

Dominance of Hybrid Contratum Strategies over Momentum and Contrarian Strategies: Half a Century of Evidence

by

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Abstract

We evaluated several investment strategies using data on over 3,500 stocks from 1956 to 2015 and find that hybrid investment strategies ranked as contrarian strategies (over the long term) but held as momentum strategies (over the medium term), what we call contratum strategies, outperform traditional momentum and contrarian strategies. The top performing strategy, a contratum strategy ranked over 60 months and held over 3 months, earned a statistically significant continuously compounded monthly return to a hedged portfolio (of losers minus winners) of about 1.1%. In contrast, a traditional momentum strategy generated significant returns of 0.5% per month for a hedged portfolio of winners minus losers, while a traditional contrarian strategy generated a significant hedged portfolio returns of 0.7% per month. Our results are robust across size groups, risk, economic states, and sub-periods. Thus, the performance of the momentum, contrarian and hybrid contratum strategies are not crowded out by documented anomalies such as the size effect, January effect or macroeconomic factors. Since it is possible to identify, ex-ante, the losers and winners of the hybrid investment strategies based on past returns, our results can be used as part of a replicable investment strategy.

1. INTRODUCTION

Since the inception of trading in financial assets, investors in their quest to perform better than the market have been implementing trading strategies that “apparently” beat the market (Conrad and Kaul, 1998). This desire to outperform the market is showing no signs of abating. It is estimated that investors are spending 0.67% of the aggregate value of the market each year searching for superior returns and that society’s capitalized cost of price discovery is at least 10% of the current market cap (French, 2008). Based on World Bank (2016) estimates of total market capitalization of listed domestic companies on world stock exchanges of US\$61.781 trillion in 2015, investors would have spent about US\$414 billion in 2015 searching for superior returns. Though there are countless trading strategies implemented by investors, momentum and contrarian strategies have gained and continue to gain prominence over the years. For example, Chan et al. (1996) note that investment strategies that exploit momentum predate the scientific evidence and have been implemented by many professional investors. Jegadeesh and Titman (2001) as well as Sias (2004) also highlight the popularity of momentum trading strategies among institutional investors, while Vayanos and Woolley (2013) contend that momentum and reversal are two of the most prominent financial market anomalies. The pervasiveness of momentum and contrarian strategies probably encouraged Eggins and Hill (2010) to propose a new class of flexible and investable stock-market indices that partition a benchmark index into momentum and contrarian sub-indices, arguing that this would allow investors to access these styles at lower cost than is currently possible and would also provide performance benchmarks for momentum and/or contrarian investment managers.

Though momentum and contrarian strategies are the dominant groups of strategies that rank stocks on the basis of their past price performance and use that to predict future performance, recent developments in information technology and the traditional definitions of momentum and contrarian strategies in the literature partly motivate this study because of the possibility of creating two additional groups of (hybrid) strategies that combine features of momentum and contrarian

strategies. Traditionally, momentum strategies rank and hold stocks over the medium term (3-12 months), while contrarian strategies rank and hold stocks over the long term (2-5 years). What if for each strategy, stocks are ranked and held at different holding periods? Thus, implicit in the definitions of momentum and contrarian strategies is the possibility of creating two new hybrid groups of trading strategies based on ranking and holding periods. One such cluster of hybrid strategies, which we call *contratum* strategies, would rank stocks over the long term (as contrarian strategies) but hold them over the medium term (as momentum strategies). The second such cluster of hybrid strategies, which we call *momentrian* strategies, would rank stocks over the medium term (as momentum strategies) but hold them over the long term (as contrarian strategies). Figure 1 presents the four groups of strategies that can be derived based on the horizons over which stocks are ranked and held.

We contend that *contratum* strategies, the hybrid strategies that rank stocks as contrarian strategies but hold them as momentum strategies will perform better than traditional momentum and contrarian strategies. This contention, to a large extent, is motivated by improvements in information technology and the easy availability of information. The tendency for investors to overreact, herd, extrapolate, trend chase and/or engage in positive feedback trading has been highlighted by authors such as De Bondt and Thaler (1985), De Long et al. (1990), Daniel et al. (1998), Cooper et al. (2004), among others. One important implication of this tendency for investors to overreact is subsequent return reversal – when stock prices gravitate towards fundamental values after the overreaction. Traditional contrarian strategies posit that the reversal occurs in the long term (usually 2-5 years). However, in an era of significant technological advancement and high frequency trading, the speed with which information is diffused has significantly improved. Scholtus et al. (2014), for example, note that information can be easily accessed with an internet connection these days. This almost instantaneous access to information means that stock prices these days will quickly impound any new relevant information. Due to the improvement in the information environment, we argue that it should not take years for reversals

to occur. As a result of the immediacy of information availability to market participants, we contend that investors who have overreacted will sooner, rather than later, have confirming information that will point to their overreaction to some news event. Consequently, we expect any overreaction to be corrected sooner rather than later, and this sooner correction of the initial overreaction will, *ceteris paribus*, lead to reversals occurring in the immediate term, which, we argue, should make hybrid contrarium strategies profitable. In this study, we test this conjecture by evaluating not only traditional momentum and contrarian strategies but also hybrid strategies that combine features of contrarian and momentum strategies into new classes of strategies.

Furthermore, in an era of significant technology advancements, high frequency trading and day trading, horizons over which investments are held are continuing to decline. Chakrabarty et al. (2012) find that over 96% of the institutional funds execute round-trip trades lasting less than one month. But while investment horizons may be shortening, there have been little attempts made at finding profitable trading strategies for short to medium term investors. We contribute to the academic and practitioner literature by determining whether replicable hybrid investment strategies that rank stocks as contrarian strategies but invest in the stocks over the medium term (like momentum strategies do) will dominate traditional momentum strategies that are traditionally ranked and held over the medium term and traditional contrarian strategies that are typically ranked and held over much longer time horizons.

Although prior studies have examined the momentum and contrarian anomalies, our study brings unique and fresh perspectives to momentum and contrarian strategies, and therefore adds significant value to our understanding of these trading strategies or anomalies. First, most studies on momentum and contrarian strategies have examined these strategies separately. For example, Jegadeesh and Titman (1993), Carhart (1997), Grundy and Martin (2001), Liu et al. (2011), etc. have all concentrated on the momentum anomaly, while De Bondt and Thaler (1985), Galariotis (2012), etc. have examined substantially only the contrarian anomaly. However, a number of studies have highlighted the fact that the momentum anomaly and contrarian anomaly seem to be inextricably

intertwined. Poterba and Summers (1988) for example noted that there is positive autocorrelation in returns over the short to medium horizons and negative autocorrelation over longer horizons. Korajczyk and Sadka (2004) have shown that at very short horizons, such as a week or a month, returns exhibit negative serial correlation (reversal), while at 3 to 12 month horizons, they exhibit positive serial correlation (momentum) and for longer horizons, such as 3 to 5 years, stock returns again exhibit reversals. This close relationship between momentum and contrarian anomalies has perhaps partly motivated authors such as Barberis et al. (1998), Daniel et al. (1998) and Hong and Stein (1999) to propose integrated theories aimed at explaining why momentum in the medium term usually leads to long term reversals. This interrelationship, notwithstanding, most studies look at these strategies in isolation. By bucking this trend and studying momentum, contrarian and hybrid (of momentum and contrarian) strategies together using the same set of common data and common time horizons, our study is uniquely placed to provide evidence on the relatedness or otherwise of these strategies. Another unique contribution of our paper is that, by studying momentum, hybrid and contrarian strategies together, we are better able to determine whether or not under the same set of conditions, one class of strategies dominates the others. Additionally, by studying these anomalies together, we are in a position to test whether or not our results support the integrated models proposed by Barberis et al. (1998), Daniel et al. (1998) and Hong and Stein (1999) to explain the momentum and contrarian anomalies.

Second, prior research on momentum and contrarian strategies has generally evaluated momentum strategies over the medium term (3-12 months) and contrarian strategies over the long term (2-5 years). To provide insights into the short/medium term performance of contrarian-ranked strategies (i.e. our contratum strategies) and long term performance of momentum-ranked strategies (our momentrian strategies), we evaluate contrarian-ranked strategies over the medium term (contratum strategies) as well as momentum-ranked strategies over the long term (momentrian strategies) to ascertain if contrarian strategies perform better in the medium term than the traditionally long term that they have been evaluated on and if momentum strategies perform better in the long term

than the traditionally short/medium term that they have been assessed on.

Third, most studies of the momentum and contrarian anomalies have been conducted over short to medium time frames of usually one or two decades. However, if there are exogenous factors confined to the window selected, results can be confounded by these exogenous factors. By examining momentum and contrarian strategies over a very long period (i.e. about 6 decades), we minimize the impact of any exogenous factors that may be present in short to medium time frames. Analysis of these investment strategies over a very long period of time also allows us to determine if any perceived benefits of these strategies are restricted to specific time windows. Further, to assure that a market anomaly is not the result of data snooping, it is germane to establish that the anomaly has staying power over time and across different geographical markets. Does an anomaly persist over time or does it fritter away after a specific window of time? Is the anomaly robust or is it a “flavor of the month” anomaly? Is the anomaly restricted to specific geographical locales? By examining our hybrid, momentum and contrarian strategies over more than half a century in a Canadian context (in contrast to the largely U.S. studies), we are better placed to offer confirming evidence on the robustness or otherwise of hybrid, momentum and/or contrarian trading strategies.

Finally, it has been argued that when trading strategies exploiting market anomalies are reported in the academic literature, they often seem to disappear (Schwert, 2003; Mclean and Pontiff, 2016), making such trading strategies unprofitable. While several recent U.S. studies have provided evidence on whether or not contrarian and/or momentum strategies are still profitable in the U.S. after they have been reported in the academic literature, there is no such recent evaluation of these strategies in the Canadian context. Our final motivation is therefore to determine whether or not the medium term momentum and long term reversal/contrarian anomalies have disappeared or weakened in Canada, and to also provide out of sample evidence on these anomalies.

Using data on over 3,500 Canadian firms from 1956 to 2015, we find that although both momentum and contrarian strategies perform strongly during this study period and that traditional contrarian strategies dominate traditional momentum strategies, our hybrid (contratum) strategies

ranked as contrarian strategies (over 2-5 years) but held over the medium term (i.e. 3-12 months) dominate traditional momentum and contrarian strategies. Indeed, we find that the best investment strategy is a hybrid contratum strategy that ranks stocks over the past 60 months, skips a year and then holds the stocks for 3 months (i.e. a 60x12x3 strategy). Over the 1956 to 2015 sample period, this strategy would have earned a statistically significant continuously compounded monthly return to a hedged portfolio (of losers minus winners) of about 1.1%. In contrast, a traditional momentum strategy that selects stocks based on the past 6 months, skips a month and invests for 6 months would have generated a significant hedged portfolio (of winners minus losers) continuously compounded returns of 0.5% per month. Over the same period, a traditional contrarian strategy that selects stocks based on the past three years, skips a year and then invests for three years would have generated significant hedged portfolio (of losers minus winners) returns of 0.7% per month. We use the less-biased continuously compounded returns approach (which mimics the buy-and-hold strategy) instead of the monthly cumulative returns approach (which assumes monthly rebalancing) because the monthly cumulative returns approach has been demonstrated by Conrad and Kaul (1993) to be biased upwards. As a result, our findings are quite conservative. We also find support for the conjecture that technological advancements should lead to reversals occurring sooner. When we split our sample into pre- and post-1994 when the dawn of the Internet age made immediate access to information easier, we find that our contratum returns are significantly greater in the post-1994 Internet era.

To evaluate the dollar investment performance of the strategies, we use a set of firms and the ranking period of 1962 to 2013 which is common to the momentum, contrarian and contratum strategies and find that a dollar investment in the hedged portfolio of losers minus winners of the contratum strategy at the beginning of the ranking period in February 1962 would have been worth \$635 by the end of the common ranking period in January 2013. However, the same dollar invested in the riskless hedged portfolio of winners minus losers of the traditional momentum strategy would have grown to \$22 while a dollar in the hedged riskless portfolio of losers minus winners of a traditional contrarian strategy would have grown to \$68 over the same period. Although both momentum and

contrarian strategies offer superior investment returns, our results indicate that a hybrid strategy ranked as a contrarian strategy and held as a momentum strategy outperforms traditional momentum and contrarian strategies. Our results are robust across size groups (with double sorts of returns on size and past returns generating significant hedged portfolio returns for small capitalization as well as large capitalization stocks). In regressions of future (1-, 9-, and 12-month) returns on a number of variables including hybrid contratum, momentum and contrarian ranking returns, we find the three investment strategies (i.e. momentum, contrarian and contratum strategies) to be statistically significant in explaining future returns, with strategies ranked over the long term (i.e. contrarian and contratum strategies) dominating the momentum strategy (ranked over the intermediate term) in regressions that include the ranking returns of the three strategies. Of the strategies ranked over the long term, the strategy held over the medium term (i.e. contratum strategy) dominates the one held over the long term (i.e. contrarian strategy) in the multiple regressions. The widely documented January effect does not subsume the hedged returns to momentum, contrarian and contratum strategies. Our results are also robust across economic states, and sub-periods, and are not crowded out by macroeconomic factors or by risk (as measured by beta).

Dissecting our results further, we find that momentum returns are significantly positive only for about a year following the portfolio formation. From one year onwards, the performance differential between past winners and past losers is either insignificantly different from zero or significantly negative. Fifteen months and beyond (after portfolio formation), momentum profits reverse and past losers significantly outperform past winners. However, we do not observe the reversal of profits for the hybrid contratum and contrarian strategies even after five years of investing in these strategies. We also find limited evidence (in univariate tests) that momentum is profitable only in up markets but not in down markets.

We conjecture, based on the reversal of momentum profits and the limited evidence indicating that momentum profits appear to be strongest in up markets, that behavioral factors such as overreaction, trend chasing, positive feedback and herd behavior are likely influencing stock prices in

the immediate term, and thereby contributing to momentum. In the long term, however, prices reverse and past losers outperform past winners. With respect to the contrarian and contratum investment strategies, the fact that the returns to these strategies do not reverse even after five years (60 months) make them consistent with the predictions of rational models, specifically the predictions of Conrad and Kaul's (1998) cross-sectional variation in expected returns hypothesis. Also, we do not find any evidence that the profits to these strategies have vanished in recent times.

The rest of this paper is structured as follows. Section two is devoted to a review of the relevant literature. Section three discusses the data and methodology, while section four presents the results. Section five concludes the paper.

2. PRIOR RESEARCH

Momentum trading strategies take long positions in stocks that have performed well in the immediate past (past winners) and short positions in stocks that have performed worse in the immediate past (past losers). Contrarian strategies, on the other hand, take long positions in past (long term) losers and short positions in past (long term) winners, with losers and winners ranked over 2- to 5-year periods. Profitable momentum and contrarian strategies are considered anomalies because finance theory, as espoused in the asset pricing models of Sharpe (1964), Lintner (1965) and Black (1972), is pivoted on risk-based explanations of stock returns. Specifically, the Sharpe-Lintner-Black asset pricing models, which have long shaped the way academics and practitioners think about average returns and risk (Fama and French, 1992), hypothesize that stock returns are largely contingent upon the level of systematic risk (as represented by beta). Market anomalies therefore arise when the observed patterns in average stock returns cannot be explained by the risk-based asset pricing models (Fama and French, 2008). Since momentum and contrarian trading strategies are investment strategies solely reliant on past stock returns, they are regarded as market anomalies. In fact, the momentum and contrarian anomalies are two of the most prominent financial market anomalies (Vayanos and Woolley, 2013).

Since momentum strategies rank and hold stocks over the medium term (3-12 months) and contrarian strategies rank and hold stocks over the long term (2-5 years), two new clusters of strategies can be identified by: (i) interacting contrarian strategies' long term ranking logic with momentum strategies' medium term holding period to obtain contratum strategies; and, (ii) combining momentum strategies' short/medium term ranking logic with contrarian strategies' long term holding period to obtain momentrian strategies. We present, in Figure 1, the four groups of strategies that can be implicitly derived from the horizons over which stocks are ranked and held.

Figure 1 about here

From Figure 1, contratum strategies are ranked over the long term (2-5 years) just like contrarian strategies but are held over the short/intermediate term (like momentum strategies). Momentrian strategies, on the other hand, are ranked over the medium term (like momentum strategies) but held over the long term (like contrarian strategies). In the ensuing paragraphs under this section, we summarize some of the key findings on the momentum and contrarian anomalies and provide some views on the hybrid strategies.

2.1 Momentum Strategies

Referred to as the premier and center-stage anomaly of recent years (Fama and French, 2008), the momentum anomaly is the result of abnormal stock returns that can be achieved by buying stocks that have performed well in the immediate past (past winners) and selling stocks that have performed worse in the immediate past (past losers). While early authors such as Alexander (1961), Cootner (1962) and Levy (1967a, 1967b) highlighted the possibility of momentum in stock returns, Jagadeesh and Titman's (1993) study (documenting average monthly returns of 1% to zero-cost portfolios of winners minus losers) gave momentum the prominence it has enjoyed over the years. Since then, other authors have documented evidence of momentum in different countries including the U.S. (e.g. Lee and

Swaminathan, 2000; Jegadeesh and Titman, 2001; Karolyi and Kho, 2004; Fama and French, 2008; 2016; Asness et al., 2013; Da et al., 2014; etc.), Canada (Foerster et al., 1994/95; Clearly and Inglis, 1998; Hou and McKnight, 2004; Deaves and Miu, 2007; etc.); the UK (Liu et al., 1999; etc.), etc. A number of refinements to momentum have also been put forward in the literature including evidence that momentum may actually be an echo (Noxy-Marx, 2012; Goyal and Wahal, 2015) and that momentum's profits can be significantly enhanced by managing its predictable worst crashes (Barroso and Santa-Clara, 2015).

The evidence thus far indicates a strong presence of momentum in several countries. There are however exceptions to momentum's global prominence, mostly in Asia and specifically in Japan. Haugen and Baker (1996) report that the 12-month excess returns (of winners minus losers) in Japan is an insignificant 0.04% and Griffin et al. (2010) find that Japan is the only market among 26 developed stock markets with negative (albeit insignificantly small) returns to momentum strategies over the 1994 to 2005 period.

The question of whether or not momentum strategies are profitable after considering realistic trading costs has been debated and the evidence appears to be mixed. While Jegadeesh and Titman (1993), Grundy and Martin (2001), Korajczyk and Sadka (2004), Novy-Marx and Velikov (2016), among others, contend that momentum trading is profitable after accounting for realistic trading costs, Lesmond et al. (2004) find evidence to the contrary.

A number of explanations for momentum have been offered in the literature, including rational/risk-based explanations and behavioral explanations.¹ Despite the attempts to explain the phenomenon, momentum still appears to be an enigma because of its persistence and pervasiveness.

¹Some rational risk-based explanations of momentum include cross-sectional variation in expected returns (Conrad and Kaul, 1998) and compensation for risk (e.g. Pástor and Stambaugh, 2003). Some behavioral explanations of momentum include underreaction (Barberis et al., 1998; Hong and Stein, 1999, etc.) and overreaction (DeLong et al., 1990; Daniel et al., 1998, etc.).

2.2 Contrarian Strategies

Contrarian strategies require buying past losers and selling past winners. Boynton and Oppenheimer (2006) defined the contrarian anomaly as the excess return from being long in past losers and short in past winners when losers and winners are ranked on 3- or 5-year periods. Based on the notion that individuals tend to overreact to information, De Bondt and Thaler (1985) demonstrated that stocks that performed poorly over the past 3 to 5 years achieve better returns over the next 3- and 5-year holding periods (than stocks that performed well during the same period). Since De Bondt and Thaler's (1985) seminal paper, several authors (including Balvers et al., 2000; Galariotis, 2012) have documented the presence and persistence of the contrarian anomaly, but Wu and Mazouz (2016) find that in the UK, long-term reversals are largely industry driven, with firms in losing industries outperforming firms in winning industries.

Although Jegadeesh and Titman (1995) have demonstrated that contrarian strategies are profitable, the strategies seem to be losing their performance edge in recent years (Boynton and Oppenheimer, 2006). In addition, the apparent profitability of contrarian strategies, notwithstanding, several authors have argued that contrarian strategies can be explained by the Fama and French 3-factor model (Fama and French, 1996), the size anomaly or the systematic risk of contrarian portfolios (Jegadeesh and Titman, 1995) and the January effect (Yao, 2012).

2.3 Explanations for Momentum and Contrarian Anomalies

A number of explanations for momentum and reversal have been offered in the literature. While not mutually exclusive, explanations can be broadly grouped into rational (risk-based) explanations, behavioral explanations, and data- or noise-related explanations. Some risk-based explanations consider momentum and contrarian returns as being compensation for risk (e.g. Pástor and Stambaugh, 2003; Karolyi and Kho, 2004; Lesmond et al., 2004), as reflecting cross-sectional variation in expected returns (Conrad and Kaul, 1998; Wang, 2003) and as being proxies for macroeconomic factors (e.g. Chordia and Shivakumar, 2002). However, these explanations have been criticized on a number of

grounds including the fact that some of the assumptions used in rational risk-based explanations appear unrealistic and require impossible computational abilities (Hirshleifer, 2001). Behavioral explanations, which assume some departure from the classical assumptions of strict rationality and unlimited computational capability on the part of investors (Hong and Stein, 1999), look at finance from a much broader social science perspective including psychology and sociology (Shiller, 2003). Some behavioral models proposed to explain the predictable patterns of returns to momentum and contrarian strategies include overreaction theories such as positive feedback, extrapolation, trend chasing and herd behavior (e.g. De Long et al., 1990; Daniel et al., 1998), as well as underreaction theories (e.g. Barberis et al., 1998; Hong and Stein, 1999). Momentum and contrarian strategies have also been explained as phantom profits caused by data related issues such as survivorship bias (e.g. Boynton and Oppenheimer, 2006), data snooping (e.g. Fama and French, 1996; Parmler and González, 2007) and spurious correlation (e.g. Jagannathan and Wang, 1996).

2.4 Contratum Strategies

Contratum strategies are hybrid strategies that rank stocks over the long term (2-5 years) and hold them over the short to medium term (3-12 months). Thus, contratum strategies are hybrid strategies that rank stocks as contrarian strategies but hold them as momentum strategies. Contratum strategies are predicated on the assumption that there is subsequent reversal in stock price performance in the medium term (i.e. 3-12 months) and, therefore, suggest that buying stocks that have performed worse in the distant past (long term past losers) and selling stocks that have performed better in the distant past (long term past winners) will generate abnormal returns in the immediate term because of the subsequent medium term reversal.

We argue that hybrid contratum strategies are likely to perform better than other stock price-based investment strategies. Investor overreaction and subsequent return reversal has been documented in the literature (e.g. De Bondt and Thaler, 1985). With advancements in technology and the consequent instantaneous availability of information, we argue that reversals will occur in

the intermediate term because the immediate access to information will lead to overreaction and reversal of any stock prices irrationally driven upwards or downwards by investors occurring sooner than implied in traditional contrarian strategies. Further, Chakrabarty et al. (2012) find that institutional investors' investment holding periods are shortening, and Yan and Zhang (2009) find that short-term institutions' trading is a better predictor of future stock returns largely because those investors are better informed and trade often to gain from their informational advantage. As a result of improvements in the information environment and immediate access to relevant information that can be quickly impounded into stock prices, we argue that reversals will happen in the medium term as well, and as such, contrarian strategies that hinge on reversal in the intermediate term will be profitable and will outperform both contrarian and momentum strategies.

2.5 Momentrian Strategies

Momentrian strategies are hybrid strategies that rank stocks as momentum strategies over the intermediate term (3-12 months) but hold them as contrarian strategies over the long term (2-5 years). Momentrian strategies assume that there is continuation in stock price performance in the long term (i.e. 2-3 years), implying that buying stocks that have performed better in the immediate past (medium term past winners) and selling stocks that have performed worse in the immediate past (medium term past losers) will lead to the realization of abnormal returns in the long term.

We review momentrian strategies only to present a complete picture of the four groups of strategies that can be derived from stock price-based ranking strategies. We submit that momentrian strategies will perform worse than the other strategies because of strong evidence showing that return continuation only lasts up to the intermediate term (e.g. Cooper et al., 2004). For the long term, return reversal seem to be the recurring finding. Therefore, with its premise of holding intermediate winners in the long term, we maintain that momentrian strategies will underperform the other strategies.

In summary, we conclude from the literature review that abnormal returns to contrarian,

contrarian and momentum strategies will dominate returns to momentum strategies. Also, we hypothesize that contrarian strategies will outperform momentum and contrarian strategies because of improvements in the information environment resulting from technological advancements and evidence that short term institutional investors are better informed and exploit their information advantage.

3. DATA AND METHODOLOGY

3.1 Data and Sample

The data used in this study was collected from a number of sources. Market data (e.g. monthly stock prices) from 1950 to 2015 were obtained from the Canadian Financial Market Research Center (CFMRC) database. Financial statement data were obtained from the Stock Guide database. We obtained Fama and French North American factors' data from French's website.² Although we used data from 1956 to 2015 (the time period that TSX index data is available) for our main analysis, in robustness analysis when we focus on momentum and contrarian strategies, we extend our sample period to include all years from 1950 to 2015. Following prior literature, we exclude investment companies, finance companies, unit trusts and classed stocks. We also exclude all observations with prices below \$1 in order to eliminate the influence of penny stocks on our results. Our final sample is made up of 3,554 unique firms from 1950 to 2015.

3.2 Methodology

3.2.1. Strategies and Portfolio formation

The momentum strategies we test mainly rank stocks over the past 3 to 12 months, skip a month and then invest in the stocks for the next 3 to 12 months. We skip a month between portfolio ranking and

² See http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

formation to ensure that the momentum strategies are not adversely impacted by the short term (weekly, monthly) reversal documented by Jegadeesh (1990). The contrarian strategies rank stocks over the past 2 to 5 years, skip a year and then hold the stocks for the next 2 to 5 years. Fama and French (1996) report that short term return continuation subsumes long term return reversal when the year prior to portfolio formation is included in ranking stocks for long term reversal studies. Therefore, to ensure that the contrarian strategies are not tainted by momentum, we skip one year between the ranking period and portfolio formation. A number of studies (e.g. Yao, 2012) evaluating contrarian strategies also exclude a year between the ranking period and portfolio formation. However, in robustness tests, we form portfolios that do not skip a month (momentum) or a year (contrarian).

The hybrid strategies combine features of traditional momentum and traditional contrarian strategies by ranking stocks as contrarian strategies (over the long term) and holding them as momentum strategies (over the medium term) and vice versa. Specifically, the hybrid contrarian strategies rank stocks on the past 2 to 5 years, skip a year and then hold the stocks over the next 3 to 12 months while the hybrid momentum strategies rank stocks on the past 3 to 12 months, skip a month and then hold the stocks for the next 2 to 5 years. Based on Fama and French's (1996) finding that short term return continuation (momentum) subsumes long term return reversal when the year prior to portfolio formation is included in ranking stocks, we skip a year between portfolio ranking and formation in order to ensure that our contrarian strategies are not adversely impacted by medium term momentum, although results are similar even if we do not skip a year between ranking and portfolio formation.

We estimate returns using the less-biased continuously compounded method, which mimics the buy-and-hold strategy.³ As commonly done in the literature, we use overlapping returns although in robustness tests, we also use non-overlapping returns. Also, to ensure that we have a reasonable number of firms in our portfolios, we form quintile portfolios; however, we use decile portfolios in our

³ Other studies use the monthly cumulative returns approach, which assumes monthly rebalancing and has been demonstrated by Conrad and Kaul (1993) to be biased upwards.

robustness tests. For the sake of brevity, we report the results of our analysis at the portfolio level, even though we also perform analysis at the individual firm level as part of our robustness tests. To reduce the effect of outliers, we winsorize returns and size (in the double sorts of size and returns) by excluding the top 1% and bottom 1% before forming our quintile portfolios.

3.2.2. Performance Measures

We perform univariate analysis to determine whether the average monthly returns of the hybrid, momentum and contrarian strategies are different from zero when evaluated using the same set of conditions. We also examine return differences between winners and losers to determine the significance of the payoffs to our hedged portfolios. We further perform double sorts on size and past returns to determine if hybrid, momentum and contrarian strategies are significant for only small cap firms or large cap firms or all firms.

In order to ascertain the incremental superiority of the strategies after controlling for the influence of other factors, we undertake multivariate analysis using a number of regression equations. In the spirit of Fama and French (1996), we estimate equation 1 by regressing excess portfolio returns on excess market returns, the SMB (small-minus-big) and HML (high-minus-low) factors.

$$Excess\ Pf\ Ret = \alpha + \beta_1(Ret_{mkt} - RF) + \beta_2SMB + \beta_3HML \quad (1)$$

Excess portfolio returns are portfolio returns minus the risk-free (RF) rate and Ret_{mkt} is the market return. We use the return on the S&P/TSX composite index as the market return and the risk-free rate is the yield on the Canadian government 91-day treasury bills. The SMB and HML factors are the Fama and French North American factor values. If the three-factor model accurately explains average stock returns in Canada (without the need for an additional factor), then we expect the alpha of equation 1 to be insignificant. However, a significant alpha will signify that a contratum, momentum and/or contrarian factor might be warranted.

We also estimated several variants of an extended regression model that incorporates the key variables identified in the literature as explanatory factors for momentum and/or contrarian profits. The extended regression model is given as:

$$\begin{aligned}
 \text{Future Ret} = & \alpha + \beta_1 \text{MOM and/or CON and/or HYB} + \beta_2 \text{LogMktCap} + \beta_3 \text{Beta} + \\
 & \beta_4 \text{Ret}_{mkt} + \beta_5 \text{TimeTrnd} + \beta_6 \text{MktState} + \beta_7 \text{RFRet}_{t-1} + \beta_8 \text{TermSpread}_{t-1} + \\
 & \beta_9 \text{JanDummy} + e
 \end{aligned} \tag{2}$$

Using equation 2, we regress future returns on a number of variables including past momentum returns, contrarian returns, contratum returns, market capitalization, and beta. Following Arnold et al. (1999), we also include a linear time trend to control for growth over time (especially since we do not have book-to-market data for the entire sample period of six decades of our study). Market state (UP/DOWN states), defined as consecutive 3-year lagged non-negative (negative) market return, is reported to be related to momentum profits. Cooper et al. (2004), for example, find that momentum is exclusive to the UP market state and that there is subsequent long term reversal. Lagged 3-month T-Bill yield is negatively related to future stock market returns, and is included to proxy for expectations of future economic activity. Similarly, lagged term spread, measured as the difference between the yields on long term government bonds and T-Bills, is included as a proxy for short-term business cycles (Chordia and Shivakumar, 2002). We also include a January dummy because a number of authors (e.g. Jegadeesh and Titman 1993; Yao, 2012) have demonstrated a January effect in the performance of momentum and contrarian strategies.

The significance and signs of the coefficients of the contrarian, contratum and momentum ranking return variables will either support or refute our contention that these past return variables will be significant in predicting future returns. Since we expect the contratum strategy's losers to outperform winners, the coefficient of the contratum ranking return variable will be significantly negative. The coefficient of the traditional contrarian strategy is also expected to be negative since past losers are expected to outperform past winners. However, we expect the momentum strategy

to be positively related to future returns since past winners are expected to be future winners as well.

4. RESULTS

4.1 Evaluation of Different Strategies in Canada

Different investment strategies have different characteristics and hence different returns. Since there are potentially several variants of hybrid, contrarian and momentum strategies that can be implemented based on, for example, the number of months used in ranking stocks and the length of the holding period, we expect the different variants of hybrid, momentum and contrarian strategies to have different returns. To assess whether returns to contratum, momentum and contrarian strategies are different based on ranking and holding periods, we examine the variants of these strategies that rank stocks based on the past 3, 6, 9, 12, 24, 36, 48 and 60 months, skip one month or one year, and hold them for the next 3, 6, 9, 12, 24, 36, 48 and 60 months. In total, we examine 64 strategies split along the four groupings with 16 strategies per group (i.e. 16 contratum strategies, 16 momentum strategies, etc.). Following the standard practice in the literature, our strategies that rank stocks based on returns from 3 to 12 months skip a month between the ranking period and holding period while strategies that rank stocks based on returns of the past 24 to 60 months skip a year between the ranking period and holding period. The results of the various strategies are presented in Table 1.

Table 1 about here

As evident from Table 1, most of the strategies perform reasonably well, with the zero-cost hedged portfolio returns (of winners minus losers for most momentum strategies and losers minus winners for contratum and contrarian strategies) being generally statistically significant. A unique insight from Table 1 relates to the two groups of strategies ranked using long term returns (i.e. contrarian and contratum strategies). All variants of contrarian and contratum strategies perform well

and have hedged returns that are significantly positive. For example, the contratum strategies that rank stocks based on their past 60 months' returns, skip one year and then hold them over the intermediate term (i.e. 3, 6, 9 and 12 months) generate hedged portfolio returns of between 1% to 1.1% per month. However, their contrarian counterparts that rank stocks over the past 60 months but instead hold them over the long term only generate monthly hedged portfolio returns of 0.8% over 24 months and 36 months and 0.6% over 48 and 60 months. In fact, the best strategy is the contratum strategy that ranks stocks over the past 60 months, skips a year and invests in the stocks for three months (i.e. the 60x12x3 strategy). This strategy generates hedged portfolio returns of 1.1% per month.

On the contrary, almost all strategies ranked over the intermediate term from 3 to 12 months are dominated by those ranked over the long term. Of these strategies, while some of those held over the medium term (i.e. momentum strategies) have significantly positive returns, all those held over the long term (i.e. momentrian strategies) have significantly negative returns. From Table 1, only momentum strategies with ranking periods of 6 and 9 months and holding periods of 3, 6 and 9 months generally perform well and have significantly positive hedged portfolio returns. For example, momentum strategies that rank stocks based on the past 6 months' returns and skip a month between ranking and portfolio formation generates about 0.5% per month return over 3 and 6 months, 0.4% over 9 months and an insignificant 0.1% over 12 months. From the twelfth month onwards, momentum strategies lose their performance edge as losers begin to outperform winners. As a result, all momentrian strategies which are pivoted on the notion of holding momentum-ranked strategies over the long term yield negative hedged portfolio returns, a finding consistent with our contention that momentrian strategies will be the worse investment strategies to pursue. For instance, momentrian strategies ranked over the past 6 months return a significant -0.4% per month over 24 months and significant -0.3% per month over 36, 48 and 60 months. Our results also indicate that the momentum winners outperform the S&P/TSX composite index, while contrarian and contratum losers outperform the S&P/TSX composite index.

Figure 2 displays the performance characteristics of the four classes of strategies. Panel A of

Figure 2 presents a box plot summarizing the comparative performance of the strategies. Contratum strategies dominate all other strategies with max, mean, median, and even the 25% percentile hedged portfolio returns being significantly higher than the max hedged portfolio returns of the next best cluster of strategies (i.e. contrarian strategies). Thus, while contratum strategies dominate all other strategies, contrarian strategies come second and momentum strategies come third. The worse performing strategies are momentrian strategies. No momentrian strategy earned positive hedged portfolio returns.

Figure 2 about here

Panel B of Figure 2 further illustrates the comparative performance of the strategies using a bar chart. As evident from the bar chart, the top 15 performing strategies are contratum strategies. Contrarian strategies come in second while momentum strategies come in third. At the bottom of the performance ladder are momentrian strategies which have negative returns to the zero-cost hedged portfolios.

Overall, all the contratum and contrarian strategies and most of the momentum strategies we examine generate significant hedged portfolio returns. The differences in returns to the variants of momentum and contrarian strategies are consistent with our expectations. Contrary to most of the documented evidence, we find that contrarian-ranked strategies perform better than momentum strategies even in the medium term. For the remaining sections of this paper, we will analyze the best strategy we discovered, the 60x12x3⁴ hybrid contratum strategy and compare this strategy to the traditional 6x1x6 momentum strategy and the traditional 36x12x36 contrarian strategy. We chose the

⁴ When the strategies are represented this way, the first number is the number of months over which the strategy is ranked, the second number is the number of months skipped and the third number is the number of months that the strategy is held for. In the 60x12x3 contratum strategy, for example, the 60 indicates that the stocks are ranked over their past 60 months' returns, the 12 signifies the skipping of 12 months and the 3 indicates that they are held for three months thereafter.

traditional momentum and contrarian strategies to compare to the best hybrid strategy because the hedged portfolio returns of these traditional strategies are typical. In addition, since most studies use these strategies, our results can be compared to these studies. While analyzing the best contratum strategy to establish its superiority over momentum and contrarian strategies is important, the performance superiority of contratum strategies will be buttressed if we can establish that more typical contratum strategies also dominate contrarian and momentum strategies. To this effect, we compare, in robustness tests, the traditional momentum and traditional contrarian strategies to a more typical contratum strategy, the 24x12x3 strategy⁵, instead of to the best strategy (60x12x3). Our results for the typical 24x12x3 strategy are similar to our main results. Since no momentum strategy generates a positive hedged portfolio return, we do not include any momentum strategy for further analysis.

4.2 Comparison of Contratum, Momentum, and Contrarian Strategies

To get a deeper understanding of the performance of contratum, momentum and contrarian strategies, we examine the traditional 6x1x6 momentum strategy, traditional 36x12x36 contrarian strategy and the hybrid 60x12x3 contratum strategy using data over the 1956 to 2015 period but restricting the ranking time period to the common ranking period of 1962 to 2013. In robustness tests, we relax this restriction and focus on these strategies individually and the results are similar.

4.2.1 Investment Performance of Momentum, Contrarian and Contratum Strategies

We analyzed the wealth creation implications of the 6x1x6 momentum strategy, 36x12x36 contrarian strategy and 60x12x3 hybrid strategy by assuming that a dollar investment is made in the zero-cost hedged portfolios at the start of the common ranking period in February 1962.⁶ We also include the

⁵ We consider the 24x12x3 contratum strategy as a typical contratum strategy because based on its performance, it ranks in the middle tier of contratum strategies. The top tier of contratum strategies have monthly hedged portfolio returns ranging between 1.13% and 1.14% while the middle tier strategies have monthly hedged portfolio returns of between 1.05% and 1.08%. Contratum strategies in the bottom tier have monthly hedged portfolio returns of about 1%.

⁶ Although we use data from 1956 to 2015 for our main analyses, the earliest period that we can assess the

performance implications of a dollar invested in the S&P/TSX composite index over the same period.

Figure 3 charts the performance of the dollar investments.

Figure 3 about here

From Figure 3, a dollar invested in the hedged portfolio of losers minus winners of the hybrid contratum investment strategy in February 1962 would have been worth \$635 by January 2013 while the same dollar invested in the riskless portfolio of winners minus losers of the traditional momentum strategy would have grown to \$22. Also, a dollar invested in the hedged riskless portfolio of losers minus winners of a traditional contrarian strategy would have grown to \$68 over the same period. By comparison, a dollar invested in the S&P/TSX composite index over the same period would have grown to \$19.

Clearly, the contratum investment strategy offers the best returns – over nine times more compared to the second-best strategy, the traditional contrarian strategy. The hedged momentum strategy offers the third-best results while the S&P/TSX composite index ranks fourth on the performance ladder. It is important, however, to state that the poor performance of the momentum strategy is exacerbated by underperformance of momentum during the 2008-2009 financial crisis. The cumulative performance of the dollar investment in the momentum strategy reached a peak of \$37 by September 2007. It then started a steady decline after its peak and reached \$16 by August 2009 before rebounding to \$22 by January 2013. The significant underperformance of the momentum strategy during the global financial crisis of 2008-2009 appears to be a worldwide phenomenon. For instance, Jegadeesh and Titman (2011) report that returns to momentum strategies in the five years starting from

strategies together is 1962 because we need the first 60 months of data (i.e. 1956 to 1960) to rank the stocks for the contratum strategy. Since we skip a year between ranking and portfolio formation, it means that the first date common to all the three strategies is 1962. Similarly, since the contrarian strategy is held over 36 months, the latest common period that we can use to evaluate the strategies together is January 2013. However, we remove this common period requirement by focusing on the strategies separately in robustness tests and our results remain essentially the same.

2004 were negative and that these negative returns were predominantly driven by extremely negative returns in 2009.

While we evaluated the investment performance of the strategies to establish their relative strengths under the same conditions, we relax these conditions and evaluate the strategies on their own merits without constraining them to a common set of conditions in robustness tests. The results of these robustness tests are consistent with our main findings. First, we extended the contratum and momentum strategies and used all data up to the end of 2015 to evaluate the performance of each. With this extension, the 6x1x6 momentum dollar investment which had grown to \$22 in January 2013, would have grown to \$37 by July 2015. The 60x12x3 contratum dollar investment which had grown to \$635 in January 2013 would have grown to \$730 by September 2015. When we further relax all conditions and evaluate each strategy as a standalone strategy over the 1962 to 2015 period, we find that the terminal values over this period would have been \$1,003 for the 60x12x3 contratum strategy, \$107 for the 36x12x36 contrarian strategy and \$62 for the 6x1x6 momentum strategy. These results indicate that when the strategies are evaluated under the same set of conditions, the absolute dollar performance of each strategy is reduced but the relative performance appears to be similar to the unconstrained analyses. For example, the \$1,003 terminal value of the contratum strategy is also over 9 times better than \$107 terminal value of the contrarian strategy – the same magnitude of performance when we compare the \$635 value of the contratum strategy to the \$68 of the contrarian strategy when both are analyzed using the same set of conditions. The analysis of dollar investments shows that the hybrid investment strategy, what we refer to as the contratum strategy, dominates the traditional momentum, traditional contrarian and the S&P/TSX composite index.

4.2.2 Partitioning Contratum, Momentum and Contrarian Strategies

It has been documented that the momentum and contrarian anomalies are subsumed by other well-known anomalies including the January effect. We evaluate this possibility that our results are influenced by the January effect by partitioning our sample accordingly. Also, to ascertain whether the

significant returns to the hedged portfolio of the hybrid, momentum and contrarian strategies we examined are seasonal or specific to a particular time period or market state, we further partitioned our data along these dimensions. First, we partition the data into January vs. Non-January since a number of authors (e.g. Jegadeesh and Titman 1993; Yao, 2012) have documented a January effect in the performance of momentum and contrarian strategies. Second, to ascertain whether the time period used in the study drives our results, we divided our sample into 2 equal periods (pre- vs. post-August 1987). Cooper et al. (2004) demonstrate that momentum strategies (in the U.S.) are exclusively profitable in UP markets. To determine if this is the case in the Canadian context, we segmented our sample into DOWN vs. UP markets for further investigation.⁷ The results of the sub samples are presented in Table 2.

Table 2 about here

From Table 2 (last column), the momentum strategy is not significant in January but the contratum and contrarian strategies are significant in January. While the contratum and contrarian strategies are significant in the two sub-periods, we find the momentum strategy to be only significant in the post August 1987 period. However, when we focus on only momentum in robustness tests and extend our sample period from 1950 to 2015, we find all time periods (including the earlier time period) to have significant momentum hedged returns. We also find that the hybrid 60x12x3 contratum strategy and traditional 36x12x36 contrarian strategy are profitable in both UP and DOWN markets but the traditional 6x1x6 momentum strategy is profitable only in UP markets. However, a multiple regression model that includes both momentum and market state dummy find both variables to be significant in explaining future portfolio returns.

⁷ Following Cooper et al. (2004), we define an “UP” (“DOWN”) market as when the lagged 3-year S&P/TSX composite index return is non-negative (negative). We also, in robustness tests, used lagged 2-year and lagged 1-year S&P/TSX composite index returns and the results are qualitatively similar.

4.3 Double Sorting on Size and Past Returns

The significant returns to zero-cost hedged contratum, momentum and contrarian strategies create the need to establish whether or not this significant performance is market-wide or limited to small and illiquid stocks that may be difficult to trade. Given that we excluded all data points with price below \$1, the impact of small and micro firms is somewhat diminished in our study. To corroborate this conjecture, we double sorted our sample firms by size and then by past returns. Also, given our long study period, sorting firms into size at the beginning of the sample period can be problematic since firms classified as small cap firms 60 years ago might be large cap stocks today. Therefore, we classify firms into size groups based on their market capitalization at the end of December of the previous year. This classification ensures that our size groups are dynamic. We form two size groups by classifying all firms above the median market capitalization in our sample as big firms and firms below the median market capitalization as small firms. The results of the double sorts are reported in Table 3.

Table 3 about here

The double sorts on size and past returns show that the hedged portfolio returns of the contratum, momentum and contrarian strategies are significantly positive for both small and large cap stocks. Monthly excess returns for the contratum strategy is 1.6% for small cap stocks and 1.0% for large cap stocks (significant at 1%), momentum profits are 0.7% for small cap stocks and 0.3% for large cap stocks (significant at 1% and 5% respectively) and contrarian profits are 0.6% for both small and big firms (significant at 1%). These results demonstrate that the superior performance of the contratum strategy is robust across size groups. The contrarian strategy's performance is also robust across size groups; and although tilted in favour of small cap firms, the performance of momentum strategies do not indicate that the returns to momentum are exclusive to small and difficult-to-trade stocks.

4.4. Does size or risk account for the performance of the strategies?

We analyze the impact of risk (as measured by beta) on the performance of the strategies. The average beta and market capitalization of the quintile portfolios are reported in Table 4.

Table 4 about here

While the results in Table 4 show that the extreme quintiles have smaller market capitalizations and higher betas, they are in some cases reasonably close to the middle quintiles. The betas of all the momentum quintiles are for instance significantly lower than the market beta of 1. We conclude from these results that the difference in performance of the 60x12x3 contratum strategy, traditional 6x1x6 momentum strategy and traditional 36x12x36 contrarian strategy are not solely driven by the systematic risk of the portfolios and that the outperformance of the hybrid contratum strategy is robust with respect to size and risk.

4.5. Multivariate Analysis of Performance of the Strategies

Although the univariate analyses demonstrate that hedged portfolios of the 60x12x3 hybrid contratum strategy, traditional 6x1x6 momentum strategy and traditional 36x12x36 contrarian strategy earn significantly positive excess returns in excess of 0.5% per month over the 1956 to 2015 sample period, the tests possess no explanatory virtue. To ensure that the significant excess returns of zero cost contratum, momentum and contrarian strategies are not driven by other factors which have been shown to impact average stock returns, we employ multivariate cross-sectional analyses to examine the performance of the three strategies.

4.5.1 Performance of Strategies in the Context of the 3-Factor Model

We conduct multivariate analysis to determine whether or not the Fama and French 3-Factor model

will explain the hedged portfolio returns of the 60x12x3 hybrid contratum strategy, traditional 6x1x6 momentum strategy and traditional 36x12x36 contrarian strategy. To be consistent with our other analyses, we use the S&P/TSX composite index and Canadian T-Bill rates to determine the excess market returns and excess portfolio returns. Since the Fama and French North American factors only go as far back as 1990, our regressions results are based on data from 1990 to 2015. We estimated equation 1 and report the results in Table 5.

Table 5 about here

The results demonstrate that the 60x12x3 contratum strategy, 6x1x6 momentum strategy and 36x12x36 contrarian strategy's hedged returns are not fully explained by the Fama and French 3-Factor model. The alpha of the hedged contratum strategy's regression is a significant 1.4% (panel C), while the alphas of the hedged momentum and contrarian strategies' regressions are significant 0.7% (panel A) and 0.9% (panel B) respectively. Thus, the excess returns to these strategies are similar to the univariate results. The excess returns on the momentum hedged portfolios are consistent with most studies using U.S. data (e.g. Jagadeesh and Titman, 1993). However, the contrarian strategy's results show a significant alpha for the hedged contrarian portfolios which are inconsistent with Fama and French's (1996) results that show that the 3-Factor model fully explains the hedged returns of contrarian profits in the U.S. We conclude, from these results, that contrarian strategies perform significantly well in Canada. More interestingly, the superior performance of our contratum strategy remains robust even after controlling for the Fama and French factors.

We also estimated several variants of equation 1 (including the CAPM version) and the results consistently demonstrate that excess returns of the hybrid contratum, momentum and contrarian strategies are significantly different from zero and the hybrid contratum strategy continues to outperform the traditional momentum and contrarian strategies in these tests. We additionally run the regressions using the Fama and French excess market returns (instead of the S&P/TSX composite

index and Canadian T-Bill yields) and the results are similar. For brevity, we do not report these results.

4.5.2. Strategies' Correlations with Future Returns

To assess the predictive capabilities of past returns, most studies restrict the future returns being predicted to one month or a maximum of one year. Chordia and Shivakumar (2002), for example, predicted one-period-ahead returns in their study. We follow this convention by using past returns to predict future returns up to one year ahead. Specifically, we use equation 2 to predict future 1-month, 9-month and 12-month returns. We do not include 3-month and 6-month returns in our prediction models because we selected stocks for our contratum strategy based on their future 3-month returns and also used future 6-month returns to select the stocks for our momentum strategy. Including the 3-month and 6-month returns will not only bias our results, but could also lead to endogeneity issues.

Several factors have been identified in the literature as potential variables that can explain stock returns. To determine whether or not the past returns of the 60x12x3 hybrid strategy, 6x1x6 momentum strategy and 36x12x36 contrarian strategy have incremental explanatory power when these other variables are accounted for, we run multiple regressions using equation 2 and variants of the equation. We regress look-ahead returns (i.e. future 1-, 9- and 12-month returns) on a number of variables including contratum ranking returns, momentum ranking returns and contrarian ranking returns.

We estimate two sets of regressions. First, since our primary source of data for this study (CFMRC database) does not have financial statement data, we could not obtain data on book-to-market, a proxy for growth. Although an imperfect proxy, we follow Arnold et al. (1999) and include a linear time trend variable in our regressions as a proxy for growth over time. Second, though our primary data source does not have financial statement data, we obtained financial statement data from Stock Guide for a relatively shorter period of 20 years. After merging the Stock Guide data and the CFMRC data, our sample reduced to 374 firms. We use this sub-sample of firms over the shorter time

window in our second set of regression analysis and the results of the shorter time window regressions (which include book-to-market as a variable) are similar to those of the longer time window regressions (which include linear time trend instead of book-to-market). Table 6 reports the results of the look-ahead returns' regressions.

Table 6 about here

It is clear, from Table 6 that momentum ranking (past 6-month) returns, contrarian ranking (past 36-month) returns and hybrid contratum ranking (past 60-month) returns play significant roles in explaining future returns even after controlling for the effects of other variables. As expected, momentum ranking (past 6-month) returns, based on the notion of return continuation, are positively related to 1-month and 9-month future returns but are insignificantly related to 12-month future returns. This shows that momentum ranking returns can predict future medium term returns but not one-year returns. For the contrarian and contratum strategies, we expect negative relationships between their past returns and future returns because they are posited on the notion of return reversal. As expected, the contrarian ranking (past 36-month) returns and contratum ranking (past 60-month) returns are significantly negatively related to future returns on all horizons. Since the multivariate regressions include other variables deemed to explain stock returns, the significance of the coefficients of these past return variables indicate that these variables are important in explaining future returns.

4.5.3 The Strategies Together and Future Returns

Recall that momentum ranking returns are expected to be positively related to future returns whereas contrarian and the hybrid contratum returns are expected to be negatively related to future returns. Having demonstrated that each of the three strategies' ranking returns significantly explains future returns on its own, in this section, we investigate whether one of the strategies dominates the others in explaining future returns. To explore this question, we re-estimated equation 2 and included all the

three strategies' ranking returns in the same regression models. Table 7 summarizes the results of this re-estimation.

Table 7 about here

As demonstrated in Table 7, the traditional contrarian ranking returns (past 36 months' returns) subsumes both the momentum ranking returns (past 6 months' returns) and contratum ranking returns (past 60 months' returns) in explaining 1-month future returns. This result is not unexpected and is consistent with the well-documented findings of return reversal in the very short term (e.g. Jegadeesh, 1990; Lehmann, 1990). Both momentum ranking returns and contratum ranking returns are insignificant in explaining 1-month future returns in a model that also includes contrarian ranking returns. However, the contratum ranking returns dominate both the traditional momentum ranking returns and traditional contrarian ranking returns in explaining 9-month and 12-month returns. The coefficients of the momentum and contrarian ranking returns are contrary to their expected signs in the 9-month and 12-month future returns' regressions that also include the hybrid contratum ranking returns. The January dummy is only significantly related to 1-month future returns but insignificant in explaining 9-month and 12-month look-ahead returns. We conclude, on the basis of these findings, that the contratum investment strategy dominates both the traditional contrarian strategy and traditional momentum strategy in predicting future returns.

Most of the other variables are also significant in our multiple regression models and have the expected signs. As expected, the market return variable is significantly positive in all the regressions while market capitalization is significantly negative. The January dummy is significantly positively related to only 1-month future returns but negatively related to 9-month (at the 10% level of significance) and insignificantly related to 12-month future returns. Market state is significantly negative in all instances. Beta is negatively related to 1- and 9-month returns but insignificantly related to 12-month future returns. T-Bill return (one of the macroeconomic variables) is generally

insignificant. However, term spread, the second macroeconomic variable, is significantly positively related to 9- and 12-month future returns. The linear time trend variable is significantly positively related to future returns.

While Table 7 shows the results for our entire sample period, Table 8 reports the same results but only for a shorter period for firms with book value data, with the sample period starting from 1995 instead of 1956 (i.e. time periods for which book value data could be obtained from the Stock Guide database).

Table 8 about here

As demonstrated in Table 8, the conclusions are similar to those from Table 7. Contrarian ranking returns dominate contratum and momentum ranking returns in predicting future 1-month returns. But contratum ranking returns dominate momentum and contrarian ranking returns in predicting future 9- and 12-month returns. The book-to-market variable is significantly positively related to future 9- and 12-month returns. Overall, past returns play a significant role in predicting future returns in Canada over the past half century. Since the contratum strategy dominates momentum and contrarian strategies in predicting two of the three forward-looking returns, we conclude that the contratum strategy is the best strategy among the three strategies in predicting future returns.

4.6 Possible Explanations of Our Results

Our results show that even after controlling for firm characteristics (e.g. size, growth, beta, etc.), macroeconomic variables (e.g. market state, term spread, etc.) and other known market anomalies (e.g. the January effect), momentum, contrarian and hybrid contratum investment strategies appear to be profitable in a Canadian context. More importantly, the contratum strategy dominates both contrarian and momentum strategies. To understand the implications of our results, we tracked the monthly performance of the three trading strategies for 60 months (i.e. 5 years) after portfolio formation to

ascertain whether the performance of each of these strategies are in line with the predictions of any of the hypotheses propounded to explain momentum and/or contrarian strategies.

Jagedeesh and Titman (2001), in their explanation of momentum returns focused on post holding period return behavior of the various hypotheses. According to the authors, (i) underreaction theories suggest that post holding period returns would be zero because information is gradually being impounded into prices but once information is fully incorporated into prices, there should be no further predictability in prices; (ii) overreaction theories suggest that post holding period returns would be negative since prices would eventually revert to their fundamentals; and, (iii) for a rational risk-based explanation along the lines of Conrad and Kaul's (1998) cross-sectional variation in expected returns to hold, the post holding period returns should be positive. The cross-sectional variation in expected returns argument predicts higher returns beyond the holding periods because these strategies select (high risk) stocks which have higher expected returns. The future return patterns of the hybrid contratum and contrarian strategies lend support to the Conrad and Kaul's (1998) cross-sectional variation in expected returns argument. As exemplified in Figure 4, the profits of the zero-risk hedged portfolio of losers minus winners for these strategies are positive from month one to month sixty.

Figure 4 about here

Profits to these strategies do not reverse, and as such, they are in line with the predictions of Conrad and Kaul's (1998) rational/risk-based explanations. Also, as shown in Table 4, the extreme quintiles have slightly higher betas and slightly lower market capitalizations. As predicted by the CAPM, higher beta stocks have higher expected returns. Therefore, the positive returns in the post-holding period could be partly compensating for the systematic risk of the contratum and contrarian strategies. Also, Fama and French (1996) and others have demonstrated that small cap firms have higher expected returns. Thus, our contrarian and contratum results could also be compensating for the slightly smaller cap stocks in these portfolios. However, size and risk (as measured by beta) do not

explain all the excess returns to these strategies. Double sorts on size and returns as well as the inclusion of size and risk in multiple regressions do not crowd out the excess returns to contratum and contrarian portfolios.

If the contrarian and contratum strategies' results are consistent with the predictions of behavioral models, we would expect the returns to be negative in the early years and positive in the later years since the integrated behavioral models of Daniel et al. (1998), Barberis et al. (1998) and Hong and Stein (1999) predict momentum in the medium term and reversal in the long term. Since by design, we skip a year between ranking period and investment period in implementing our contratum and contrarian strategies, there is the possibility that the returns to our strategies may be negative for the year that we skip – a result which could support the integrated behavioral models' predictions of momentum in the medium term and reversal in the long term. To rule out this possibility, we re-estimate future returns from month 1 to month 60 without skipping a year between the ranking period and holding period. As evident from Figure 5, our conclusions remain unchanged even when we do not skip a year between ranking and portfolio formation. Thus, the returns to our hybrid and contrarian strategies monotonically increase from month 1 to month 60 whether or not we skip a year between the ranking period and holding period. Consequently, we conclude that returns to contrarian and hybrid contratum investment strategies support rational/risk-based explanations of the contrarian and contratum anomalies we document in this study.

Figure 5 about here

While our contrarian and contratum results offer support for rational/risk-based explanations, our momentum results support behavioral models. From Figure 4, we observe that cumulative momentum profits grew from 0.7% in month 1 to 5.1% in month 12. It then declined from month 12 onwards and by month 31, the cumulative momentum profits are completely reversed and become negative. Since momentum profits reverse in the post holding period, our momentum results lend

credence to behavioral models; specifically, overreaction theories such as positive feedback, extrapolation, trend chasing and herd behavior – as espoused by DeLong et al. (1990) and Daniel et al. (1998). Behavioral theories also predict that the extent of reversal in the extreme portfolio will be more severe than the reversal in the less extreme portfolios. To test this prediction, we compare momentum profits of the extreme portfolio (quintile 1 minus quintile 5) to a slightly less extreme portfolio (quintile 2 minus quintile 4). As Figure 6 shows, reversal in the extreme portfolio is more severe than in the less extreme portfolio. These findings buttress our conclusion that the momentum results support the overreaction hypothesis advanced by DeLong et al. (1990) and Daniel et al. (1998).

Figure 6 about here

4.7 Robustness Tests

We conducted a number of robustness tests to assess the sensitivity of our results. For reasons of brevity, we do not report the results of these robustness tests. They are however available upon request. First, we argued that technological improvements will make reversals occur sooner and would hence help make our contratum strategies profitable. In robustness tests, we assess this conjecture by splitting our sample into pre-1994 and post-1994 (i.e. start of technological improvements and easy access to information).⁸ Our results, which show that the average monthly contratum returns of 1.5% in the post-1994 period is 80% greater than the pre-1994 average monthly returns of 0.8%, support our contention that technological improvements should lead to profitable contratum strategies. Second, we tested the strategies using non-overlapping returns and the results are qualitatively similar. The contratum strategy outperforms the contrarian and momentum strategies. Third, we tested the

⁸ We use the beginning of the Internet economy in 1994 as the start of the period of significant technological improvements because Lyytinen and Rose (2003) observed that Internet computing spawned a wave of innovations in technology while Bartov et al. (2002) noted that the new Internet industry economy started in 1994.

strategies without skipping a month or a year between ranking period and investment period and the results are qualitatively similar, with the momentum, contratum and contrarian strategies continuing to generate significant excess returns while the contratum strategy continues to outperform the other strategies. Fourth, because we compared momentum, contratum and contrarian strategies, we started some of the strategies later (e.g. the 6x1x6 momentum strategy) and ended others earlier than the available data allows (e.g. the 6x1x6 momentum strategy). In robustness tests, we focus on the momentum strategy alone, which allows us to examine momentum from September 1950 to July 2015. The hedged portfolio returns to the momentum strategy is a significant 0.6% over this period. To determine if momentum has disappeared since it was first reported by Jegadeesh and Titman (1993), we divided the sample into 3 time periods (195009-197104, 197105-199112 and 199401-201507) so that the last time period will cover the period after the initial Jegadeesh and Titman (1993) study. We find momentum to be significant in all three sub-periods. We conclude, as a result, that the momentum anomaly has not completely disappeared in Canada. We also evaluated the contratum and contrarian strategies as standalone strategies and the results are similar to our main findings. We additionally examined contrarian and hybrid contratum strategies' performances in recent years (from 1994 onwards) and the profits have not disappeared. Furthermore, we re-run all the analyses using an alternative contratum strategy, the 24x12x3 strategy and the results are similar to our main results using the 60x12x3 contratum strategy.

5. CONCLUSION

We empirically evaluated a number of investment strategies using Canadian data from 1956 to 2015. The motivation for the paper is not only to add to the empirical evidence on the performance of investment strategies based on past returns but to also understand if it is possible to create a replicable cluster of investment strategies that perform better than other clusters of strategies (based on past returns). The motivation for examining hybrid contratum investment strategies that rank stocks as contrarian strategies and hold them over the medium term (like momentum strategies) is

influenced by two important (theoretical and empirical) developments – overreaction and investors’ easy access to information in recent years. Overreaction implies return reversals, and this, combined with the fact that technological advancements in recent years have led to easy flow of information, motivate us to conjecture that subsequent correction/reversal will happen sooner rather than later as generally implied by traditional contrarian strategies. We therefore contend that investment strategies that rank stocks as contrarian strategies but invest in them over the medium term as momentum strategies would outperform traditional momentum and contrarian strategies.

Our results show that easily replicable hybrid contratum investment strategies that rank stocks as contrarian strategies over the past 24 to 60 months, skip one year and hold the stocks as momentum strategies over the next 3 to 12 months outperform traditional momentum and traditional contrarian strategies in Canada over the 1956 to 2015 period. Traditional contrarian and momentum strategies also perform well in Canada. The performance of momentum, contrarian and contratum strategies are not crowded out by other documented anomalies (such as the size effect and January effect), risk or macroeconomic factors. We find that while contrarian and hybrid (contratum) returns do not reverse, momentum returns reverse after about a year. The fact that contrarian and contratum results do not reverse make these results consistent with the predictions of Conrad and Kaul’s (1998) cross-section variation in expected returns hypothesis. The reversal of momentum profits is consistent with behavioral models and raises the possibility that momentum in Canada may be caused by overreaction, positive feedback, trend chasing and/or herd behavior. The past higher returns of momentum stocks induce trend chasers to join the “bandwagon”. This drives up returns of momentum stocks in the short to median term, leading to the positive serial correlation in returns. However, when investors realize, in the long term, that the higher returns are not supported by improvements in firm fundamentals, they reverse course and momentum stocks begin to experience long-term return reversal.

REFERENCES

- Alexander, S.S. (1961). Price Movements in Speculative Markets: Trends or Random Walks, *Industrial Management Review*, 2, pp. 7-26.
- Arnold, T., Hersch, P., Mulherin, J.H. and Netter, J. (1999). Merging Markets, *Journal of Finance*, 54 (3), pp. 1083-1107.
- Asness, C.S., Moskowitz, T.J. and Pedersen, L.H. (2013). Value and Momentum Everywhere, *Journal of Finance*, 68(3), pp. 929-985.
- Balvers, R., Wu, Y. and Gilliland, E. (2000). Mean Reversion across National Stock Markets and Parametric Contrarian Investment Strategies, *Journal of Finance*, 55(2), pp. 745-772.
- Barberis, N., Shleifer, A. and Vishny, R. (1998). A Model of Investor Sentiment, *Journal of Financial Economics*, 49, pp. 307-343.
- Barroso, P. and Santa-Clara, P. (2015). Momentum has its Moments, *Journal of Financial Economics*, 116, pp. 111-120.
- Bartov, E., Mohanram, P. and Seethamraju, C. (2002). Valuation of Internet Stocks: An IPO Perspective, *Journal of Accounting Research*, 40(2), pp. 321-346.
- Black, F. (1972). Capital market equilibrium with restricted borrowing, *Journal of Business*, 45, pp. 444-455.
- Boynton, W. and Oppenheimer, H.R. (2006). Anomalies in Stock Market Pricing: Problems in Return Measurements, *Journal of Business*, 79(5), pp. 2617-2631.
- Carhart, M.M. (1997). On Persistence in Mutual Fund Performance, *Journal of Finance*, 52(1), pp. 57-82.
- Chakrabarty, B., Moulton, P.C. and Trzcinka, C. (2012). Institutional Holding Periods, Working Paper.
- Chan, L.K.C., Jegadeesh, N. and Lakonishok, J. (1996). Momentum Strategies, *Journal of Finance*, 51(5), pp. 1681-1713.
- Chordia, T. and Shivakumar, L. (2002). Momentum, Business Cycle, and Time-varying Expected Returns, *Journal of Finance*, 57(2), pp. 985-1019.
- Clearly, S. and Inglis, M. (1998). Momentum in Canadian Stock Returns, *Canadian Journal of Administrative Sciences*, 15(3), pp. 279-291.
- Conrad, J. and Kaul, G. (1993). Long-Term Market Overreaction or Biases in Computed Returns? *Journal of Finance*, 48(1), pp. 39-63.
- Conrad, J. and Kaul, G. (1998). An Anatomy of Trading Strategies, *Review of Financial Studies*, 11(3), pp. 489-519.
- Cooper, M.J., Gutierrez Jr., R.C. and Hameed, A. (2004). Market States and Momentum, *Journal of Finance*, 59(3), pp. 1345-1365.
- Cootner, P. H. (1962). Stock Prices: Random vs. Systematic Changes, *Industrial Management Review*, 3 (2), pp. 24-45.
- Da, Z., Gurun, U.G. and Warachka, M. (2014). Frog in the Pan: Continuous Information and Momentum, *Review of Financial Studies*, 27(7), pp. 2171-2218.
- Daniel, K., Hirshleifer, D. and Subrahmanyam, A. (1998). Investor Psychology and Security Market Under- and Overreactions, *Journal of Finance*, 53(6), pp. 1839-1885.
- De Bondt, W.F.M. and Thaler, R. (1985). Does the Stock Market Overreact? *Journal of Finance*, 40, pp. 793-808.
- De Long, J.B., Shleifer, A., Summers, L.H. and Waldmann, R.J. (1990). Positive Feedback Investment Strategies and Destabilizing Rational Speculation, *Journal of Finance*, 45(2), pp. 379-395.
- Deaves, R and Miu, P. (2007). Refining Momentum Strategies by Conditioning on Prior Long-Term Returns: Canadian Evidence, *Canadian Journal of Administrative Sciences*, 24, pp. 135-145.

- Eggins, J.E. and Hill, R.J. (2010). Momentum and Contrarian Stock-Market Indices, *Journal of Applied Finance*, 1, pp. 78-94.
- Fama, E.F. and French, K.R. Fama and French North American Factors Data, http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html. Last Accessed on June 15, 2016.
- Fama, E.F. and French, K.R. (1992). The Cross-Section of Expected Stock Returns, *Journal of Finance*, 47(2), pp. 427-465.
- Fama, E.F. and French, K.R. (1996). Multifactor Explanations of Asset Pricing Anomalies, *Journal of Finance*, 51(1), pp. 55-84.
- Fama, E.F. and French, K.R. (2008). Dissecting Anomalies, *Journal of Finance*, 63(4), pp. 1653-1678.
- Fama, E. F., and French, K. R. (2016). Dissecting Anomalies with a Five-Factor Model, *Review of Financial Studies*, 29, pp. 69–103.
- Foerster, S., Prihar, A. and Schmitz, J. (1994/1995). Back to the Future (Price Momentum and TSE Stocks), *Canadian Investment Review*, 7(4), pp. 9-13.
- French, K.R. (2008). Presidential Address: The Cost of Active Investing, *Journal of Finance*, 63(4), pp. 1537-1573.
- Galariotis, E. C. (2012). Recent Evidence on the Performance and Riskiness of Contrarian Portfolios, *European Journal of Finance*, 18(7), pp. 603-617.
- Goyal, A. and Wahal, S. (2015). Is Momentum an Echo? *Journal of Financial and Quantitative Analysis*, 50(6), pp. 1237-1267.
- Griffin, J.M., Kelly, P.J. and Nardari, F. (2010). Do Market Efficiency Measures Yield Correct Inferences? A Comparison of Developed and Emerging Markets, *Review of Financial Studies*, 23(8), pp. 3225-3277.
- Grundy, B.D. and Martin, J.S. (2001). Understanding the Nature of the Risks and Source of the Rewards to Momentum Investing, *The Review of Financial Studies*, 14(1), pp. 29-78.
- Haugen, R.A. and Baker, N.L. (1996). Commonality in the Determinants of Expected Stock Returns, *Journal of Financial Economics*, 41, pp. 401-439.
- Hirshleifer, D. (2001). Investor Psychology and Asset Pricing, *Journal of Finance*, 56(4), pp. 1533-1597.
- Hong, H. and Stein, J.C. (1999). A Unified Theory of Underreaction, Momentum Trading and Overreaction in Asset Markets, *Journal of Finance*, 54(6), pp. 2143-2184.
- Hou, T.C.T and McKnight, P.J. (2004). An Explanation of Momentum in Canadian Stocks, *Canadian Journal of Administrative Sciences*, 21(4), pp. 334-343.
- Jegadeesh, N. (1990). Evidence of Predictable Behavior of Security Returns, *Journal of Finance*, 45, pp. 881-898.
- Jegadeesh, N. and Titman, S. (1993). Returns to buying Winners and Selling Losers: Implications for Market Efficiency, *Journal of Finance*, 48(1), pp. 65-91.
- Jegadeesh, N. and Titman, S. (1995). Overreaction, Delayed Reaction, and Contrarian profits, *Review of Financial Studies*, 8(4), pp. 973-993.
- Jegadeesh, N. and Titman, S. (2001). Profitability of Momentum Strategies: An Evaluation of Alternative Explanations, *Journal of Finance*, 56(2), pp. 699-720.
- Jegadeesh, N. and Titman, S. (2002). Cross-Sectional and Time-Series Determinants of Momentum, *Review of Financial Studies*, 15(1), pp. 143-157.
- Jegadeesh, N. and Titman, S. (2011). Momentum, *Annual Review of Financial Economics*, 3, pp. 493-509.
- Karolyi, G.A. and Kho, B-C. (2004). Momentum Strategies: Some Bootstrap Tests, *Journal of Empirical Finance*, 11, pp. 509-536.
- Korajczyk, R. and Sadka, R. (2004). Are Momentum Profits Robust to Trading Costs? *Journal of Finance*, 59(3), pp. 1039- 1082.
- Lee, C.M.C. and Swaminathan, B. (2000). Price Momentum and Trading Volume, *Journal of*

- Finance, 55(5), pp. 2017- 2069.
- Lehmann, B.N. (1990). Fads, Martingales, and Market Efficiency, *Quarterly Journal of Economics*, 105(1), pp. 1-28.
- Lesmond, D.A., Schill, M.J. and Zhou, C. (2004). The illusory nature of momentum profits, *Journal of Financial Economics*, 71, pp. 349-380.
- Levy, R.A. (1967a). Relative Strength as a Criterion for Investment Selection, *Journal of Finance*, 22, pp. 595-610.
- Levy, R.A. (1967b). Random Walks: Reality or Myth, *Financial Analysts Journal*, pp. 69-77.
- Lintner, J. (1965). The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets, *Review of Economics and Statistics*, 47, pp. 13-37.
- Liu, M., Liu, Q. and Ma, T. (2011). The 52-Week High Momentum Strategy in International Stock Markets, *Journal of International Money and Finance*, 30, pp. 180-204.
- Liu, W., Norman, S. and Xu, X. (1999). The Profitability of Momentum Investing, *Journal of Business Finance and Accounting*, 26(9) & (10), pp. 1043-1091.
- Lyytinen, K. and Rose, G.M. (2003). The Disruptive Nature of Information Technology Innovations: The Case of Internet Computing in Systems Development Organizations, *MIS Quarterly*, 27(4), pp. 557-596.
- McLean, R.D. and Pontiff, J. (2016). Does Academic Research Destroy Stock Return Predictability? *Journal of Finance*, 71(1), pp. 5-32.
- Novy-Marx, R. (2012). Is Momentum Really Momentum? *Journal of Financial Economics*, 103, pp. 429-453.
- Novy-Marx, R. and Velikov, M. (2016). A Taxonomy of Anomalies and their Trading Costs, *Review of Financial Studies*, 29, pp. 104-47.
- Parmler, J. and González, A. (2007). Is Momentum Due to Data-snooping? *European Journal of Finance*, 13,(4), pp. 301-318.
- Pástor, L. and Stambaugh, R.F. (2003). Liquidity Risk and Expected Stock Returns, *Journal of Political Economy*, 111, pp. 642-685.
- Poterba, J. M. and Summers, L. H. (1988). Mean Reversion in Stock Prices, *Journal of Financial Economics*, 22, pp. 27-59.
- Scholtus, M., van Dijk, D., Frijns, B. (2014). Speed, Algorithmic Trading, and Market Quality around Macroeconomic News Announcements, *Journal of Banking and Finance*, 38, pp. 89-105.
- Schwert, G.W. (2003). Anomalies and Market Efficiency in Constantinides, G.M. , Harris, M. and Stulz, R. (eds), *Handbook of the Economics of Finance*, Elsevier Science B.V., pp. 937-972.
- Sharpe, W.F. (1964). Capital Asset Prices: A theory of Market Equilibrium under Conditions of Risk, *Journal of Finance*, 19, pp. 425-442.
- Sias, R.W. (2004). Institutional Herding, *Review of Financial Studies*, 17(1), pp. 165-206.
- Vayanos, D. and Woolley, P. (2013). An Institutional Theory of Momentum and Reversal, *Review of Financial Studies*, 26(5), pp. 1087-1145.
- Wang, K.Q. (2003) Asset Pricing with Conditioning Information: A New Test, *Journal of Finance*, 58(1), pp. 161-196.
- World Bank (2016). Market capitalization of listed domestic companies (current US\$), <http://data.worldbank.org/indicator/CM.MKT.LCAP.CD?view=chart>. Last Accessed on October 6, 2016.
- Wu, Y. and Mazouz, K. (2016). Long-term industry reversals, *Journal of Banking and Finance*, 68, pp. 236-250.
- Yan, X. and Zhang, P. (2009). Institutional Investors and Equity Returns: Are Short-Term Institutions Better Informed? *Review of Financial Studies*, 22(2), pp. 893-924.
- Yao, Y. (2012). Momentum, Contrarian, and the January Seasonality, *Journal of Banking and Finance*, 36, pp. 2757-2769.

Table 1 – Variants of Hybrid, Momentum and Contrarian Strategies

This table evaluates the performance of a number of hybrid, momentum and contrarian strategies based on data from 1956 to 2015. The stocks are ranked based on their performance over the past 3, 6, 9, 12, 24, 36, 48 and 60 months and held for the next 3, 6, 9, 12, 24, 36, 48 and 60 months. For ranking periods up to 12 months, we skip a month between ranking period and holding period. For ranking periods 24 months and over, we skip a year between portfolio ranking and holding period. We calculate returns (expressed as monthly returns) using the continuously compounded method. (t-statistics are in parentheses.)

| | | Holding Period (K) | | | | | | | |
|---|------------------|---------------------|----------------------|----------------------|-----------------------|-----------------------|-----------------------|------------------------|------------------------|
| Ranking Period (J) | | 3 | 6 | 9 | 12 | 24 | 36 | 48 | 60 |
| Panel A: Market Returns | | | | | | | | | |
| | S&P/TSX Index | 0.0055 (4.76)*** | 0.0054 (6.41)*** | 0.0054 (7.74)*** | 0.0053 (8.94)*** | 0.0051 (13.65)*** | 0.0050 (18.37)*** | 0.0049 (23.37)*** | 0.0049 (26.79)*** |
| Panel B: Momentum / Momentum Strategies | | | | | | | | | |
| 3 | Winners | 0.0129 (7.75)*** | 0.0121 (10.19)*** | 0.0120 (12.32)*** | 0.0111 (13.38)*** | 0.0077 (14.57)*** | 0.0066 (17.42)*** | 0.0058 (19.65)*** | 0.0051 (19.79)*** |
| | Losers | 0.0103 (6.23)*** | 0.0101 (7.96)*** | 0.0095 (9.49)*** | 0.0100 (11.46)*** | 0.0104 (19.41)*** | 0.0091 (24.54)*** | 0.0081 (28.61)*** | 0.0072 (29.16) |
| | Winners - Losers | 0.0027 (1.14) | 0.0020 (1.14) | 0.0025 (1.77)* | 0.0011 (0.94) | -0.0028 (-3.65)*** | -0.0025 (-4.76)*** | -0.0023 (-5.56)*** | -0.0021 (-5.98)*** |
| | Winners - TSX | 0.0074 (7.33)*** | 0.0067 (9.28)*** | 0.0067 (10.73)*** | 0.0058 (11.16)*** | 0.0026 (7.12)*** | 0.0016 (5.80)*** | 0.0009 (3.61)*** | 0.0002 (0.77) |
| 6 | Winners | 0.0139 (8.32)*** | 0.0134 (10.91)*** | 0.0124 (12.59)*** | 0.0105 (12.93)*** | 0.0067 (12.96)*** | 0.0060 (15.92)*** | 0.0052 (17.09)*** | 0.0045 (17.47)*** |
| | Losers | 0.0085 (4.97)*** | 0.0086 (6.92)*** | 0.0087 (8.73)*** | 0.0098 (11.32)*** | 0.0104 (19.08)*** | 0.0089 (23.89)*** | 0.0081 (28.77)*** | 0.0075 (29.49)*** |
| | Winners - Losers | 0.0053 (2.22)** | 0.0048 (2.74)*** | 0.0036 (2.59)*** | 0.0008 (0.64) | -0.0037 (-4.90)*** | -0.0029 (-5.55)*** | -0.0029 (-7.07)*** | -0.0030 (-8.20)*** |
| | Winners - TSX | 0.0083 (8.16)*** | 0.0080 (10.04)*** | 0.0070 (11.15)*** | 0.0053 (10.15)*** | 0.0016 (4.53)*** | 0.0010 (3.55)*** | 0.0003 (1.03) | -0.0004 (-1.93)* |
| 9 | Winners | 0.0138 (8.40)*** | 0.0126 (10.62)*** | 0.0109 (11.46)*** | 0.0091 (11.24)*** | 0.0058 (11.07)*** | 0.0053 (14.17)*** | 0.0046 (15.20)*** | 0.0039 (15.03)*** |
| | Losers | 0.0087 (5.13)*** | 0.0091 (7.18)*** | 0.0097 (9.40)*** | 0.0104 (12.14)*** | 0.0105 (19.46)*** | 0.0088 (23.82)*** | 0.0081 (28.85)*** | 0.0076 (29.10)*** |
| | Winners - Losers | 0.0051 (2.14)** | 0.0035 (2.04)** | 0.0013 (0.89) | -0.0013 (-1.11) | -0.0048 (-6.33)*** | -0.0035 (-6.65)*** | -0.0036 (-8.66)*** | -0.0036 (-9.86)*** |
| | Winners - TSX | 0.0083 (7.96)*** | 0.0072 (9.71)*** | 0.0056 (9.26)*** | 0.0038 (7.52)*** | 0.0007 (1.89)* | 0.0003 (1.10) | -0.0004 (-1.55) | -0.0010 (-4.53)*** |
| 12 | Winners | 0.0132 (8.01)*** | 0.0110 (9.45)*** | 0.0090 (9.57)*** | 0.0074 (9.17)*** | 0.0049 (9.41)*** | 0.0046 (12.58)*** | 0.0040 (13.41)*** | 0.0035 (13.42)*** |
| | Losers | 0.0096 (5.80)*** | 0.0104 (8.34)*** | 0.0109 (11.01)*** | 0.0113 (13.62)*** | 0.0109 (20.53)*** | 0.0091 (24.90)*** | 0.0084 (30.22)*** | 0.0078 (29.87)*** |
| | Winners - Losers | 0.0036 (1.52) | 0.0006 (0.34) | -0.0019 (-1.39) | -0.0039 (-3.36)*** | -0.0060 (-8.00)*** | -0.0044 (-8.53)*** | -0.0044 (-10.76)*** | -0.0043 (-11.76)*** |
| | Winners - TSX | 0.0077 (7.78)*** | 0.0056 (8.02)*** | 0.0037 (6.40)*** | 0.0022 (4.34)*** | -0.0002 (-0.45) | -0.0003 (-1.22) | -0.0009 (-3.97)*** | -0.0014 (-6.81)*** |
| Panel C: Contrarian / Contrarian Strategies | | | | | | | | | |
| 24 | Losers | 0.0151 (9.44)*** | 0.0144 (12.51)*** | 0.0135 (14.51)*** | 0.0128 (16.10)*** | 0.0107 (21.73)*** | 0.0096 (25.20)*** | 0.0087 (27.47)*** | 0.0079 (29.90)*** |
| | Winners | 0.0043 (2.83)*** | 0.0047 (4.19)*** | 0.0047 (5.33)*** | 0.0046 (6.10)*** | 0.0037 (7.40)*** | 0.0034 (9.12)*** | 0.0031 (11.21)*** | 0.0028 (11.43)*** |
| | Losers - Winners | 0.0108 (4.87)*** | 0.0097 (6.03)*** | 0.0088 (6.86)*** | 0.0082 (7.45)*** | 0.0070 (9.96)*** | 0.0062 (11.72)*** | 0.0056 (13.17)*** | 0.0051 (14.18)*** |
| | Losers - TSX | 0.0096 (9.34)*** | 0.0090 (12.00)*** | 0.0082 (13.28)*** | 0.0075 (14.01)*** | 0.0056 (14.29)*** | 0.0046 (13.75)*** | 0.0037 (13.12)*** | 0.0030 (12.90)*** |

| | | | | | | | | | |
|----|------------------|---------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| 36 | Losers | 0.0142 (9.02)*** | 0.0136 (12.06)*** | 0.0131 (14.80)*** | 0.0128 (16.95)*** | 0.0112 (23.62)*** | 0.0099 (25.90)*** | 0.0088 (29.01)*** | 0.0080 (30.45)*** |
| | Winners | 0.0047 (3.13)*** | 0.0039 (3.69)*** | 0.0035 (4.14)*** | 0.0032 (4.34)*** | 0.0033 (6.86)*** | 0.0030 (8.42)*** | 0.0025 (9.58)*** | 0.0023 (9.81)*** |
| | Losers - Winners | 0.0095 (4.40)*** | 0.0097 (6.25)*** | 0.0096 (7.79)*** | 0.0096 (9.11)*** | 0.0079 (11.57)*** | 0.0070 (13.39)*** | 0.0063 (15.55)*** | 0.0057 (16.33)*** |
| | Losers - TSX | 0.0086 (8.66)*** | 0.0082 (11.28)*** | 0.0077 (12.88)*** | 0.0075 (14.05)*** | 0.0061 (15.55)*** | 0.0050 (14.60)*** | 0.0039 (13.67)*** | 0.0031 (12.92)*** |
| 48 | Losers | 0.0141 (9.41)*** | 0.0140 (12.63)*** | 0.0136 (15.28)*** | 0.0132 (17.13)*** | 0.0111 (22.17)*** | 0.0096 (25.51)*** | 0.0088 (28.23)*** | 0.0078 (27.43)*** |
| | Winners | 0.0043 (2.80)*** | 0.0034 (3.17)*** | 0.0033 (3.89)*** | 0.0032 (4.30)*** | 0.0032 (6.52)*** | 0.0023 (6.72)*** | 0.0022 (8.25)*** | 0.0021 (9.23)*** |
| | Losers - Winners | 0.0098 (4.55)*** | 0.0107 (6.96)*** | 0.0103 (8.31)*** | 0.0100 (9.42)*** | 0.0079 (11.31)*** | 0.0073 (14.18)*** | 0.0066 (16.31)*** | 0.0057 (15.59)*** |
| | Losers - TSX | 0.0086 (8.59)*** | 0.0086 (11.37)*** | 0.0083 (13.20)*** | 0.0079 (13.94)*** | 0.0060 (14.44)*** | 0.0047 (13.41)*** | 0.0039 (13.34)*** | 0.0029 (11.47)*** |
| 60 | Losers | 0.0145 (9.55)*** | 0.0140 (12.52)*** | 0.0132 (15.02)*** | 0.0127 (17.07)*** | 0.0109 (22.18)*** | 0.0094 (25.30)*** | 0.0084 (27.22)*** | 0.0075 (26.00)*** |
| | Winners | 0.0030 (1.98)** | 0.0026 (2.43)*** | 0.0027 (3.11)*** | 0.0029 (3.89)*** | 0.0024 (4.98)*** | 0.0017 (5.06)*** | 0.0019 (7.59)*** | 0.0016 (7.36)*** |
| | Losers - Winners | 0.0115 (5.32)*** | 0.0114 (7.39)*** | 0.0105 (8.56)*** | 0.0098 (9.34)*** | 0.0085 (12.22)*** | 0.0077 (15.17)*** | 0.0065 (16.23)*** | 0.0059 (16.57)*** |
| | Losers - TSX | 0.0090 (8.92)*** | 0.0086 (11.28)*** | 0.0078 (12.90)*** | 0.0074 (14.09)*** | 0.0058 (14.31)*** | 0.0045 (13.37)*** | 0.0035 (12.27)*** | 0.0026 (10.25)*** |

***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively

Table 2 – Partitioning of Investment Strategies

This table partitions the performance of hybrid contratum, traditional momentum and contrarian strategies based on data from 1956 to 2015. The stocks are ranked based on their performance over the past 6, 36 or 60 months and held for the next 3, 6 or 36 months. For the 6-month ranking period momentum strategy, we skip a month between ranking period and holding period. For the 36- and 60-month ranking strategies, we skip a year between portfolio ranking and investment. We calculate returns (expressed as monthly returns) using the continuously compounded method. (t-statistics are in parentheses.)

| | Winners (P1) | P2 | P3 | P4 | Losers (P5) | Winner Minus Losers |
|---------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|------------------------|
| Panel A: Momentum (6x1x6) | | | | | | |
| All | 0.0118 (9.95)*** | 0.0079 (8.26)*** | 0.0074 (8.10)*** | 0.0060 (6.41)*** | 0.0066 (5.36)*** | 0.0053 (3.09)*** |
| Seasonality: January | 0.0129 (3.31)*** | 0.0107 (3.39)*** | 0.0103 (3.42)*** | 0.0096 (3.18)*** | 0.0119 (3.21)*** | 0.0010 (0.18) |
| Seasonality: Non-January | 0.0117 (9.40)*** | 0.0077 (7.62)*** | 0.0071 (7.45)*** | 0.0057 (5.77)*** | 0.0061 (4.71)*** | 0.0057 (3.16)*** |
| Sub-Period 1: Feb 1962-Jul 1987 | 0.0094 (5.75)*** | 0.0076 (5.37)*** | 0.0069 (5.20)*** | 0.0062 (4.47)*** | 0.0058 (3.63)*** | 0.0036 (1.59) |
| Sub-Period 2: Aug 1987-Jan 2013 | 0.0143 (8.30)*** | 0.0082 (6.36)*** | 0.0078 (6.30)*** | 0.0058 (4.60)*** | 0.0073 (3.95)*** | 0.0069 (2.74)*** |
| Market State: Down State | 0.0260 (12.19)*** | 0.0196 (11.27)*** | 0.0195 (11.19)*** | 0.0192 (9.77)*** | 0.0231 (8.01)*** | 0.0029 (0.79) |
| Market State: Up State | 0.0079 (5.87)*** | 0.0047 (4.33)*** | 0.0040 (3.98)*** | 0.0023 (2.32)** | 0.0020 (1.55) | 0.0059 (3.22)*** |
| Panel B: Contrarian (36x12x36) | | | | | | |
| All | 0.0026 (7.69)*** | 0.0035 (12.50)*** | 0.0048 (18.31)*** | 0.0066 (21.25)*** | 0.0096 (27.02)*** | 0.0069 (14.14)*** |
| Seasonality: January | 0.0023 (1.80)* | 0.0036 (3.58)*** | 0.0047 (4.84)*** | 0.0070 (6.59)*** | 0.0103 (7.50)*** | 0.0080 (4.28)*** |
| Seasonality: Non-January | 0.0026 (7.49)*** | 0.0035 (11.97)*** | 0.0048 (17.66)*** | 0.0066 (20.19)*** | 0.0095 (25.97)*** | 0.0068 (13.46)*** |
| Sub-Period 1: Feb 1962-Jul 1987 | 0.0013 (2.57)*** | 0.0027 (6.57)*** | 0.0043 (11.36)*** | 0.0065 (14.65)*** | 0.0072 (15.93)*** | 0.0059 (8.73)*** |
| Sub-Period 2: Aug 1987-Jan 2013 | 0.0039 (8.86)*** | 0.0042 (11.56)*** | 0.0053 (14.66)*** | 0.0067 (15.38)*** | 0.0119 (23.33)*** | 0.0080 (11.76)*** |
| Market State: Down State | 0.0091 (12.31)*** | 0.0079 (14.26)*** | 0.0099 (19.23)*** | 0.0123 (20.22)*** | 0.0148 (25.68)*** | 0.0057 (6.06)*** |
| Market State: Up State | 0.0008 (2.38)** | 0.0023 (7.59)*** | 0.0034 (12.56)*** | 0.0050 (15.48)*** | 0.0081 (20.35)*** | 0.0073 (13.92)*** |
| Panel C: Hybrid (60x12x3) | | | | | | |
| All | 0.0028 (1.89)* | 0.0044 (3.53)*** | 0.0065 (5.57)*** | 0.0087 (6.82)*** | 0.0138 (9.08)*** | 0.0110 (5.21)*** |
| Seasonality: January | 0.0114 (2.83)*** | 0.0163 (4.51)*** | 0.0162 (4.06)*** | 0.0194 (4.75)*** | 0.0242 (5.57)*** | 0.0128 (2.15)** |
| Seasonality: Non-January | 0.0020 (1.27) | 0.0033 (2.53)** | 0.0056 (4.62)*** | 0.0078 (5.79)*** | 0.0128 (8.01)*** | 0.0109 (4.86)*** |
| Sub-Period 1: Feb 1962-Jul 1987 | 0.0026 (1.26) | 0.0049 (2.71)*** | 0.0061 (3.62)*** | 0.0095 (5.57)*** | 0.0111 (5.77)*** | 0.0085 (3.00)*** |
| Sub-Period 2: Aug 1987-Jan 2013 | 0.0029 (1.40) | 0.0039 (2.26)** | 0.0069 (4.25)*** | 0.0079 (4.16)*** | 0.0165 (7.03)*** | 0.0135 (4.32)*** |
| Market State: Down State | 0.0170 (5.61)*** | 0.0146 (5.90)*** | 0.0175 (7.33)*** | 0.0202 (7.35)*** | 0.0298 (8.29)*** | 0.0128 (2.72)*** |
| Market State: Up State | -0.0012 (-0.72) | 0.0015 (1.09) | 0.0035 (2.65)*** | 0.0055 (3.91)*** | 0.0093 (5.81)*** | 0.0105 (4.59)*** |

***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively

Table 3 – Double Sorts on Size and Past Returns

Table 3 reports the results of double sorts on size and past returns of momentum, contrarian and contratum strategies. The stocks are ranked based on market capitalization and their performance over the past 6, 36 or 60 months and held for the next 3, 6 or 36 months. For the 6-month ranking period strategy, we skip a month between ranking period and holding period. For the 36- and 60-month ranking strategies, we skip a year between portfolio ranking and investment. We calculate returns (expressed as monthly returns) using the continuously compounded method. (t-statistics are in parentheses.)

| | Winners (P1) | P2 | P3 | P4 | Losers (P5) | Winner Minus Losers |
|--------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|------------------------|
| Panel A: Momentum (6x1x6) | | | | | | |
| Small Firms | 0.0084 (6.18)*** | 0.0089 (7.26)*** | 0.0069 (5.98)*** | 0.0034 (2.79)*** | 0.0011 (0.85) | 0.0072 (3.79)*** |
| Big Firms | 0.0127 (10.68)*** | 0.0076 (8.04)*** | 0.0074 (8.48)*** | 0.0078 (8.72)*** | 0.0093 (7.64)*** | 0.0034 (1.97)** |
| Panel B: Contrarian (36x12x36) | | | | | | |
| Small Firms | 0.0053 (11.04)*** | 0.0073 (16.84)*** | 0.0082 (21.17)*** | 0.0097 (18.71)*** | 0.0116 (21.53)*** | 0.0063 (8.63)*** |
| Big Firms | 0.0011 (3.08)*** | 0.0021 (7.49)*** | 0.0034 (12.28)*** | 0.0049 (15.59)*** | 0.0067 (19.62)*** | 0.0056 (11.51)*** |
| Panel B: Hybrid (60x12x3) | | | | | | |
| Small Firms | -0.0039 (-2.05)** | 0.0024 (1.26) | 0.0065 (3.49)*** | 0.0054 (2.95)*** | 0.0120 (5.77)*** | 0.0159 (5.63)*** |
| Big Firms | 0.0041 (2.75)*** | 0.0056 (4.32)*** | 0.0064 (5.40)*** | 0.0091 (7.13)*** | 0.0144 (9.32)*** | 0.0103 (4.84)*** |

***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively

Table 4 – Average Betas and Market Capitalization of Strategies

We report, in Table 4, the average betas and market capitalizations of the hybrid, momentum and contrarian strategies. The stocks are ranked based on their performance over the past 6, 36 or 60 months and are held for the next 3, 6 or 36 months. For the 6-month ranking period strategy, we skip a month between ranking period and holding period. For the 36- and 60-month ranking strategies, we skip a year between portfolio ranking and investment. We calculate returns (expressed as monthly returns) using the continuously compounded method. (t-statistics are in parentheses.)

| | Winners (P1) | P2 | P3 | P4 | Losers (P5) | Winner Minus Losers |
|--------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|
| Panel A: Momentum (6x1x6) | | | | | | |
| Risk: Beta (compared to 1) | 0.9404 (-6.11)*** | 0.8868 (-15.76)*** | 0.8632 (-21.17)*** | 0.8895 (-14.84)*** | 0.9711 (-3.24)*** | -0.0307 (-2.32)** |
| Size: Market Cap | 9,634,548 (20.19)*** | 13,700,000 (26.63)*** | 14,700,000 (27.93)*** | 11,500,000 (24.81)*** | 7,926,246 (18.78)*** | 1,708,302 (2.68)*** |
| Panel B: Contrarian (36x12x36) | | | | | | |
| Risk: Beta (compared to 1) | 1.0658 (6.69)*** | 0.9200 (-10.55)*** | 0.8987 (-16.10)*** | 0.9525 (-6.96)*** | 1.0441 (5.28)*** | -0.0218 (-1.68) |
| Size: Market Cap | 14,400,000 (20.74)*** | 18,800,000 (22.65)*** | 16,500,000 (25.22)*** | 14,000,000 (23.76)*** | 11,100,000 (23.61)*** | (3,250,235) (-3.87)*** |
| Panel C: Hybrid (60x12x3) | | | | | | |
| Risk: Beta (compared to 1) | 1.0341 (3.69)*** | 0.9063 (-12.96)*** | 0.8708 (-22.06)*** | 0.9194 (-13.76)*** | 1.0328 (4.37)*** | -0.0013 (-0.11) |
| Size: Market Cap | 16,800,000 (19.78)*** | 21,300,000 (22.88)*** | 18,600,000 (22.74)*** | 15,100,000 (24.32)*** | 12,900,000 (24.48)*** | (3,956,435) (-3.95)*** |

***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively

Table 5 – Strategies and the 3-Factor Model

Table 5 reports Fama and French 3-Factor model regressions of the hybrid, momentum and contrarian strategies over the July 1990 to December 2015 period. The stocks are ranked based on their performance over the past 6, 36 or 60 months and held for the next 3, 6 or 36 months. For the 6-month ranking period strategy, we skip a month between ranking period and holding period. For the 36- and 60-month ranking strategies, we skip a year between portfolio ranking and investment. We calculate returns (expressed as monthly returns) using the continuously compounded method. (t-statistics are in parentheses.)

The N for the various quintile portfolios is the 271 common-period months (only) from July 1990 to January 2013. N for All columns is the 271 months multiplied by the 5 quintile portfolios. The equation estimated is:

$$Excess\ Pf\ Ret = \alpha + \beta_1(Ret_{mkt} - RF) + \beta_2SMB + \beta_3HML$$

| | All | Winners (P1) | P2 | P3 | P4 | Losers (P5) | Winners Minus Losers |
|--------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|-------------------------|
| Panel A: Momentum (6x1x6) | | | | | | | |
| TSX Minus | | | | | | | |
| Tbill | 1.0022 (43.42)*** | 1.1215 (18.79)*** | 0.8880 (21.33)*** | 0.8905 (24.40)*** | 0.9192 (23.96)*** | 1.1915 (18.04)*** | -0.0700 (-0.90) |
| SML | 0.0998 (6.32)*** | 0.1425 (3.49)*** | 0.0922 (3.24)*** | 0.0702 (2.81)*** | 0.0823 (3.14)*** | 0.1115 (2.47)** | 0.0310 (0.58) |
| HML | 0.1038 (6.87)*** | 0.1297 (3.32)*** | 0.1659 (6.09)*** | 0.1107 (4.63)*** | 0.1108 (4.41)*** | 0.0017 (0.04) | 0.1281 (2.50)** |
| Alpha | 0.0046 (9.70)*** | 0.0100 (8.23)*** | 0.0040 (4.76)*** | 0.0039 (5.27)*** | 0.0015 (1.95)* | 0.0033 (2.47)** | 0.0067 (4.20)*** |
| N | 1355 | 271 | 271 | 271 | 271 | 271 | 271 |
| R ² | 0.5906 | 0.5808 | 0.6372 | 0.6945 | 0.6879 | 0.5698 | 0.0302 |
| Adjusted R ² | 0.5897 | 0.5761 | 0.6332 | 0.6911 | 0.6844 | 0.5650 | 0.0193 |
| Panel B: Contrarian (36x12x36) | | | | | | | |
| TSX Minus | | | | | | | |
| Tbill | 0.4819 (16.73)*** | 0.6955 (12.8)*** | 0.4846 (8.91)*** | 0.3875 (7.57)*** | 0.5201 (8.9)*** | 0.3217 (4.7)*** | -0.3738 (-5.42)*** |
| SML | 0.0236 (3.64)*** | 0.0295 (2.41)** | 0.0112 (0.91) | 0.0300 (2.6)*** | 0.0130 (0.99) | 0.0344 (2.23)** | 0.0049 (0.31) |
| HML | 0.0146 (2.39)** | 0.0133 (1.15) | 0.0091 (0.79) | 0.0150 (1.38) | 0.0125 (1) | 0.0232 (1.59) | 0.0098 (0.67) |
| Alpha | 0.0031 (15.32)*** | 0.0001 (0.31) | 0.0007 (1.77)* | 0.0020 (5.74)*** | 0.0034 (8.41)*** | 0.0091 (19.11)*** | 0.0090 (18.72)*** |
| N | 1355 | 271 | 271 | 271 | 271 | 271 | 271 |
| R ² | 0.1804 | 0.3920 | 0.2325 | 0.1967 | 0.2323 | 0.0952 | 0.1019 |
| Adjusted R ² | 0.1786 | 0.3851 | 0.2238 | 0.1877 | 0.2237 | 0.0850 | 0.0918 |
| Panel C: Hybrid (60x12x3) | | | | | | | |
| TSX Minus | | | | | | | |
| Tbill | 0.8704 (37.75)*** | 0.9634 (17.87)*** | 0.8062 (19.4)*** | 0.7042 (17.08)*** | 0.9355 (22.02)*** | 0.9429 (14.23)*** | -0.0205 (-0.27) |
| SML | 0.1511 (6.97)*** | 0.1032 (2.03)** | 0.1210 (3.1)*** | 0.1412 (3.64)*** | 0.1363 (3.41)*** | 0.2539 (4.07)*** | 0.1507 (2.14)** |
| HML | 0.1461 (7.16)*** | 0.0938 (1.97)** | 0.1247 (3.39)*** | 0.1286 (3.52)*** | 0.1710 (4.55)*** | 0.2127 (3.63)*** | 0.1189 (1.80)* |
| Alpha | 0.0037 (5.84)*** | -0.0008 (-0.55) | -0.0002 (-0.17) | 0.0033 (2.91)*** | 0.0036 (3.06)*** | 0.0128 (6.96)*** | 0.0136 (6.56)*** |
| N | 1355 | 271 | 271 | 271 | 271 | 271 | 271 |
| R ² | 0.5382 | 0.5622 | 0.6058 | 0.5511 | 0.6633 | 0.4721 | 0.0218 |
| Adjusted R ² | 0.5372 | 0.5573 | 0.6014 | 0.5461 | 0.6595 | 0.4661 | 0.0109 |

***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively

Table 6 – Strategies’ Performance in Multifactor Regressions

Table 6 reports multiple regression models that, in separate regression equations, regress future returns (1-, 9- and 12-month returns) on ranking period returns of the hybrid contratum strategy, momentum strategy, contrarian strategy and other control variables. Stocks are ranked based on their performance over the past 6, 36 or 60 months and the ranking returns used as explanatory variables for 1-month, 9-month and 12-month future returns. For the 6-month momentum strategy, we skip a month between ranking period and holding period. For the 36- and 60-month ranking strategies, we skip a year between portfolio ranking and investment. We calculate returns using the continuously compounded method. (t-statistics are in parentheses.)

The N of 3060 is the 612 common-period months from February 1962 to January 2013 multiplied by the 5 quintile portfolios. The equation estimated is:

$$Future\ Ret = \alpha + \beta_1 MOM\ or\ \beta_1 CON\ or\ \beta_1 HYB + \beta_2 LogMktCap + \beta_3 Beta + \beta_4 Ret_{mkt} + \beta_5 TimeTrnd + \beta_6 MktState + \beta_7 RFRet_{t-1} + \beta_8 TermSpread_{t-1} + \beta_9 JanDummy + e$$

| | Future Returns | | | | | | | | |
|--|-----------------------|------------------------|------------------------|-----------------------|------------------------|------------------------|-----------------------|------------------------|------------------------|
| | 1-Month | 9-Month | 12-Month | 1-Month | 9-Month | 12-Month | 1-Month | 9-Month | 12-Month |
| Momentum Ranking (Past 6-Month) Return | 0.0072 (3.30)*** | 0.0343 (2.86)*** | -0.0049 (-0.35) | | | | | | |
| Contrarian Ranking (Past 36-Month) Return | | | | -0.0040 (-5.24)*** | -0.0256 (-6.56)*** | -0.0330 (-7.13)*** | | | |
| Hybrid Ranking (Past 60-Month) Return | | | | | | | -0.0027 (-4.54)*** | -0.0291 (-10.00)*** | -0.0369 (-10.72)*** |
| Log Market Cap | -0.0003 (-0.33) | -0.0285 (-5.76)*** | -0.0425 (-7.31)*** | -0.0031 (-2.96)*** | -0.0410 (-7.72)*** | -0.0536 (-8.51)*** | -0.0033 (-3.03)*** | -0.0551 (-10.35)*** | -0.0727 (-11.55)*** |
| Beta | 0.0014 (0.44) | -0.0763 (-4.36)*** | -0.0988 (-4.80)*** | -0.0015 (-0.47) | -0.0513 (-3.15)*** | -0.0645 (-3.34)*** | -0.0057 (-1.60) | -0.0474 (-2.72)*** | -0.0465 (-2.26)** |
| Market Return | 1.0233 (74.33)*** | 1.0238 (13.51)*** | 1.0110 (11.34)*** | 0.9822 (72.97)*** | 0.9543 (13.79)*** | 0.9351 (11.38)*** | 0.9584 (67.71)*** | 0.9505 (13.70)*** | 0.9281 (11.32)*** |
| Linear Time Trend | 0.0000 (1.17) | 0.0002 (5.61)*** | 0.0003 (7.48)*** | 0.0000 (3.68)*** | 0.0003 (7.80)*** | 0.0004 (8.95)*** | 0.0000 (3.70)*** | 0.0004 (10.36)*** | 0.0006 (11.93)*** |
| Market State Dummy | -0.0096 (-6.27)*** | -0.1494 (-17.69)*** | -0.1799 (-18.11)*** | -0.0069 (-4.52)*** | -0.1243 (-15.92)*** | -0.1470 (-15.86)*** | -0.0073 (-4.58)*** | -0.1067 (-13.70)*** | -0.1236 (-13.42)*** |
| T-Bill Return | -0.1635 (-0.76) | 1.4286 (1.21) | 3.0535 (2.19)** | 0.0217 (0.10) | 2.2570 (2.03)** | 4.1216 (3.13)*** | 0.0060 (0.03) | 2.0017 (1.81)* | 3.6201 (2.77)*** |
| Term Spread | -0.0140 (-0.57) | 0.6224 (4.60)*** | 0.5051 (3.17)*** | -0.0043 (-0.18) | 0.5681 (4.60)*** | 0.4801 (3.28)*** | -0.0126 (-0.50) | 0.5519 (4.46)*** | 0.4521 (3.09)*** |
| January Dummy | 0.0181 (8.09)*** | -0.0089 (-0.73) | -0.0031 (-0.22) | 0.0148 (6.80)*** | -0.0101 (-0.91) | -0.0025 (-0.19) | 0.0131 (5.73)*** | -0.0134 (-1.19) | -0.0080 (-0.60) |
| Constant | 0.0119 (0.92) | 0.6418 (9.05)*** | 0.8944 (10.72)*** | 0.0495 (3.32)*** | 0.7642 (9.98)*** | 0.9783 (10.76)*** | 0.0575 (3.66)*** | 0.9455 (12.31)*** | 1.2105 (13.33)*** |
| N | 3060 | 3060 | 3060 | 3060 | 3060 | 3060 | 3060 | 3060 | 3060 |
| R ² | 0.6609 | 0.1737 | 0.1664 | 0.6520 | 0.1955 | 0.1834 | 0.6169 | 0.2063 | 0.1983 |
| Adjusted R ² | 0.6599 | 0.1712 | 0.1640 | 0.6510 | 0.1931 | 0.1810 | 0.6158 | 0.2039 | 0.1960 |

***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively

Table 7 – Strategies’ Comparative Performance in Multifactor Regressions

Table 7 presents multiple regression models that, in the same regression models, regress future returns (1-, 9- and 12-month returns) on ranking period returns of the contratum strategy, momentum strategy, contrarian strategy and other control variables. Stocks are ranked based on their performance over the past 6, 36 or 60 months and the ranking period returns used to explain the 1-month, 9-month and 12-month future returns. For the 6-month momentum strategy, we skip a month between ranking period and holding period. For the 36- and 60-month ranking strategies, we skip a year between portfolio ranking and investment. We calculate returns using the continuously compounded method. (t-statistics are in parentheses.)

The N of 3060 is the 612 common-period months (only) from February 1962 to January 2013 multiplied by the 5 quintile portfolios. The equation estimated is:

$$Future\ Ret = \alpha + \beta_1 MOM + \beta_{10} CON + \beta_{11} HYB + \beta_2 LogMktCap + \beta_3 Beta + \beta_4 Ret_{mkt} + \beta_5 TimeTrnd + \beta_6 MktState + \beta_7 RFRet_{t-1} + \beta_8 TermSpread_{t-1} + \beta_9 JanDummy + e$$

| | Future Returns | | |
|---|-----------------------|------------------------|------------------------|
| | 1-Month | 9-Month | 12-Month |
| Momentum Ranking (Past 6-Month) Return | -0.0001 (-0.03) | -0.0685 (-2.84)*** | -0.1158 (-4.02)*** |
| Contrarian Ranking (Past 36-Month) Return | -0.0089 (-3.59)*** | 0.0459 (3.96)*** | 0.0660 (4.77)*** |
| Hybrid Ranking (Past 60-Month) Return | 0.0014 (1.07) | -0.0515 (-8.42)*** | -0.0709 (-9.72)*** |
| Log Market Cap | -0.0035 (-3.19)*** | -0.0456 (-8.89)*** | -0.0614 (-10.05)*** |
| Beta | -0.0092 (-2.50)** | -0.0314 (-1.83)* | -0.0272 (-1.33) |
| Market Return | 0.9579 (66.27)*** | 0.9170 (13.55)*** | 0.8784 (10.89)*** |
| Linear Time Trend | 0.0000 (3.63)*** | 0.0004 (8.71)*** | 0.0005 (10.30)*** |
| Market State Dummy | -0.0056 (-3.36)*** | -0.1019 (-13.17)*** | -0.1182 (-12.81)*** |
| T-Bill Return | 0.3000 (1.26) | 1.2131 (1.09) | 2.4195 (1.82)* |
| Term Spread | -0.0312 (-1.20) | 0.5185 (4.25)*** | 0.3535 (2.43)** |
| January Dummy | 0.0125 (5.32)*** | -0.0185 (-1.68)* | -0.0157 (-1.19) |
| Constant | 0.0610 (3.86)*** | 0.8001 (10.82)*** | 1.0408 (11.81)*** |
| N | 3060 | 3060 | 3060 |
| R ² | 0.6056 | 0.2002 | 0.1944 |
| Adjusted R ² | 0.6042 | 0.1973 | 0.1915 |

***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively

Table 8 – Strategies' Performance in Multifactor Regressions with Book-to-Market

Table 8 presents multiple regression models that, in the same regression models, regress future returns (1-, 9- and 12-month returns) on ranking period returns of the contratum strategy, momentum strategy, contrarian strategy and other control variables. Stocks are ranked based on their performance over the past 6, 36 or 60 months and used to explain the 1-month, 9-month and 12-month future returns. For the 6-month momentum strategy, we skip a month between ranking period and holding period. For the 36- and 60-month ranking strategies, we skip a year between portfolio ranking and investment. We calculate returns using the continuously compounded method. (t-statistics are in parentheses.)

The N of 1085 is the 217 common-period months (only) from January 1995 to January 2013 multiplied by the 5 quintile portfolios. The equation estimated is:

$$Future\ Ret = \alpha + \beta_1 MOM + \beta_{10} CON + \beta_{11} HYB + \beta_2 LogMktCap + \beta_3 Beta + \beta_4 Ret_{mkt} + \beta_5 BookToMkt + \beta_6 MktState + \beta_7 RFRet_{t-1} + \beta_8 TermSpread_{t-1} + \beta_9 JanDummy + e$$

| | Future Returns | | |
|---|----------------------|-----------------------|-----------------------|
| | 1-Month | 9-Month | 12-Month |
| Momentum Ranking (Past 6-Month) Return | -0.0010 (-0.08) | -0.0659 (-1.50) | -0.1234 (-2.31)** |
| Contrarian Ranking (Past 36-Month) Return | -0.0085 (-1.72)* | 0.0212 (1.25) | 0.0236 (1.15) |
| Hybrid Ranking (Past 60-Month) Return | 0.0002 (0.09) | -0.0224 (-2.77)*** | -0.0319 (-3.25)*** |
| Log Market Cap | -0.0009 (-0.30) | -0.0616 (-6.33)*** | -0.0831 (-7.01)*** |
| Beta | -0.0106 (-1.65)* | -0.0745 (-3.39)*** | -0.0775 (-2.90)*** |
| Market Return | 0.8103 (21.13)*** | 0.6518 (4.99)*** | 0.5658 (3.56)*** |
| Book-to-Market | -0.0104 (-1.44) | 0.0994 (4.05)*** | 0.1022 (3.42)*** |
| Market State Dummy | -0.0089 (-1.88)* | -0.1584 (-9.78)*** | -0.1927 (-9.78)*** |
| T-Bill Return | 1.9754 (1.44) | 17.7953 (3.80)*** | 23.4617 (4.12)*** |
| Term Spread | -0.0532 (-0.68) | -0.0118 (-0.04) | -0.3805 (-1.18) |
| January Dummy | 0.0058 (0.94) | -0.0179 (-0.86) | 0.0132 (0.52) |
| Constant | 0.0407 (0.79) | 1.2427 (7.07)*** | 1.6628 (7.77)*** |
| N | 1085 | 1085 | 1085 |
| R ² | 0.3118 | 0.2029 | 0.2019 |
| Adjusted R ² | 0.3048 | 0.1947 | 0.1937 |

***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively

Figure 1 – Matrix of Continuation- and Reversal-based Investment Strategies

This figure presents the four classes of investment strategies implicit in return continuation and reversal. As shown in Figure 1, while momentum strategies are ranked and held over the medium term and contrarian strategies are ranked and held over the long term, two more classes of implicit strategies on the continuation-reversal continuum are those ranked over the long term but held over the medium term (what we call contratum strategies) and those ranked over the medium term but held over the long term (what we refer to as momentrian strategies).

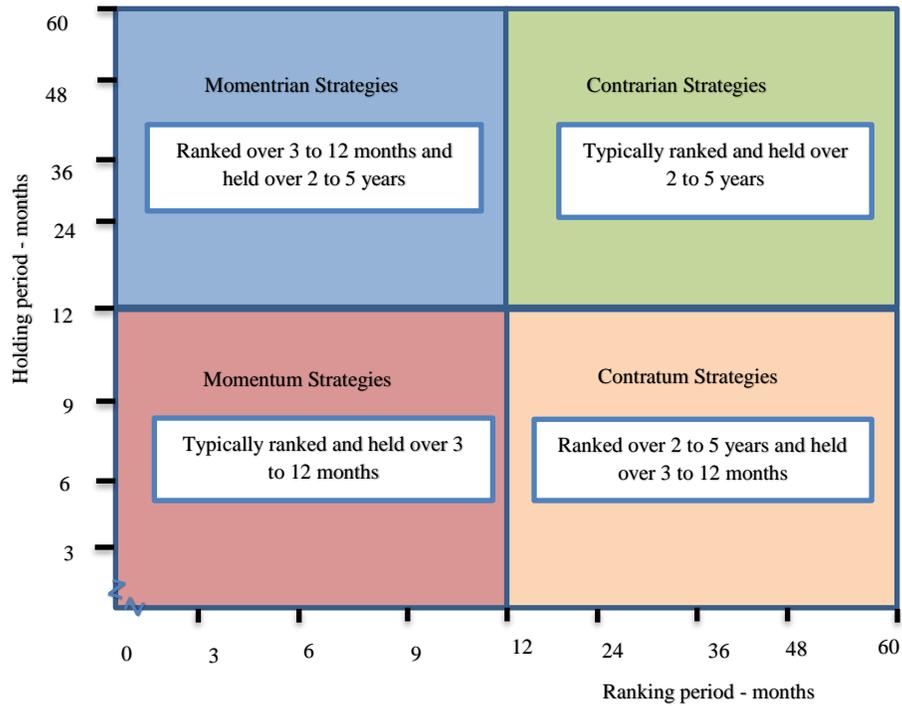
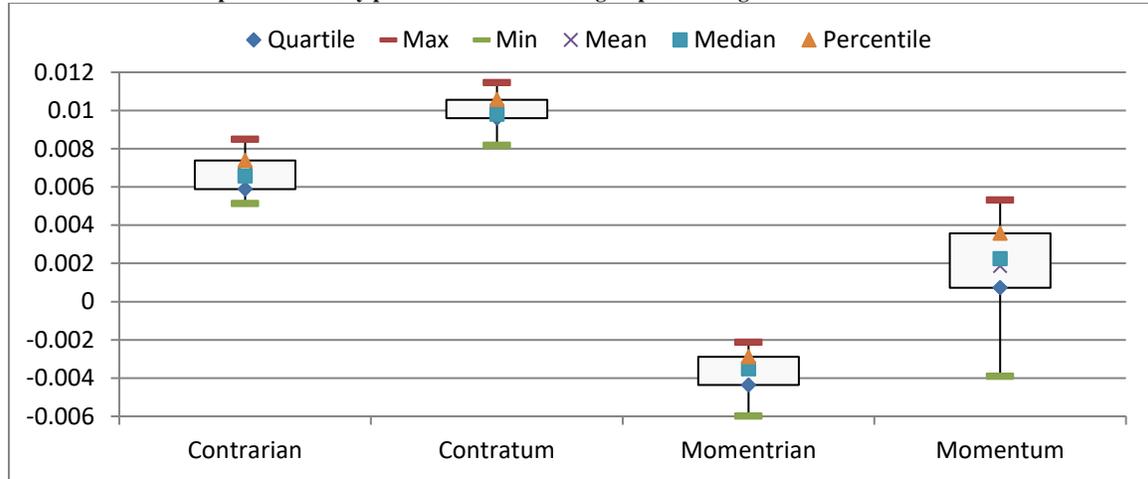


Figure 2 – Summary Performance and Ranking of Investment Strategies

Figure 2 presents the summary performance and ranking of 16 traditional momentum strategies, 16 traditional contrarian strategies, 16 momentum strategies and 16 contrarian strategies. Panel A presents a Box-Whisker chart summarizing the performance of the four groups of strategies (i.e. momentum, contrarian, momentum and contrarian strategies). Panel B shows a Bar chart ranking the 64 strategies by each strategy's group.

Panel A: Box-Whisker plot of summary performance of the four groups of strategies



Panel B: Bar chart ranking 64 investment strategies broken into four groups



Figure 3 – \$1 Invested in Momentum, Contrarian and Contratum Strategies

This figure presents the performance of a dollar investment in the hedged portfolios of losers (winners) minus winners (losers) of the momentum strategy, contrarian strategy, and hybrid contratum strategy as well as the performance of the S&P/TSX composite index.

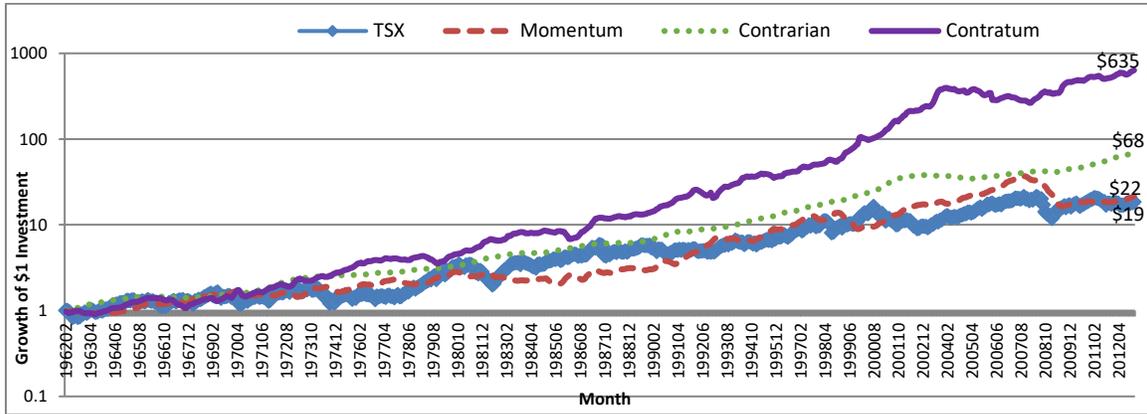


Figure 4 – Monthly Returns of Momentum, Contrarian and Contratum Strategies

This figure presents the post-ranking period monthly returns of contrarian, momentum and hybrid contratum strategies for five years.

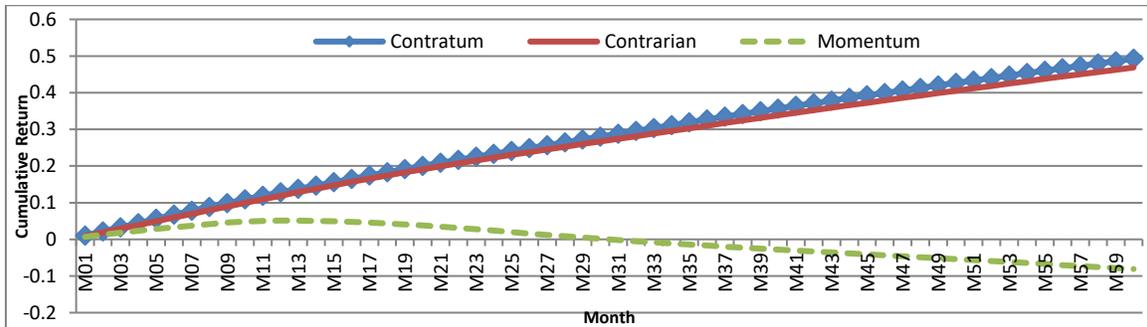


Figure 5 – Monthly Returns of Hybrid and Contrarian Strategies

This figure presents the post-ranking period monthly returns of contrarian and contratum strategies (that do not skip a year between ranking period and investment period) for five years.

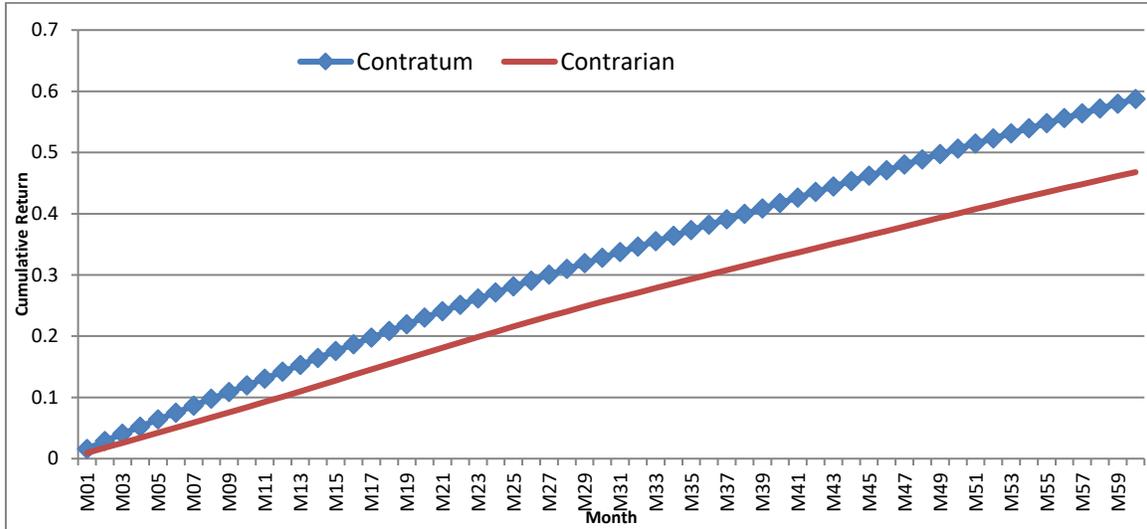


Figure 6 – Monthly Momentum Returns for Extreme Portfolios and less Extreme Portfolios (quintile 2 minus quintile 4)

Figure 6 presents the post-ranking period monthly momentum returns for the extreme portfolios (quintile 1 minus quintile 2) and less extreme portfolios (quintile 2 minus quintile 4) – for five years.

