

Financial Statement Analysis also Separate Winners from Losers in Brazil

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ABSTRACT

This paper investigates if an accounting-based fundamental analysis strategy can help investors earn excess returns on a portfolio of high book-to-market (HBM) firms in Brazil. The strategy we adopt is based on Piotroski (2000) who identified 9 fundamental signals to form a composite score (*F_SCORE*) capable to separate out ex-post winners from losers among HBM firms in US stock market. However the result of such a strategy applied to Brazilian firms is not straightforward. First, Brazilian accounting information complies badly with the five factors related with the relevance of accounting information for equity investors identified by Ali and Hwang (2000). Second, there are evidences that market efficiency in Brazil is lower than in US (Harvey, 1995; Karemera et al., 1999; and Ojah and Karemera, 1999). Third Brazil is classified as a poor enforcement, legal regime and transparency country (Durnev and Kim, 2005). Hence, Brazil's settings represent an additional challenge to test the usefulness of financial statement analysis. However, we find evidences that a financial statement analysis strategy based on HBM Brazilian firms can separate winners from losers, particularly for two-years (raw and adjusted) returns after the portfolio formation. One could have changed his/her HBM portfolio one-year (two-years) market-adjusted returns from 8.3% (11.5%) to 34.5% (98.2%) selecting financially strong HBM firms between 1994-2004. Within the portfolio of HBM firms small and medium companies are the ones that contribute the most to this performance. Additionally a strategy based on forming portfolios long on financially strong HBM firms and short on financially weak HBM firms generates 52% annual (or 162% for two years accumulated) market-adjusted return between 1994 and 2006. One interesting issue arising from the evidence we find is that the underlying economic reality represented by financial statements for Brazilian firms seems to be slowly incorporated into prices.

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1. Introduction

This paper investigates whether applying an accounting-based fundamental analysis strategy can help investors earn excess returns on a portfolio of high book-to-market (HBM) firms in Brazil's stock markets. Investment strategies based on book-to-market ratio have been largely investigated in finance and accounting literature. Since the classical book of Graham and Dodd (1934) investment strategies that focused on buying stocks with low price-to-book (the so called value stocks) were told to produce higher returns than strategies based on growth¹ (glamour) stocks. Evidences show a positive and relatively strong correlation between the book-to-market ratio of a firm and its future stock performance. Fama and French (1992, 1993, 1996), Lakonishok et al. (1994), and Rosenberg et al. (1984) document the success of high book-to-market strategies, although the explanations about value-based strategies outperforming growth-based strategies remains controversial (Doukas et al., 2002). Fama and French (1992) attribute the book-to-market effect to unobserved risk factors captured by this ratio, while Lakonishok et al. (1994) argument in favor to mispricing.

Piotroski (2000) applies financial statement analysis (fundamental analysis) on a broad portfolio of HBM (value) American firms and shows that investors can create a stronger value portfolio. Mohanram (2005) argues that financial statement analysis attempts to separate ex-post winners from losers on the basis of information from financial statements that is not correctly impounded in prices. Piotroski (2000) argues that such analyses will be specially effective in HBM firms for three reasons: i) HBM firms are often ignored by market participants and are barely followed by analysts; ii) HBM firms have limited access to most informal information dissemination channels therefore financial statements represent the most reliable and most accessible source of information, iii) HBM firms tend to be financially distressed, which causes its valuation is primarily based on accounting fundamentals.

Financial statements analysis, thus, should work at least as well in emerging markets, where efficiency tends to be lower, as it works in developed markets. Harvey (1995) shows that the amount of predictability found in emerging markets is greater than found in developed markets.

We apply the same methodology based on *F_SCORE* strategy identified by Piotroski (2000) to select a portfolio of financially strong HBM Brazilian firms. Brazil provides an interesting scenario to test the usefulness of financial statement analysis due to the features of its capital markets and financial reporting models. First, Brazil's accounting information complies badly with the five factors related with the relevance of accounting information for equity investors identified by Ali and Hwang (2000). Second, there are evidences that market efficiency in Brazil is lower than in United States (US). Haque et al. (2001) documents that Brazil's markets are no weak form efficient and Ratner and Leal (1999) and da Costa (1994) suggest semi-strong efficiency to Brazilian capital markets. However Karemera et al. (1999) and Ojah and Karemera (1999) suggest that Brazil is weak form efficient. Third, Brazil is the emerging market with the highest number of American Depositary Receipts² issuers and the participation of foreign investors in Bovespa³ in constantly increasing moving from⁴ 25% in 2001 to 37% of the volume traded on the first semester of 2006. Additionally the average daily volume traded in Bovespa in the first semester of 2006 was above US\$ 1 billion, what makes Brazil the biggest capital market in Latin America. These features makes analysis about Brazilian capital markets a topic of great interest to foreign investors. Finally, Brazil is

¹ We refer to low book-to-market firms as glamour stocks and to high book-to-market firms as value stocks.

² According to JPMorgan at the end of 1S2006, 37 Brazilian companies adopted the ADR program.

³ São Paulo Stock Exchange.

⁴ According to Bovespa data (available on www.bovespa.com.br). Appendix A shows the evolution in the proportion of foreign investors from 2001 to 1S2006.

ranked below the average (Durnev and Kim, 2005) in its enforcement, legal regime and transparency. For all the above mentioned reasons, it is not clear enough if an accounting-based fundamental analysis strategy can help investors earn excess returns in an environment with unique features like Brazil.

We find evidences that a financial statement analysis strategy based on HBM Brazilian firms can separate winners from losers, particularly for two-years (raw and adjusted) returns after the portfolio formation. One could have changed his/her HBM portfolio one-year (two-years) market-adjusted returns from 8.3% (11.5%) to 34.5% (98.2%) selecting financially strong HBM firms between 1994-2004. Within the portfolio of HBM firms small and medium companies are the ones that contribute the most to this performance. Additionally a strategy based on forming portfolios long on financially strong HBM firms and short on financially weak HBM firms generates 52% annual (or 162% for two years accumulated) market-adjusted return between 1994 and 2006.

The remaining structure of the paper is organized as follows. Section 2 reviews prior research on book-to-market effect and fundamental analysis. 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. Research design, sample selection and summary statistics are discussed in Section 5. Section 6 presents the results to the fundamental analysis strategy based on F_SCORE to Brazilian firms and shows some additional results. Section 7 concludes the paper.

2. HBM effect and fundamental analysis literature review

There is large evidence on prior research, particularly on developed markets, that portfolios of HBM stocks outperform portfolios of low book-to-market stocks. Fama and French (1992, 1993, 1996), Lakonishok et al. (1994), Rosenberg, Reid and Lansteisn (1984) agree on the evidence that the book-to-market ratio is strongly and positively correlated to future stock performance. However their explanations to the HBM effect are not homogeneous.

Fama and French (1992, 1996) relate the HBM effect is due to the higher risks faced by this kind of firms. Considering that the book-to-market ratio captures financial distress, this would explain the excess returns earned by HBM compared to most firms. Vassalou and Xing (2004) document that the book-to-market risk is a proxy for default risk in HBM firms. However, Ohlson (2005) explores the framework provided by residual income valuation model and shows the discount factor relates negatively to book-to-market ratio.

On the other hand Lakonishok et al. (1994) suggest that mispricing should explain the book-to-market effect. According to them HBM are neglected stocks where prior performance creates pessimistic expectations about future performances. Additional research supports mispricing. Bartov and Kim (2004) demonstrate that the book-to-market effect is stronger when one considers the accounting related reasons for low book-to-market ratios. Ali et al. (2003) show that the BM effect is greater for stocks with higher idiosyncratic return volatility, higher transaction costs and lower investor sophistication.

Piotroski (2000) relates that analysts do not recommend HBM firms as an investment strategy when forming their buy/sell recommendations and he also argues this paradoxical behavior could be explained by the documented superior performance of HBM broad portfolio and not individual stocks (and usually analysts recommend individual stocks), or by the incentives analysts have to recommend firms with strong recent performance.

Fundamental analysis research focus on the usefulness of financial information in predicting future realizations of both earnings and returns (Mohanram, 2005). Ou and Penman (1989) document a set of financial ratios from financial statements that can accurately predict

future changes in earnings. Lev and Thiagarajan (1993) analyze 12 financial signals that are frequently used by analysts, and show that these signals are correlated to contemporaneous returns. Abarbanell and Bushee (1998) document that an investment strategy based on these signals yields significant abnormal returns. Concerning specific accounting signals, Sloan (1996) shows that firms with higher amounts of accruals in their earnings underperform in the future.

Piotroski (2000) aggregates the HBM 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 to identify likely extreme performers and then they use financial statement analysis to differentiate between winners and losers among these firms. Recently Mohanram (2005) combines traditional fundamental analysis with measures tailored for low book-to-market firms and documents significant excess returns, what is controversial to the risk-based explanation of excess returns for HBM stocks.

3. Capital markets and financial reporting model in Brazil

Piotroski (2000) suggests that the success of accounting-based fundamental analysis strategy on HBM stocks is directed linked to the market efficiency associated to value stocks and to the relevance of accounting information to distressed firms. Hence, Brazil provides an interesting set to test the usefulness of financial statement analysis. Some features of Brazilian capital market contribute to it.

Anderson (1999) presents an overview on Brazil's institutional environment, and relates the weak institutional environment. He documents that firms present a low reliance on external financing and ownership concentration is enormous. Using data from 1991 for 68 nonfinancial firms (Brazilian blue chips) he shows that the top shareholder owns on average 54.9% of common shares and 33.2% of all shares. The top three shareholders hold an average 74% of common shares and 49% of all shares. Ownership structure is important since it influences directly the efficiency of the market.

Gorga (2003) agrees with Black (2000) that points to 18 problems that limit the development of capital markets in Brazil: 1) the Brazilian Securities Commission (CVM) has a very limited staff and budget and is not yet sophisticated enough to catch subtle forms of mis-disclosure or self-dealing; 2) there are no specialized prosecutors with the skill to bring complex securities cases and prosecutors have a reputation for not always being honest; 3) the courts lack sophistication; 4) there are no class action mechanisms; 5) Brazil does not yet have a strong culture of compliance with disclosure rules; 6) there are no strong rules for disclosure of self-dealing transactions; 7) there is a disincentive for private companies to prepare audited financial statements because it is more difficult for a company with audited statements to hide income from the tax collector; 8) there is no meaningful risk of liability for bad audits by accountants; there are no cases of accountants being found liable for violations; 9) Bovespa does not have strong listing rules and relies mostly on CVM to establish rules for listed companies; 10) public held companies make little use of independent directors, and nominally independent directors may not be so independent in practice; 11) company insiders face limited risks of civil sanctions, either from lawsuits brought by investors or by the regulatory authority; 12) company insiders face little risk of criminal liability for self-dealing or disclosure violations; 13) bankers do not face liability for frauds in practice; 14) there is no risk of civil liability for independent directors who approve gross self-dealing; 15) there are no significant number of cases seeking sanctions for market manipulation; 16) there are no sufficient procedural controls on self dealing transactions and there are no rules requiring accountants to review self-dealing transactions; 17) there is a problem with enforcing civil

sanctions against insider traders; 18) Brazil does not currently have a good accounting standard body. Additionally, Brazil has also been classified as a poor enforcement, legal regime and transparency country (Durnev and Kim, 2005).

Ali and Hwang (2000) documents that five factors drive the relevance of accounting numbers for equity investors: (i) bank versus investors oriented market, (ii) type of regulatory body, (iii) influence of tax regulations, (iv) ownership concentration and (v) amount spent on auditing. According to Lopes (2006) Brazil clearly complies negatively with the factors outlined. Despite these facts some Brazilian firms try to opt out this weak institutional environment. Houlthausen (2003) comments that firms can opt out of their reporting regime by cross listing, by hiring a high quality auditor or some other mechanism. Cross listing has been a common way for some Brazilian firms to borrow US corporate governance model, which is supposedly more rigorous. Other common mechanism Brazilian companies have voluntarily adopted is to comply with governance rules stated by Bovespa. Created on December 2000, the special corporate governance levels are established in 3 segments with increasing requirements. Level 1 companies have to: i) prepare and release the statement of cash flows (that is not a mandatory statement in Brazil), ii) comply with the maintenance of a free-float of at least 25% of its capital, iii) use mechanisms that favors capital dispersion in public offerings, iv) disclose its consolidated financial statements and special audit revision, v) presents monthly disclosure of trades involving equities issued by the company on the part of the controlling shareholders or the management, and vi) release the annual calendar of corporate events. To be classified as a Level 2 company, in addition to the obligations in Level 1, the firm and its controlling shareholders must adopt a broader range of corporate governance practices. The additional requirements are: i) a single one-year mandate for the entire Board of Directors, which must have, at least, five members, ii) disclosure of annual financial statements according to US GAAP or IFRS in addition to Brazilian accounting standards, iii) in the case majority shareholders sell their stake, the same conditions granted to them must be extended to common shareholders, while preferred shareholders must get, at least, 70% of the value/conditions (tag along), iv) voting rights have to be granted to preferred shares in circumstances such as incorporation, spin-off, merger and approval of contracts between the company and other firms of the same holding group, when deliberated at general shareholders meeting, v) obligation to hold a tender offer by an economic value model, in case of delisting or deregistration process, and vi) attend the Market Arbitration Panel for resolution of corporate disputes. Finally, the companies interested to be classified in the “new market” segment have to adopt all the requirements of Level 1 and 2 and issue only ordinary stocks. This is an important topic considering that firms in Brazil can issue preferred and common shares. Preferred shares do not give voting rights and their owners only have access to dividends. In the case that dividends are not paid for three consecutive years preferred shares turn to have voting rights but they do not become common shares. According to corporate law firms could issue, until 2001, a maximum of 2/3 of its total stocks as preferred shares. The reform of Brazilian corporate law, in 2001, changed this proportion to the maximum of 1/2 of its total shares as preferred shares. However companies created before 2001 continue to follow its original shareholders structure. As of July 2006 there were 366 firms listed in Bovespa, from which 35 were listed on Level 1, 13 on Level 2 and 33 on “New Market”. Generally HBM firms are not listed in Bovespa’s special corporate governance levels and do not comply with the previously mentioned rules.

Adding the prior features to evidences about Brazilian market efficiency turn the investigation about the usefulness of financial statement analysis of HBM firms an interest topic. It is not consensus whether Brazilian capital market is semi-strong or weak form efficient. Karemera et al. (1999) used runs tests (with monthly returns) to conclude that Argentina, Brazil and Mexico were weak form efficient from an international investor’s

perspective while Brazil and Mexico were weak form efficient in local currency terms. Ojah and Karemera (1999) suggest that Argentina, Brazil, and Chile were weak form efficient. However Haque et al. (2001) documents that all of these markets are no weak form efficient on the basis of testing the single variance ratio procedure using weekly returns. Ratner and Leal (1999) shows that there is no evidence that a strategy based on past prices information (technical analysis) results in abnormal results. Da Costa (1994) documents the process of price reversals in Brazil is higher than those in US.

Given that scenario it is not obvious that financial statements analysis in Brazil will possess the same relevance documented in previous research, especially in US.

4. Financial Performance Signals

Piotroski (2000) builds a composite score (F_SCORE) comprising financial variables that reflect changes in margins, profits, cash flows, liquidity and financial leverage. These variables are intended to be useful in predicting future firm performance, specially the financially distressed ones (HBM). We use the same basic nine 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). We call the indicator variable as $F_variable$. For example, the indicator variable of return on assets (ROA) is F_ROA and the indicator variable of leverage ($LEVER$) is F_LEVER . It is important to state that the definition of "good" or "bad" signal is facilitated given the presumable distressed financial firms that compose HBM portfolio.

The four variables used to measure profitability are ROA , CF , ΔROA and $ACCRUAL$. ROA is defined as net income scaled by beginning-of-the-year total assets, while CF is defined by the firm-year change on cash and cash equivalents scaled by beginning-of-the-year total assets. We do not use the changes in cash flow from operations because it is not available information for most Brazilian firms. We also did not use EBITDA⁵ 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. We considered positive ROA and CF 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 the current year net income less CF , 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.

The three financial signals used to measure changes in capital structure and liquidity are $\Delta LIQUID$, $\Delta LEVER$ and EQ_OFFER . As stated by Piotroski (2000), since most HBM firms are financially distressed we assume that increase in leverage, weakening in liquidity, or public offerings of equity are "bad" signals. $\Delta LIQUID$ measures the 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. 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 $\Delta LEVER$. 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.

⁵ Earnings before interest, taxes, depreciation and amortization.

Brazil's historical high interest rates, credit structure⁶ and volatile markets reduce the opportunity to firms raise money in the long term at a competitive cost. We measure $\Delta LEVER$ 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 equity⁷ 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 investors liquidity, changes in Brazilian corporate law 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 very low. We computed only two equity offers in our sample of HBM firms from 1994-2004.

Operating efficiency is measured by $\Delta MARGIN$ and $\Delta TURN$. We define $\Delta MARGIN$ 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 $\Delta TURN$ 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_ATURN) equals to one, or zero otherwise.

The composite score is called F_SCORE and represents the sum of all indicator variables mentioned above, or:

$$F_SCORE = F_ROA + F_CF + F_AROA + F_ACCRUAL + F_LIQUID + F_ALEVER + EQ_OFFER + F_AMARGIN + F_ATURN$$

F_SCORE range is from 0 ("bad" signals) to 9 ("good" signals). Low F_SCORE represent firms with poor expected future performance and stock returns, while high F_SCORE is associated with firms expected to outperform. The investment strategy analyzed in this paper is similar to Piotroski (2000) and is based on selecting firms with high F_SCORE . We consider firms with high F_SCORE the ones in the range of 7-9 and firms with low F_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).

One could wonders about this simple application of fundamental analysis because the translation of profitability, liquidity, capital structure and operating efficiency measures into binary codes could eliminate useful information. However, as commented by Piotroski (2000), the binary signals approach is simple and easy to implement. Hence we also performed an alternative methodology⁸ that captures the continuous representations of the financial performance factors. To attest the robustness of our results in a continuous framework we rank each individual signal realizations and transform it in a continuous variable by calculating the ratio of variable rank to the total sum of ranks. For example, we rank ROA from the lowest to the highest. Then we calculate the ratio ROA/n (R_ROA), where

⁶ There is only one source of long term credit in Brazil that is BNDES (National Bank for Economic and Social Development).

⁷ Brazilian firms can issue common and/or preferred shares and both are considered as equity sources.

⁸ A similar methodology is also presented by Piotroski (2000).

n is the total number of observations. We proceed with this calculation for all variables, except to EQ_OFFER , due to its binary feature and compute R_SCORE as:

$$R_SCORE = R_ROA + R_CF + R_ΔROA + R_ACCRUAL + R_ALIQUID - R_ALEVER + R_ATURN + R_AMARGIN$$

R_SCORE represents a quasi-continuous form of F_SCORE . Low R_SCORE corresponds to firms with poor expected future performance and stock returns, while high R_SCORE is associated with firms expected to outperform. For the implementation of R_SCORE we treated the variables as pooled data because our main interest with this approach is not to construct a portfolio strategy, but to check the robustness of results obtained with F_SCORE strategy. If R_SCORE and F_SCORE discriminate winners from losers, the strategy of apply fundamental analysis and treat the signals as binary variables (“good” or “bad”) do not lose relevant information.

5. Research Design

5.1. Data

We identify⁹ firms with sufficient stock prices and book values in Bovespa each year from 1994-2004¹⁰. We select the higher liquidity stock class¹¹ of each firm for each year. We calculate the market value of equity (MVE) and book-to-market ratio (BM) of each company at fiscal year-end. Companies with sufficient data are annually classified and we identify distribution of BM and MVE .

To construct the HBM portfolio we selected the top BM quintile with sufficient financial statement data to calculate the financial performance signals. We also separate companies by its size (small, medium or large) according to their 33.3 and 66.7 percentiles distribution of MVE . These approach outcomes 476 HBM firms to the final sample from 1994-2004 (see appendix B).

Figure 1 presents the top quintiles of BM used to build HBM portfolio. Firms above these levels of BM were included in the HBM portfolio.

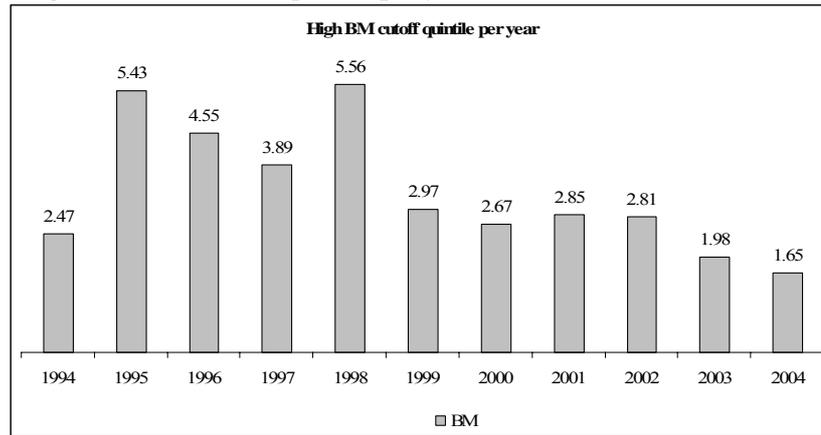
It is important to mention there are relevant macroeconomic shocks in the timeline presented in Figure 1 that might explain the increase in HBM quintile through 1995 to 1998. In 1995 the Brazilian BM top quintile clearly reacted to Mexican crisis. In 1998 the crisis was in Russia, and Brazilian stocks also reflected the deterioration of macroeconomic conditions. From August 1998 to September 1998 Brazil lost US\$ 30 billion in reserves. In the same year there was also a high expectation relating to Real devaluation. This macroeconomic scenario made stock prices decrease rapidly. In January 1999 Brazil changed its exchange rate regime from fixed to floating. Since January 1999 there has not been a high impact crisis in Brazilian capital markets.

⁹ We use the database available on Economatica.

¹⁰ We select this range due to the beginning of current Brazilian currency, Real. After the adoption of Real, Brazilian inflation rate drastically decreased and remained sustainable.

¹¹ 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.

Figure 1. Cutoff HBM quintile per year



5.2. 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 that the most recent financial statements are publicly available. 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 assume the delisting return as zero. We define market-adjusted-returns as the buy-and-hold returns for 1-year and 2-years in excess to the value-weighted market return¹² over the same time period. We collect returns from May 1995 to June 2006¹³.

5.3. HBM versus Non HBM firms - Descriptive Statistics

We compute descriptive statistics for HBM 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. Additionally we choose firms with sufficient financial statement data to calculate the financial performance signals and we exclude extreme observations on returns¹⁴. Finally we exclude companies with negative BM and we get the sample of 1,613 non HBM firms.

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 1.38 (1.26) while panel A from table 2 presents the average (median) BM of HBM firms of 7.98 (5.05). Piotroski (2000) finds an average (median) BM of HBM American firms of 2.44 (1.72). The standard deviation BM of HBM firms (14.97) is considerable higher than standard deviation BM of non HBM firms (0.81), representing the heterogeneous between HBM firms. The difference between the median market capitalization (*MVE*) of non HBM (BRL 280 million) and HBM (BRL 21 million) shows growth stocks represents usually more valuable companies compared to value stocks.

¹² We use IBRX as benchmark.

¹³ We consider the two-years raw and adjusted returns for fiscal year-ended 2004 as the accumulated return from May 1st 2005 to June 1st 2006. This procedure is adopted due to the available data in the date this paper is being write.

¹⁴ Variables are winsorized at the 5% level to control for the effect of outliers. This procedure was necessary due to some absurd returns. There were firms with more than 13,000% one-year return.

ROA performs poorly in HBM firms. Panel A from table 2 documents average (median) *ROA* of HBM firms is 0.34% (0.51%) while panel A from table 1 points an average (median) *ROA* of 8.6% (4.4%) 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-years buy-and-hold returns. Consistent with the HBM effect, the market-adjusted returns are positive for HBM firms and negative 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.

TABLE 1
Financial and Returns Characteristics of Non High Book-to-Market Firms
(1613 Firm-Year Observation between 1994 and 2004)

Panel A: Financial Characteristics				
Variable	Mean	Median	Standard Deviation	Proportion with Positive Signal
<i>BM</i>	1.3877	1.2619	0.8118	n/a
<i>MVE</i>	1,725,671	279,708	5,897,398	n/a
<i>ROA</i>	0.0856	0.0444	0.3252	0.7750
<i>CF</i>	0.1175	0.0078	0.4850	0.6348
ΔROA	0.3259	0.0004	40.2313	0.5034
<i>ACCRUAL</i>	-0.0319	0.0191	0.4159	0.5840
<i>ALIQUID</i>	-0.0219	0.0100	1.0628	0.5034
<i>ALEVER</i>	0.0042	0.0011	0.0965	0.5133
$\Delta TURN$	0.0295	0.0200	0.2075	0.5759
<i>AMARGIN</i>	0.0021	0.0024	0.0948	0.5226

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	0.2407	-0.4545	-0.2075	0.1080	0.5364	0.9778	0.5784
Market-Adjusted	-0.0647	-0.8065	-0.4842	-0.1306	0.2448	0.6306	0.3924
Two-Years Returns							
Raw	0.8449	-0.4862	-0.1126	0.4266	1.2602	2.4207	0.7006
Market-Adjusted	-0.0735	-1.5691	-0.9170	-0.3404	0.3647	1.3806	0.3614

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 exclude extreme observations on returns. 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 = change on cash and cash equivalents at the fiscal year scaled by beginning-of-the-year total assets.

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

ACCRUAL = current year net income less *CF*, scaled by beginning-of-the-year total assets.

ALIQUID = 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.

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

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

AMARGIN = 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 Characteristics of High Book-to-Market Firms
(476 Firm-Year Observation between 1994 and 2004)

Panel A: Financial Characteristics				
Variable	Mean	Median	Standard Deviation	Proportion with Positive Signal
<i>BM</i>	7.9814	5.0511	14.9695	n/a
<i>MVE</i>	350,505	20,769	2,059,900	n/a
<i>ROA</i>	0.0034	0.0051	0.2948	0.5651
<i>CF</i>	0.6522	0.0004	13.5278	0.5273
ΔROA	0.0760	-0.0005	0.7057	0.4937
<i>ACCRUAL</i>	-0.6487	-0.0050	13.4180	0.4727
<i>ALIQUID</i>	-0.6803	-0.0300	7.7501	0.4538
<i>ALEVER</i>	0.0070	0.0000	0.1049	0.4915
$\Delta TURN$	-0.0093	0.0000	0.2121	0.4748
$\Delta MARGIN$	-0.0050	0.0000	0.1376	0.4692

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	0.3872	-0.4722	-0.2482	0.0821	0.6986	1.5672	0.5441
Market-Adjusted	0.0837	-0.8460	-0.5063	-0.1311	0.3488	1.2563	0.4181
Two-Years Returns							
Raw	0.9294	-0.5528	-0.2629	0.2608	1.3680	3.1577	0.5903
Market-Adjusted	0.1152	-1.6174	-0.9643	-0.3679	0.5551	2.2013	0.3676

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.

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 = change on cash and cash equivalents at the fiscal year scaled by beginning-of-the-year total assets.

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

ACCRUAL = current year net income less *CF*, scaled by beginning-of-the-year total assets.

ALIQUID = 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.

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

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

$\Delta MARGIN$ = 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.

6. Results

6.1 Main Results

Table 3 shows Spearman and Pearson correlations between the nine financial performance signals, *F_SCORE* and one year raw return (*RETURN*), one year market-adjusted return (*MA_RET*) and two years market-adjusted return (*MA_RET2*). *F_SCORE* is significant, positive and the most correlated (spearman and pearson) with *RETURN*, *MA_RET* and *MA_RET2*. This is an indication of the explanatory power of *F_SCORE* on portfolio returns. The individual financial performance sign that has the highest correlation with *RETURN*, *MA_RET* and *MA_RET2* is *F_ALEVER*. *F_ROA* also has somewhat relevant correlation with returns, especially with *MA_RET2*. *F_ACCRUAL* has negative correlation with returns, although is only significantly correlated (spearman and pearson) with *MA_RET2*.

TABLE 3

Panel A: Spearman 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	F_SCORE
RETURN	1.0000												
MA_RET	0.9026	1.0000											
MA_RET2	0.5669	0.6394	1.0000										
F_ROA	0.0744	0.0849	0.2218	1.0000									
F_ΔROA	-0.0498	-0.0162	0.1087	0.2559	1.0000								
F_ΔMARGIN	0.0650	0.0921	0.2120	0.0186	0.1595	1.0000							
F_CF	0.0689	0.0446	0.0703	0.1032	0.0849	0.0007	1.0000						
F_ΔLIQUID	0.0659	0.1049	0.1480	0.2293	0.1634	0.0030	0.2037	1.0000					
F_ΔLEVER	0.1249	0.1236	0.2065	0.2198	0.1933	0.1429	-0.1012	0.1650	1.0000				
F_ΔTURN	0.0628	0.0537	0.2065	0.0957	0.1971	0.0541	-0.0015	0.0798	0.1138	1.0000			
F_ACCRUAL	-0.0501	-0.0619	-0.1845	-0.6014	-0.2013	0.0007	0.3004	-0.0583	-0.2359	-0.1110	1.0000		
EQ_OFFER	0.0293	0.0009	-0.0017	-0.0570	-0.0658	0.0641	0.0036	-0.0060	0.0652	-0.0033	0.0686	1.0000	
F_SCORE	0.1173	0.1334	0.3096	0.3896	0.5641	0.4146	0.4723	0.5414	0.4481	0.4294	0.0111	0.0670	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	F_SCORE
RETURN	1.0000												
MA_RET	0.9670	1.0000											
MA_RET2	0.5215	0.5598	1.0000										
F_ROA	0.0617	0.0636	0.1521	1.0000									
F_ΔROA	-0.0166	0.0146	0.1145	0.2559	1.0000								
F_ΔMARGIN	0.0694	0.0945	0.1489	0.0186	0.1595	1.0000							
F_CF	0.0766	0.0623	0.0859	0.1032	0.0849	0.0007	1.0000						
F_ΔLIQUID	0.0654	0.0876	0.1653	0.2293	0.1634	0.0030	0.2037	1.0000					
F_ΔLEVER	0.1644	0.1605	0.1542	0.2198	0.1933	0.1429	-0.1012	0.1650	1.0000				
F_ΔTURN	0.0866	0.0904	0.1783	0.0957	0.1971	0.0541	-0.0015	0.0798	0.1138	1.0000			
F_ACCRUAL	-0.0295	-0.0362	-0.1304	-0.6014	-0.2013	0.0007	0.3004	-0.0583	-0.2359	-0.1110	1.0000		
EQ_OFFER	0.0295	0.0130	0.0142	-0.0570	-0.0658	0.0641	0.0036	-0.0060	0.0652	-0.0033	0.0686	1.0000	
F_SCORE	0.1454	0.1627	0.2626	0.3946	0.5568	0.4196	0.4799	0.5378	0.4548	0.4310	0.0320	0.0602	1.0000

Panel A presents spearman correlation between the nine financial performance signals, *F_SCORE* and portfolio returns of HBM firms. Panel B presents pearson correlation between the nine financial performance signals, *F_SCORE* and portfolio returns of HBM firms.

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

MA_RET = 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 = 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.

.The sample represents 476 HBM firm-year observations between 1994 and 2004.

Table 4 panel A, B and C presents the buy-and-hold returns from financial statement analysis based on F_SCORE for the HBM portfolio of Brazilian firms. We present the mean, median and percentiles one-year raw, one-year adjusted and two years adjusted returns for each F_SCORE class. We test the returns earned with high F_SCORE firms portfolio against returns gained from low F_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 F_SCORE and low F_SCORE portfolios. Reported bootstrapped z-statistics (p-values) result from 1,000 iterations. We also present on panel D the buy-and-hold returns to R_SCORE strategy (a quasi-continuous form of F_SCORE). We classify R_SCORE according to quintile portfolios. Low R_SCORE corresponds to firms with poor expected future performance and stock returns (the lowest quintile), while high R_SCORE is associated with firms expected to outperform (the highest quintile).

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 14% to 60% considering F_SCORE based strategy. Comparing to all HBM firms returns improve 21% and are statistically significant at 10% (see appendix C). However there is no significant difference between percentage positive in one-year raw returns from High and Low F_SCORE firms.

Table 4 panel B documents significant difference between one-year market-adjusted returns from High Score firms and Low Score Firms. Returns shift from -18% to 34% considering F_SCORE based strategy. This is a considerable improvement. Comparing to all HBM firms returns improve 26% and are statistically significant at 5% (see appendix C). Again there is no significant difference between percentage positive in one-year market-adjusted returns from High and Low F_SCORE firms. This feature may be explained by the poor performance of firms in the 10th percentile and 25th percentile regardless of being classified as High or Low Scores firms against the positive performance of firms above 50th percentile, which contributes to increase the standard deviation of the sample. However when one considers one-year raw mean (median) returns and one-year market-adjusted means (median) returns the differences are significant due to the disparity in level returns earned from High and Low Score firms.

F_SCORE based strategy is also (and apparently even more) useful to increase subsequent two-years market-adjusted returns for Brazilian firms. Table 4 panel C presents 162% (87%) significant difference between two-years market-adjusted mean (median) returns from High and Low Score firms. Additionally there is a significant difference between percentage positive in two-years market-adjusted returns from High and Low F_SCORE firms. Bootstrap results confirm the classical tests. The difference between two-years market-adjusted mean returns of High Score firms and all HBM firms is 87% and is statistically significant at 1% (see appendix C). These results are interesting considering the presumably lower market efficiency and poor accounting numbers relevance 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 in comparison to US.

We present on appendix B a comparison between returns earned annually from High F_SCORE (≥ 7) portfolio and Low F_SCORE portfolio (≤ 3). Consistent with prior results, High F_SCORE firms outperform Low F_SCORE firms.

Finally table 4 panel D presents the results of the R_SCORE strategy. R_SCORE represents a quasi-continuous form of F_SCORE and captures the continuous representations from the financial performance factors. Results remain robust and indicate that portfolio with High R_SCORE firms outperforms the portfolio formed by Low R_SCORE firms.

TABLE 4*Buy-and-Hold Returns to a Value Investment Strategy Based on Fundamental Signals*

This table presents on Panel A,B and C the buy-and-hold returns to financial statements analysis based on fundamental signals of high book-to-market firms. Low *F_SCORE* portfolio consists of firms with an aggregate score of 1-3 while the High *F_SCORE* represents firms with a score of 7-9. Additionally we present on panel D the buy-and-hold returns to *G_SCORE* strategy (a quasi-continuous form of *F_SCORE*). We classify *G_SCORE* according to quintile portfolios.

Panel A: One-Year Raw Returns								
Returns	Mean	10th Percentile	25th Percentile	Median	75th Percentile	90th Percentile	Percentage Positive	n
<i>All Firms</i>	0.3872	-0.4722	-0.2482	0.0821	0.6986	1.5672	0.5441	476
<i>F_SCORE</i>								
1	0.1837	-0.8214	-0.0484	0.2451	0.7143	0.8289	0.6000	5
2	0.0464	-0.5299	-0.2950	0.0000	0.2308	0.6901	0.4615	26
3	0.1775	-0.4783	-0.2986	-0.0186	0.4675	1.1053	0.4444	63
4	0.3122	-0.4545	-0.2710	0.0595	0.6847	1.2500	0.5309	81
5	0.2931	-0.5231	-0.2273	0.0492	0.6049	1.3186	0.5413	109
6	0.5836	-0.3750	-0.1429	0.2727	1.0000	1.9071	0.6392	97
7	0.7224	-0.4689	-0.2706	0.1831	1.0892	2.4337	0.5692	65
8	0.3298	-0.4186	-0.2873	0.0087	0.6667	1.6952	0.5000	26
9	0.4111	-0.3476	-0.2089	0.1331	1.0311	1.7258	0.5000	4
<i>Low Score (1-3)</i>	0.1415	-0.5299	-0.2950	0.0000	0.4462	0.8289	0.4574	94
<i>High Score (7-9)</i>	0.6018	-0.4553	-0.2873	0.1667	0.8056	2.0400	0.5474	95
High - Low	0.4603	0.0746	0.0077	0.1667	0.3594	1.2111	0.0899	-
t-stat/z-stat	2.7249	-	-	2.304	-	-	1.2362	-
(p-Value)	(0.0070)	-	-	(0.0212)	-	-	(0.2164)	-
Bootstrap Result								
1000 rep/z-stat	3.4300	-	-	2.3700	-	-	-	-
(p-Value)	(0.0010)	-	-	(0.0180)	-	-	-	-
Panel B: One-Year Market Adjusted Returns								
Returns	Mean	10th Percentile	25th Percentile	Median	75th Percentile	90th Percentile	Percentage Positive	n
<i>All Firms</i>	0.0837	-0.8460	-0.5063	-0.1311	0.3488	1.2563	0.4181	476
<i>F_SCORE</i>								
1	-0.0266	-1.2543	-0.4667	0.2089	0.5864	0.7927	0.6000	5
2	-0.3209	-1.2379	-0.7329	-0.4036	0.0229	0.3932	0.3077	26
3	-0.1297	-0.8324	-0.5770	-0.2789	0.2241	0.6724	0.3333	63
4	0.0111	-0.8324	-0.4691	-0.0996	0.2484	0.7806	0.4074	81
5	-0.0170	-0.8294	-0.5486	-0.1264	0.2588	0.7991	0.4037	109
6	0.2541	-0.9374	-0.3510	0.0822	0.6864	1.6641	0.5052	97
7	0.4682	-0.7551	-0.4183	-0.1348	0.9138	2.0707	0.4308	65
8	0.0635	-0.8498	-0.6332	-0.1404	0.3503	1.2739	0.4231	26
9	0.1759	-0.7833	-0.5142	0.0970	0.8660	1.2929	0.5000	4
<i>Low Score (1-3)</i>	-0.1771	-0.9628	-0.6231	-0.2865	0.2241	0.6088	0.3404	94
<i>High Score (7-9)</i>	0.3451	-0.7833	-0.4527	-0.1348	0.7694	1.6615	0.4316	95
High - Low	0.5222	0.1795	0.1704	0.1517	0.5453	1.0527	0.0912	-
t-stat/z-stat	3.1746	-	-	3.041	-	-	1.2869	-
(p-Value)	(0.0018)	-	-	(0.0024)	-	-	(0.1981)	-
Bootstrap Result								
1000 rep/z-stat	3.8100	-	-	3.3300	-	-	-	-
(p-Value)	(0.0000)	-	-	(0.0010)	-	-	-	-

TABLE 4 – Continued

Panel C: Two-Year Market Adjusted Returns

Returns	Mean	10th Percentile	25th Percentile	Median	75th Percentile	90th Percentile	Percentage Positive	n
<i>All Firms</i>	0.1152	-1.6174	-0.9643	-0.3679	0.5551	2.2013	0.3676	476
<i>F_SCORE</i>								
1	-0.4762	-1.5449	-1.2726	-0.9372	-0.7814	2.1549	0.2000	5
2	-0.3401	-2.3756	-0.9363	-0.5580	-0.0613	1.4512	0.2308	26
3	-0.7737	-1.8565	-1.3912	-0.7146	-0.1890	0.1942	0.1429	63
4	-0.3380	-1.8656	-1.1556	-0.4703	0.0974	1.2884	0.3210	81
5	-0.1858	-1.5781	-0.9817	-0.5850	0.0903	1.2118	0.2661	109
6	0.7124	-1.3527	-0.7155	0.0775	1.3994	3.3517	0.5258	97
7	1.0523	-1.0297	-0.5405	0.0753	1.5874	4.5084	0.5692	65
8	0.8753	-0.8161	-0.5887	0.2950	1.1349	2.0703	0.5385	26
9	0.5402	-0.7316	-0.4630	0.0777	1.5434	2.7370	0.5000	4
<i>Low Score (1-3)</i>	-0.6379	-1.9652	-1.2780	-0.7230	-0.1890	0.3554	0.1702	94
<i>High Score (7-9)</i>	0.9823	-0.9846	-0.5828	0.1479	1.5605	3.0513	0.5579	95
High - Low	1.6202	0.9806	0.6952	0.8709	1.7495	2.6959	0.3877	-
t-stat/z-stat	4.7647	-	-	5.274	-	-	5.535	-
(p -Value)	(0.0000)	-	-	(0.0000)	-	-	(0.0000)	-
Bootstrap Result								
1000 rep/z-stat	6.1200	-	-	6.6500	-	-	-	-
(p -Value)	(0.0000)	-	-	(0.0000)	-	-	-	-

Panel D: Portfolios Formed on the Sum of Ranked Fundamental Signs

.One-Year Market Adjusted Returns

Returns	Mean	10th Percentile	25th Percentile	Median	75th Percentile	90th Percentile	Percentage Positive	n
<i>All Firms</i>	0.0837	-0.8460	-0.5063	-0.1311	0.3488	1.2563	0.4181	476
<i>R_SCORE</i>								
1 (<i>Low</i>)	-0.2060	-0.9628	-0.6304	-0.3208	0.1056	0.5864	0.3333	96
2	0.1445	-0.7996	-0.4429	-0.0787	0.5132	1.2647	0.5158	95
3	0.1353	-0.8065	-0.3938	-0.0810	0.3869	1.0346	0.5263	95
4	0.0287	-0.8279	-0.5362	-0.1214	0.3355	1.0819	0.5789	95
5 (<i>High</i>)	0.3191	-0.8865	-0.4936	-0.0555	0.8531	1.6199	0.6211	95
High - Low	0.5251	0.0763	0.1368	0.2653	0.7475	1.0335	0.2877	-
t-stat/z-stat	3.1288	-	-	2.955	-	-	3.9807	-
(p -Value)	(0.0020)	-	-	(0.0031)	-	-	(0.0001)	-

.Two-Years Market Adjusted Returns

Returns	Mean	10th Percentile	25th Percentile	Median	75th Percentile	90th Percentile	Percentage Positive	n
<i>All Firms</i>	0.1152	-1.6174	-0.9643	-0.3679	0.5551	2.2013	0.3676	476
<i>R_SCORE</i>								
1 (<i>Low</i>)	-0.6812	-1.9822	-1.4753	-0.8279	-0.2390	0.3956	0.1563	96
2	-0.1732	-1.6012	-1.1556	-0.5893	0.1229	1.7532	0.2842	95
3	0.1620	-1.5608	-0.6850	-0.2182	0.3462	2.2454	0.4105	95
4	0.1956	-1.2199	-0.7406	-0.2224	0.7058	2.2317	0.4421	95
5 (<i>High</i>)	1.0809	-0.9813	-0.6171	0.2167	1.4736	2.9504	0.5474	95
High - Low	1.7621	1.0009	0.8582	1.0446	1.7126	2.5548	0.3911	-
t-stat/z-stat	4.9615	-	-	5.3600	-	-	5.6634	-
(p -Value)	(0.0000)	-	-	(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.

F_SCORE range is from 0 ("bad" signals) to 9 ("good" signals). Low *F_SCORE* represent firms with poor expected future performance and stock returns, while high *F_SCORE* is associated with firms expected to outperform. *F_SCORE* represents the sum of all indicator variables, or: $F_SCORE = F_ROA + F_CF + F_ARO + F_ACCRUAL + F_LIQUID + F_ALEVER + EQ_OFFER + F_AMARGIN + F_ATURN$

R_SCORE represents a quasi-continuous form of *F_SCORE*. $R_SCORE = R_ROA + R_CF + R_ARO + R_ACCRUAL + R_ALIQUID - R_ALEVER + R_ATURN + R_AMARGIN$

TABLE 5

*Buy-and-Hold Returns to a Value Investment Strategy
Based on Fundamental Signals by Size Partition*

Panel A: One-year market-adjusted returns									
Returns	Small Firms			Medium Firms			Large Firms		
	Mean	Median	n	Mean	Median	n	Mean	Median	n
<i>All Firms</i>	0.0504	-0.1546	335	0.1838	-0.0429	105	0.1013	-0.0344	36
<i>F_SCORE</i>									
1	-0.3340	-0.3340	2	-0.1289	-0.1289	2	0.7927	0.7927	1
2	-0.4988	-0.5624	19	0.1621	0.2655	7	0.0000	0.0000	0
3	-0.1773	-0.3034	40	-0.0200	-0.1972	16	-0.1089	-0.2789	7
4	-0.0196	-0.1730	60	0.1111	-0.0362	16	0.0596	-0.0284	5
5	-0.0125	-0.1248	80	-0.0846	-0.1108	22	0.1445	-0.3256	7
6	0.3483	0.0332	68	-0.0197	-0.0733	19	0.1336	0.1437	10
7	0.2273	-0.1680	51	1.5982	0.3066	12	-0.1686	-0.1686	2
8	0.0419	-0.2883	14	-0.0305	-0.1977	8	0.3269	0.3517	4
9	0.4390	0.4390	1	0.0882	-0.2450	3	0.0000	0.0000	0
<i>Low Score (1-3)</i>	-0.2826	-0.3986	61	0.0223	-0.1295	25	0.0038	-0.1596	8
<i>High Score (7-9)</i>	0.1912	-0.1527	66	0.8347	-0.0297	23	0.1618	0.0940	6
High - Low	0.4738	0.2460	-	0.8124	0.0998	-	0.1579	0.2536	-
t-stat/z-stat	2.9294	2.002	-	1.7158	1.333	-	0.6155	2.201	-
(p-Value)	(0.0040)	(0.0453)	-	(0.0929)	(0.1824)	-	(0.5497)	(0.0277)	-
Panel B: Two-years market-adjusted returns									
Returns	Small Firms			Medium Firms			Large Firms		
	Mean	Median	n	Mean	Median	n	Mean	Median	n
<i>All Firms</i>	0.0346	-0.4092	335	0.3759	-0.3788	105	0.1047	-0.1229	36
<i>F_SCORE</i>									
1	-1.1049	-1.1049	2	-1.1632	-1.1632	2	2.1549	2.1549	1
2	-0.6084	-0.7855	19	0.3883	-0.2754	7	0.0000	0.0000	0
3	-0.7768	-0.7142	40	-0.8720	-1.0965	16	-0.5308	-0.5280	7
4	-0.3367	-0.5143	60	-0.3168	-0.5232	16	-0.4223	-0.2625	5
5	-0.2518	-0.6263	80	0.0639	-0.3501	22	-0.2160	-0.0865	7
6	0.7681	0.0353	68	0.5267	0.0775	19	0.6862	0.3352	10
7	0.7780	0.0328	51	2.3847	1.3479	12	0.0524	0.0524	2
8	0.3224	0.0958	14	2.0325	0.1347	8	0.4962	0.3838	4
9	0.3497	0.3497	1	0.6037	-0.1944	3	0.0000	0.0000	0
<i>Low Score (1-3)</i>	-0.7351	-0.7574	61	-0.5424	-0.7412	25	-0.1951	-0.4866	8
<i>High Score (7-9)</i>	0.6748	0.0384	66	2.0299	0.5889	23	0.3483	0.2785	6
High - Low	1.4100	0.7958	-	2.5722	1.3301	-	0.5434	0.7651	-
t-stat/z-stat	3.5953	4.217	-	3.1539	2.324	-	1.1389	2.201	-
(p-Value)	(0.0005)	(0.0000)	-	(0.0028)	(0.0201)	-	(0.2770)	(0.0277)	-

.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.

.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 percentile represent the cutoffs.

6.2 Returns conditional on firm size

Table 5 presents evidences to one analyze if the excess returns earned with *F_SCORE* strategy are a result of firm size. We classify HBM 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 *MVE*. Clear 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 tests presented on table 5 panel A indicate the excess returns earned by High *F_SCORE* strategy can statistically differentiate between winners and loser only for small firms, besides the difference mean return earned from a

strategy long on High Score firms and Short on Low Score firms is larger than 80%. However, table 5 panel B shows that F_SCORE strategy differentiates winners from losers in a portfolio of small or medium firms at 1% of significance. Again, the price reaction of Brazilian firms related to the release of accounting information seems to be slower than the evidences find by Piotroski (2000) for US capital markets.

6.3 Robustness of F_SCORE to predict returns

In order to check the relation between F_SCORE and subsequent returns we run cross-sectional (pooled) regressions to analyze if there exists correlation between F_SCORE and other variables that could explain returns and are directly or indirectly related to F_SCORE strategy. We control F_SCORE effect for BM , MVE and $ACRRUALS$. Additionally we also control F_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 F_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 F_SCORE strategy works in Brazil, one could wonder if momentum strategies could work as well.

To help answer these issues we estimate cross-sectional regression for HBM Brazilian firms considering the heterokedasticity-consistent covariance matrix estimator proposed by White (1980). Table 6 presents the results:

TABLE 6
Cross Section Regressions

This table presents the results of cross sections regressions of RET controlling for MVE , BM , $ACCRUAL$, $MOMENT$ and F_SCORE . Coefficients are shown in first line, [t-statistics] apperas in second line and (p-values) in third line.

Coefficients from Pooled Regression							
	Intercept	Ln (MVE)	Ln (BM)	Moment	$ACCRUAL$	F_SCORE	Adj. R^2
(1) $RET_i = \alpha + \beta_1 \ln(MVE_i) + \beta_2 \ln(BM_i) + \beta_3 MOMENT + \beta_4 ACCRUAL_i + \beta_5 F_SCORE_i$	-0.9071	0.0540	0.1648	0.0219	0.0029	0.0915	0.0300
	[-2.61]	[2.20]	[2.35]	[0.28]	[8.53]	[3.03]	
	(0.009)	(0.028)	(0.019)	(0.777)	(0.000)	(0.003)	
(2) $RET_i = \alpha + \beta_1 \ln(MVE_i) + \beta_2 \ln(BM_i) + \beta_3 MOMENT + \beta_4 ACCRUAL_i$	-0.4097	0.0532	0.1459	0.0331	0.0023		0.0104
	[-1.27]	[2.14]	[2.08]	[0.43]	[8.71]		
	(0.206)	(0.033)	(0.038)	(0.670)	(0.000)		
(3) $RET_i = \alpha + \beta_1 \ln(MVE_i) + \beta_2 \ln(BM_i) + \beta_3 F_SCORE_i$	-0.8754	0.0494	0.1618			0.0968	0.0314
	[-2.72]	[2.18]	[2.44]			[3.43]	
	(0.007)	(0.029)	(0.015)			(0.001)	
(4) $RET_i = \alpha + \beta_1 \ln(MVE_i) + \beta_2 \ln(BM_i)$	-0.3549	0.0493	0.1431				0.0089
	[-1.21]	[2.13]	[2.14]				
	(0.227)	(0.034)	(0.033)				
(5) $RET_i = \alpha + \beta_5 F_SCORE_i$	-0.0834					0.0935	0.0211
	[-0.65]					[3.28]	
	(0.516)					(0.001)	

RET_i = buy-and-hold returns for 1-year period for firm i starting on the 1st of May of the year after portfolio formation.

MVE_i = market value of equity of firm i at fiscal year-end.

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

$Moment_i$ = six month buy-and-hold return of firm i prior to portfolio formation.

$ACCRUAL_i$ = current year net income less cash flow generation of firm i , scaled by beginning-of-the-year total assets.

$F_SCORE_i = F_ROA + F_CF + F_AROA + F_ACCRUAL + F_LIQUID + F_ALEVER + EQ_OFFER + F_AMARGIN + F_ATURN$.

The cross sectional regressions show that F_SCORE coefficients are significant and positively related to future returns after controlling for MVE , BM , Moment and $ACCRUAL$.

Models (3) and (4) show that F_SCORE add considerable information to MVE and BM . Models (1) and (2) also show the importance of F_SCORE in predicting one-year ahead returns.

Estimated models show that F_SCORE is associated with an approximate 9% increase in RET . Furthermore one can realize momentum strategies are not associated with RET , what is consistent to prior evidences of semi-strong form efficiency of Brazilian stock markets.

7. 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. The strategy we adopt is based on Piotroski (2000) who identified 9 fundamental signals to form a composite score (F_SCORE) capable to separate out ex-post winners from losers among HBM firms in US stock market. However the result of such a strategy applied to Brazilian firms is not straightforward. First, Brazilian accounting information complies badly with the five factors related with the relevance of accounting information for equity investors identified by Ali and Hwang (2000). Second, there are evidences that market efficiency in Brazil is lower than in United States (US). Third Brazil is classified as a poor enforcement, legal regime and transparency country (Durnev and Kim, 2005). This environment represents an additional challenge to the usefulness of financial statement analysis.

In this paper we use the same framework from Piotroski (2000), making some adaptations due to features of Brazilian accounting information and capital markets.

We find evidences that a financial statement analysis strategy based on HBM Brazilian firms can separate winners from losers, particularly for two-years (raw and adjusted) returns after the portfolio formation. One could have changed his/her HBM portfolio one-year (two-years) market-adjusted returns from 8.3% (11.5%) to 34.5% (98.2%) selecting financially strong HBM firms between 1994-2004. Within the portfolio of HBM firms small and medium companies are the ones that contribute the most to this performance. Additionally a strategy based on forming portfolios long on financially strong HBM firms and short on financially weak HBM firms generates 52% annual (or 162% for two years accumulated) market-adjusted return between 1994 and 2006. One interesting issue is that the underlying economic reality represented by financial statements for Brazilian firms seems to be slower incorporated into prices than in US. We find a particularly significant change in distribution of subsequent two-years market-adjusted returns after formation of High Score portfolio based on financial statements analysis. Piotroski (2000) documents that F_SCORE based strategy improves subsequent returns, particularly over the first subsequent year. Our results suggest that financial accounting information follows a slower path to be incorporated into prices in Brazil. We also find that F_SCORE is associated positively and significantly with approximately 9% increase in subsequent annual returns. Another important result of our analysis is the evidence that small and medium HBM firms are the ones that change the distribution of returns earned based on F_SCORE strategy.

Future research can explore F_SCORE based strategy for small and medium firms in connection with information based on analysts reports about the performance of this companies. This combination should improve even more the results of F_SCORE strategy. Additionally one should deeply explores the apparent slow process of Brazilian market to fully incorporate financial information into prices.

APPENDIX A

This appendix presents the evolution of foreign investors in Brazilian Stock Exchange.

Foreign Investors Participation on Traded Volume at Bovespa

2001	2002	2003	2004	2005	1S06
25,1%	26%	24,1%	27,3%	32,81%	37,37%

Source: Bovespa, 2006.

APPENDIX B

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

One-year market-adjusted returns taking a long position in High F_SCORE firms and a short position in Low F_SCORE firms by Year								
Year	High F_SCORE	n_1	Low F_SCORE	n_2	High - Low Return Difference	Intermediate F_SCORE	n_3	Total ($n_1+n_2+n_3$)
	One Year Market Adjusted Return		One Year Market Adjusted Return			One Year Market Adjusted Return		
1994	-0.7156	14	-0.7834	3	0.0677	-0.5334	22	39
1995	-0.1373	1	-0.6015	13	0.4642	0.0145	26	40
1996	0.4987	9	-0.0876	12	0.5863	0.1124	21	42
1997	-0.1019	9	-0.0488	5	-0.0531	0.1781	25	39
1998	1.1703	7	0.3220	11	0.8484	0.3174	19	37
1999	0.6423	11	-0.0088	9	0.6511	0.2797	26	46
2000	0.0846	11	-0.1820	7	0.2665	0.0380	30	48
2001	0.6636	10	-0.0724	12	0.7360	0.0644	26	48
2002	0.9867	7	-0.2285	9	1.2152	0.3371	27	43
2003	0.0534	5	-0.3339	7	0.3874	0.2323	34	46
2004	0.8524	11	-0.3515	6	1.2038	-0.1570	31	48
Average	0.3451	8.64	-0.1771	8.55	0.5222	0.0826	26.09	43.27
					t-stat (p-Value)	3.1746 0.0018	Total	476

APPENDIX C

This appendix presents buy-and-hold returns to financial statements analysis based on fundamental signals of high book-to-market firms. High F_SCORE represents firms with a score of 7-9. All Firms represents all the HBM firms in sample. We present the two-sample mean comparison t-test for mean returns. Additionally we implement bootstrap procedure to test between the difference of mean from high F_SCORE and all HBM firms. Reported bootstrapped z-statistics (p-values) result from 1,000 iterations.

<i>Buy-and-Hold Returns to a Value Investment Strategy Based on Fundamental Signals</i>				
Returns	One-Year Raw Returns	One-Year Market Adjusted Returns	Two-Years Market Adjusted Returns	n
	Mean	Mean	Mean	
<i>F_SCORE</i>				
1	0.1837	-0.0266	-0.4762	5
2	0.0464	-0.3209	-0.3401	26
3	0.1775	-0.1297	-0.7737	63
4	0.3122	0.0111	-0.3380	81
5	0.2931	-0.0170	-0.1858	109
6	0.5836	0.2541	0.7124	97
7	0.7224	0.4682	1.0523	65
8	0.3298	0.0635	0.8753	26
9	0.4111	0.1759	0.5402	4
<i>All Firms (1-9)</i>	0.3872	0.0837	0.1152	476
<i>High Score (7-9)</i>	0.6018	0.3451	0.9823	95
High - All	0.2146	0.2614	0.8671	-
t-stat/z-stat	1.6658	2.0828	3.3241	-
(p-Value)	(0.0963)	(0.0377)	(0.0009)	-
Bootstrap Result				
1000 rep/z-stat	1.8400	2.4600	4.3900	-
(p-Value)	(0.0660)	(0.0140)	(0.0000)	-

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