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Limits to Arbitrage and Returns to Value Investing

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ABSTRACT

We investigate the role played by limits to arbitrage (Shleifer, 2000; Shleifer and Vishny, 1997) on the abnormal returns earned by accounting-based fundamental analysis reported by the literature in the US markets (Piotroski, 2000; Monharam, 2005). We hypothesize that if limitations on the actions of arbitrageurs are partially responsible for these reported results, abnormal returns will be even higher in markets where such limitations are more impounding. Using Brazil as a laboratory and directly controlling for limitations to arbitrage our results confirm this hypothesis and show that firms with strong fundamentals only generate abnormal returns if there are restrictions to trade on their stocks.

I. INTRODUCTION

In this paper we investigate the role played by limits to arbitrage on the magnitude and persistence of abnormal returns generated by accounting-based fundamental analysis strategies. We find it interesting to investigate value investing anomalies because fundamental analysis has a long tradition (Graham and Dodd, 1934) in finance and accounting literatures, is extremely popular among practioneers (Buffet, 2007), and is widely taught in business schools being the core of many frequently used text-books (Penman, 2006; Palepu and Healy, 2007)[2]. Previous research (Piotroski, 2000 and Monharam, 2005) has shown that significant abnormal returns are generated by trading strategies based on the analysis of financial statements. They argue that markets do not reflect completely the information contained in financial statements and consequently it's possible to earn abnormal returns based on buying (selling) financially strong (weak) firms. Shleifer (2000), however, argument that pricing anomalies can persist as long as arbitrage is not possible due to market microstructure problems like (i) low liquidity and high transaction costs, (ii) restrictions on short sales, and (iii) the absence of similar assets. The argument goes that in markets with such features, securities can be traded above or below fundamental value for long periods and be very slow to incorporate new information – essential characteristics of market inefficiency. We try to incorporate Shleifer's (2000) argument and investigate the impact of restrictions to arbitrage on the returns generated by accounting-based fundamental analysis strategies[3].

We hypothesize that if limits to arbitrage (Shleifer, 2000) are important determinants of the reported excess returns generated by fundamental analysis in the US, abnormal returns will be even higher in markets where limits to arbitrage are more impounding. We use the São

[2] Some authors like Bernard (1993) argue that excess returns to fundamentals like the Value Line enigma is a manifestation of the post-earnings announcement drift. Our study takes a longer time interval than most studies related to post-earnings drifts and is focused on the magnitude and persistence of abnormal returns over time.

[3] There has been skepticism about these accounting-related anomalies for a long time in the accounting and finance literatures.Ball, (1978) discusses the role of research design flaws including adequate control for risk.

Paulo Stock Exchange in Brazil (BOVESPA) as a laboratory to investigate this hypothesis. The country's feature most relevant to our analysis is the limitation imposed on arbitrageurs. Firstly, the trading volume for HBM firms in Brazil is below US$ 300,000 per day and bid and ask spreads are high. This low liquidity and high transaction costs have important effects. Secondly, short sales are not generally allowed. For most shares, if a market participant wants to bet on the downside risk he has to borrow the share and sell it with a commitment to buy back in the future. Such transactions do not occur for HBM shares because liquidity can make the buy back transaction impossible. Thirdly, due to liquidity problems and low number of shares traded on BOVESPA, similar assets are not available in Brazil. Traders cannot buy the HBM shares and sell the stock index because the BOVESPA stock index is built on the most liquid shares which does not include any HBM share on it. Derivatives are not available for these shares because BOVESPA does not list derivatives on such illiquid underlyings. Thus, if returns to fundamental analysis are driven by restrictions to arbitrage we expect these returns to be abnormally high in Brazil.

To test our hypothesis we first replicate an adapted version of Piotroski (2000) – for the sake of comparability – creating the *Br_F-SCORE* which reflects the firms' financial position, and show that an investor could have changed his/her HBM portfolio one-year (two-year) market-adjusted returns from 5.7% (42.4%) to 26.7%% (120.2%) by selecting financially strong HBM firms in the 1994-2004 period on the São Paulo Stock Exchange (BOVESPA). Our results are considerably higher than Piotroski (2000) which increased his portfolio one-year (two-year) market adjusted return from 5.9% (12.7%) to 13.4% (28.7%). Additionally, a strategy based on forming portfolios long on financially strong HBM firms and short on financially weak HBM firms generates 41.8% annual (or 144.2% for two years accumulated) market-adjusted returns between 1994 and 2004. Again our portfolio returns are higher than Piotroski (2000) who found 23% annual or 43% for two years accumulated. These results

confirm our hypothesis that fundamental value strategies applied in Brazil generates returns significantly higher than in the US.

However after partioning the sample, our results show that the fundamental analysis strategy employed works only for the groups of small and medium size firms and for the groups of low and medium liquidity firms but not for the group of large size and high liquidity firms. Basically, our results only work for the group of shares upon which limits to arbitrage are more severe because of low liquidity. Low liquidity is proxy for limits to trade and to arbitrage.

However, to avoid controversy over the adequate proxies to control for limits to arbitrage we directly control for restrictions of the actions of arbitrageurs in Brazil. We select the shares for which arbitrage is possible: shares with forwards and options traded on them which allows traders to sell short without concerns about liquidity and which are part of the stock index. Using pooled and panel data specifications we show that *Br_F-SCORE* is not statistically related to abnormal returns for these firms. *Br_F-SCORE* explains returns for the full sample but not for the sub-sample of firms for which arbitrage is possible. Basically, our results confirm the hypothesis that the *Br_F-SCORE* only explains abnormal returns for the firms for which arbitrage is not possible. We believe that by directly controlling for limits to arbitrage we contribute to the literature which normally uses proxies like idiosyncratic volatility. We believe our paper to be the first to control explicitly for limits to arbitrage instead of using proxies and thus we avoid the controversies surrounding these proxies (Brav and Heaton, 2006).

This paper is, to the best of our knowledge, the first to explicitly investigate the effect of limits to arbitrage on the results of value investing strategies. We control directly for limitations on the actions of arbitrageurs unlike Piotroski (2000) and Monharan (2005). Our results contribute to a very recent strand of the literature that tries to address the impact of

limits to arbitrage on some well reported capital markets phenomena related to financial reporting. Mashruwala et al. (2006) explains the accrual anomaly based on the same 'limits to arbitrage' argument used here. Cohen et al. (2007) showed that the earnings announcement premia is not completely eliminated because of the costs of arbitrage - Frazinni and Lamont (2006) found similar results but controlling for liquidity. We address the effect of limits to arbitrage on the results of accounting-based fundamental analysis. We complement the results presented by Piotroski (2000) and Monharan (2005) by showing that the reported mispricing is caused by the absence of mechanisms to arbitrage. We also show that caution must be used to implement those strategies, especially in emerging markets, due to liquidity problems. Our results are by no means definitive but shed some light on the value stock puzzle directly addressing the problem of why this phenomenon exists (Guay, 2000). We provide strong evidence favorable to the limits to arbitrage hypothesis regarding accounting-based fundamental strategy anomalies.

We also contribute to a growing body of the financial economics literature related to emerging markets (Bekaert and Harvey, 2003). Our results contribute to this literature by showing that expected returns are heavily influenced by liquidity (Bekaert and Havey, 2006). There is a huge body of research on emerging markets that suggests that simple combinations of financial characteristics can be used to develop portfolios that exhibit considerable excess returns to a benchmark (Archour et al., 1999; Rouwenhorst, 1999; Fama and French, 1998; Van der Hart et al., 2003). None of these authors, however, directly investigate accounting-based signals in the same fashion performed in our paper.

One could argue about a joint hypothesis problem. Abnormal returns to fundamental analysis in Brazil may be due to market imperfections or to especially informative accounting reports. However, it is not reasonable to believe, based on past research (Ball et al., 2000), that financial statements are more informative in a country like Brazil than they are in the US.

Recent evidence (Lopes and Walker, 2008) confirms this expectation and shows that accounting numbers in Brazil are on average of low value relevance and timeliness – that is, unrelated to prices and returns. Thus, we conclude that if returns to an accounting-based fundamental analysis strategy in Brazil are higher than in the US this is not due to the superior quality of Brazilian accounting reports.

The rest of the paper is organized as follows. Section 2 reviews prior research on the book-to-market effect, fundamental analysis and motivates the paper. Section 3 presents the main features of Brazilian capital markets and accounting information. Section 4 presents the financial performance signals used to identify strong and weak HBM firms. Sample selection, summary statistics and results are presented in Section 5. Section 6 concludes the paper.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

The efficient market hypothesis (EMH, Fama 1976) is a cornerstone of modern financial economics. It states that when rational economic agents receive new information they update their beliefs correctly in the manner described by Bayes' law. As a result prices reflect all available information and no 'free-lunch' (or profit without incurring any risk or committing capital) is possible. If the EMH holds prices will not deviate from fundamentals for long periods because any such deviation will be corrected by the actions of arbitrageurs who are willing to enjoy the 'free lunch' made available by such inefficiencies. The concepts of information and arbitrage are essential to EMH. The first relates to what piece of news should economic agents really react and the second relates to the mechanism by which prices converge to fundamentals. Despite the appeal of the EMH in the financial economics literature, the accounting literature contains several examples of situations where markets react unexpectedly to accounting information. There is a significant body of accounting literature devoted to understand the abnormal returns apparently generated by accounting-

based fundamental analysis strategies (Ou and Penman, 1989; Lev and Thiagarajan,1993; Abarbanell and Bushee,1997). Other authors deal with specific accounting signals (Sloan 1996) and find evidence that firms with higher amounts of accruals underperform in the future. Ball and Kothari (1991) and Penman (1984) reported extreme returns around earnings announcements – a phenomenon that later was called the earnings announcement premia. Piotroski (2000) relates the HBM long reported in the financial economics literature (Fama and French, 1992) effect to financial statement analysis and shows that the mean return earned by a HBM investor can be increased by at least 7.5% annually through the selection of financially strong HBM firms. Beneish et al. (2001) use market based signals and financial statement analysis to differentiate between winners and losers. Recently Mohanram (2005) combines traditional fundamental analysis with measures tailored for low book-to-market firms and documents significant excess returns. This last result is challenges the risk-based explanation of excess returns for HBM stocks. Summarizing, this literature suggests that prices are not fully efficient regarding accounting reports – accounting-related anomalies - and recommends strategies based on financial reports designed to explore such mispricing[4].

However, a recent branch of the financial economics literature (the so-called behavioral finance) argues that price deviations from fundamentals can persist in the long run because arbitrage is not a easy process as the traditional EMH assume (Shleifer, 2000; Shleifer and Vishny, 1997). These authors argue that arbitrage can be costly, risky and sometimes even impossible due to market restrictions to trade. Arbitrage is a central concept in the EMH formulation – without arbitrage there is no EMH and prices can deviate from fundamentals and consequently abnormal returns can be achieved using public information. Very recently the accounting literature started to investigate some well known accounting-related anomalies in the light of the restriction to arbitrage theories. Mashruwala et al. (2006) states that the so-

[44] Bernard (1993) provides an interesting survey of this topic.

called accrual anomaly (Sloan, 1996) is caused by transaction costs and arbitrageurs do not correct the accrual anomaly because of transaction costs, low liquidity and high idiosyncratic risk. Cohen et al. (2007) show evidence that the abnormal returns observed around earnings announcements - long reported by the accounting literature (Penman, 1984; Ball and Kothari, 1991) – is not arbitrated because of high costs. This new and vibrant literature casts strong doubt on the whole class of accounting-related anomalies presented so far.

In this paper we contribute to the limits to arbitrage literature related to accounting phenomena (Mashruwala et al. 2006; Cohen et al. 2007) by examining the apparent abnormal returns generated by fundamental analysis strategies. More specifically, we suspect that Piotroski (2000) and Monharam's (2005) results are strongly influenced by restrictions on the actions of arbitrageurs. We argue this because Piotroski's results are mainly driven by small and less liquid firms and Monharam's results are very hard to be implemented in real markets as Piotroski (2005) argues. For example, Monharam (2005) results are smaller for firms with put options which suggest that impediments to hedging influence the results. Additionally, there is a significant body of the literature which shows that abnormal returns are influenced by liquidity and limitations to arbitrage (Bekaert et al., 2006). Based on this literature, in this paper we try to complement the Monharam (2005) and Piotroski (2000) papers and uncover the determinants of the mispricing reported. In the next section we show why Brazil provides a unique opportunity to investigate this question.

III. WHY BRAZIL? CAPITAL MARKETS AND FINANCIAL ACCOUNTING

To investigate whether abnormal returns to fundamental analysis are driven mainly by limits to trade we need a setting with two conditions: (i) where accounting reports are less informative than in the US - otherwise someone could argue that our results are driven by a superior set of financial reports, thus we need an environment where accounting reports are

indisputably inferior, in terms of informativeness[5], to US reports; (ii) and at the same time possess strict restrictions on trade and consequently to arbitrage. We believe Brazil provides exactly this opportunity for the following reasons: (i) arbitrage is almost impossible in Brazil for HBM firms due to illiquidity, restrictions to short sales and absence of similar assets like derivatives for such shares, (ii) the quality of accounting numbers is very poor reducing the usefulness of financial reports and consequently of accounting-based fundamental analysis – this aspect is linked to the weak protection investors have in Brazil, (iii) a series of macroeconomic shocks in the last ten years increased market synchronicity in Brazil (Morck et al., 2005) which then reduces the relevance of firm-specific information to explain stock returns and. Thus, we argue that if financial statement analysis generates abnormal returns in Brazil is not because they help to uncover value stocks but due to trade limitations. At the same time, there is pervasive evidence that accounting reports in Brazil are not informative (Lopes, 2005; 2006; Lopes and Walker, 2008). The Brazilian corporate governance model is characterized by poor investor protection, poor enforcement of the rule of law and consequently anemic capital markets. Firms finance their activities primarily using banks and insider deals. There is no demand for highly informative accounting reports in Brazil. Thus abnormal returns obtained by an accounting-based fundamental analysis strategy in Brazil are not due to a superior set of accounting reports. In the next pages we explain these aspects in detail.

Limits to Arbitrage in Brazil

For markets to be efficient a key element is necessary: arbitrage. Arbitrage is the mechanism by which information is incorporated into prices. For the market to be efficient, it is not necessary for all agents to be rational or to have the same amount of information. As long as arbitrage is possible prices are driven to fundamentals by the actions of traders with

[5] We refer to informativeness as the ability of accounting numbers to reflect underlying economic activity. It's normally measure by the relation of accounting earnings to stock returns (timeliness).

superior information (Shleifer, 2000). For arbitrage to be achievable in real markets, a series of conditions must be in place. Initially, the market must have enough liquidity to accommodate the trading orders of such investors. This can easily become a problem because arbitrageurs can trade on huge sums on behalf of mutual funds, pension funds and banks. Second, similar assets must be available to allow for arbitrage to be feasible. Arbitrage strategies frequently consist of buying a given asset and selling a similar one. Third short sales or other similar mechanism like derivatives must be available to allow traders to bet on the downside risk. These features must be available on a continuous basis and not only sporadically for arbitrageurs to be able to engage in such strategies.

There is pervasive evidence that Brazilian capital markets impose several restrictions on the actions of arbitrageurs, especially for HBM firms. Recently, Chong and Lopez-de-Silanes (2007) showed that this is actually the case for most of Latin America. Initially, these shares trade at very low volumes which restrict some institutions to trade – especially pension funds, hedge funds, large banks and mutual funds which are more specialized and likely to correct market inefficiencies. This liquidity problem has some important consequences for another condition essential to arbitrage: the presence of similar securities. HBM shares in Brazil do no compose the São Paulo Stock Exchange Index which only counts with the 52 most liquid shares and are not underlying for derivative financial instruments – the stock exchange will not list derivatives based on illiquid shares. Thus, arbitrageurs in Brazil face low liquidity and absence of similar assets. Additionally, short sales are not allowed in Brazil. To sell a share short a trader must borrow it and sell on t_0 and then buy it back on t_1. On an illiquid market this strategy is very risky because there is no guarantee that one will be able to buy the share back on t_1.

Additionally, idiosyncratic risk is very high in Brazil due to macroeconomic crises. During the second half of the twentieth Brazil has been a textbook case of macroeconomic

crowding out. Excessive public spending increased the public deficit which lead to higher taxes, then higher interest rates and finally inflation. To finance the public deficit the government had to issue very short term variable rate notes which consumed the country's national savings leaving little room for private sector development. To partially remedy the absence of private investment the country started a series of initiatives to foster development based on selective policies and state-controlled firms. This was a period of low economic growth and poor development of capital markets. This scenario started to be reversed in 1993 when the Real Plan was implemented with the focus of reducing inflation and stabilizing the economy on fiscal terms. However, the Real implementation was anchored on pegged currency scheme to the US dollar what left economy very vulnerable to external shocks because the exchange rate was fixed and all the adjustments should be made trough interest rates (Beim and Colomiris, 2001). This scheme was in place until January 1999, when Real was devaluated and the exchange rate regime changed from fixed to float.

During this meantime the Brazilian economy was affected by the crises of Mexico (1995), Argentina (1995), Thailand (1997), Indonesia (1997), Philippines (1998), Korea (1997-8), Russia (1998) and finally the Brazilian devaluation of the Real in 1999. More recently, the crises in Turkey (2001-2), Argentina (2002) and the Brazilian presidential election (2002) complete the picture.

Figure 1 shows that around these macroeconomic crises share price volatility increased dramatically. Uncertainty in the macroeconomic arena leads to a reduction in the usefulness of financial statement analysis. Macroeconomic instability leads to price synchronicity – the trend of prices to move together – which means that firm-specific information is not relevant to explain securities' behavior. Confirming this assumption, Morck et al. (2005) find that Brazilian stock prices present significant synchronicity when compared to other emerging markets. The difference is even more significant when compared to the US. The Piotroski

(2000) results were obtained on a market which operates with minimum levels of synchronicity which makes us argue that financial statements analysis is supposed to be *ex ante* more relevant in the US than in Brazil.

Quality of Accounting Numbers and Corporate Governance

We can say that Brazilian accounting reports – during our sample period – were not prepared to inform external users. Financial reports in Brazil are prepared to comply with tax and government regulations. There is no demand for informative accounting reports since firms do not rely on external sources of finance and banks supply finance privately. The biggest conflict of interest in Brazil is not between managers and shareholders but between controlling and minority shareholders. The law specifies a minimum mandatory dividend (25% of reported earnings) to protect minority shareholders, thus creating strong incentives for managers to understate earnings. Additionally, tax rules have a strong influence on financial accounting which increases the incentives managers have to report lower earnings. Additionally, Brazilian managers have great discretion over accounting reports (revaluation of fixed assets, capitalization of research and development among others) and are subject to weak oversight. We believe that these characteristics reduce the informativeness of accounting reports and make the investigation of the relevance of financial statement analysis in Brazil a worthwhile endeavour. This scenario in Brazil differs significantly from the one found in the US. Piotroski´s (2000) results were found in a market where accounting numbers are known (Ball et al., 2000) to be relatively of high quality and informative. Thus the quality of accounting numbers in Brazil acts against the usefulness of a fundamentals-based strategy which lead us to expect that abnormal returns to accounting signals are expected to be higher in the US than in Brazil.

What can we learn from the financial reporting model, the macroeconomic scenario and financial markets in Brazil? The financial reporting system is a typical case of a code law

emerging market stakeholder model which does not produce informative accounting reports – from an equity investor perspective. The macroeconomic scenario is very volatile which increases synchronicity and reduces the usefulness of firm-specific information. These two conditions taken together are likely to make financial statement analysis in Brazil useless. The inputs to financial statement analysis are uninformative in the first place and prices move on a synchronous manner and are not significantly affected by firm news. Thus we hypothesize that if financial statement analysis generates higher abnormal returns in Brazil than in the US this is due to limitations to trade and consequently restrictions to arbitrage[6].

IV. RESEARCH DESIGN

Initially we apply an adapted version of the strategy proposed by Piotroski (2000) who built a score composed of fundamental signals (*F_SCORE*) extracted from financial statements. These variables are intended to be useful in predicting future firm performance, specially the financially distressed ones (HBM). We use the nine basic fundamentals signs identified by Piotroski (2000), making some adaptations due to features of Brazilian accounting information and capital markets. We classify each firm's signal realization as either "good" or "bad" depending on the signal's theoretical impact on future prices and performance. If the realization signal is "good" the indicator variable is equal to one (1); if it is "bad", it equals zero (0). The main reason for us to adapt Piotroski' score is the absence of published cash flow statements in Brazil.

The three financial signals used to measure changes in capital structure and liquidity are *CF, ΔLIQUID, ΔLEVER* and *EQ_OFFER.* As stated by Piotroski (2000), since most HBM

[6] One could argue that as financial reports in Brazil are of lower quality than normally found in developed markets the abnormal returns we document are driven by an initial discount that investors impound on the information first released. That is investors do not take reported statements at face value and discount the information received for low credibility. Later they overreact to actual realization of the accounting numbers. We believe this is not the case in our study because the excess returns documented last for a significant time ahead of the publication of financial statements (two years).

firms are financially distressed we assume that increase in leverage, weakening in liquidity, or public offerings of equity are "bad" signals. *CF* is defined by the firm-year change on cash and cash equivalents scaled by beginning-of-the-year total assets. This is the main difference between our score (Br_FSCORE) and Piotroski's *F_SCORE*. We do not use operating cash flow (a profitability measure) due to the lack of cash flow statements in Brazil. We also do not use EBITDA[7] as a proxy to cash flow from operations because when it is positive/(negative), the likelihood that net income would also be positive/(negative) is huge, so it would represent no new information to our measure of return on assets (*ROA*). *ΔLIQUID* measures the changes in firm's current ratio in relation to previous year. The current ratio is defined as the ratio of current assets to current liabilities at company's year end. An improvement in liquidity represents $\Delta LIQUID > 0$ and is considered a "good" signal, "bad" otherwise. The change in firm's gross debt level is represented by *ΔLEVER*. We considered the long plus short term debt due to the lack of long term competitive credit to Brazilian companies, specially to the distressed ones. Brazil's historical high interest rates, credit structure[8] and volatile markets reduce the opportunity to firms raise money in the long term at a competitive cost. We measure *ΔLEVER* as the change in the ratio of total gross debt to total assets in relation to prior year. An increase in leverage ($\Delta LEVER > 0$) is a "bad" signal while a decrease is "good". The variable *EQ_OFFER* represents the use of equity financing. If the firm did not issue equity[9] in the year preceding portfolio construction it is a "good" signal (*EQ_OFFER* equals one), "bad" (*EQ_OFFER* equals zero) otherwise. It is important to report the low level of public offerings in Brazil compared to US. During the period of 1986-1996 there was not a single initial public offering in Brazil. From 2000 on, with the implementation of the special corporate governance levels in Bovespa, increase in world's investors liquidity,

[7] Earnings before interest, taxes, depreciation and amortization.
[8] There is only one source of long term credit in Brazil that is BNDES (National Bank for Economic and Social Development), which is a State bank.
[9] Brazilian firms can issue common and/or preferred shares and both are considered as equity sources.

changes in Brazilian corporate law as well as positive macroeconomic conditions and other specific actions aiming the development of capital markets (e.g. tax benefits for foreign investors), Brazilian firms started to issue equity as a source of funds. However the number of companies adopting such strategy is still low. We computed only two equity offers in our sample of HBM firms from 1994-2004.

The three variables used to measure profitability are *ROA*, *ΔROA* and *ACCRUAL*. *ROA* is defined as net income scaled by beginning-of-the-year total assets[10]. We considered positive *ROA* as "good" information, "bad" otherwise. We define *ΔROA* as the current firm-year *ROA* less the previous firm-year *ROA*. If *ROA* changes is positive it is considered a "good" signal, if not it is considered a "bad" signal. We define *ACCRUAL* as changes on non-cash current assets minus changes on current liabilities (except short-term debt) minus depreciation, scaled by beginning-of-the-year total assets. The indicator variable (*F_ACCRUAL*) equals one ("good") if *CF>ROA*, zero ("bad") otherwise. This treatment is consistent with Sloan (1996) that shows great amount of accruals into earnings is a bad signal about future performance.

Operating efficiency is measured by *ΔMARGIN* and *ΔTURN*. We define *ΔMARGIN* as the change in firm-year current gross margin scaled by total sales (gross margin ratio) compared to previous year. A positive change (i.e. $\Delta MARGIN > 0$) means a "good" signal, while a negative change is classified as "bad". Finally, we define *ΔTURN* as the change in firm's current firm-year sales scaled by beginning-of-the-year total assets (asset turnover ratio). An improvement in assets turnover is a "good" signal, thus indicator variable (*F_ΔTURN*) equals to one, or zero otherwise.

The composite score represents the sum of the following indicator variables, or:

[10] For all variables that should be scaled by total assets from the beginning-of-the-year of 1994 we use the assets for the end-of-the-year. This procedure is necessary due to the end of monetary correction related to inflation rates that existed until 1994 in Brazil. Since that year monetary correction is not accounted for.

$$BrF\_SCORE = F\_ROA + F\_CF + F\_\Delta ROA + F\_ACCRUAL + F\_\Delta LIQUID + F\_\Delta LEVER + EQ\_OFFER + F\_\Delta MARGIN + F\_\Delta TURN$$

BrF_SCORE range is from 0 ("bad" signals) to 9 ("good" signals). Low *BrF_SCORE* represent firms with poor expected future performance and stock returns, while high *BrF_SCORE* is associated with firms expected to outperform. The investment strategy analyzed in this paper is similar to Piotroski (2000) and consistent with Mohanran (2005) and is based on selecting firms with high *BrFscore*. We consider firms with high *BrF_SCORE* the ones in the range of 7-9 and firms with low *BrF_SCORE* the ones beneath or equal to 3. We expand the range in comparison to Piotroski (2000) due to the sample size and to special features of Brazilian capital markets (e.g. the low number of equity offerings).

V. SAMPLE SELECTION AND RESULTS

Sample selection

We start with all non financial firms listed in Bovespa between 1994 and 2004[11]. We collect these data from Economatica® database and we select the higher liquidity stock class[12] of each firm for each year. This procedure resulted in 6,682 firm-year observations. Additionally we identify firms with sufficient stock prices and book values and calculate the market value of equity (*MVE*) and book-to-market ratio (*BM*) of each company at fiscal year-end. We calculate *BM* as the book value at fiscal year-end divided by the market value of

[11] We select this range due to the adoption of the Real in 1994. After the Real the Brazilian inflation rate drastically decreased and remained stable.

[12] As stated on Section 3, both preferred or common stocks are considered as equity in Brazil. Usually the preferred stock has higher liquidity than common shares. To select the most liquidity class of shares we use the stock liquidity ratio that is calculated as the ratio of the number of days in which there were at least 1 trade of the stock during the year to the total number of days in the year multiplied by the square root of the ratio of number of trades of the stock during the year to the total number of trades of all stocks in the year times the ratio of volume in monetary terms of the stock in the year to total volume in monetary terms of all stocks in the same year.

equity at the same date represented by the balance sheet. Finally we exclude firms with negative *BM* and trimmed the data at 1% for one-year-raw returns. Companies with sufficient data are annually classified and we identify distribution of *BM* and *MVE*. This procedure resulted in 2,151 firm-year observations.

We use the *BM* distribution from the prior year to the construction of the portfolio and classify firms *BM* data for each year into *BM* quintiles. To construct the HBM portfolio (value firms) we selected the top *BM* quintile. Figure 2 presents the top quintiles of BM used to build HBM portfolio. Firms above these levels of BM were included in the HBM portfolio. Additionally we separate companies by its size (small, medium or large) according to their 33.3 and 66.7 percentiles distribution of *MVE* and by its stock liquidity (less, medium or high) according to their 33.3 and 66.7 percentiles distribution of stock liquidity ratio. This approach results in 426 HBM firms to the final sample from 1994-2004 (see appendix A).

Returns

Firm returns are calculated as buy-and-hold returns for 1-year and 2-years period starting on the 1st of May of the year after portfolio formation. This procedure is also adopted by Piotroski (2000) and Mohanram (2005) to ensure all financial statements information are publicly available at the moment of portfolio formation. This method is consistent with Brazilian requirements to public held companies release their annual financial statements until the end of April. If a firm delists, we consider returns until the delisting date and assume no delisting return. We define market-adjusted-returns as the buy-and-hold returns for 1-year and 2-years in excess to the value-weighted market return[13] over the same time period. We collect returns from May 1995 to March 2007[14].

[13] We use IBRX as benchmark. IBRX represents a Brazilian stock market index composed by the most 100 liquid stocks traded on Bovespa. We also use other proxies for excess returns like the one obtained using the market model and the one factor CAPM. Our results do not change significantly.

[14] We consider the two-year raw and adjusted returns for fiscal year-ended 2004 as the accumulated return from May 1st 2005 to the end of March 2007. This procedure is adopted due to the available data at the date this paper is written.

HBM versus Non HBM firms - Descriptive Statistics

We compute descriptive statistics for HBM (high book-to-market) and non HBM firms to better understand the HBM effect in Brazil. To form the portfolio of non HBM firms we selected firms that did not qualify as HBM. Our sample of non HBM firms has 1,725 firm-year observations. Table 1 presents descriptive statistics about the financial and returns characteristics of the non HBM portfolio of firms, while table 2 provides descriptive statistics about the financial and returns characteristics of the HBM portfolio. Some comparisons are interesting.

Panel A from table 1 shows the average (median) BM of non HBM firms is 1.46 (1.25) while panel A from table 2 presents the average (median) BM of HBM firms of 8.68 (5.48). Piotroski (2000) finds an average (median) BM of HBM American firms of 2.44 (1.72). The standard deviation BM of HBM firms (15.81) is considerable higher than standard deviation BM of non HBM firms (0.98), representing the great heterogeneity among HBM Brazilian firms. The difference between the median market capitalization (*MVE*) of non HBM (BRL 280 million) and HBM (BRL 16 million) shows that growth stocks represents usually more mature companies compared to value stocks. *ROA* is also lower in HBM firms. Panel A from table 2 documents average (median) *ROA* of HBM firms is -1.35% (0.40%) while panel A from table 1 points an average (median) *ROA* of 3.36% (3.72%) for non HBM firms. This evidence is consistent with Fama and French (1995) and Piotroski (2000) for US companies. Panel B from tables 1 and 2 presents one-year and two-year buy-and-hold returns. Consistently with the HBM effect, returns are higher (raw and market-adjusted) for HBM firms in comparison to non HBM firms. Additionally the market-adjusted returns are considerable negative in the left tail of return distribution for both, HBM and non HBM firms. Given this scenario the strategy proposed by Piotroski (2000) based on fundamental analysis of HBM firms should improve the average portfolio return for HBM Brazilian firms.

Main Results

Table 3 shows Spearman and Pearson correlations between the nine financial performance signals, *BrF_SCORE* and one year raw return (*RETURN*), one year market-adjusted return (*MA_RET*) and two years market-adjusted return (*MA_RET2*). *BrF_SCORE* is significant, positive and correlated (spearman and pearson) with *RETURN*, *MA_RET* and *MA_RET2*. This is an indication of the explanatory power of *BrF_SCORE* on portfolio returns. The individual financial performance signs that have the highest spearman correlation with *RETURN* are *F_ ΔLEVER* and *F_ ΔMARGIN*. *F_ ROA* also has somewhat relevant spearman correlation with returns, especially with *MA_RET2*. Regarding Pearson correlation, *F_ ΔLEVER* and *F_CF* are the most correlated to *RETURN*.

Table 4 panel A, B, C and D presents the buy-and-hold returns for the investment strategy based on financial statement analysis for the HBM portfolio of Brazilian firms. We present the mean, median and percentiles one-year raw, one-year adjusted, two-years raw and two-years adjusted returns for each *BrF_SCORE* class. We test the returns earned with high *BrF_SCORE* firms portfolio against returns gained from low *BrF_SCORE* firms portfolio. We adopted two-sample mean comparison test for mean returns, two-sample proportion test for positive returns and Wilcoxon signed-rank test for median returns. Additionally we implement bootstrap procedure to test between the difference of mean and medians returns from high *BrF_SCORE* and low *BrF_SCORE* portfolios. Reported bootstrapped z-statistics (p-values) result from 1,000 iterations. Table 4 panel A shows the significant difference between one-year raw returns from High Score firms and Low Score Firms. Mean returns shift from 36% to 53% considering *BrF_SCORE* based strategy. Comparing to low *BrF_SCORES* HBM firms returns improve 35 p.p. and are statistically significant at 1%. The difference between median and percentage positive one-year raw returns for high and low *BrF_SCORES* firms are significant at 1% and 10%, respectively. Table 4 panel B documents

significant difference between one-year market-adjusted returns from High Score firms and Low Score Firms. Returns shift from 5.7% to 26.7% considering *BrF_SCORE* based strategy. This is a considerable improvement. Comparing to low *BrF_SCORES* HBM firms returns improve 41.8 p.p. and are statistically significant at 1%. It is possible to differentiate the one-year market-adjusted median returns at 1% of significance, but the difference in percentage positive for one-year market-adjusted returns from High and Low *F_SCORE* firms are significant at 10%. Table 4, panels A and B show that *BrF_SCORE* strategy helps to differentiate firms with poor performance (classified in the 10^{th} percentile and 25^{th} percentile) and firms with superior performance (classified above 50^{th} percentile) within the sample of HBM firms.

BrF_SCORE based strategy is also (and apparently even more) useful to increase subsequent two-years raw and market-adjusted returns for Brazilian firms. Table 4 panel C shows an increase of 82 p.p. if one applies the *BrF_SCORE* strategy in comparison to a HBM strategy. Table 4 panel D presents 144% (80%) significant difference between two-years market-adjusted mean (median) returns from High and Low Score firms. Additionally there is a significant difference at 1% between percentage positive in two-years (raw and market-adjusted) returns from High and Low *BrF_SCORE* firms as well as for the two-years (raw and market-adjusted) median returns. Bootstrap results confirm the classical tests. The difference between two-year market-adjusted mean returns of High Score firms and all HBM firms is 78 p.p. and is statistically significant at 1%. These results are interesting considering the presumably lower market efficiency and poor accounting numbers in Brazil. Piotroski (2000) finds that *F_SCORE* based strategy improves subsequent returns, particularly over the first year. Our results suggest that financial accounting information follows a slower path to be incorporated into prices in Brazil when compared to the US.

We present on appendix A a comparison between returns earned annually from High *BrF_SCORE* (≥ 7) portfolio and Low *BrF_SCORE* portfolio (≤ 3). Consistent with prior results, High *BrF_SCORE* firms outperform Low *BrF_SCORE* firms in 10 of 11 years analyzed for one-year market-adjusted returns and in 9 of 11 years for two-year market-adjusted returns.

Size, Liquidity and Indebtedness Effects

We classify HBM (Table 5) firms into three categories by size (small, medium or large). The percentile size cutoffs are constructed according to firms 33.3 and 66.7 percentiles distribution of previous year *MVE*. The HBM sample for Brazilian firms is formed mostly by small companies. We present buy-and-hold market-adjusted returns for one year and two years after the portfolio construction. The results presented on table 5 panel A indicate the excess returns earned by High *BrF_SCORE* strategy can statistically differentiate between winners and losers only for small and median firms considering the one-year market-adjusted mean and median returns earned from a strategy long on High Score firms and Short on Low Score firms. The strategy based on High *BrF_SCORE* small firms also differentiate one-year market-adjusted mean and median returns from the returns obtained by a strategy based on all HBM small firms. Comparing our results to Piotroski's (2000)[15] one can realize the amount of return that financial statement analysis provide in an environment like Brazil seems much higher than in US and our strategy differentiates essentially between HBM small and medium firms. Another important feature is to analyze how the *BrF_SCORE* strategy works regarding the liquidity of firms' shares. The Spearman correlation between classification of firm size and liquidity is 0.46, so we implement an additional analysis for stock's liquidity partition. We classify firms' stock as low liquidity, medium liquidity or high liquidity based on their year distribution of liquidity ratio. This ratio considers both, numbers of shares traded and

[15] Table 4, page 21.

volume traded during the year of portfolio implementation. The 33.3 and 66.7 percentiles represent the cutoffs. The strategy works (Table 5) for low and medium liquidity stocks for one-year market-adjusted returns to separate High *BrF_SCORE* and Low *BrF_SCORE* firms with 5% of significance. Finally we classify firms' indebtedness as low debt, medium debt or high debt based on their prior year's distribution of debt to debt plus equity ratio. The 33.3 and 66.7 percentiles represent the cutoffs. Results from table 5, panel C show that the investment strategy works better for firms with higher indebtedness levels. Piotroski's (2000) finds evidence that the accounting-based fundamental analysis strategy works for HBM firms independently of its level of financial distress. We find evidences that fundamental analysis differentiate winners from losers for firms with higher indebtedness levels. Our result can be explained by the enhanced power of fundamental analysis when it is applied to more distressed firms. In an environment like Brazil the outcome of fundamental analysis applied to HBM firms with high indebtedness levels suppresses the low quality of accounting reports. These results are consistent with abundant evidence that size affects the results of accounting-related anomalies (Piotroski, 2000; Monharan, 2005; Foster et al., 1984)

Robustness of BrF_SCORE to predict returns

In order to check the relation between *BrF_SCORE* and subsequent returns we run cross-sectional (pooled) and fixed-effect regressions to analyze if there are correlations between *BrF_SCORE* and other variables that could explain returns and are directly or indirectly related to *BrF_SCORE* strategy. We control *BrF_SCORE* effect for *BM*, *MVE*, *EQ_OFFER* and *ACRRUALS*. Additionally we also control *BrF_SCORE* effect for momentum strategies. As commented by Piotroski (2000, p.26) the underreaction to historical information and financial events, which should be the ultimate mechanism underlying the success of *BrF_SCORE*, is also the primary mechanism underlying momentum strategies. Momentum strategies (based on past prices) are intended to better work in less efficient

markets. Considering that *BrF_SCORE* strategy works in Brazil, one could wonder if momentum strategies could work as well. To help answer these issues we estimate robust cross-sectional regression for HBM Brazilian firms. The cross sectional regressions presented on table 6, panel A show (with 5% of significance) that *BrF_SCORE* coefficient is positively related to future returns after controlling for *MVE* and *BM* (model 3). Comparing models (3) and (4) one can realize that *BrF_SCORE* add considerable information to *MVE* and *BM*. Models (1) and (2) show that *ACCRUAL* and *MOMENT* do not have power in predicting one-year market-adjusted returns. Additionally we run robust fixed effect regression for unbalanced panel data (table 6, panel B, model 6) and the result confirms the relevance of *BrF_SCORE* on predicting one-year market-adjusted returns. Model (6) shows that one additional *BrF_SCORE* point is associated with an approximate 5% increase in one-year market-adjusted returns (with 5% of significance). These results confirm the effectiveness of *BrF_SCORE* to separate winners from losers within the HBM portfolio. Additionally we run the robust fixed effect regression for all firms in our sample. This procedure is necessary to test whether *BrF_SCORE* is associated with future returns for firms with different characteristics (non HBM firms). Our results (table 6, panel B, model 7) show that *BrF_SCORE* is also associated with market adjusted returns for the full sample, however with a lower intensity than for the group of HBM firms. Within the group of HBM firms each an increase of one point in *BrF_SCORE* represents an increase on expected market-adjusted return of 5%, against 2% of increase for the full sample.

Restrictions to Arbitrage and Information Environment

Beyond investigating the effect of illiquidity, size and indebtedness on abnormal returns we check directly the effect of limits to arbitrage. The São Paulo Stock Exchange (BOVESPA)[16] provides an interesting setting to directly control for limits to arbitrage because

[16] More information can be found in www.bovespa.com.br.

restrictions to trade and arbitrage apply to the majority of shares. However, for a fraction of the shares traded arbitrage is possible. BOVESPA is the only stock exchange in Brazil where shares can be traded in the main market and in the access (SOMA) market. BOVESPA also lists derivatives (options and forwards) of the shares traded on its main floor. There is a future contract based on the IBOVESPA (the stock index of the shares traded at BOVESPA) traded on BMF (The Brazilian Exchange where derivatives based on commodities, indexes and rates are traded). The IBOVESPA does not provide a substitute for the shares traded at BOVESPA because it is based on the most liquid shares (the 52 most liquid shares in January, 2008) and not on a representative sample of the shares traded in São Paulo. Short selling is only allowed for a few shares generally the more liquid ones.

We select firms for which arbitrage is possible by hand picking firms with the following features: (i) firms which are included in the stock exchange index (IBOVESPA) and (ii) firms which have options and forwards traded on their shares - to allow short selling. We call this the ARBITRAGE firms and show in table 7 that the interaction on *BrF_SCORE* and ARBITRAGE is negatively related to future abnormal returns which suggests that accounting signals are only relevant for firms for which arbitrage is not possible. Table 7, panel A, model (A) considers the association between *BrF_SCORE* and ARBITRAGE and show that the possibility of arbitrage turns the strategy almost ineffective. Table 7, panel A, model (B) show that the *BrF_SCORE* is not significantly related to future abnormal returns for firms where arbitrage is possible, whereas it remains positively associated to one-year market-adjusted returns for firms where arbitrage is not possible. Finally table 7, panel B, shows the results of one-year market-adjusted returns for a buy-and-hold strategy based on fundamental signals partitioned by arbitrage possibility. Results show that buy-and-hold returns from high *Br_FSCORE* firms and low *Br_FSCORE* firms are statistically different only for firms where arbitrage is not possible.

Our results confirm that excess returns to strategies based on financial statement analysis are generated mainly by firms for which arbitrage is not possible. Thus one cannot actually generate profits without incurring into risk for these shares – these strategies are not actually implementable in our setting. The abnormal returns we observe are returns to idiosyncratic risk and not real excess returns. By direct controlling for limits to arbitrage we avoid the controversies surrounding proxies for restrictions to trade like idiosyncratic volatility previously used in the literature (Brav and Heaton, 2006; Pontiff, 1996; Ali,Hwang, and Trombley, 2003; Mendenhall, 2004; Wurgler and Zhuravskaya, 2002; Mashruwala, Rajgopal, and Shevlin, 2006; and Pontiff, 2005).

Our results are not significantly affected when we control for transactions costs. Using Stoll (1991) approach we estimate transactions costs to be significant in Brazil especially for low liquidity shares but not large enough to change our results what adds to the idea that fundamental strategies analysis only work for small, low liquidity firms and especially for firms for which arbitrage is not possible. However, transaction costs are not significantly large to explain the excess returns that financially strong HBM firms obtain in Brazil. Our result corroborates Ball (1990) who argues that a meaningful definition of efficiency should require that frictions such as transactions costs and trading restrictions do not influence price. Our results also confirm evidence presented by Bernard (1993, p. 321) in the US especially for short-selling[17].

VI. CONCLUSIONS

This paper investigates if an accounting-based fundamental analysis strategy can help investors earn excess returns on a portfolio of HBM firms in Brazil. We find evidences that a

[17] "Indeed, most (not all) of the fund managers that trade on SUE-related (standardized unexpected earnings) signals and with whom I have spoken do not attempt to sell short on bad news, and trade only within a universe of the 500 or 1,000 largest stocks on the NYSE, where transactions are lower, and where large positions can be taken without much concern about price pressure.

financial statement analysis strategy based on financially strong HBM firms can separate winners from losers in an environment of adverse conditions like Brazil. An investor could have increased his/her HBM portfolio one-year (two-year) market-adjusted returns from 5.7% (42.4%) to 26.7%% (120.2%) selecting financially strong HBM firms in the 1994-2004 period. Additionally a strategy based on forming portfolios long on financially strong HBM firms and short on financially weak HBM firms generates 41.8% annual (or 144.2% for two years accumulated) market-adjusted return to portfolios implemented from 1994 to 2004.

Additional tests, however, show that these results are mainly driven by small, low liquidity or highly indebted firms. Our specifications show that accounting-based signals are only able to predict future abnormal returns for firms which are not liquid, do not posses derivatives based on their shares and are not part of the stock index. These shares do not allow arbitrage and so prices do not converge to fundamentals as quickly as they would if markets were efficient. Our results contribute to the literatures on financial statement analysis and on emerging markets finance by showing the relative importance of restrictions to arbitrage on the prediction of future abnormal returns. Our results, however, do not suggest that the analysis of financial statements is not a worthwhile endeavor and that students should stop learning and practioners should stop examining financial reports. Real world fundamental analysis involves more than the simple score we used in this study and it's *possible* that experienced and more skilful analysts are able to uncover information from financial statements and generate superior returns than the market average. This, however, is a question for future research that we did not address in this paper. We also do not provide any behavioral explanations for the results found for HBM firms because we do not take any behavioral characteristic of traders into account and simply provide a more accurate control for limits to arbitrage than previously done in the literature.

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Figure 1 – Macroeconomic Crises and the São Paulo Stock Exchange Index Volatility (per month)

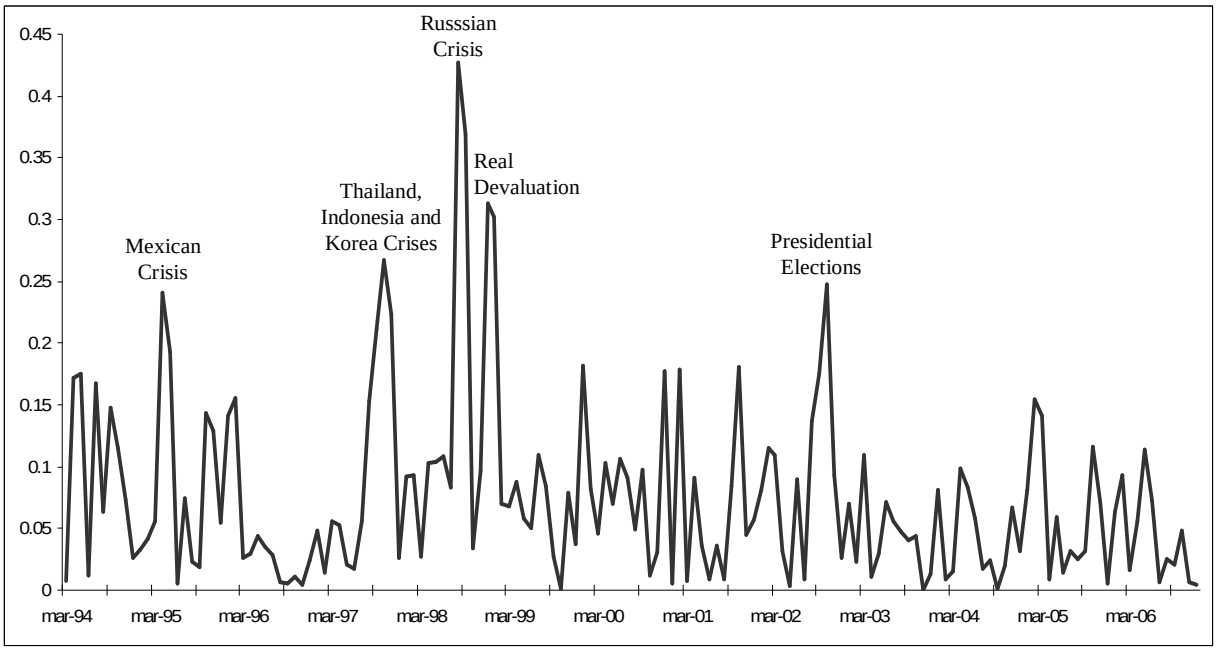

Figure 2. Cutoff HBM quintile per year

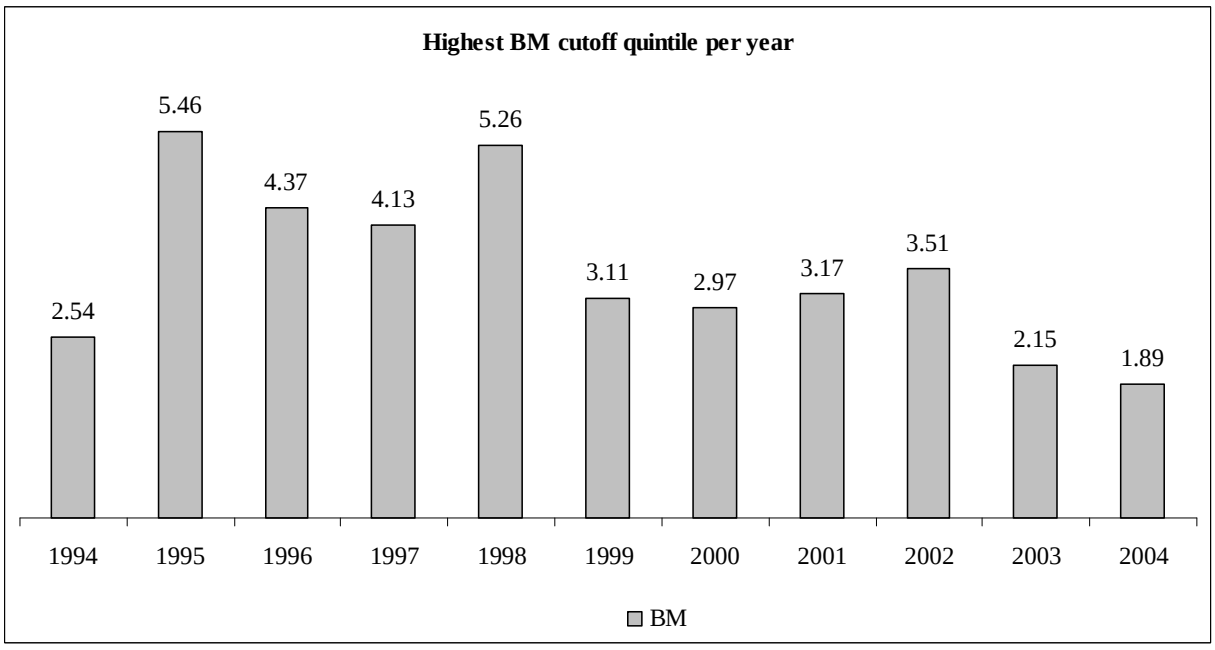

TABLE 1

Financial and Returns Characteristcs of Non High Book-to-Market Firms
(Firm-Year Observation between 1994 and 2004)

Panel A: Financial Characteristics

Variable	Mean	Median	Standard Deviation	Proportion with Positive Signal	n
BM	1.4626	1.2501	0.9853	n/a	1725
MVE	1,661,306	279,708	5,698,093	n/a	1725
ROA	0.0336	0.0372	0.1134	0.7704	1674
CF	0.0325	0.0062	0.1708	0.6365	1674
ΔROA	-0.0404	0.0018	0.2885	0.5490	1589
ACCRUAL	-0.0281	-0.0297	0.1702	0.3774	1577
ΔLIQUID	0.0563	0.0200	1.2113	0.5171	1725
ΔLEVER	0.0132	0.0071	0.1046	0.5449	1725
ΔTURN	0.0494	0.0227	0.2663	0.5983	1725
ΔMARGIN	0.0144	0.0025	0.1405	0.5177	1725

Panel B: Buy-Hold Returns from a Non High Book-to-Market Investment Strategy

Returns	Mean	10th Percentile	25th Percentile	Median	75th Percentile	90th Percentile	Percentage Positive
One-Year Returns							
Raw	0.2312	-0.4534	-0.2042	0.1137	0.5200	1.0082	0.5843
Market-Adjusted	-0.0679	-0.7414	-0.4748	-0.1413	0.2306	0.6306	0.3907
Two-Years Returns							
Raw	0.6997	-0.5324	-0.1862	0.3261	1.0143	1.9758	0.6591
Market-Adjusted	0.0245	-1.3048	-0.7537	-0.2638	0.3896	1.2285	0.3872

.This table refers to financial and returns characteristics of non HBM firms. Non HBM firms are the ones that did not qualify as HBM firm, i.e. did not reach the cutoff quintile of HBM companies. We collected data from firms with sufficient financial statement data to calculate the financial performance signals and we trimmed one-year returns at 1%. We also exclude companies with negative BM.

BM = book value of equity at fiscal year-end scaled by *MVE*.

MVE = market value of equity at fiscal year-end.

ROA = net income scaled by beginning-of-the-year total assets.

CF = current firm-year change in cash and equivalents, scaled by beginning-of-the-year total assets.

ΔROA = current firm-year ROA less the previous firm-year ROA.

ACCRUAL = changes on non-cash current assets minus changes on current liabilities (except short-term debt) minus depreciation, scaled by beginning-of-the-year total assets.

ΔLIQUID = changes in the firm's current ratio in relation to previous year. The current ratio is defined as the ratio of current assets to current liabilities at company's year end.

ΔLEVER = change in firm's gross debt scaled by fiscal year-end total assets.

ΔTURN = change in firm's current firm-year sales scaled by beginning-of-the-year total assets in relation to prior year.

ΔMARGIN = change in firm-year current gross margin scaled by total sales.

.One-Year Raw Return = buy-and-hold returns for 1-year period starting on the 1st of May of the year after portfolio formation.

.Two-Years Raw Return = buy-and-hold returns for 2-years period starting on the 1st of May of the year after portfolio formation.

.One-Year Market-Adjusted Return = buy-and-hold returns for 1-year period starting on the 1st of May of the year after portfolio formation less the value-weighted market return over the same time period.

.Two-Years Market-Adjusted Return = buy-and-hold returns for 2-years period starting on the 1st of May of the year after portfolio formation less the value-weighted market return over the same time period.

TABLE 2

Financial and Returns Characteristcs of High Book-to-Market Firms
(Firm-Year Observation between 1994 and 2004)

Panel A: Financial Characteristics

Variable	Mean	Median	Standard Deviation	Proportion with Positive Signal	n
BM	8.6817	5.4821	15.8105	n/a	426
MVE	326,359	16,366	2,153,823	n/a	426
ROA	-0.0135	0.0040	0.0885	0.5681	416
CF	0.0112	0.0002	0.1364	0.5305	416
ΔROA	0.0016	0.0013	0.2573	0.5329	404
ACCRUAL	-0.0301	-0.0302	0.1106	0.3545	379
ΔLIQUID	-0.5545	-0.0200	8.6688	0.4671	426
ΔLEVER	0.0101	0.0000	0.1122	0.4977	426
ΔTURN	0.0026	0.0025	0.2717	0.5258	426
ΔMARGIN	0.0153	0.0000	0.1780	0.4765	426

Panel B: Buy-Hold Returns from a High Book-to-Market Investment Strategy

Returns	Mean	10th Percentile	25th Percentile	Median	75th Percentile	90th Percentile	Percentage Positive
One-Year Returns							
Raw	0.3569	-0.4815	-0.2427	0.1192	0.7453	1.5180	0.5634
Market-Adjusted	0.0574	-0.8279	-0.5194	-0.1220	0.3903	1.2739	0.4460
Two-Years Returns							
Raw	1.0992	-0.5385	-0.2727	0.3846	1.6243	3.3385	0.6197
Market-Adjusted	0.4244	-1.4384	-0.7735	-0.2272	1.0405	2.4437	0.4366

.This table refers to financial and returns characteristics of HBM firms. HBM firms are the ones that reach the top quintile of BM. We collected data from firms with sufficient financial statement data to calculate the financial performance signals and we trimmed one-year returns at 1%. We also exclude companies with negative BM.

BM = book value of equity at fiscal year-end scaled by *MVE*.

MVE = market value of equity at fiscal year-end.

ROA = net income scaled by beginning-of-the-year total assets.

CF = current firm-year change in cash and equivalents, scaled by beginning-of-the-year total assets.

ΔROA = current firm-year ROA less the previous firm-year ROA.

ACCRUAL = changes on non-cash current assets minus changes on current liabilities (except short-term debt) minus depreciation, scaled by beginning-of-the-year total assets.

ΔLIQUID = changes in the firm's current ratio in relation to previous year. The current ratio is defined as the ratio of current assets to current liabilities at company's year end.

ΔLEVER = change in firm's gross debt scaled by fiscal year-end total assets.

ΔTURN = change in firm's current firm-year sales scaled by beginning-of-the-year total assets in relation to prior year.

ΔMARGIN = change in firm-year current gross margin scaled by total sales.

.One-Year Raw Return = buy-and-hold returns for 1-year period starting on the 1st of May of the year after portfolio formation.

.Two-Years Raw Return = buy-and-hold returns for 2-years period starting on the 1st of May of the year after portfolio formation.

.One-Year Market-Adjusted Return = buy-and-hold returns for 1-year period starting on the 1st of May of the year after portfolio formation less the value-weighted market return over the same time period.

.Two-Years Market-Adjusted Return = buy-and-hold returns for 2-years period starting on the 1st of May of the year after portfolio formation less the value-weighted market return over the same time period.

TABLE 3

Panel A: Sperman Correlation

Spearman Correlation Analysis between One and Two Year Market Adjusted Returns, the Nine Fundamental Signals and the Composite Signal (F_SCORE) for High Book-to-Market Firms

	RETURN	*MA_RET*	*MA_RET2*	*F_ROA*	*F_ΔROA*	*F_ΔMARGIN*	*F_CF*	*F_ΔLIQUID*	*F_ΔLEVER*	*F_ΔTURN*	*F_ACCRUAL*	*EQ_OFFER*	*BrF_SCORE*
RETURN	1.0000												
MA_RET	0.9115	1.0000											
MA_RET2	0.6369	0.6749	1.0000										
F_ROA	0.0393	0.0539	0.0930	1.0000									
F_ΔROA	-0.0617	-0.0387	-0.0592	0.3698	1.0000								
F_ΔMARGIN	0.0804	0.1242	0.1706	0.0226	0.1068	1.0000							
F_CF	0.0752	0.0310	0.0406	0.1268	0.1035	-0.0656	1.0000						
F_ΔLIQUID	0.0516	0.0878	0.0728	0.1374	0.1158	0.0676	0.1509	1.0000					
F_ΔLEVER	0.0828	0.0772	0.0711	0.1833	0.1974	0.0942	-0.0611	0.0850	1.0000				
F_ΔTURN	0.0588	0.0676	0.1017	0.0760	0.1520	0.1342	0.0233	0.1447	0.0797	1.0000			
F_ACCRUAL	0.0375	-0.0034	0.0378	-0.1184	-0.0849	-0.0314	0.1444	-0.1822	0.0764	-0.0233	1.0000		
EQ_OFFER	-0.0045	-0.0273	-0.0006	-0.0214	-0.0305	0.0804	0.0285	0.0226	0.0846	-0.0800	-0.0650	1.0000	
BrF_SCORE	0.1093	0.1192	0.1519	0.5191	0.5690	0.3838	0.4033	0.4378	0.4743	0.4530	0.1944	0.0500	1.0000

Panel B: Pearson Correlation

Pearson Correlation Analysis between One and Two Year Market Adjusted Returns, the Nine Fundamental Signals and the Composite Signal (F_SCORE) for High Book-to-Market Firms

	RETURN	*MA_RET*	*MA_RET2*	*F_ROA*	*F_ΔROA*	*F_ΔMARGIN*	*F_CF*	*F_ΔLIQUID*	*F_ΔLEVER*	*F_ΔTURN*	*F_ACCRUAL*	*EQ_OFFER*	*BrF_SCORE*
RETURN	1.0000												
MA_RET	0.9498	1.0000											
MA_RET2	0.4126	0.4057	1.0000										
F_ROA	0.0216	0.0301	0.0655	1.0000									
F_ΔROA	-0.0557	-0.0272	0.0014	0.3698	1.0000								
F_ΔMARGIN	0.0761	0.1238	0.0959	0.0226	0.1068	1.0000							
F_CF	0.0852	0.0522	0.0278	0.1268	0.1035	-0.0656	1.0000						
F_ΔLIQUID	0.0579	0.0871	0.0699	0.1374	0.1158	0.0676	0.1509	1.0000					
F_ΔLEVER	0.1144	0.1118	0.1176	0.1833	0.1974	0.0942	-0.0611	0.0850	1.0000				
F_ΔTURN	0.0504	0.0702	0.0897	0.0760	0.1520	0.1342	0.0233	0.1447	0.0797	1.0000			
F_ACCRUAL	0.0342	0.0072	0.0096	-0.1184	-0.0849	-0.0314	0.1444	-0.1822	0.0764	-0.0233	1.0000		
EQ_OFFER	0.0052	-0.0084	0.0200	-0.0214	-0.0305	0.0804	0.0285	0.0226	0.0846	-0.0800	-0.0650	1.0000	
BrF_SCORE	0.1107	0.1307	0.1385	0.5177	0.5644	0.3871	0.4102	0.4404	0.4806	0.4536	0.2130	0.0544	1.0000

.Panel A presents spearman correlation between the nine financial performance signals, *BrF_SCORE* and portfolio returns of HBM firms. Panel B presents pearson correlation between the nine financial performance signals, *BrF_SCORE* and portfolio returns of HBM firms. *RETURN* represents the buy-and-hold returns for 1-year period starting on the 1st of May of the year after portfolio formation. *MA_RET* represents the buy-and-hold returns for 1-year period starting on the 1st of May of the year after portfolio formation less the value-weighted market return over the same time period. *MA_RET2* represents the buy-and-hold returns for 2-years period starting on the 1st of May of the year after portfolio formation less the value-weighted market return over the same time period. *F_ROA* equals 1 if *ROA* is positive, zero otherwise. *F_CF* equals 1 if *CF* is positive, zero otherwise. *F_ΔROA* equals 1 if *ΔROA* is positive, zero otherwise. *F_ACCRUAL* equals 1 if *CF* > *ROA*, 0 otherwise. *F_ΔLIQUID* equals 1 if *ΔLIQUID* is positive, zero otherwise. *F_ ΔLEVER* equals 1 if there is a decrease in leverage (*ΔLEVER* < 0), zero otherwise. *EQ_OFFER* equals 1 if the firm did not issue equity in the year preceding portfolio construction, zero otherwise. *F_ΔMARGIN* equals 1 if there is a positive change (i.e. *ΔMARGIN* > 0), zero otherwise. *F_ ΔTURN* equals 1 if there is an improvement in assets turnover, zero otherwise.

.The sample represents 426 HBM firm-year observations between 1994 and 2004.

TABLE 4

Buy-and-Hold Returns to a Value Investment Strategy Based on Fundamental Signals

This table presents on Panel A, B, C and D the buy-and-hold returns to financial statements analysis based on fundamental signals of high book-to-market firms. Low BrF_SCORE portfolio consists of firms with an aggregate score of 1-3 while the High BrF_SCORE represents firms with a score of 7-9.

Panel A: One-Year Raw Returns

Returns	Mean	10th Percentile	25th Percentile	Median	75th Percentile	90th Percentile	Percentage Positive	n
All Firms	0.3569	-0.4815	-0.2427	0.1192	0.7453	1.5180	0.5634	426
BrF_SCORE								
1	0.0317	-0.1818	-0.1818	0.0317	0.2451	0.2451	0.5000	2
2	0.1094	-0.5474	-0.3278	0.0847	0.4645	0.8275	0.5333	30
3	0.2287	-0.6002	-0.3590	-0.0400	0.5000	1.5000	0.4490	49
4	0.4260	-0.4783	-0.1957	0.2580	0.8551	1.5472	0.5921	76
5	0.2263	-0.5231	-0.3797	-0.0262	0.5779	1.3768	0.4651	86
6	0.3997	-0.4917	-0.2196	0.2059	0.7958	1.7963	0.6477	88
7	0.6427	-0.4111	-0.1354	0.2265	1.3361	2.0000	0.6610	59
8	0.3242	-0.3248	-0.1852	0.1912	0.7059	1.2973	0.6296	27
9	0.4226	-0.4050	-0.2873	-0.1367	0.4349	3.1018	0.3333	9
Low Score (1-3)	0.1797	-0.5717	-0.3333	0.0000	0.4645	1.1053	0.4815	81
High Score (7-9)	0.5314	-0.4000	-0.1821	0.2040	0.9500	1.7671	0.6211	95
High - Low	0.3517	0.1717	0.1512	0.2040	0.4855	0.6618	0.1396	-
t-stat/z-stat	2.6943	-	-	2.723	-	-	1.8578	-
(*p* -Value)	(0.0077)	-	-	(0.0065)	-	-	(0.0632)	-
Bootstrap Result								
1000 rep/z-stat	2.7300	-	-	2.8600	-	-	-	-
(*p* -Value)	(0.0060)	-	-	(0.0040)	-	-	-	-

Panel B: One-Year Market Adjusted Returns

Returns	Mean	10th Percentile	25th Percentile	Median	75th Percentile	90th Percentile	Percentage Positive	n
All Firms	0.0574	-0.8279	-0.5194	-0.1220	0.3903	1.2739	0.4460	426
BrF_SCORE								
1	-0.3430	-0.8949	-0.8949	-0.3430	0.2089	0.2089	0.5000	2
2	-0.2474	-1.1028	-0.6231	-0.3935	0.2718	0.5957	0.4333	30
3	-0.0845	-1.1481	-0.6115	-0.2131	0.2158	1.0972	0.3469	49
4	0.1533	-0.6214	-0.3988	-0.0209	0.4917	1.3832	0.4868	76
5	-0.1017	-0.8865	-0.5991	-0.2281	0.2026	0.9439	0.3256	86
6	0.0962	-0.8541	-0.5322	0.0113	0.4392	1.4155	0.5114	88
7	0.3862	-0.5541	-0.2701	0.1372	1.0540	1.6199	0.5593	59
8	0.0771	-0.4606	-0.4253	-0.0676	0.3298	0.8108	0.4815	27
9	0.0522	-0.8498	-0.7591	-0.6414	0.4135	3.0656	0.3333	9
Low Score (1-3)	-0.1513	-1.0582	-0.6231	-0.2254	0.2655	0.6724	0.3827	81
High Score (7-9)	0.2667	-0.6476	-0.4253	0.0564	0.7694	1.5610	0.5158	95
High - Low	0.4180	0.4106	0.1978	0.2818	0.5039	0.8886	0.1331	-
t-stat/z-stat	3.2258	-	-	3.051	-	-	1.7671	-
(*p* -Value)	(0.0015)	-	-	(0.0023)	-	-	(0.0772)	-
Bootstrap Result								
1000 rep/z-stat	3.2900	-	-	3.2400	-	-	-	-
(*p* -Value)	(0.0010)	-	-	(0.0010)	-	-	-	-

TABLE 4 – Continued

Panel C: Two-Years Raw Returns

Returns	Mean	10th Percentile	25th Percentile	Median	75th Percentile	90th Percentile	Percentage Positive	n
All Firms	1.0992	-0.5385	-0.2727	0.3846	1.6243	3.3385	0.6197	426
BrF_SCORE								
1	-0.2797	-0.3182	-0.3182	-0.2797	-0.2412	-0.2412	0.0000	2
2	0.5465	-0.7520	-0.4649	-0.1410	1.0472	2.3488	0.4333	30
3	0.3039	-0.6735	-0.3799	0.0000	0.4450	1.6874	0.4898	49
4	1.2617	-0.5214	-0.1930	0.5753	2.1306	3.7222	0.6842	76
5	0.7913	-0.5294	-0.3478	0.0639	1.0196	2.8999	0.5116	86
6	1.0328	-0.5154	-0.2237	0.4458	1.8908	2.8179	0.6591	88
7	2.3523	-0.4975	0.0353	0.8519	2.7706	6.8864	0.7797	59
8	1.1972	-0.4174	-0.0651	0.5200	1.4853	1.9118	0.7407	27
9	1.2901	-0.1902	0.2263	0.9789	1.6243	3.9099	0.7778	9
Low Score (1-3)	0.3794	-0.6735	-0.4000	-0.1000	0.7230	2.0006	0.4568	81
High Score (7-9)	1.9234	-0.4236	0.0320	0.7633	2.2597	3.9726	0.7684	95
High - Low	1.5440	0.2499	0.4320	0.8633	1.5367	1.9720	0.3116	-
t-stat/z-stat	3.5723	-	-	4.6570	-	-	4.2563	-
(*p* -Value)	(0.0005)	-	-	(0.0000)	-	-	(0.0000)	-
Bootstrap Result								
1000 rep/z-stat	5.5900	-	-	5.1500	-	-	-	-
(*p* -Value)	(0.0000)	-	-	(0.0000)	-	-	-	-

Panel D: Two-Years Market Adjusted Returns

Returns	Mean	10th Percentile	25th Percentile	Median	75th Percentile	90th Percentile	Percentage Positive	n
All Firms	0.4244	-1.4384	-0.7735	-0.2272	1.0405	2.4437	0.4366	426
BrF_SCORE								
1	-0.9504	-1.1193	-1.1193	-0.9504	-0.7814	-0.7814	0.0000	2
2	-0.2096	-1.9691	-1.5219	-0.3421	0.2180	2.0725	0.3667	30
3	-0.2308	-1.5317	-0.8235	-0.4906	0.1561	1.0615	0.2653	49
4	0.6724	-1.1312	-0.6543	0.0712	1.3408	2.8032	0.5132	76
5	0.0667	-1.5081	-0.8981	-0.4576	0.2906	1.9282	0.3256	86
6	0.3326	-1.4384	-0.8585	-0.1903	1.2782	2.2469	0.4432	88
7	1.6012	-1.6012	-0.5828	0.5403	2.1999	5.7781	0.6610	59
8	0.6439	-0.6099	-0.4602	-0.0202	0.7295	1.2856	0.4815	27
9	0.2571	-1.8076	-1.2157	-0.5748	1.5659	3.3697	0.4444	9
Low Score (1-3)	-0.2407	-1.6452	-0.9990	-0.4906	0.1942	1.0615	0.2963	81
High Score (7-9)	1.2018	-1.3691	-0.5748	0.3117	1.6004	3.3697	0.5895	95
High - Low	1.4425	0.2761	0.4242	0.8023	1.4062	2.3082	0.2932	-
t-stat/z-stat	3.3662	-	-	4.0030	-	-	3.8932	-
(*p* -Value)	(0.0009)	-	-	(0.0001)	-	-	(0.0001)	-
Bootstrap Result								
1000 rep/z-stat	5.1900	-	-	4.1700	-	-	-	-
(*p* -Value)	(0.0000)	-	-	(0.0000)	-	-	-	-

.One-Year Raw Return = buy-and-hold returns for 1-year period starting on the 1st of May of the year after portfolio formation.

.Two-Years Raw Return = buy-and-hold returns for 2-years period starting on the 1st of May of the year after portfolio formation.

.One-Year Market-Adjusted Return = buy-and-hold returns for 1-year period starting on the 1st of May of the year after portfolio formation less the value-weighted market return over the same time period.

.Two-Years Market-Adjusted Return = buy-and-hold returns for 2-years period starting on the 1st of May of the year after portfolio formation less the value-weighted market return over the same time period.

.*BrF_SCORE* range is from 0 ("bad" signals) to 9 ("good" signals). Low *BrF_SCORE* represent firms with poor expected future performance and stock returns, while high *BrF_SCORE* is associated with firms expected to outperform. *BrF_SCORE* represents the sum of all indicator variables, or: *BrF_SCORE = F_ROA + F_CF + F_ΔROA + F_ACCRUAL + F_LIQUID + F_ ΔLEVER + EQ_OFFER + F_ΔMARGIN + F_ΔTURN*

TABLE 5

Panel A: One-year market-adjusted returns for Buy-and-Hold Returns to a Value Investment Strategy based on Fundamental Signals by Size Partition

	Small Firms			Medium Firms			Large Firms		
Returns	Mean	Median	n	Mean	Median	n	Mean	Median	n
All Firms	0.0754	-0.1282	159	0.0542	-0.1138	140	0.0385	-0.1019	127
BrF_SCORE									
1	n/a	n/a	0	n/a	n/a	0	-0.3430	-0.3430	2
2	-0.1507	-0.0760	11	-0.4028	-0.5624	9	-0.2140	-0.3935	10
3	-0.1056	-0.2193	24	-0.2689	-0.3876	14	0.1961	0.0800	11
4	-0.1458	-0.2181	25	0.4354	0.1312	29	0.1215	-0.1018	22
5	-0.1222	-0.3058	30	-0.1899	-0.2593	32	0.0416	-0.1943	24
6	0.1420	-0.0348	35	0.0804	0.0416	24	0.0541	0.0297	29
7	0.6140	0.2591	26	0.2304	-0.1111	21	0.1652	0.0607	12
8	0.1786	0.2730	5	0.2506	0.0333	10	-0.1098	-0.1314	12
9	0.5550	-0.6414	3	-0.8498	-0.8498	1	-0.0690	-0.5132	5
Low Score (1-3)	-0.1198	-0.2131	35	-0.3213	-0.4058	23	-0.0291	-0.1679	23
High Score (7-9)	0.5448	0.2278	34	0.2030	-0.1276	32	0.0110	-0.0676	29
High - Low	0.6646	2.5810	-	0.5243	2.1670	-	0.0401	0.3960	-
t-stat/z-stat	2.8300	0.0099	-	2.3279	0.0302	-	0.2150	0.6920	-
(*p*-Value)	(0.0061)	(0.0105)	-	(0.0238)	(0.0070)	-	(0.8306)	(0.7935)	-
High - All	0.4694	0.3560	-	0.1488	-0.0139	-	-0.0275	0.0343	-
t-stat/z-stat	2.5650	2.3150	-	0.8936	0.8050	-	-0.1964	0.0800	-
(*p*-Value)	(0.0111)	(0.0206)	-	(0.3728)	(0.4210)	-	(0.8446)	(0.9365)	-

Panel B: One-year market-adjusted returns for Buy-and-Hold Returns to a Value Investment Strategy based on Fundamental Signals by Stock Liquidity Ratio

	Low Liquidity			Medium Liquidity			High Liquidity		
Returns	Mean	Median	n	Mean	Median	n	Mean	Median	n
All Firms	0.2222	0.0045	142	-0.0040	-0.1131	142	-0.0460	-0.1658	142
BrF_SCORE									
1	n/a	n/a	0	-0.8949	-0.8949	1	0.2089	0.2089	1
2	-0.2592	-0.5422	5	-0.2735	-0.4557	11	-0.2227	-0.2036	14
3	0.0690	-0.2131	17	-0.3284	-0.4058	15	-0.0230	-0.1279	17
4	-0.0004	-0.0574	23	0.4102	0.0557	27	0.0225	-0.1988	26
5	0.0031	-0.3547	25	-0.2556	-0.2183	33	-0.0138	-0.1917	28
6	0.2588	0.1821	32	0.0376	-0.0364	32	-0.0424	-0.0585	24
7	0.6631	0.6415	28	0.1898	0.1299	18	0.0617	-0.1441	13
8	0.2542	0.1024	10	0.2011	0.2868	5	-0.1221	-0.2169	12
9	1.1079	1.1079	2	n/a	n/a	0	-0.2494	-0.6414	7
Low Score (1-3)	-0.0056	-0.2193	22	-0.3270	-0.4329	27	-0.1031	-0.1020	32
High Score (7-9)	0.5831	0.3988	40	0.1923	0.1651	23	-0.0753	-0.1816	32
High - Low	0.5887	0.6180	-	0.5193	0.5980	-	0.0278	-0.0796	-
t-stat/z-stat	2.2964	2.5600	-	2.6594	2.6960	-	0.1390	0.2620	-
(*p*-Value)	(0.0252)	(0.0105)	-	(0.0106)	(0.0070)	-	(0.8899)	(0.7935)	-
High - All	0.3609	0.3943	-	0.1962	0.2782	-	-0.0293	-0.0158	-
t-stat/z-stat	2.1336	2.2020	-	1.0790	1.6160	-	-0.1999	-0.5170	-
(*p*-Value)	(0.0342)	(0.0277)	-	(0.2822)	(0.1061)	-	(0.8418)	(0.6054)	-

TABLE 5 – Continued

Panel C: One-year market-adjusted returns for Buy-and-Hold Returns to a Value Investment Strategy based on Fundamental Signals by Indebtedness

	Low Debt			Medium Debt			High Debt		
Returns	Mean	Median	n	Mean	Median	n	Mean	Median	n
All Firms	0.0031	-0.1353	142	0.1357	-0.0555	143	0.0328	-0.1282	141
BrF_SCORE									
1	n/a	n/a	0	0.2089	0.2089	1	-0.8949	-0.8949	1
2	-0.1373	-0.0951	10	-0.2620	-0.4147	10	-0.3430	-0.3089	10
3	-0.0959	-0.3095	12	0.0661	-0.1442	20	-0.2538	-0.2087	17
4	0.1683	0.0295	30	0.1624	-0.0792	26	0.1190	-0.0118	20
5	-0.2861	-0.2938	30	0.1721	0.1450	23	-0.1248	-0.4011	33
6	0.1558	0.1316	28	-0.0141	-0.2529	31	0.1567	0.0822	29
7	0.2385	-0.1441	17	0.5001	0.1464	20	0.3967	0.2259	22
8	0.1112	-0.0676	11	0.2747	0.3066	8	-0.1673	-0.3761	8
9	-0.7868	-0.7712	4	0.1380	-0.0499	4	3.0656	3.0656	1
Low Score (1-3)	-0.1147	-0.3095	22	-0.0352	-0.2964	31	-0.3085	-0.2171	28
High Score (7-9)	0.0666	-0.1561	32	0.3985	0.1814	32	0.3372	0.1730	31
High - Low	0.1813	0.1534	-	0.4337	0.4778	-	0.6458	0.3901	-
t-stat/z-stat	0.6986	0.5810	-	2.0118	1.8560	-	3.1922	2.9140	-
(*p* -Value)	(0.4879)	(0.5613)	-	(0.0487)	(0.0635)	-	(0.0023)	(0.0036)	-
High - All	0.0635	-0.0208	-	0.2628	0.2369	-	0.3045	0.3012	-
t-stat/z-stat	0.3945	0.0140	-	1.5271	1.4550	-	1.7969	1.9840	-
(*p* -Value)	(0.6937)	(0.9892)	-	(0.1286)	(0.1456)	-	(0.0741)	(0.0473)	-

.One-Year Market-Adjusted Return = buy-and-hold returns for 1-year period starting on the 1st of May of the year after portfolio formation less the value-weighted market return over the same time period.

.We classify firms as small, medium or large based on their prior year's distribution of firm market value (*MVE*). The 33.3 and 66.7 percentiles represent the cutoffs.

.We classify firms' stock as low liquidity, medium liquidity or high liquidity based on their prior year's distribution of liquidity ratio. This ratio considers both, numbers of shares traded and volume traded during the year of portfolio implementation. The 33.3 and 66.7 percentiles represent the cutoffs.

.We classify firms' indebtedness as low debt, medium debt or high debt based on their prior year's distribution of debt to debt plus equity ratio. The 33.3 and 66.7 percentiles represent the cutoffs.

.*BrF_SCORE* range is from 0 ("bad" signals) to 9 ("good" signals). Low *BrF_SCORE* represent firms with poor expected future performance and stock returns, while high *BrF_SCORE* is associated with firms expected to outperform. *BrF_SCORE* represents the sum of all indicator variables, or: *BrF_SCORE = F_ROA + F_CF + F_ΔROA + F_ACCRUAL + F_LIQUID + F_ ΔLEVER + EQ_OFFER + F_ΔMARGIN + F_ΔTURN*

TABLE 6

Regressions

Panel A of this table presents the results of cross sections and fixed effect robust regressions for one-year market-adjusted returns (MA_RET_1) controling for *MVE, BM, ACCRUAL, MOMENT, EQ_OFFER and BrF_SCORE* for high book-to-market firms. Panel B analyses further the robustness of *BrF_SCORE* and presents the results of fixed effect regressions for the group of HBM firms and for the full sample of firms. Coeficients are shown in first line, [t-statistcs] apperas in second line and (p-values) in third line.

Panel A: Pooled Cross Section Regressions

Coefficients from Pooled Regression - dependent variable: *MA_RET1*

	Intercept	Ln (*MVE*)	Ln (*BM*)	*MOMENT*	*ACCRUAL*	*EQ_OFFER*	*BrF_SCORE*	Adj. R^2
Model (1)	-1.3644	0.0458	0.1898	0.0009	0.1746	0.3621	0.0436	0.0316
	[-2.97]	[1.79]	[2.61]	[1.20]	[0.43]	[2.02]	[1.61]	
	(0.003)	(0.075)	(0.010)	(0.232)	(0.671)	(0.044)	(0.107)	
Model (2)	-1.1498	0.0473	0.1722	0.0010	0.1286	0.3857		0.0238
	[-2.33]	[1.84]	[2.32]	[1.38]	[0.31]	[2.00]		
	(0.021)	(0.066)	(0.021)	(0.170)	(0.758)	(0.046)		
Model (3)	-1.0113	0.0317	0.2103				0.0742	0.0403
	[-3.69]	[1.53]	[3.31]				[3.09]	
	(0.000)	(0.126)	(0.001)				(0.002)	
Model (4)	-0.5912	0.0329	0.1808					0.0174
	[-2.08]	[1.56]	[2.79]					
	(0.038)	(0.120)	(0.006)					
Model (5)	-1.4877	0.0465	0.2220	0.0010		0.3562	0.0563	0.0450
	-3.5100	[1.98]	[3.29]	[1.53]		[2.14]	[2.21]	
	(0.000)	(0.048)	(0.001)	(0.126)		(0.033)	(0.027)	

Panel B: Fixed Effect Regression

Coefficients from Cross Section Fixed Effects for unbalanced panel data - dependent variable: *MA_RET1*

	Intercept	Ln (*MVE*)	Ln (*BM*)	*BrF_SCORE*	*Obs. (n)*
Model (6)	1.3397	-0.2038	0.2578	0.0511	426
	[0.91]	[-1.60]	[1.69]	[2.08]	
	(0.366)	(0.110)	(0.092)	(0.038)	
	Intercept	Ln (*MVE*)	Ln (*BM*)	*BrF_SCORE*	*Obs. (n)*
Model (7)	2.4378	-0.2175	0.0367	0.0208	2151
	[5.34]	[-5.89]	[0.92]	[2.40]	
	(0.000)	(0.000)	(0.358)	(0.016)	

MA_RET1 = buy-and-hold market adjusted returns for 1-year period starting on the 1st of May of the year after portfolio formation.
Ln(MVE) = natural logarithm of market value of equity at fiscal year-end.
Ln(BM) = book value of equity at fiscal year-end scaled by *MVE.*
MOMENT = six month buy-and-hold return prior to portfolio formation.
ACCRUAL = changes on non-cash current assets minus changes on current liabilities (except short-term debt) minus depreciation, scaled by beginning-of-the-year total assets.
EQ_OFFER = 1 if the firm did not issue equity in the year preceding portfolio construction, zero otherwise.
BrF_SCORE = F_ROA + F_CF + F_ΔROA + F_ACCRUAL + F_LIQUID + F_ ΔLEVER + EQ_OFFER + F_ΔMARGIN + F_ ΔTURN.

TABLE 7

Regressions

Panel A from this table presents the results of pooled cross sections robust regressions for one-year market-adjusted returns (MA_RET_1) controling for *LIQUIDITY, MVE, BM, ACCRUAL, MOMENT, EQ_OFFER, BrF_SCORE* and *ARBITRAGE*BrF_Score* for both all sample of firms and high book-to-market firms. Additionally we split our analysis on firms where arbitrage is possible and where no arbitrage is possible due to limits on trading. Coeficients are shown in first line, [t-statistcs] apperas in second line and (p-values) in third line.Panel B presents the buy-and-hold returns to financial statements analysis based on fundamental signals partitioned by the possibility of arbitrage. Low BrF_SCORE portfolio consists of firms with an aggregate score of 1-3 while the High BrF_SCORE represents firms with a score of 7-9.

Panel A: Pooled Cross Section Regressions

Coefficients from Pooled Regression - dependent variable: *MA_RET1*

	Intercept	Ln (*MVE*)	Ln (*BM*)	*MOMENT*	*ACCRUAL*	*EQ_OFFER*	*LIQUIDITY*	*BrF_SCORE*	*ARBITRAGE*BrF_SCORE*	Adj. R^2
Model (A) - all	-0.4451	0.0235	0.0980	0.0014	0.0380	-0.0598		0.0197	-0.0181	0.0290
	[-2.49]	[2.14]	[4.44]	[4.25]	[0.51]	[-0.72]		[2.15]	[-2.25]	
	(0.013)	(0.033)	(0.000)	(0.000)	(0.612)	(0.471)		(0.032)	(0.024)	
Model (A) - HBM	-1.2523	0.0524	0.1947	0.0009	0.1663	0.1818		0.0430	-0.0450	0.0324
	[-2.98]	[1.77]	[2.65]	[1.19]	[0.40]	[0.99]		[1.58]	[-1.06]	
	(0.003)	(0.078)	(0.008)	(0.234)	(0.686)	(0.321)		(0.116)	(0.289)	
Model (B) - all	-0.8301	0.0464	0.1053	0.0013	0.0388	-0.0619	-0.0253	0.0171		0.0369
	[-4.17]	[3.95]	[4.77]	[3.99]	[0.52]	[-0.76]	[-4.06]	[1.88]		
	(0.000)	(0.000)	(0.000)	(0.000)	(0.606)	(0.450)	(0.000)	(0.060)		
Model (B) - HBM	-2.4423	0.1152	0.2353	0.0007	0.0484	0.3145	-0.0658	0.0280		0.0708
	[-4.58]	[3.81]	[3.09]	[1.01]	[0.12]	[1.73]	[-3.72]	[1.05]		
	(0.000)	(0.000)	(0.002)	(0.312)	(0.904)	(0.084)	(0.000)	(0.294)		
Model (B) - all firms with possible arbitrage	-1.4464	0.0813	0.0377	0.0036	1.3915	0.0627	0.0648	-0.0083		0.2276
	[-1.89]	[1.72]	[0.80]	[2.61]	[3.40]	[0.48]	1.16	[-0.45]		
	(0.062)	(0.089)	(0.426)	(0.010)	(0.001)	(0.632)	(0.250)	(0.651)		
Model (B) - all firms with **no** possible arbitrage	-0.8555	0.0482	0.1082	0.0013	0.0232	-0.0631	-0.0247	0.0189		0.036
	-3.97	[3.73]	[4.57]	[3.82]	[0.31]	-[0.64]	-3.84	[1.96]		
	(0.000)	(0.000)	(0.000)	(0.000)	(0.758)	(0.525)	(0.000)	(0.050)		

TABLE 7 – Continued

Panel B: One-year market-adjusted returns for Buy-and-Hold Returns to a Value Investment Strategy based on Fundamental Signals by arbitrage possibility

Returns	Mean	10th Percentile	25th Percentile	Median	75th Percentile	90th Percentile	n
All firms with possible arbitrage	-0.0983	-0.5837	-0.3256	-0.0615	0.1501	0.3370	107
Low Score (1-3)	-0.0764	-0.5029	-0.2676	-0.0614	0.1217	0.2062	11
High Score (7-9)	-0.1343	-0.6264	-0.4807	-0.0816	0.1494	0.4136	44
High - Low	-0.0579	-0.1235	-0.2131	-0.0202	0.0277	0.2074	-
t-stat/z-stat	-0.4229	-	-	0.2950	-	-	-
(*p* -Value)	(0.6741)	-	-	(0.7683)	-	-	-
Bootstrap Result							
1000 rep/z-stat	-0.4500	-	-	0.3300	-	-	-
(*p* -Value)	(0.6510)	-	-	(0.7380)	-	-	-
All firms with no possible arbitrage	-0.0402	-0.7601	-0.4848	-0.1435	0.2731	0.7497	2044
Low Score (1-3)	-0.1250	-0.8541	-0.5417	-0.2472	0.2241	0.6724	289
High Score (7-9)	0.0157	-0.6992	-0.4194	-0.0881	0.2942	0.7694	587
High - Low	0.1407	0.1549	0.1223	0.1591	0.0701	0.0970	-
t-stat/z-stat	2.9247	-	-	3.5500	-	-	-
(*p* -Value)	(0.0035)	-	-	(0.0004)	-	-	-
Bootstrap Result							
1000 rep/z-stat	2.9700	-	-	3.8500	-	-	-
(*p* -Value)	(0.0030)	-	-	(0.0000)	-	-	-

MA_RET1, *Ln(MVE)*, *Ln(BM)*, *;MOMENT*, *ACCRUAL*, *EQ_OFFER;*and *BrF_SCORE are defined on table 6.*

LIQUIDUTY = liquidity index is calculated as: ln(100 * p/P * sqrt(n/N * v/V)), where p is the number of days in which there were at least 1 trade of the stock during the period; P is the total number of days in the period; n represents the number of trades of the stock during the period; N represents the total number of trades of all the stocks in the period; v is the volume in monetary terms of the stock in the period and; V represents the total volume in monetary terms of all the stocks in the period.

ARBITAGE =1 for firms where arbitrage is possible; zero otherwise. We consider that arbitrage is possible for firms with the following features: (i) firms which are included in the stock exchange index (IBOVESPA) and (ii) firms which have options and forwards traded on their shares - to allow short selling.

*ARBITAGE*BrF_SCORE* = interaction between firms with possible arbitrage and *BrF_SCORE.*

APPENDIX A

This appendix presents one-year market adjusted returns by year in a portfolio formed with High *BrF_SCORE* (≥ 7) firms and other formed with Low *BrF_SCORE* (≤ 3) firms. Additionally it shows one-year market adjusted returns by year in a portfolio taking long position in firms with High *BrF_SCORE* and short position in firms with Low *BrF_SCORE* and the one-year market adjusted returns by year in a portfolio formed with intermediate *BrF_SCORE* (3 > *BrF_SCORE* > 7).

Panel A - One-year market-adjusted return taking a long position in High *BrF_SCORE* firms and a short position in Low *BrF_SCORE* firms by Year

Year	High *BrF_SCORE* One Year Market Adjusted Return	n_1	Low *BrF_SCORE* One Year Market Adjusted Return	n_2	High - Low Return Difference	Intermediate *BrF_SCORE* One Year Market Adjusted Return	n_3	Total (n_1+n_2+n_3)
1994	-0.5942	13	-0.8013	3	0.2071	-0.4926	23	39
1995	-0.0159	1	-0.6027	15	0.5868	-0.0167	23	39
1996	0.3453	6	-0.1096	12	0.4549	-0.2225	23	41
1997	-0.1218	8	-0.0670	6	-0.0548	0.2468	22	36
1998	0.9292	5	0.4438	9	0.4853	0.3387	25	39
1999	0.6144	9	0.4610	8	0.1535	0.1763	27	44
2000	0.1696	11	-0.1490	6	0.3186	0.0340	24	41
2001	0.6744	13	-0.0528	6	0.7272	0.2857	20	39
2002	0.7673	10	-0.2403	6	1.0076	0.2729	20	36
2003	0.3190	9	-0.2783	6	0.5973	0.1930	22	37
2004	0.0628	10	-0.6123	4	0.6751	-0.3181	21	35
Average	0.2864	-	-0.1826	-	0.4690	0.0452	-	-
Total	0.2667	95	-0.1513	81	0.4180	0.0455	250	426
				t-stat	3.2258			
				(*p* -Value)	(0.0015)			

Panel B - Two-years market-adjusted returns taking a long position in High *BrF_SCORE* firms and a short position in Low *BrF_SCORE* firms by Year

Year	High *BrF_SCORE* One Year Market Adjusted Return	n_1	Low *BrF_SCORE* One Year Market Adjusted Return	n_2	High - Low Return Difference	Intermediate *BrF_SCORE* One Year Market Adjusted Return	n_3	Total (n_1+n_2+n_3)
1994	-1.6216	13	-2.2842	3	0.6627	-1.2762	23	39
1995	0.5889	1	-1.0142	15	1.6031	1.0440	23	39
1996	-0.0880	6	-0.1053	12	0.0173	-0.1240	23	41
1997	0.0049	8	0.4654	6	-0.4604	0.7793	22	36
1998	1.9420	5	0.3294	9	1.6126	0.5442	25	39
1999	0.6602	9	0.1021	8	0.5580	0.3148	27	44
2000	0.5167	11	-0.0830	6	0.5996	0.1912	24	41
2001	3.2529	13	-0.3285	6	3.5815	0.2272	20	39
2002	2.3648	10	-0.6417	6	3.0064	1.0811	20	36
2003	4.1463	9	-0.2296	6	4.3759	-0.3576	22	37
2004	1.0566	10	1.2389	4	-0.1823	1.5312	21	35
Average	1.1658	-	-0.2319	-	1.3977	0.3596	-	-
Total	1.2018	95	-0.2407	81	1.4425	0.3444	250	426
				t-stat	3.3662			
				(*p* -Value)	(0.0009)			