance	4.84	0.000	Reject
				Separate-variance	4.84	0.000	Reject
Best Period	8.05	2.33	5.72	Pooled-variance	3.68	0.000	Reject
				Separate-variance	3.68	0.001	Reject

Table 4: Initial Yields, Past and Future Performances of Value and Growth Properties Industrial Properties

Panel A: Initial Yields			
		Value	Growth
1994 Q3	Initial Yield	5.16	2.05
1994 Q4	Portfolio Composition	Ford Lauderdale	Memphis
		Orlando	Sydney
		Tampa	Brisbane
			AuckLand

Panel B: Past Performances of Industrial Properties				
	Value		Growth	
Year	Capital Growth (%)	Rental Growth (%)	Capital Growth (%)	Rental Growth (%)
1985Q1	3.49	-10.04	0.33	28.09
1985Q2	9.78	-2.77	-0.30	17.08
1985Q3	10.42	-10.74	1.11	53.13
1985Q4	8.07	-13.11	2.33	75.05
1986Q1	14.48	34.09	-0.10	1.96
1986Q2	8.26	14.43	4.34	133.92
1986Q3	7.47	-13.38	-3.22	57.14
1986Q4	-2.62	-8.56	-2.13	25.23
1987Q1	-3.56	-0.41	-1.16	25.14
1987Q2	5.50	3.74	-1.80	12.58
1987Q3	4.99	-1.61	-1.68	-2.32
1987Q4	19.25	-6.02	-5.43	-2.21
1988Q1	9.96	-12.62	-0.30	10.18
1988Q2	2.03	-28.59	0.55	2.81
1988Q3	3.50	-10.86	-0.31	14.89
1988Q4	0.71	-13.76	-1.30	10.39
1989Q1	-4.77	-14.75	0.07	44.75
1989Q2	-7.09	-9.42	0.01	6.44
1989Q3	-7.01	-2.32	0.23	-9.88
1989Q4	-15.02	-8.35	-1.73	85.05
1990Q1	-23.97	-3.15	-4.31	-0.15
1990Q2	-79.20	-17.69	-0.23	0.91
1990Q3	-81.46	39.75	-2.43	46.27
1990Q4	19.05	26.34	-4.04	15.10
1991Q1	13.41	21.41	-1.19	49.70
1991Q2	6.68	-9.09	-2.47	1.62
1991Q3	8.19	9.93	-2.51	6.49
1991Q4	-5.01	7.03	-7.32	43.55
1992Q1	-6.58	1.42	-0.89	4.04
1992Q2	-10.22	0.80	-3.10	20.29
1992Q3	-17.40	-16.83	-2.54	-0.33
1992Q4	5.87	2.57	-4.30	20.04
1993Q1	1.43	16.89	-3.06	6.91
1993Q2	-5.41	-1.78	-2.42	-0.14
1993Q3	-5.58	-18.94	-2.46	7.45
1993Q4	-19.91	-1.10	-3.14	33.85

Panel B Continued:

Panel B: Past Performances of Industrial Properties				
	Value		Growth	
Year	Capital Growth (%)	Rental Growth (%)	Capital Growth (%)	Rental Growth (%)
1994Q1	-45.04	-8.95	-2.73	20.38
1994Q2	73.58	50.95	8.40	8.40
1994Q3	19.71	1.65	2.02	15.55
1994Q4	-6.31	3.17	2.06	32.13
Geometric Average Growth Rate	-7.45	-1.47	-1.21	20.43

Panel C: Future Performances of Industrial Properties				
	Value		Growth	
Year	Capital Growth	Rental Growth	Capital Growth	Rental Growth
1995Q1	-9.86	12.95	1.30	6.14
1995Q2	3.55	1.24	1.16	-15.97
1995Q3	-2.22	10.48	-0.04	-14.62
1995Q4	0.49	-1.63	-0.72	35.19
1996Q1	3.43	6.28	2.83	49.37
1996Q2	-0.68	-1.06	0.36	-7.04
1996Q3	-3.21	-0.52	0.55	-11.06
1996Q4	11.81	5.63	0.56	35.99
1997Q1	-1.85	0.48	2.57	8.30
1997Q2	-1.07	-0.81	0.78	-10.67
1997Q3	9.08	1.93	1.59	4.66
1997Q4	1.92	-10.39	2.17	-5.20
1998Q1	-5.03	15.17	0.57	2.19
1998Q2	-1.20	-4.76	4.46	-4.61
1998Q3	-17.24	4.44	1.97	-22.83
1998Q4	-9.80	2.70	0.26	-17.75
1999Q1	-12.91	8.69	0.38	-5.93
1999Q2	15.41	0.36	1.01	0.30
1999Q3	7.36	-1.30	0.80	-8.00
1999Q4	-8.96	5.52	2.19	21.93
2000Q1	-23.09	-1.66	1.29	1.93
2000Q2	-18.13	2.17	1.10	6.85
2000Q3	-109.70	3.38	0.14	-19.98
2000Q4	-51.56	1.09	0.27	19.42
2001Q1	-167.77	2.84	1.02	14.03
2001Q2	401.62	0.71	0.78	6.18
2001Q3	23.38	0.94	1.34	7.47
2001Q4	22.95	-4.79	-0.58	72.33
2002Q1	-21.36	-0.31	-0.63	-2.24
2002Q2	22.64	0.25	-0.29	-4.13
2002Q3	60.71	-4.14	0.84	-10.59
2002Q4	-1.06	8.12	0.40	-6.92
2003Q1	37.16	-0.14	-9.98	23.37
2003Q2	-0.20	-4.44	-0.18	-0.63
2003Q3	12.40	-1.43	-5.64	-21.03
2003Q4	6.83	2.50	-1.56	-3.94
2004Q1	-6.19	-4.01	-11.51	13.44
2004Q2	-0.26	2.82	2.71	5.39
2004 Q3	30.22	1.22	1.56	-10.12
Geometric Average Growth Rate	4.88	1.43	0.10	1.76

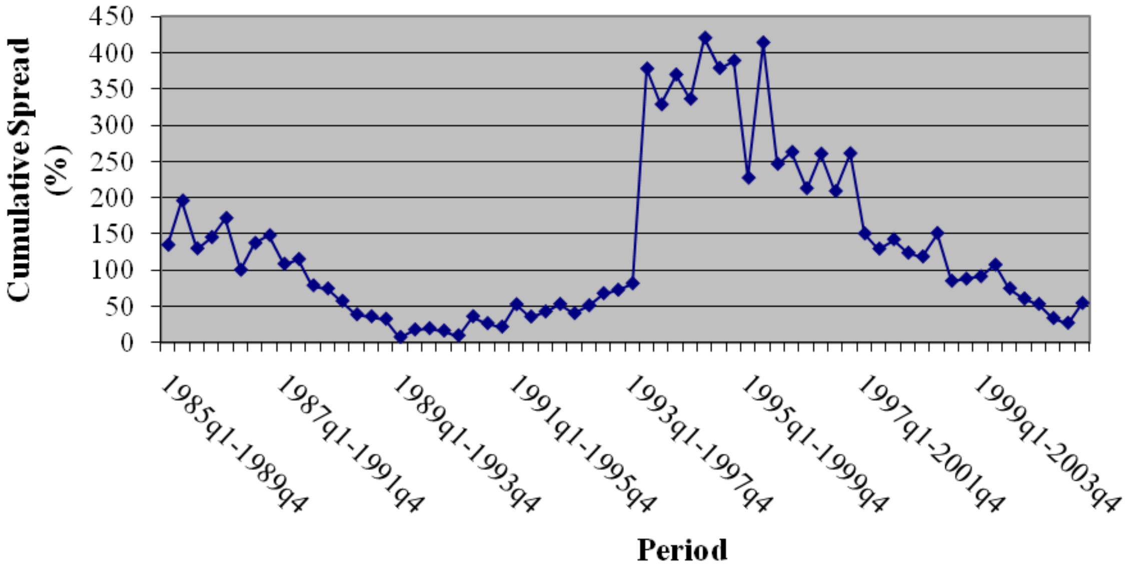
Table 5: Growth of Industrial Sector's Rental Income Per Dollar Invested (4th Quarter 1994)

Quarters	Value Portfolio	Growth Portfolio	Quarters	Value Portfolio	Growth Portfolio
0	5.16	2.05	4	4.86	4.31
1	5.08	2.47	5	4.78	5.19
2	5.01	2.97			
3	4.94	3.58			

Table 6: Variance Ratio Test

Investment Horizon	Variance Ratio	
	Value Portfolio	Growth Portfolio
4 Quarters	5.896	0.712
20 Quarters	0.298	0.712
40 Quarters	0.523	0.659
60 Quarters	0.254	0.479
80 Quarters	0.050	0.354

Figure 1: Value-Growth Spread for 5-Year Holding Period



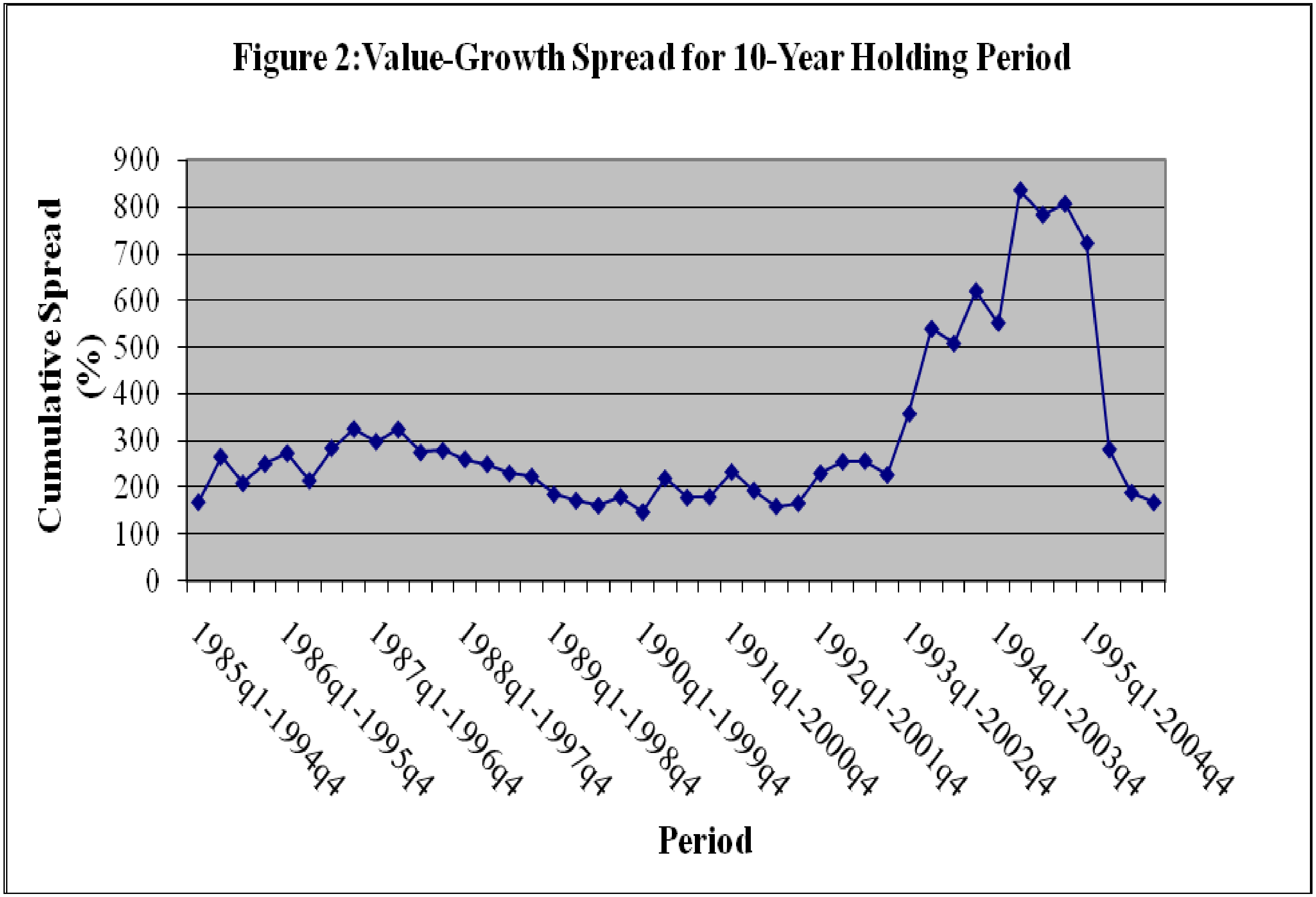


Figure 2:Value-Growth Spread for 10-Year Holding Period
Cumulative Spread (%)
900
800
700
600
500
400
300
200
100
0
1985q1-1994q4
1986q1-1995q4
1987q1-1996q4
1988q1-1997q4
1989q1-1998q4
1990q1-1999q4
1991q1-2000q4
1992q1-2001q4
1993q1-2002q4
1994q1-2003q4
1995q1-2004q4
Period

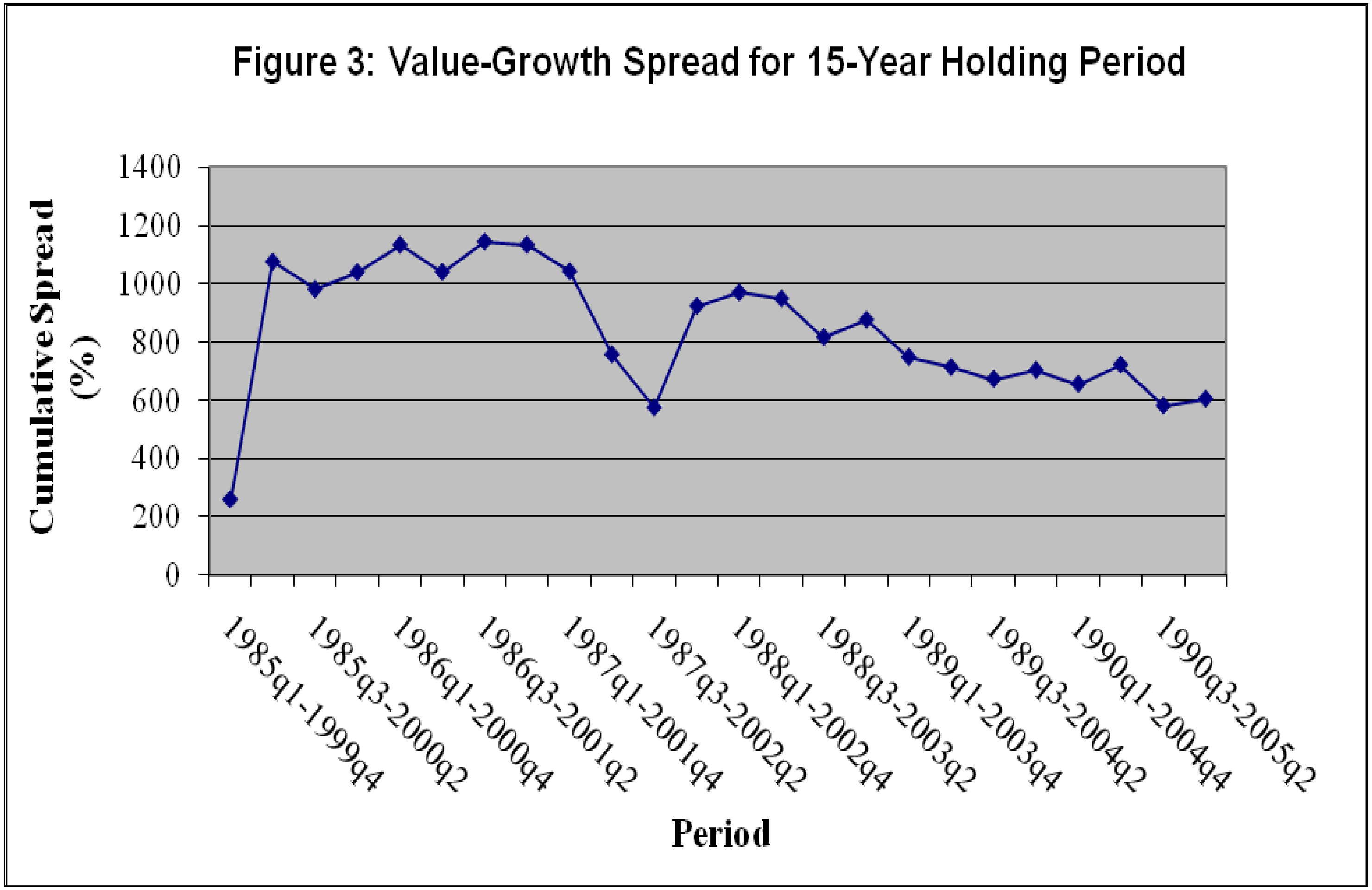


Figure 3: Value-Growth Spread for 15-Year Holding Period
Cumulative Spread (%)
1400
1200
1000
800
600
400
200
0
1985q1-1999q4
1985q3-2000q2
1986q1-2000q4
1986q3-2001q2
1987q1-2001q4
1987q3-2002q2
1988q1-2002q4
1988q3-2003q2
1989q1-2003q4
1989q3-2004q2
1990q1-2004q4
1990q3-2005q2
Period

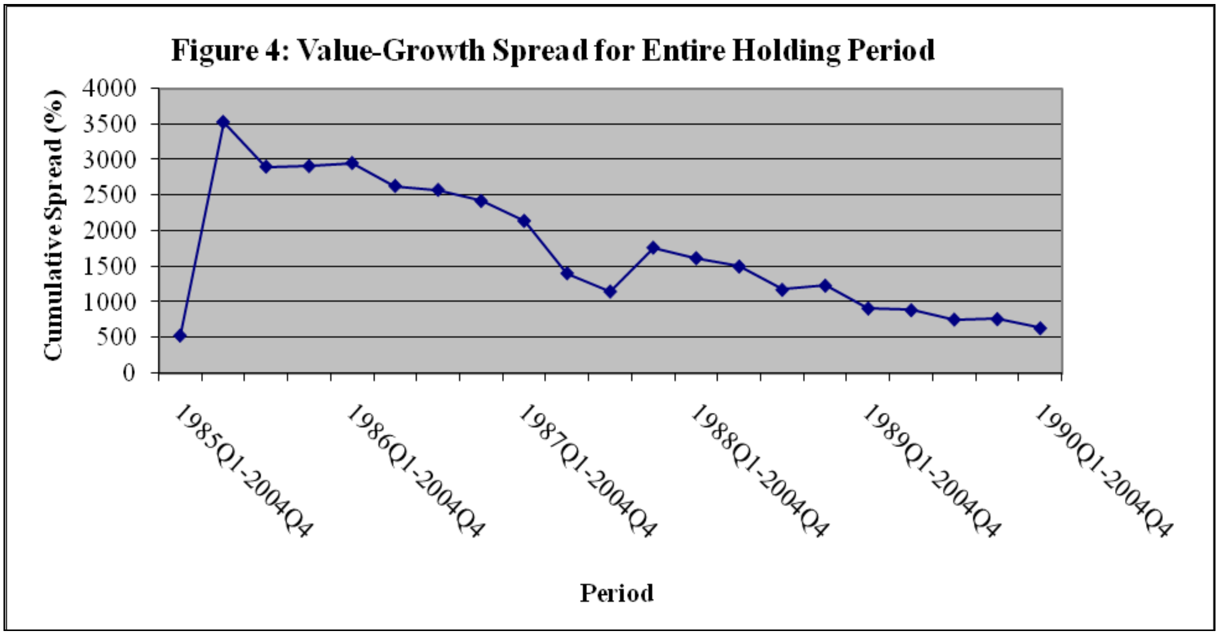


Figure 4: Value-Growth Spread for Entire Holding Period
Cumulative Spread (%)
4000
3500
3000
2500
2000
1500
1000
500
0
1985Q1-2004Q4
1986Q1-2004Q4
1987Q1-2004Q4
1988Q1-2004Q4
1989Q1-2004Q4
1990Q1-2004Q4
Period

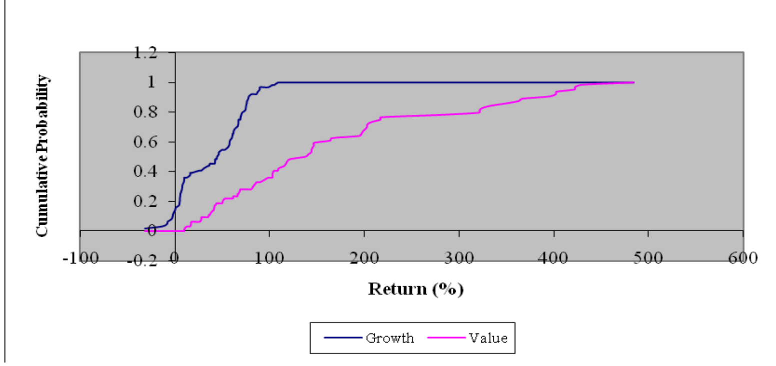


Figure 5a: Stochastic Dominance Analysis for 5-Year Holding Period

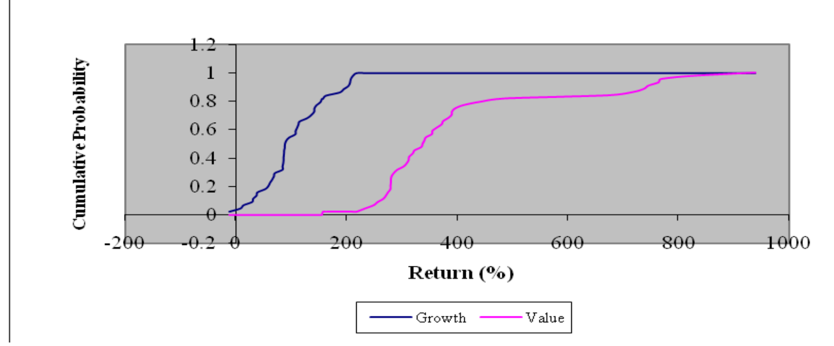


Figure 5b: Stochastic Dominance Analysis for 10-Year Holding Period

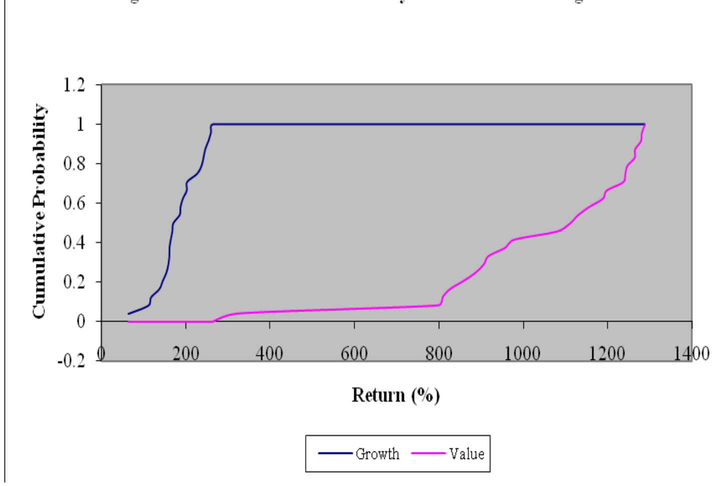


Figure 5c: Stochastic Dominance Analysis for 15-Year Holding Period

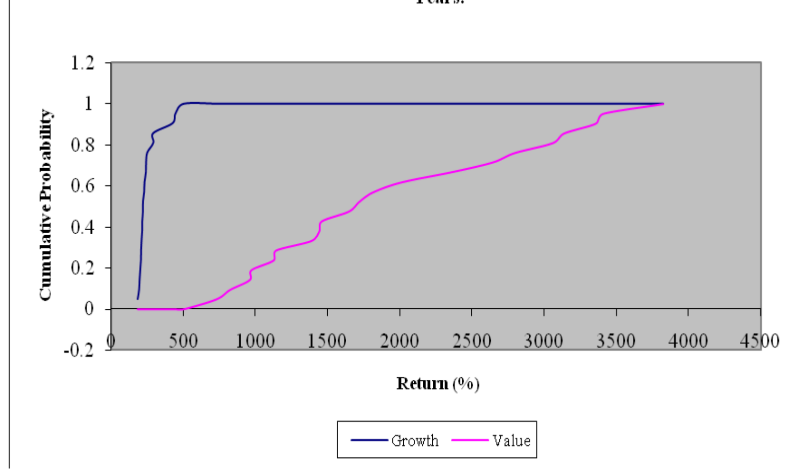


Figure 5d: Stochastic Dominance Analysis for Holding Period Exceeding 15 Years.

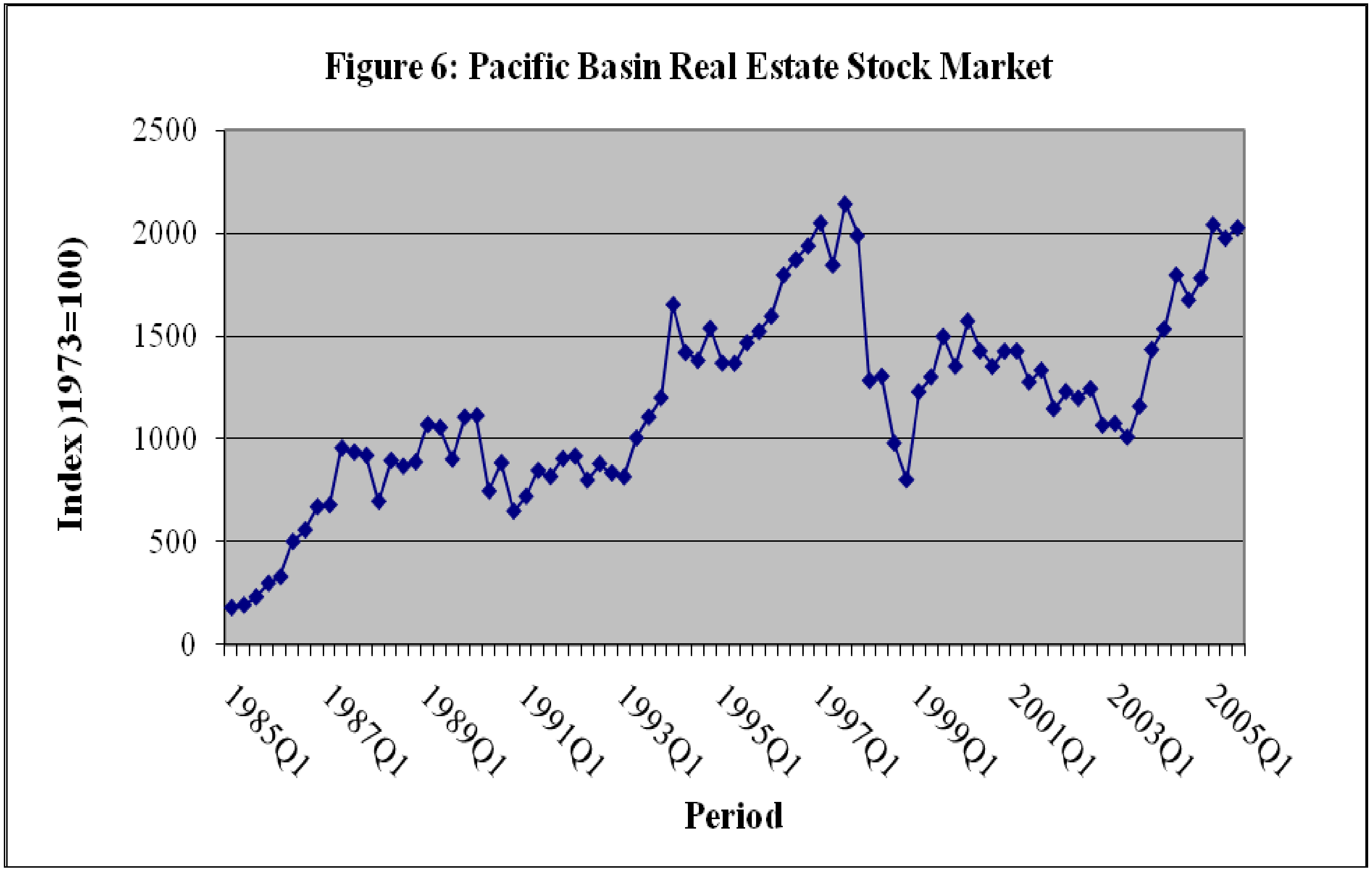


Figure 6: Pacific Basin Real Estate Stock Market
2500
2000
1500
1000
500
0
Index)1973=100)
1985Q1
1987Q1
1989Q1
1991Q1
1993Q1
1995Q1
1997Q1
1999Q1
2001Q1
2003Q1
2005Q1
Period

Appendix A-1: Cities in the Portfolios

Code	Country	Code	Country
1	Atlanta	27	Oklahoma City
2	Austin	28	Orlando
3	Baltimore	29	Oxnard
4	Boston	30	Philadelphia
5	Cambridge	31	Phoenix
6	Camden	32	Portland
7	Charlotte	33	Reno
8	Chicago	34	Riverside
9	Cincinnati	35	Sacramento
10	Columbus	36	St. Louis
11	Dallas	37	Salt Lake City
12	Denver	38	San Diego
13	Edison	39	San Francisco
14	Fort Lauderdale	40	San Jose
15	Fort Worth	41	Santa Ana
16	Houston	42	Seattle
17	Indianapolis	43	Tacoma
18	Kansas City	44	Tampa
19	Lake County	45	Warren
20	Los Angeles	46	Washington
21	Louisville	47	Wilmington
22	Memphis	48	Worcester
23	Miami	49	Sydney
24	Minneapolis	50	Melbourne
25	New York	51	Brisbane
26	Oakland	52	Auckland(nz)

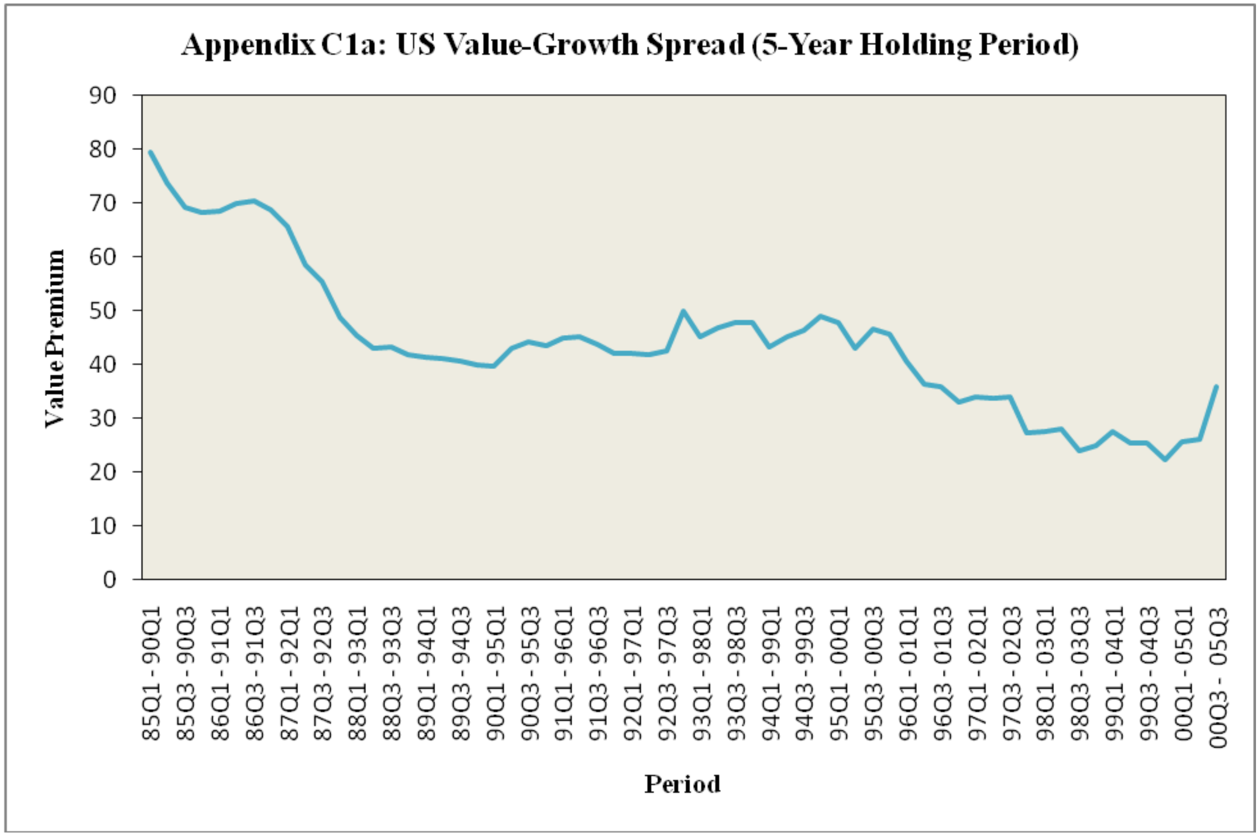
Appendix A-2: Composition of Value and Growth Portfolios

Year	Country Code		Year	Country Code	
	Growth Properties	Value Properties		Growth Properties	Value Properties
1985Q1	16	3	1995Q3	12,15,44	22,31,52
1985Q2	16,40	15,49	1995Q4	13,14,34	10,22,52
1985Q3	3,36	22,49	1996Q1	3,44,51	2,42,52
1985Q4	3,31	22,49	1996Q2	2,12,46	40,44,52
1986Q1	16,31	46,49	1996Q3	3,14,23	6,25,52
1986Q2	3,31	15,49	1996Q4	14,17,23	32,50,52
1986Q3	16,36	3,49	1997Q1	10,15,34,35	17,32,46,52
1986Q4	16,28	22,49	1997Q2	14,17,20,35	16,24,44,52
1987Q1	16,28	22,49	1997Q3	3,14,34,35	2,17,49,52
1987Q2	16,31	22,49	1997Q4	3,17,26,34	24,37,50,52
1987Q3	26,40	22,49	1998Q1	3,14,28,34	16,25,50,52
1987Q4	16,40	22,49	1998Q2	17,26,40,42	12,25,50,52
1988Q1	6,16	3,49	1998Q3	3,13,17,26	14,16,28,52
1988Q2	6,16	15,49	1998Q4	3,26,40,44	8,9,27,52
1988Q3	6,16	22,49	1999Q1	10.17,26,37	18,25,27,52
1988Q4	16,28	3,49	1999Q2	12,14,26,37	27,33,51,52
1989Q1	6,16	1,49	1999Q3	10,26,40,44	9,25,30,52
1989Q2	16,34	22,49	1999Q4	14,26,34,44	5,30,35,52
1989Q3	15,31	9,49	2000Q1	1,17,26,35	5,9,13,52
1989Q4	15,28	8,49	2000Q2	14,17,29,48	6,15,24,52
1990Q1	9,28	44,49	2000Q3	13,17,31,48	9,40,44,52
1990Q2	6,31	16,49	2000Q4	13,14,29,31	18,27,35,52
1990Q3	10,28	22,49	2001Q1	13,17,25,33	7,15,27,51
1990Q4	1,10	17,49	2001Q2	5,13,25,39,42	2,15,30,33,51
1991Q1	20,46	15,49	2001Q3	13,25,27,33,44	2,3,16,29,30
1991Q2	10,20,44	4,22,49	2001Q4	1,13,14,39,44	6,29,33,51,52
1991Q3	9,20,46	16,36,49	2002Q1	15,16,25,33,39	2,30,36,44,52
1991Q4	4,17,44	22,42,49	2002Q2	8,23,25,33,39	30,36,45,48,50
1992Q1	4,34,35	20,44,49	2002Q3	6,13,25,33,39	24,29,36,45,48
1992Q2	4,22,35	13,14,49	2002Q4	13,14,25,43,44	2,12,18,29,52
1992Q3	4,35,41	13,16,49	2003Q1	12,14,16,27,33	2,37,45,50,51
1992Q4	4,28,35	22,44,49	2003Q2	10,12,16,33,38	30,43,45,50,52
1993Q1	13,35	22,28,49	2003Q3	23,33,36,38,43	7,10,26,30,45
1993Q2	17,34,35	22,49,52	2003Q4	6,27,33,35,44	19,23,30,45,52
1993Q3	4,35,41	22,49,52	2004Q1	6,23,35,36,44	10,26,30,45,52
1993Q4	22,28,35	44,49,52	2004Q2	5,14,23,41,43	10,30,33,45,52
1994Q1	4,6,35	44,49,52	2004Q3	6,14,23,36,47	10,30,45,51,52
1994Q2	3,4,35	49,51,52	2004Q4	4,14,23,28,50	2,30,33,51,52
1994Q3	8,14,35	49,51,52	2005Q1	5,6,23,47	44,45,46,52
1994Q4	14,28,44	49,51,52	2005Q2	5,15,30,35	10,18,,27,44
1995Q1	14,28,46	49,51,52	2005Q3	5,25,30,40	21,22,37,52
1995Q2	6,14,46	49,51,52			

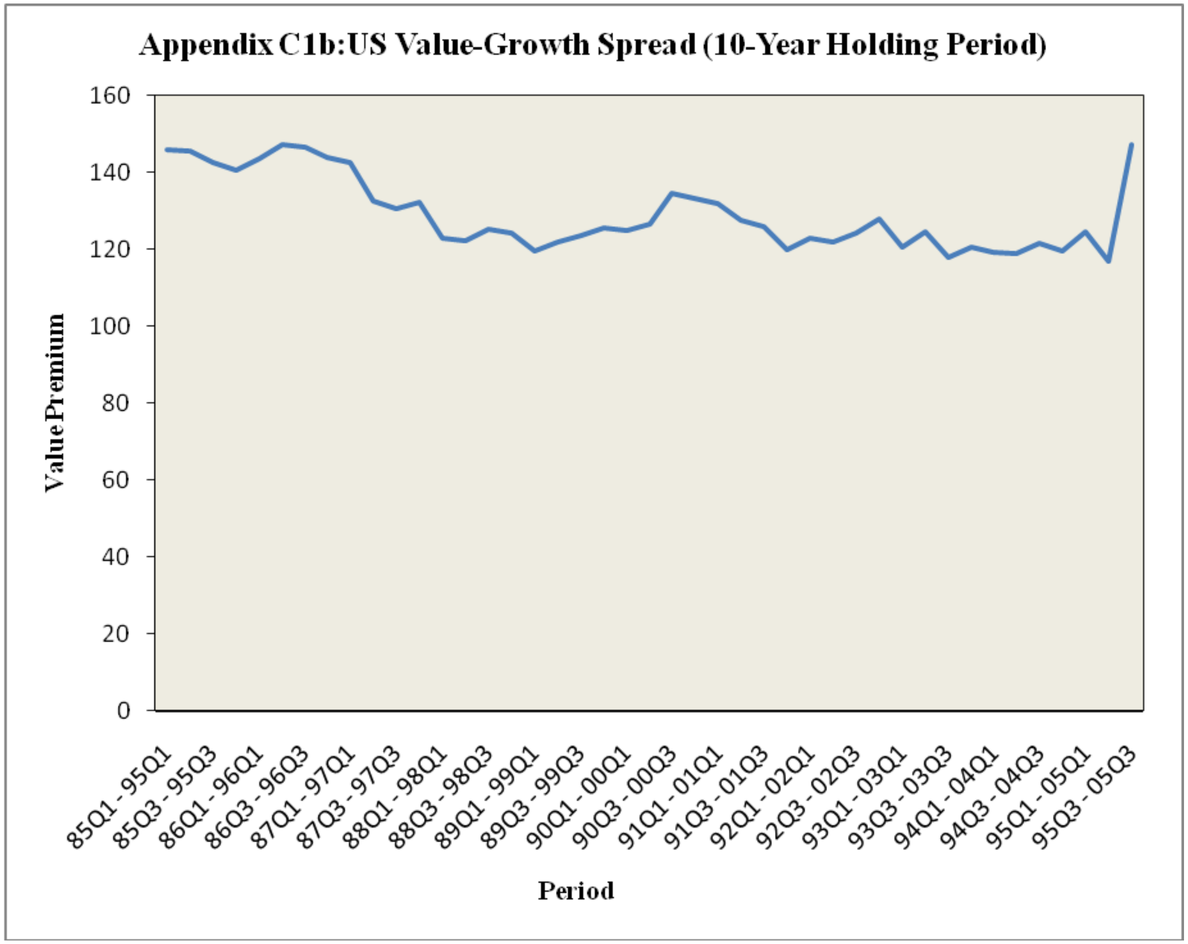
Appendix B: States of the World

Year	State	Year	State	Year	State	Year	State
1985Q1	W	1990Q2	W	1995Q3	NB	2000Q4	NB
1985Q2	W	1990Q3	NW	1995Q4	B	2001Q1	NB
1985Q3	W	1990Q4	W	1996Q1	B	2001Q2	NB
1985Q4	W	1991Q1	W	1996Q2	B	2001Q3	NB
1986Q1	W	1991Q2	W	1996Q3	B	2001Q4	NW
1986Q2	W	1991Q3	W	1996Q4	B	2002Q1	NB
1986Q3	W	1991Q4	NW	1997Q1	B	2002Q2	NB
1986Q4	W	1992Q1	NW	1997Q2	B	2002Q3	NB
1987Q1	W	1992Q2	W	1997Q3	B	2002Q4	NW
1987Q2	NW	1992Q3	W	1997Q4	B	2003Q1	NW
1987Q3	NW	1992Q4	W	1998Q1	NB	2003Q2	NW
1987Q4	NW	1993Q1	W	1998Q2	NB	2003Q3	NW
1988Q1	W	1993Q2	NW	1998Q3	NW	2003Q4	NB
1988Q2	NW	1993Q3	NW	1998Q4	W	2004Q1	B
1988Q3	Worst	1993Q4	NB	1999Q1	NB	2004Q2	B
1988Q4	NW	1994Q1	B	1999Q2	NB	2004Q3	B
1989Q1	NW	1994Q2	NB	1999Q3	B	2004Q4	B
1989Q2	NW	1994Q3	NB	1999Q4	NB	2005Q1	B
1989Q3	NW	1994Q4	B	2000Q1	B	2005Q2	B
1989Q4	NW	1995Q1	NB	2000Q2	NB	2005Q3	B
1990Q1	NW	1995Q2	NB	2000Q3	NB		

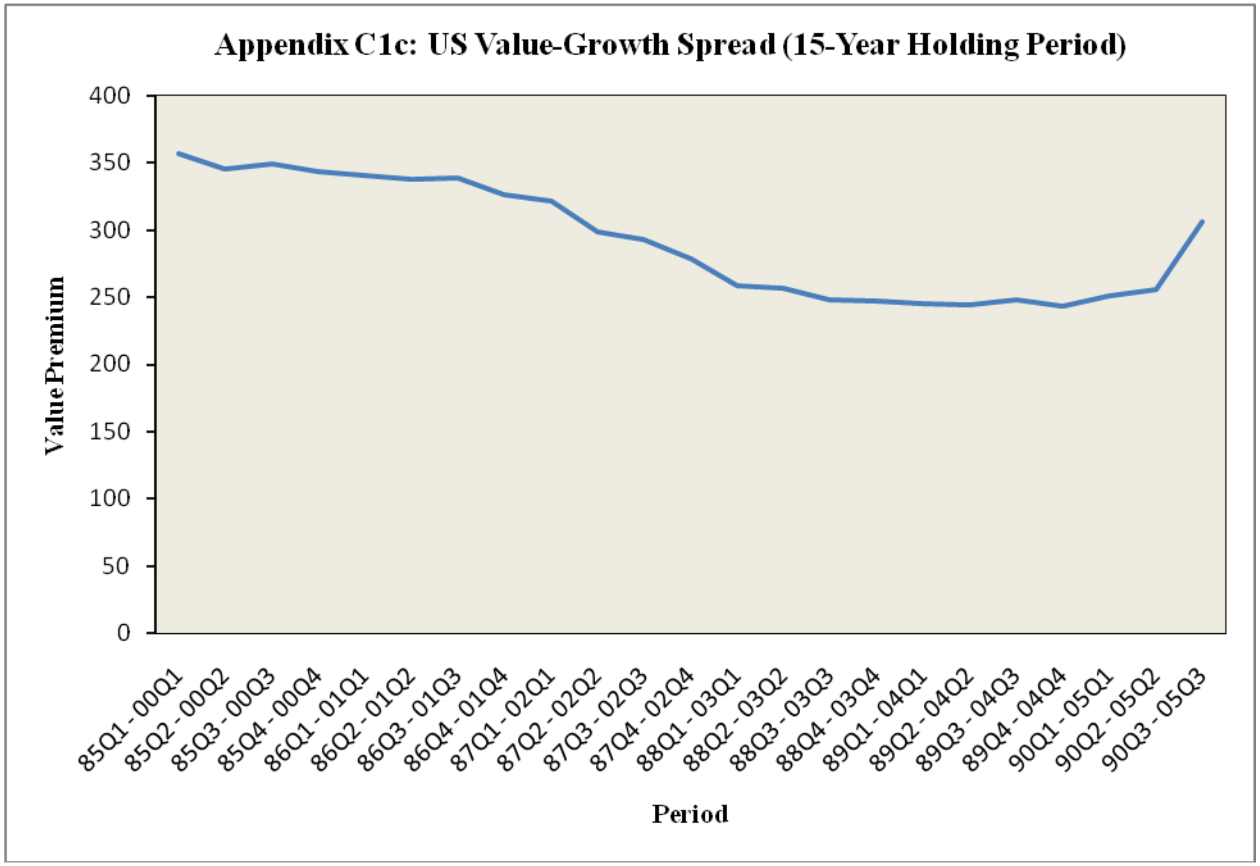
W=Worst , NW=Next Worst , NB= Next Best , B=Best



100% positive Value-Growth spread.



100% positive Value-Growth spread.



100% positive Value-Growth spread.
Note: The value-growth spread increases with the length of the holding period.

Appendix C2a: Descriptive Return Statistics

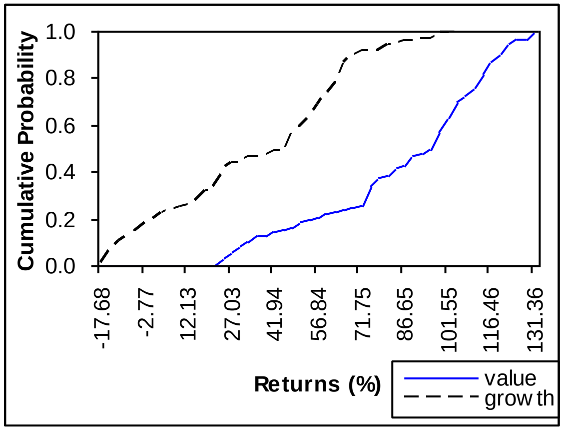
Holding Period	Mean Return (%)		Standard Deviation		Coefficient of Variation	
	Value	Growth	Value	Growth	Value	Growth
5 Years	71.26	27.22	28.14	31	0.39	1.14
10 Years	189.77	60.7	45.88	50.8	0.24	0.83
15 Years	379.12	86.39	31.62	15.12	0.08	0.17

Value is safer than growth in all periods as measured by CV and even as measured by standard deviation apart from 15-year holding period.

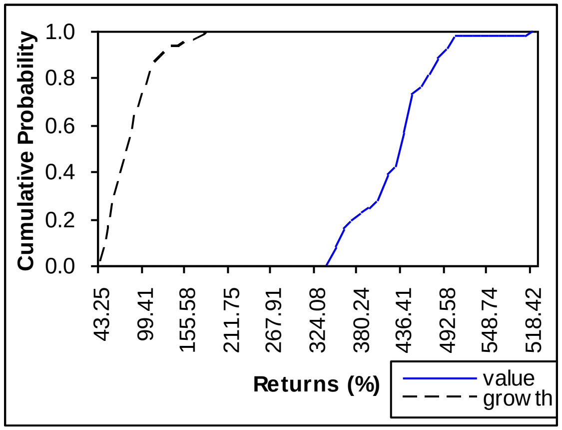
Appendix C2b: Median versus Mean Return

Holding Period	Cumulative Median Return (%)			Cumulative Mean Return (%)		
	Value (V)	Growth (G)	V-G Spread	Value (V)	Growth (G)	V-G Spread
5 Years	73.85	26.79	47.06	71.26	27.22	44.04
10 Years	169.09	42.67	126.42	189.77	60.70	129.07
15 Years	376.34	86.40	289.94	379.12	86.39	292.73

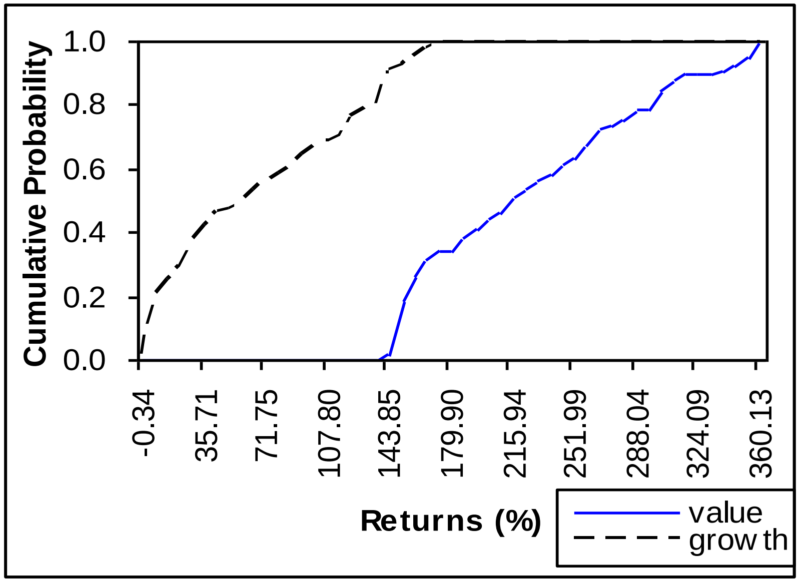
Appendix C3a – FSD: 5-Year Holding Period



Appendix C3c – FSD: 15-Year Holding Period



Appendix C3b – FSD: 10-Year Holding Period



Appendix C4: Test for Equality of Means for U.S. Portfolios							
Sector	**Holding Period**	**Value-Growth**	**t-test**	**t-value**	**p-value**	**α = 0.01**	**α = 0.05**
Industrial			separate variance	7.22	0.000	reject	reject
	5 years	44.04%	pooled variance	10.90	0.000	reject	reject
			separate variance	10.90	0.000	reject	reject
	10 years	129.07%	pooled variance	15.46	0.000	reject	reject
			separate variance	15.46	0.000	reject	reject
	15 years	292.73%	pooled variance	44.38	0.000	reject	reject
			separate variance	44.38	0.000	reject	reject

The null hypothesis that there is no statistical difference between the means of the two portfolios is rejected at both the 0.01 and 0.05 levels of significance. In other words, the superior performance of value over growth US industrial property portfolio is statistically significant.