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Does This Dog Hunt?
Testing the Performance of the Dogs of the Dow Strategy in the U.S. and in Brazil

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Michael Austin

This study analyzes the performance of the Dogs of the Dow Jones (DoD) investment strategy in the U.S and in Brazil on an absolute and on a risk adjusted basis. The DoD is a value oriented strategy that calls for investing equal dollar amounts in the highest yielding components of the Dow Jones. Our performance evaluation findings demonstrate that the DoD strategy shows only limited evidence that it can add value as an investment strategy in the U.S stock market. The use of the DoD strategy in Brazil shows virtually no evidence that it can add value as an investment strategy. Our analysis suggests that the dividend yield may not be a good variable to select value stocks in the U.S and in Brazil given existing empirical evidence that value stocks have outperformed growth stocks in these markets.

1 INTRODUCTION

The Dogs of the Dow Jones (DoD) is a value oriented strategy that became popular in the United States recently due to its simplicity and its alleged ability to outperform popular market indices. The theoretical basis for a value oriented strategy is that the stock's current price is low relative to the book value, earnings, dividends, cash flow or other measures of value. The DoD strategy comes in a variety of versions, all of which call for investing equal amounts in the highest yielding components of the Dow Jones Industrial Average. One year later, the portfolio is rebalanced and updated with equally weighted investments in the new DoD stocks.

The theoretical basis for the strategy can be traced to the theory of corporate dividend policy. The numerator of dividend yield is the annualized dividend payout and the denominator is the stock's current price. Corporations strive to maintain stable dividend payouts to avoid sending undesirable signals to the markets about the company's future

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business prospects. If the market driven equity prices exceed (fall below) intrinsic market values, they will produce lower (higher) dividend yields, due to the more stable policy driven dividend payout.

Recent empirical research by Fama and French (1992) is consistent with a high dividend yield strategy outperforming the market. They argue that observed excess returns represent market compensation for risk associated with investments in small capitalization stocks and company specific distress risk impounded in share prices. They find that market capitalization and book-to-market equity explain observed stock returns. Variables like price-to-earnings, book-to-market equity, and dividend yield are all scaled versions of a firm's stock price. Therefore, to the extent the DoD strategy outperforms the market proponents of efficient markets would argue that the DoD strategy is capturing the information impounded in dividend yield which Fama and French found in the book-to-market equity ratio.

Fama and French (1992, 1993, 1996) argue that value strategies are fundamentally riskier and therefore the higher average returns associated with high book-to-market stocks reflect compensation for bearing this risk. Lakonishok, Shleifer and Vishny (1994), however, argue that value strategies yield higher returns because investors are able to identify mispriced stocks and not because they are fundamentally riskier.

Capaul, Rowley and Sharpe (1993) document the superior performance of the value investing strategies in six countries over the period from 1981 through 1992. McQueen, Shields and Thorley (1997) report that the DoD strategy beats the Dow Jones statistically; however, after adjusting for the DoD portfolio's higher risk, extra transaction costs, and unfavorable tax treatment, the DoD does not beat the market economically. Barry et al (1997) examined size and price-to-book value (P/BV) effects in cross-sectional returns for 26 emerging markets during 1985-1995. The tests are based on four regional portfolios and on a composite portfolio that uses all of the data. They formed multi-market portfolios by using relative measures of size and P/BV. In univariate tests, they find some evidence of the P/BV effect but do not find evidence of the size effect. However, in asset pricing tests based on cross sectional regressions, size is priced in three of four regions and in the composite result, whereas P/BV is priced in just two of four regions but not in the composite portfolio.

In a recent study, Fama and French (1998) document that value stocks have higher returns than growth stocks in developed markets around the world. They report that there is also a value premium in emerging markets. In Brazil, the average difference between annual dollar returns on the high and low book-to-market portfolios is 73.72% over the

1987 to 1995 period. Braga, Costa Jr. and Mescolin (1998) report a value premium in the Brazilian stock market from 1986 through 1996. They show that value portfolios formed on book-to-market equity and dividend yield have higher returns than growth portfolios. Claessens et al (1998) find evidence on the ability of factors to explain cross-sectional returns in a group of eighteen emerging markets. In addition to beta, two factors – size and trading volume – have considerable power in explaining returns; dividend yield and earnings/price ratios are somewhat less important.

This article will provide background on the DoD strategy, describe the theoretical rationale for why it may have investment merit, and conduct a performance evaluation on whether the strategy outperforms, on both an absolute and a risk adjusted basis, a buy and hold investment strategy in the broad based equity market indices in the American and Brazilian stock markets.

2 DATA AND METHODOLOGY

The DoD strategy was widely popularized by Bary (1993, 1994) and O'Higgins and Downes (1990). The DoD strategy consists in investing equal amounts in the highest yielding components of the Dow Jones. At the end of the year, the portfolio is rebalanced and updated with the new DoD stocks. We will test the most popular versions of the DoD strategy: the ten highest yielding stocks (Top 10), the five highest yielding stocks (Top 5), the highest yielding stock by itself (Top 1) and the second highest yielding stock by itself or what has been called the stock with the "penultimate profit potential" (PPP). We have performed all our tests for one year holding period starting from the end of each of the twelve calendar months. Using this approach we will be able to ascertain whether the DoD strategy has a seasonal characteristic.

We will test the performance of the strategy both on an absolute and on a risk adjusted basis. We have statistically tested the strategy's absolute return by employing a measure called "differential return" by Sharpe (1994)[12]. To measure the risk adjusted performance of the DoD, we employ two traditional measures of risk adjusted performance: the Treynor (1965) ratio and Jensen's (1968) alpha. The Treynor ratio measures performance relative to non-diversifiable risk (beta). Jensen's alpha is an

[2] Sharpe has shown that his popular performance measure used for deriving risk adjusted portfolio performance can be generalized to statistically test for absolute performance relative to any desired benchmark.

alternative performance measure which assumes a portfolio will underperform or outperform a benchmark market index after adjusting for market correlated returns using the security market line of the Capital Asset Pricing Model (CAPM). If the portfolio out (under) performs the market after adjusting for beta risk, the estimated alpha will be positive (negative).

We will conduct a performance evaluation of the DoD strategy in a developed and in an emerging market. Emerging market equities have gained increasing acceptance among investors trying to enhance portfolio returns. Brazil is the most important emerging market in Latin America and one of the major emerging markets in the world. The Brazilian market capitalization in 1998 (US$ 161 billion) was the 4th largest among all emerging markets in the Emerging Market Database maintained by the International Finance Corporation (IFC). Our performance evaluation will be tested in the U.S. and in the Brazilian stock market. The data for this study are taken from the Datastream database (U.S. stock market) and from the Economatica database (Brazilian stock market).

We have performed the evaluation in the U.S. stock market for the available data from January 1980 through December 1998, which provides 228 monthly observations for individual stocks. The sample covered for the Brazilian stock market is the 54-month period from July 1994 to December 1998. By focusing on the 1994 to 1998 period, this paper studies the behavior of stock returns after the "Real Plan" that introduced a new currency and suceeded in taming inflation.

Market returns in the U.S. are proxied by the monthly total return on the DJ30 and S&P500 stock indices. In Brazil, market returns are proxied by the monthly total return on the IBOVESPA (the Sao Paulo Stock Exchange Index) and on the FGV100 index (an index of 100 non-state owned corporations). The IBOVESPA is a representative indicator of price performance in the Brazilian stock market, since it clearly shows the behavior of the main shares traded on the Sao Paulo Stock Exchange (BOVESPA). The index portfolio is made up of stocks which jointly represent 80% of the amount of cash transacted during the twelve months preceding the formation of the portfolio. The participation of each stock in the portfolio has a direct relationship with its proportion of trading volume. The FGV100 is composed by 100 stocks of non-state owned nonfinancial firms. The participation of each stock in the portfolio has a direct relationship with the firm's book value of common equity.

The riskless rate of return used for the U.S. market is the monthly return on 3-month Treasury Bills. In Brazil, the riskless rate of return used is the monthly equivalent CDI

(Interbank Certificate of Deposit, the average monthly equivalent of the prime rate for one day loans between financial institutions). This rate is the most commonly used investment benchmark in Brazil, yielding virtually the same as the equivalent one-day repo rates on government securities (the "Over/SELIC" rate). Thus we decided to use the benchmark widely followed by the market.

Returns are monthly total returns (price change adjusted by corporate actions such as cash dividends, stock dividends, rights offers, etc.) in U.S. dollars, based on month-end prices. It should be noted that we compute the dividend yield only for stocks in the DJ30 (U.S. stock market) and in the IBOVESPA (Brazilian stock market). Thus, the DoD portfolios are formed by the highest yielding components of the DJ30 and of the IBOVESPA.

3 RESULTS FOR THE U.S. STOCK MARKET

All the proponents of the DoD strategy demonstrate it's virtues by comparing the strategy's returns relative to the DJ30. As a point of reference we have reconstructed the performance evaluation approach used by DoD proponents over our sample period. The results are summarized in Table 1.

Table 1 - Mean Monthly Returns for the DoD Strategies, DJ30, S&P500 and 3-Month Treasury Bill

January 1980 to December 1998

	Top1	PPP	Top 5	Top 10	DJ30	S&P500	T-BILL
Average Return	2.04%	0.32%	1.22%	1.21%	1.15%	1.17%	0.59%
Std Dev of Return	8.70%	7.07%	4.56%	4.36%	4.37%	4.35%	0.24%
Geometric Mean Return	1.64%	0.06%	1.11%	1.11%	1.06%	1.07%	0.55%

Table 1 is consistent with the performance claims of the proponents of the DoD. Over the nineteen year period from 1980 through 1998, except for the PPP version, the other DoD strategies outperform the DJ30 and the S&P 500 on an absolute basis. The average monthly return of the DJ30 over the period is 1.15% compared to returns for the various DoD strategies ranging from 0.32% to 2.04%. Despite their superior returns, the DOD strategies also have higher variability of returns than the DJ30 and the S&P500. Comparing the geometric mean of return, all the DoD strategies, except for the PPP version, outperform the DJ30 and the S&P 500.

In Table 2 we computed Sharpe's "differential return" performance measure using the DJ30 as the market index benchmark. Using the market index return rather than the

Treasury Bill rate, as is traditionally done with the Sharpe ratio, is the appropriate way of measuring the absolute performance of the DoD strategy. By using the "differential return" version of the Sharpe ratio relative to the DJ30 we can directly statistically test the strategy's absolute performance (see Sharpe (1994)).

Tables 2 shows differential returns defined as the twelve month average holding period excess returns for each DoD strategy relative to the DJ30 by the end of the month in which the strategy was initiated. Many of the differential returns (30 out of 48 differential returns) are positive; however, no strategy significantly outperforms the market at the 95% level. Therefore, we conclude that there does not exist statistical evidence to support the argument that the DoD strategies outperform the DJ30 on an absolute basis.

Table 2 - Sharpe's Differential Returns Relative to the DJ30 by End of Month Initiated

Month	Top 1	PPP	Top 5	Top 10
January	0.89%	-0.84% *	0.06%	0.06%
February	0.81%	-0.17%	0.06%	0.02%
March	0.61%	0.01%	-0.14%	-0.08%
April	0.56%	0.25%	-0.06%	-0.11%
May	0.73%	0.22%	-0.01%	-0.02%
June	0.72%	0.07%	-0.05%	-0.02%
July	0.61%	-0.12%	-0.07%	0.02%
August	0.11%	0.27%	0.03%	0.00%
September	-0.19%	-0.15%	0.02%	0.05%
October	0.09%	-0.18%	0.11%	-0.01%
November	0.26%	-0.17%	0.07%	0.02%
December	0.62%	-0.11%	0.10%	0.06%
Nº Returns < 0	1	7	5	5

* significant at the 95% level

Table 3 shows the differential returns for each DoD strategy relative to the S&P500 by the end of the month in which the strategy was initiated. We find that most of the differential returns are positive (31 out of 48 differential returns) but none of them is statistically significant at the 95% level. Therefore, there is no statistical evidence that the DoD strategies outperform the S&P500 on an absolute basis.

Table 3 - Sharpe's Differential Returns Relative to the S&P500 by End of Month Initiated

Month	Top 1	PPP	Top 5	Top 10
January	0.87%	-0.85% *	0.05%	0.04%
February	0.80%	-0.18%	0.05%	0.01%
March	0.60%	0.00%	-0.14%	-0.09%
April	0.55%	0.24%	-0.07%	-0.12%
May	0.72%	0.21%	-0.02%	-0.03%
June	0.72%	0.06%	-0.06%	-0.03%
July	0.60%	-0.13%	-0.07%	0.01%
August	0.10%	0.26%	0.02%	-0.01%
September	-0.20%	-0.15%	0.01%	0.05%
October	0.10%	-0.17%	0.12%	-0.01%
November	0.28%	-0.15%	0.08%	0.04%
December	0.65%	-0.08%	0.13%	0.09%
Nº Returns < 0	1	7	5	6

* significant at the 95% level

Even if the evidence does not indicate that the DoD strategy outperforms the market on an absolute basis, the strategy may provide for reduction in total portfolio risk which could make it advantageous to use for selecting stocks to be added to an already diversified portfolio. In order to perform risk adjusted performance tests we employed Jensen's alpha and Treynor ratios. We ran regressions of the excess return on the DoD strategy over the Treasury Bill rate against the excess return on the market index (DJ30 and S&P500) over the Treasury Bill rate. Table IV shows estimated beta values relative to the DJ30 for each DoD strategy by the month it was initiated. All of the beta values are significant and below unity indicating that the DoD strategy has a low market risk.

Table 4 - DJ30 Betas by End of Month Initiated

Month	Top 1	PPP	Top 5	Top 10
January	0.69 *	0.84 *	0.80 *	0.90 *
February	0.58 *	0.89 *	0.75 *	0.90 *
March	0.66 *	0.85 *	0.73 *	0.89 *
April	0.70 *	0.64 *	0.71 *	0.87 *
May	0.72 *	0.82 *	0.71 *	0.88 *
June	0.80 *	0.71 *	0.76 *	0.87 *
July	0.72 *	0.83 *	0.77 *	0.87 *
August	0.76 *	0.86 *	0.78 *	0.87 *
September	0.56 *	0.75 *	0.79 *	0.88 *
October	0.57 *	0.83 *	0.76 *	0.87 *
November	0.51 *	0.87 *	0.79 *	0.89 *
December	0.56 *	0.93 *	0.78 *	0.88 *
Mean	0.65	0.82	0.76	0.88

* significant at the 95% level

Table 5 shows estimated beta values relative to the S&P500 for each DoD strategy by the month it was initiated. All the beta values are significant and below the unity indicating that the DoD strategy is a lower risk strategy than investing in the market and would appeal to investors who prefer conservative, lower risk portfolios.

Table 5 - S&P500 Betas by End of Month Initiated

Month	Top 1	PPP	Top 5	Top 10
January	0.63 *	0.80 *	0.79 *	0.89 *
February	0.52 *	0.84 *	0.74 *	0.88 *
March	0.62 *	0.82 *	0.72 *	0.87 *
April	0.67 *	0.69 *	0.70 *	0.85 *
May	0.67 *	0.84 *	0.71 *	0.86 *
June	0.72 *	0.73 *	0.76 *	0.86 *
July	0.69 *	0.81 *	0.76 *	0.86 *
August	0.73 *	0.83 *	0.78 *	0.85 *
September	0.52 *	0.72 *	0.77 *	0.86 *
October	0.52 *	0.81 *	0.75 *	0.85 *
November	0.47 *	0.85 *	0.77 *	0.87 *
December	0.55 *	0.90 *	0.78 *	0.86 *
Mean	0.61	0.80	0.75	0.86

* significant at the 95% level

Table 6 summarizes Jensen's alpha relative to the DJ30 by month for each DoD strategy. Most of the DoD strategies exhibit positive alphas (40 out of 48 Jensen's alphas) but few of them are statistically significant at the 95% level. Therefore, we conclude that the evidence using alphas does not indicate that the DoD strategies achieve statistically significant risk adjusted excess returns.

Table 6 - Jensen's Alpha Relative to the DJ30 by End of Month Initiated

Month	Top 1	PPP	Top 5	Top 10
January	1.07% *	-0.75% *	0.17%	0.11%
February	1.04% *	-0.10%	0.20%	0.07%
March	0.80%	0.09%	0.01%	-0.02%
April	0.75%	0.47%	0.12%	-0.03%
May	0.90%	0.33%	0.16%	0.06%
June	0.84% *	0.24%	0.09%	0.05%
July	0.77% *	-0.02%	0.06%	0.09%
August	0.24%	0.35%	0.16%	0.07%
September	0.06%	0.01%	0.14%	0.12%
October	0.34%	-0.08%	0.25%	0.06%
November	0.55%	-0.09%	0.19%	0.09%
December	0.86%	-0.07%	0.21%	0.13%
Nº Alphas < 0	0	6	0	2

* significant at the 95% level

Table 7 summarizes Jensen's alpha relative to the S&P500 by month for each DoD strategy. Most of the DoD strategies exhibit positive alphas (40 out of 48 Jensen's alphas) but few of them are statistically significant at the 95% level. The evidence once again does not suggest that the DoD strategies achieve statistically significant risk adjusted excess returns. The results of Table VI and Table VII suggest that the DoD, as a stand alone investment strategy, does not yield statistically significant risk adjusted excess returns and, as such, would be inappropriate for small investors who do not hold diversified portfolios.

Table 7 - Jensen's Alpha Relative to the S&P500 by End of Month Initiated

Month	Top 1	PPP	Top 5	Top 10
January	1.09% *	-0.73% *	0.17%	0.11%
February	1.07% *	-0.09%	0.20%	0.08%
March	0.82%	0.10%	0.01%	-0.01%
April	0.76%	0.43%	0.12%	-0.03%
May	0.92%	0.31%	0.16%	0.06%
June	0.88% *	0.22%	0.08%	0.05%
July	0.79% *	-0.01%	0.07%	0.09%
August	0.25%	0.35%	0.15%	0.07%
September	0.08%	0.01%	0.14%	0.13%
October	0.37%	-0.06%	0.26%	0.08%
November	0.58%	-0.07%	0.22%	0.11%
December	0.89%	-0.02%	0.25%	0.17%
Nº Alphas < 0	0	6	0	2

* significant at the 95% level

Table 8 shows Treynor ratios relative to the DJ30 by month initiated for each DoD strategy. It is clear from Table VIII that all the DoD strategies outperform the DJ30 after adjusting for risk. Lastly, we have performed a differences in means test of the DoD strategies relative to the DJ30 and found that only the Top1 and Top 5 DoD strategies significantly outperform the market after adjusting for risk.

Table 8 - Treynor Ratio with DJ30 Betas by End of Month Initiated

Month	Top 1	PPP	Top 5	Top 10	DJ30	Top 1 – DJ30	PPP – DJ30	Top 5 – DJ30	Top 10 – DJ30
January	2.11%	-0.33%	0.78%	0.69%	0.56%	1.55%	-0.89%	0.22%	0.12%
February	2.36%	0.43%	0.82%	0.63%	0.55%	1.81%	-0.12%	0.27%	0.08%
March	1.79%	0.67%	0.58%	0.54%	0.56%	1.22%	0.11%	0.01%	-0.02%
April	1.68%	1.35%	0.78%	0.58%	0.61%	1.07%	0.74%	0.17%	-0.03%
May	1.85%	1.00%	0.83%	0.66%	0.60%	1.25%	0.41%	0.23%	0.06%
June	1.64%	0.92%	0.70%	0.65%	0.59%	1.05%	0.33%	0.11%	0.06%
July	1.66%	0.56%	0.67%	0.69%	0.59%	1.07%	-0.03%	0.08%	0.10%
August	0.88%	0.97%	0.76%	0.64%	0.56%	0.32%	0.41%	0.20%	0.08%
September	0.67%	0.56%	0.74%	0.71%	0.57%	0.11%	-0.01%	0.18%	0.14%
October	1.17%	0.48%	0.90%	0.64%	0.58%	0.60%	-0.09%	0.32%	0.07%
November	1.66%	0.49%	0.83%	0.69%	0.59%	1.07%	-0.10%	0.24%	0.10%
December	2.09%	0.49%	0.84%	0.71%	0.56%	1.53%	-0.07%	0.28%	0.15%
Mean	**1.63%**	**0.63%**	**0.77%**	**0.65%**	**0.58%**	**1.05%**	**0.06%**	**0.19%**	**0.08%**
Std Dev	**0.50%**	**0.41%**	**0.09%**	**0.05%**	**0.02%**	**0.50%**	**0.40%**	**0.09%**	**0.06%**
t test	**-**	**-**	**-**	**-**	**-**	**2.11 ***	**0.14**	**2.18 ***	**1.38**

* significant at 5% level

NM indicates not meaningful due to insignificant beta estimates at 5% level

Table IX shows Treynor ratios relative to the S&P500 by month initiated for each DoD strategy. The results suggest that only the Top 1 and Top 5 DoD strategies significantly outperform the market after adjusting for risk.

Table 9 - Treynor Ratio with S&P500 Betas by End of Month Initiated

Month	Top 1	PPP	Top 5	Top 10	S&P500	Top 1 – S&P500	PPP - S&P500	Top 5 – S&P500	Top 10 – S&P500
January	2.30%	-0.34%	0.79%	0.70%	0.58%	1.72%	-0.92%	0.22%	0.12%
February	2.62%	0.46%	0.83%	0.65%	0.56%	2.07%	-0.10%	0.27%	0.09%
March	1.88%	0.70%	0.59%	0.56%	0.57%	1.31%	0.13%	0.02%	-0.01%
April	1.76%	1.24%	0.79%	0.59%	0.62%	1.14%	0.62%	0.17%	-0.03%
May	1.98%	0.98%	0.83%	0.68%	0.61%	1.37%	0.37%	0.22%	0.07%
June	1.83%	0.90%	0.70%	0.66%	0.60%	1.23%	0.30%	0.11%	0.06%
July	1.74%	0.57%	0.68%	0.70%	0.59%	1.14%	-0.02%	0.09%	0.11%
August	0.92%	1.00%	0.76%	0.66%	0.57%	0.35%	0.43%	0.19%	0.09%
September	0.73%	0.59%	0.76%	0.72%	0.58%	0.15%	0.01%	0.18%	0.15%
October	1.30%	0.49%	0.92%	0.66%	0.57%	0.72%	-0.08%	0.35%	0.09%
November	1.81%	0.50%	0.86%	0.70%	0.57%	1.24%	-0.08%	0.28%	0.13%
December	2.16%	0.51%	0.85%	0.73%	0.53%	1.63%	-0.03%	0.32%	0.20%
Mean	**1.75%**	**0.63%**	**0.78%**	**0.67%**	**0.58%**	**1.17%**	**0.05%**	**0.20%**	**0.09%**
Std Dev	**0.54%**	**0.40%**	**0.09%**	**0.05%**	**0.02%**	**0.55%**	**0.39%**	**0.10%**	**0.06%**
t test	**-**	**-**	**-**	**-**	**-**	**2.14 ***	**0.14**	**2.07 ***	**1.38**

* significant at 5% level

NM indicates not meaningful due to insignificant beta estimates at 5% level

4 RESULTS FOR THE BRAZILIAN STOCK MARKET

We have performed the same evaluation used for U.S. stocks to analyze the DoD strategy in the Brazilian stock market. Table X shows the average and geometric mean monthly returns for the IBOVESPA, FGV100, the CDI and each of the DoD strategies. All data for the Brazilian market are in U.S. dollars. Over the period from 1994 through 1998, only the Top 1 version outperforms the FGV100 and the IBOVESPA on an absolute basis. The average return of the FGV100 is 0.28% per month compared to returns for the various DoD strategies ranging from -0.40% to 2.57% per month. The problem with this approach is that the IBOVESPA outperforms the FGV100 over the sample period. As we can see from the standard deviation of returns, all the DoD strategies have greater variability than the FGV100. Furthermore, the Top 1 and PPP DoD strategies have greater variability than the IBOVESPA. Comparing the geometric mean of return, all the DoD strategies underperform the FGV100 and the IBOVESPA. This result conflicts with the average returns results. It is well known that the larger the variability in returns the larger will be the deviation between average and geometric mean return.

Table 10 - Mean Monthly Returns for the DoD Strategies, IBOVESPA, FGV100 and CDI

July 1994 to December 1998

	Top1	PPP	Top 5	Top 10	FGV-100	Ibovespa	CDI
Average Return	2.57%	-0.40%	-0.10%	-0.05%	0.28%	1.69%	2.28%
Std Dev of Return	27.40%	14.72%	11.48%	10.67%	9.85%	13.00%	2.34%
Geometric Mean Return	-0.19%	-1.40%	-0.73%	-0.59%	-0.19%	0.81%	2.25%

Table 11 shows Sharpe's "differential return" performance measure using the FGV100 as the market index benchmark. We find that many of the differential returns are negative (20 out of 48 differential returns) and only the PPP strategy initiated in January significantly outperforms the market at the 95% level. Therefore, we conclude that there does not exist statistical evidence to support the argument that the DoD strategies outperform the FGV100.

Table 11 - Sharpe's Differential Returns Relative to the FGV100 by End of Month Initiated

Month	Top 1	PPP	Top 5	Top 10
January	-1.98%	2.94% *	0.35%	0.41%
February	1.34%	-1.05%	-0.23%	0.36%
March	0.57%	0.53%	-0.11%	-0.25%
April	0.49%	-0.59%	0.71%	-0.37%
May	0.10%	1.50%	0.16%	0.15%
June	1.43%	-1.28%	-0.34%	0.28%
July	2.29%	-0.68%	-0.38%	-0.32%
August	-0.32%	-0.65%	-0.18%	-0.46%
September	4.22%	-0.65%	0.21%	0.17%
October	0.53%	1.71%	0.51%	0.38%
November	2.11%	-0.53%	0.67%	0.44%
December	-0.39%	0.64%	-0.14%	0.39%
Nº Returns < 0	3	7	6	4

* significant at the 95% level

Table 12 shows the differential returns for each DoD strategy relative to the IBOVESPA by the end of the month in which the strategy was initiated. We find that most of the differential returns are negative (43 out of 48 differential returns) and many of them are statistically significant at the 95% level. Therefore, we conclude that there is no statistical evidence that the DoD strategies outperform the IBOVESPA.

Table 12 - Sharpe's Differential Returns Relative to the IBOVESPA by End of Month Initiated

Month	Top 1	PPP	Top 5	Top 10
January	-4.26% *	0.65%	-1.93%	-1.87%
February	-1.06%	-3.46% *	-2.63% *	-2.05% *
March	-2.15%	-2.19%	-2.83% *	-2.96% *
April	-2.34%	-3.42% *	-2.12% *	-3.20% *
May	-2.37%	-0.96%	-2.30% *	-2.32% *
June	-1.16%	-3.86%	-2.92% *	-2.31% *
July	0.88%	-2.10%	-1.79%	-1.74% *
August	-1.63%	-1.96%	-1.49%	-1.77% *
September	2.87%	-2.01%	-1.14%	-1.19%
October	-1.05%	0.13%	-1.07%	-1.20%
November	0.17%	-2.47%	-1.27%	-1.50%
December	-2.56%	-1.54%	-2.31% *	-1.78%
Nº Returns < 0	9	10	12	12

* significant at the 95% level

In order to perform risk adjusted performance tests we employed Jensen's alpha and Treynor ratios. We ran regressions of the excess return on the DoD strategy over the CDI rate against the excess return on the market index (IBOVESPA and FGV100) over the CDI rate. Table XIII shows estimated beta values relative to the FGV100 for each DoD

strategy by the month it was initiated. Most of the beta values which are significant are below unity indicating that the DoD strategy has a low market risk.

Table 13 - FGV100 Betas by End of Month Initiated

Month	Top 1	PPP	Top 5	Top 10
January	1.04 *	0.68 *	0.92 *	0.95 *
February	0.82 *	0.75 *	0.94 *	0.95 *
March	0.64 *	0.78 *	0.77 *	0.93 *
April	0.99 *	0.46 *	0.91 *	0.92 *
May	0.77 *	0.71 *	0.84 *	0.94 *
June	1.15 *	0.33	0.77 *	0.99 *
July	1.26 *	0.62	0.93 *	1.00 *
August	0.69 *	1.25 *	0.90 *	0.96 *
September	0.13	0.83 *	0.72 *	0.92 *
October	0.98 *	0.25	0.79 *	0.96 *
November	0.72 *	0.95 *	0.81 *	0.94 *
December	1.09 *	0.74 *	0.83 *	0.91 *
Mean	0.86	0.70	0.84	0.95

* significant at the 95% level

Table 14 shows estimated beta values relative to the IBOVESPA for each DoD strategy by the month it was initiated. Most of the beta values are significant and below the unity indicating that the DoD strategy is a lower risk strategy than investing in the market and would appeal to investors who prefer conservative, lower risk portfolios.

Table 14 - IBOVESPA Betas by End of Month Initiated

Month	Top 1	PPP	Top 5	Top 10
January	0.68 *	0.48 *	0.50 *	0.54 *
February	0.43 *	0.47 *	0.50 *	0.53 *
March	0.35 *	0.53 *	0.44 *	0.54 *
April	0.66 *	0.32 *	0.55 *	0.55 *
May	0.66 *	0.44 *	0.55 *	0.59 *
June	0.78 *	0.47 *	0.53 *	0.67 *
July	0.88 *	0.57 *	0.64 *	0.66 *
August	0.61 *	0.74 *	0.58 *	0.63 *
September	0.43 *	0.44 *	0.53 *	0.60 *
October	0.58 *	0.34 *	0.51 *	0.59 *
November	0.47 *	0.57 *	0.53 *	0.59 *
December	0.73 *	0.34 *	0.48 *	0.51 *
Mean	0.61	0.48	0.53	0.58

* significant at the 95% level

Table 15 summarizes Jensen's alpha relative to the FGV100 by month for each DoD strategy. Most of the DoD strategies exhibit negative alphas (30 out of 48 Jensen's

alphas). The evidence using alphas does not indicate that the DoD strategies achieve statistically significant risk adjusted excess returns.

Table 15 - Jensen's Alpha Relative to the FGV100 by End of Month Initiated

Month	Top 1	PPP	Top 5	Top 10
January	-1.85%	2.02%	0.13%	0.26%
February	0.85%	-1.74%	-0.40%	0.22%
March	-0.39%	-0.06%	-0.71%	-0.44%
April	0.46%	-1.93%	0.48%	-0.56%
May	-0.51%	0.74%	-0.25%	-0.02%
June	1.83%	-3.04%	-0.95%	0.26%
July	2.82%	-1.44%	-0.51%	-0.33%
August	-0.98%	-0.11%	-0.39%	-0.53%
September	1.95%	-1.09%	-0.51%	-0.06%
October	0.46%	-0.44%	-0.08%	0.27%
November	1.30%	-0.67%	0.13%	0.28%
December	-0.13%	-0.14%	-0.64%	0.11%
Nº Alphas < 0	5	10	9	6

* significant at the 95% level

Table 16 summarizes Jensen's alpha relative to the IBOVESPA by month for each DoD strategy. Most of the DoD strategies exhibit negative alphas (45 out of 48 Jensen's alphas). The evidence once again does not suggest that the DoD strategies achieve statistically significant risk adjusted excess returns.

Table 16 - Jensen's Alpha Relative to the IBOVESPA by End of Month Initiated

Month	Top 1	PPP	Top 5	Top 10
January	-4.47% *	0.32%	-2.25% *	-2.17% *
February	-1.26%	-3.64% *	-2.80% *	-2.21% *
March	-2.11%	-2.16%	-2.80% *	-2.94% *
April	-2.23%	-3.19% *	-1.97% *	-3.05% *
May	-2.43%	-1.07%	-2.39% *	-2.40% *
June	-1.16%	-3.88% *	-2.94% *	-2.32% *
July	0.81%	-2.35%	-2.01% *	-1.94% *
August	-1.93%	-2.17%	-1.82% *	-2.06% *
September	2.15%	-2.72%	-1.73% *	-1.69% *
October	-1.58%	-0.71%	-1.69% *	-1.71% *
November	-0.34%	-2.89%	-1.72% *	-1.89% *
December	-2.79%	-2.09%	-2.74% *	-2.19% *
Nº Alphas < 0	10	11	12	12

* significant at the 95% level

Table 17 shows Treynor ratios relative to the FGV100 by month initiated for each DoD strategy. It is clear from Table XVII that the DoD strategies do not significantly outperform the market after adjusting for risk.

Table 17 - Treynor Ratio with FGV100 Betas by End of Month Initiated

Month	Top 1	PPP	Top 5	Top 10	FGV 100	Top 1 – FGV100	PPP – FGV100	Top 5 – FGV100	Top 10 – FGV100
January	-4.70%	0.02%	-2.78%	-2.65%	-2.92%	-1.78%	2.94%	0.14%	0.28%
February	-1.72%	-5.08%	-3.18%	-2.52%	-2.75%	1.04%	-2.32%	-0.43%	0.24%
March	-3.27%	-2.75%	-3.59%	-3.14%	-2.67%	-0.61%	-0.08%	-0.92%	-0.47%
April	-2.03%	-6.66%	-1.97%	-3.10%	-2.50%	0.47%	-4.16%	0.52%	-0.60%
May	-3.32%	-1.62%	-2.96%	-2.68%	-2.66%	-0.67%	1.04%	-0.30%	-0.02%
June	-1.03%	NM	-3.87%	-2.36%	-2.62%	1.59%	NM	-1.25%	0.26%
July	0.23%	-4.33%	-2.55%	-2.33%	-2.00%	2.23%	-2.32%	-0.55%	-0.33%
August	-3.52%	-2.19%	-2.52%	-2.65%	-2.10%	-1.42%	-0.09%	-0.43%	-0.55%
September	NM	-3.92%	-3.32%	-2.67%	-2.61%	NM	-1.30%	-0.70%	-0.06%
October	-2.37%	NM	-2.94%	-2.56%	-2.84%	0.47%	NM	-0.10%	0.29%
November	-1.10%	-3.60%	-2.74%	-2.61%	-2.90%	1.81%	-0.70%	0.16%	0.30%
December	-3.13%	-3.19%	-3.78%	-2.89%	-3.01%	-0.12%	-0.18%	-0.77%	0.12%
Mean	**-2.36%**	**-3.33%**	**-3.02%**	**-2.68%**	**-2.63%**	**0.27%**	**-0.72%**	**-0.39%**	**-0.05%**
Std Dev	**1.41%**	**1.87%**	**0.56%**	**0.25%**	**0.31%**	**1.32%**	**1.97%**	**0.50%**	**0.35%**
t test	**-**	**-**	**-**	**-**	**-**	**0.21**	**-0.37**	**-0.77**	**-0.13**

* significant at 5% level

NM indicates not meaningful due to insignificant beta estimates at 5% level

Table 18 shows Treynor ratios relative to the IBOVESPA by month initiated for each DoD strategy. The results suggest that the DoD strategies do not significantly outperform the market after adjusting for risk.

Table 18 - Treynor Ratio Relative with IBOVESPA Betas by End of Month Initiated

Month	Top 1	PPP	Top 5	Top 10	Ibovespa	Top 1 – Ibovespa	PPP - Ibovespa	Top 5 – Ibovespa	Top 10 – Ibovespa
January	-7.24%	0.03%	-5.17%	-4.67%	-0.64%	-6.60%	0.67%	-4.53%	-4.04%
February	-3.26%	-8.02%	-5.95%	-4.48%	-0.35%	-2.91%	-7.67%	-5.60%	-4.13%
March	-5.93%	-4.00%	-6.29%	-5.35%	0.05%	-5.98%	-4.05%	-6.34%	-5.40%
April	-3.04%	-9.72%	-3.25%	-5.20%	0.33%	-3.37%	-10.05%	-3.59%	-5.53%
May	-3.85%	-2.62%	-4.52%	-4.26%	-0.19%	-3.66%	-2.43%	-4.33%	-4.07%
June	-1.52%	-8.32%	-5.54%	-3.51%	-0.04%	-1.48%	-8.28%	-5.51%	-3.48%
July	0.33%	-4.72%	-3.74%	-3.53%	-0.59%	0.91%	-4.14%	-3.15%	-2.95%
August	-3.96%	-3.72%	-3.93%	-4.05%	-0.78%	-3.17%	-2.93%	-3.15%	-3.27%
September	3.76%	-7.48%	-4.52%	-4.06%	-1.26%	5.02%	-6.23%	-3.26%	-2.80%
October	-3.99%	-3.36%	-4.61%	-4.17%	-1.26%	-2.73%	-2.09%	-3.35%	-2.91%
November	-1.68%	-6.08%	-4.25%	-4.17%	-0.96%	-0.71%	-5.11%	-3.28%	-3.21%
December	-4.69%	-6.93%	-6.50%	-5.14%	-0.84%	-3.85%	-6.09%	-5.66%	-4.30%
Mean	**-2.92%**	**-5.41%**	**-4.86%**	**-4.38%**	**-0.54%**	**-2.38%**	**-4.87%**	**-4.31%**	**-3.84%**
Std Dev	**2.90%**	**2.83%**	**1.04%**	**0.61%**	**0.51%**	**3.10%**	**3.00%**	**1.18%**	**0.92%**
t test	**-**	**-**	**-**	**-**	**-**	**-0.77**	**-1.62**	**-3.65 ***	**-4.18 ***

* significant at 5% level

NM indicates not meaningful due to insignificant beta estimates at 5% level

5 CONCLUSIONS

The DoD strategy shows only limited evidence that it can add value as an investment strategy in the U.S. stock market. The Top 1 and Top 5 DoD strategies when used as a stock selection strategy in an already diversified portfolio show some evidence of improving risk adjusted return performance. When the DoD strategy is used to construct stand-alone investment portfolios its performance is found to be wanting. We cannot state that the DoD strategy can be used to improve the investment performance of small investors who do not already possess diversified portfolios.

The use of the Dogs of the Dow Jones strategy in Brazil shows virtually no evidence that it can add value as an investment strategy. Our performance evaluation findings demonstrate that the DoD strategy does not outperform the FGV-100 and the IBOVESPA indices on an absolute and on a risk adjusted basis over our sample period. Our analysis suggests that the dividend yield may not be a good variable to select value stocks in Brazil given existing empirical evidence that value stocks have outperformed growth stocks in Brazil.

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