PERFORMANCE OF FIXED INCOME FUNDS IN BRAZIL: MARKET TIMING AND STYLE ANALYSIS

PERFORMANCE DE FUNDOS DE RENDA FIXA NO BRASIL: MARKET TIMING E ANÁLISE DE ESTILO

RENDIMIENTO DE FONDOS DE RENTA FIJA EN BRASIL: MARKET TIMING Y ANÁLISIS DE ESTILO

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ABSTRACT

This study investigates whether managers of Fixed Income Brazilian funds exhibit market-timing abilities and what are the main components driving a fund's return. Measuring timing ability of Fixed Income funds' managers has a lot to do with their ability to anticipate interest rate movements. We also conduct a style analysis in order to check the main drives of return of these funds. We collected information on 338 Brazilian FI funds, and data goes from January 2003 to April 2016. Our results indicate that managers of FI funds in Brazil do not exhibit market-timing abilities, which is, they consistently underperform the market. Style analysis demonstrates that funds are well classified. We contribute to the literature by providing evidence on market timing abilities of Fixed Income fund managers.

Keywords: Market timing, style analysis, fixed income, fixed income funds, Brazil

RESUMO

Este estudo investiga se os gestores de fundos de renda fixa brasileiros exibem habilidades de *market timing* e quais são os principais componentes que explicam o retorno de um fundo. A habilidade de antecipar o mercado por parte dos gerentes dos fundos de renda fixa tem muito a ver com sua capacidade de antecipar os movimentos das taxas de juros. Coletamos informações acerca de 338 fundos de renda fixa brasileiros, e os dados vão de janeiro de 2003 a abril de 2016. Nossos resultados indicam que os gerentes de fundos de renda fixa no Brasil não apresentam habilidades de *market timing*, pois a performance destes fundos é constantemente inferior aos indicadores de mercado utilizados para comparação, em média. A análise de estilo demonstra que os fundos estão bem classificados. Contribuímos para a literatura, fornecendo evidências sobre as habilidades de *market timing* dos gestores de fundos de renda fixa.

Palavras-Chave: market timing, análise de estilo, renda fixa, fundos de investimento, Brasil

RESUMEN

Este estudio investiga si los gerentes de los fondos brasileños de renta fija exhiben habilidades de anticipar nuevas informaciones. Medir la capacidad de anticipación de los administradores de fondos de renta fija tiene mucho que ver con su capacidad para anticipar los movimientos de las tasas de interés. También realizamos un análisis de estilo con el fin de comprobar los principales conductores de retorno de estos fondos. Recopilamos información sobre 338 fondos de renta fija brasileños y los datos van de enero de 2003 hasta abril de 2016. Nuestros resultados indican que los gerentes de fondos de renta fija en Brasil no exhiben habilidades de anticipar nuevas informaciones, lo que significa que siempre tienen un rendimiento inferior al del mercado. El análisis de estilo demuestra que los fondos están bien clasificados. Contribuimos con la literatura al proporcionar evidencia sobre las capacidades de mercado de los administradores de fondos de renta fija.

Palabras clave: market timing, análisis de estilo, renta fija, fondos de inversion, Brasil

1. INTRODUCTION

Despite lots of research regarding the Brazilian stock market, just a few studies provide real insights on the functioning of Brazilian Fixed Income (FI) markets. Understanding the theme in Brazil is not negligible: FI funds represent 90% of all the assets of Brazilian investment funds (Vilella and Leal, 2008), and most part of fixed income funds' holdings consists on government bonds. According to a Financial Times' article on January 2016, Brazil was the FI trade of the year. Besides, constant inflationary pressures and the high interest rates level make Brazil a unique environment to study fund performance, as fund managers can struggle even more to obtain satisfactory achievements. Despite this, we find no literature evidence on market timing abilities of Brazilian FI fund managers so far.

In this sense, the purpose of this study is to investigate the performance of Brazilian fixed income (FI) Funds. Our objective is twofold: first, we evaluate these funds' performance based on Treynor and Masuy measure of market timing. Second, we conduct a style analysis, as proposed by Sharpe (1992), in order to assess the main components driving a fund's return. Our data set contains 338 Brazilian FI funds and goes from January 2003 to April 2016. To

our knowledge, this is the study using the largest time span to assess Brazilian FI funds'performance.

To give some figures, the total amount of FI investments in Brazil is R$2,7 billion, and debentures are the most used capital-raising instrument by banks (see Table 1). For the period 2006-2016, average real interest rate in Brazil was 5% (Graph 1), while in emerging markets it was around 2% and in some developed countries it even reached negative levels. In this sense, measuring timing ability of FI managers in Brazil has to do with their ability to anticipate interest rate movements.

Table 1: Top five capital raising instruments in Brazil, as of May 2016

Capital raising instrument	Amount (in billion reais)
Debentures	778
DI – Inter financial Deposits	528
CDB – Bank deposit certificate	520
Letra Financeira	415

Graph 1: Average real interest rates (yearly basis)
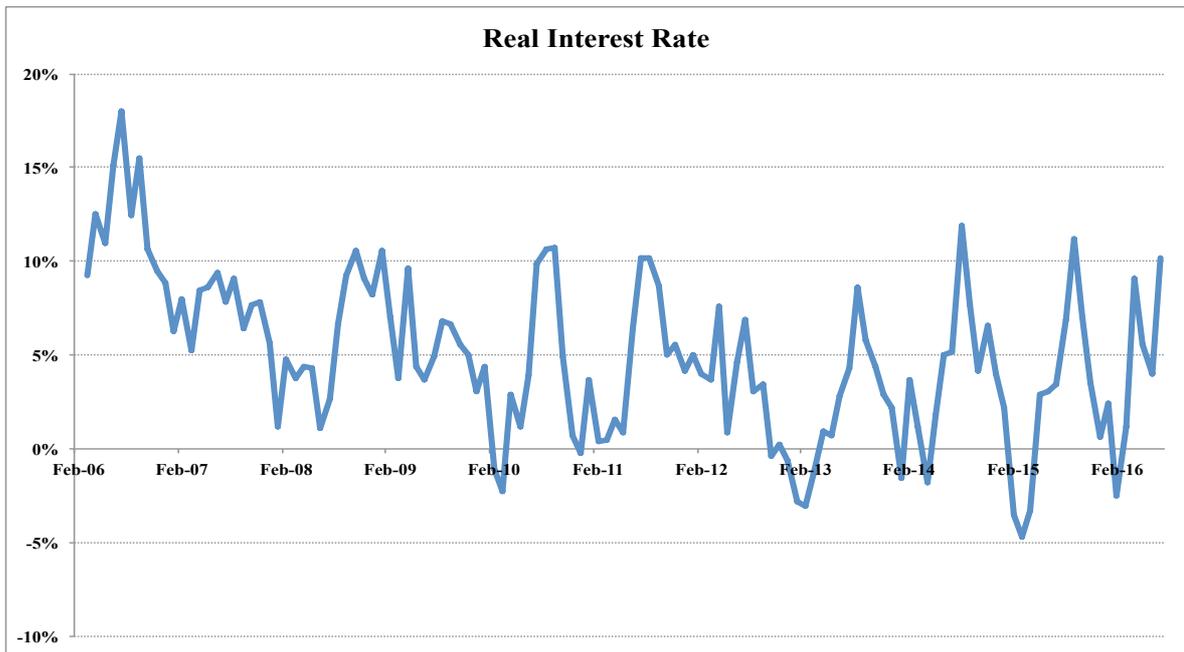
Source: BCB, IBGE

Our results demonstrate that Brazilian fixed income funds' managers exhibit negative market timing abilities, which is, they consistently underperform the market. However, one should not take these results as a demonstration of the quality of the fund management business,

however, as our sample covers a period of huge economic policy shocks. Our style analysis indicates that funds are well classified: government and private debt indexes account for the greatest amount of returns.

The paper proceeds as follows: next section covers prior literature on market timing and style analysis. Third session describes our methodology. Fourth session brings some descriptive statistics, and fifth session covers the results as well as the theoretical explanations for the existence of negative market timing. Concluding remarks are on the sixth session.

2. PRIOR LITERATURE

2.1 Performance Measure: Treynor and Mazuy (1966)

There are more than a hundred ways described in the literature to measure performance (Cogneau and Hübner, 2009). According to Duarte (1996), there are two basic approaches for measuring the performance of a fund. The first consists on asset selection ability, which is the comparison of the returns of a certain fund and the benchmark. The second relates to the timing ability of the manager, determining whether its performance is due to skill or luck. Shortfalls of these measures of performance abound: the problem of identifying an appropriate benchmark portfolio, the possibility of overestimating risk because of market timing ability and the failure of informed investors to earn positive risk-adjusted returns because of increasing risk aversion (Grinblatt and Titman, 1989).

Most part of the studies assessing performance In Brazil deal with mutual funds (Pizzinga et. al (2007), Brito e Leusin (2008)). Despite the fact that FI funds represent 90% of all the assets of Brazilian investment funds (Vilella and Leal, 2008), we find only a few studies on the theme. Barros and Melo (2005) find no evidence of market timing ability for a sample of Brazilian pension funds from 1999 to 2001. Based on the works of Fama (1978) and Jensen (1991), Malaquias and Eid Junior (2013) demonstrate funds do not aggregate extraordinary value. Lobão and Gomes (2015) present results in line with this evidence, showing that Portuguese mutual funds, in general, are not able to beat the benchmarks.

Measuring performance of FI funds in Brazil with traditional measures such as Sharpe's can be difficult for essentially two reasons: low volatility of FI funds and the fact that negative values are not comparable (Securato, Chára and Senger (1998). For the purpose of this study, we focus on the methodology proposed by Treynor and Mazuy (1966).

The Treynor –Mazuy Measure, henceforth TM, is an absolute measure of performance used to describe a manager's ability to anticipate market factor evolutions, which is, their ability to *time* the market. It consists on the inclusion of a quadratic term on the conventional regression of Jensen (1968).

$$EX_i = \alpha + \beta\, EX_M + \delta EX_M^2 + \varepsilon, \qquad\qquad \text{(a)}$$

In Equation (a), EX_i denotes the measure of excessive return of the fund and EX_M denotes the excessive return of the market portfolio.

If the manager expects certain FI assets to exhibit superior performance, he would rebalance the investment portfolio in that direction, obtaining some differential return in relation to the market portfolio. Brito (2003) analyzes Brazilian derivative funds based on Merton's (1981),

using a sample from the third quarter of 1999. The vast majority of the funds on his sample exhibit no market timing ability.

If the fund's returns are above market returns, its characteristic line will have a slope greater than one. Conversely, when a fund underperforms the market, this slope will be lower than one. This is essentially the idea behind Treynor & Mazuy regression applied here: the quadratic component of the regression must be greater than zero in order for the fund to outperform the market.

2.2 Style Analysis: Sharpe (1992)

The purpose of style analysis is to characterize a fund's return by parameters of linear return models (Yoshinaga et al, 2009). According to Lucas and Riepe (1996), "returns-based style analysis is a statistical technique that identifies what combination of long positions in passive indexes would have most closely replicated the actual performance of a fund over a specified time period. The passive indexes selected typically represent distinct investment styles within particular asset classes."

Sharpe (1992) proposed a model to identify what is the fund's exposition to selected asset classes. The benefit of this methodology is that it helps one better understand the main drivers of FI funds' returns. To put it simply, the equation is

$$R_i = \alpha_{i1} F_1 + \alpha_{i2} F_2 + \alpha_{in} F_n + \varepsilon_i, \qquad (b)$$

In equation (b), R represents fund's return and F are the factors in which the fund's return can be decomposed.

Style analysis meets the major criteria for to measuring manager performance: "it is identifiable in advance, it is a viable alternative, it is not easily beaten, and it is easily constructed" (Lucas and Riepe, 1996). It is a procedure of categorization of financial assets aimed to understand portfolio allocation decisions. From the point of view of the manager, style investing simplifies problems of choice allowing efficient information process. For the investor, applying style analysis in fixed income funds is useful because their managers often follow systematic rules of portfolio allocation (Barberis and Schleifer, 2003). Then, the shift of funds between asset classes will occur in response to private information (Admati et. al, 1986).

Schutt and Caldeira (2013) run a dynamic style analysis for multimarket funds and demonstrate that the exposure to fixed income factors has been increasing in Brazil. They cover the period that goes from January 2006 to October 2011.

3. METHODOLOGY

The question under investigation is: do managers of fixed income funds in Brazil exhibit market timing abilities? Our secondary question is: what are the main drives of return of Brazilian fixed income funds?

3.1 Data Source

Our primary source is Economatica. We collected information on 338 Brazilian FI funds, from January 2003 to April 2016, with the condition that their net worth was positive. We excluded funds-of-funds and gathered the following information: fund's quota, administration

fee and type of fund. We adjust funds' returns for average administration fee (0.6%). To our knowledge, this is the largest time span ever used to assess performance of fixed income funds in Brazil.

As controls, we use monthly data for Anbima's IMA Indexes family – IMA-B, IMA-C, IMA-S, IRF-M. They represent the evolution of a public bond portfolio consisting of brazilian bonds, at market prices. Each sub-index relates to a different bond indexer, such as inflation or benchmark interest rates. We also use Anbima's Debentures Index (IDA), SELIC (benchmark interest rate) and DI (interbank depositary rate), which is reduced by the average administration fee of funds. Our time span goes from January-2003 to April-2016, although IDA is only available from October-2011. In this sense, our style analysis covers the period from October-2011 to April-2016.

We use two indexes as our benchmarks: DI and IMA-S. DI is the main fixed income index in Brazil, while IMA-S is a benchmark for floating rate bonds that correlates to the Selic rate.

3.2 Empirical Strategy
Under the null hypothesis that managers do not exhibit market-timing abilities, we run the following regression:

$$R_{i,t} - (DI_t - AdmFee_i) = \alpha + \beta \left(IMA_t - (DI_t - AdmFee_i)\right) + \gamma \left(IMA_t - (DI_t - AdmFee_i)\right)^2 + \varepsilon_{i,t}$$
$$(1)$$

To conduct style analysis, we proceeded with the following regressions, using both DI and IMA-S as benchmarks:

$$R_{i,t} = \alpha_1 IMAB_t + \alpha_2 IMAC_t + \alpha_3 IRFM_t + \alpha_4 IMAS_t + \alpha_5 IDA_t + \alpha_6 SELIC_t + \varepsilon_{i,t} \quad (2)$$

$$R_{i,t} = \alpha_1 IMAB_t + \alpha_2 IMAC_t + \alpha_3 IRFM_t + \alpha_4 DI_t + \alpha_5 IDA_t + \alpha_6 SELIC_t + \varepsilon_{i,t}$$
$$(3)$$

4. DESCRIPTIVE STATISTICS
For the whole period, funds' average gross return was 0.99% per month, with a standard deviation of 0.38%. 66% of funds have had a superior performance than DI (adjusted for performance fee), and average administration fee was 0.4% per year. During the period we cover, funds had an average net worth of R$192 million (about US$60 million).

Top quintile players had an average return of 1.36%, while bottom quintile exhibited an 0.68% average monthly return. The top player yielded an average return of 4.53% (*Anchor Fixed Income*), while the bottom player had an average return of -1.87% (*Fixed Income Private Credit Portfolio Master I*). Among top players, there are only two funds owned by large Brazilian banks. Among worst performers, on the other hand, this number jumps to eight.

On average, our measure of DI (which is the interbank depositary rate reduced by the average administration fee of funds) yields 0.99% per month, and the Debentures Index yields 0.89% per month.

5. RESULTS
5.1 Market Timing

Treynor and Mazuy regression results in Table 2 demonstrate there is no evidence of market timing ability, as quadratic coefficients are negative. Similar evidence is verified by Chen et al (2009), for a sample of american FI funds. Their results, however, are based on a larger sample: from January 1962 to March 2007. At first, negative market timing would indicate FI funds managers behave precisely in the opposite way of what is expected: their funds would yield returns lower than the benchmark. These results, however, can come due to some methodological issues, briefly explained in the next sub-section.

Table 2: Market timing – TM results

Following equation (a), EX_M denotes the excessive return of the market portfolio. Our dependent variable is the excessive of the fund.

VARIABLES	Market Timing Regression Clustered
EX_M	0.141***
	(0.0290)
EX_M^2	-3.696***
	(1.198)
Constant	0.00812
	(0.00647)
Observations	14,463
Number of funds	323

Standard errors in parentheses
*** $p<0.01$, **$p<0.05$, *$p<0.1$

However, one should not take these results as a demonstration of the quality of the fund management business, as our sample covers a period of huge economic policy shocks, as the Brazilian Central Bank tried to respond to after-shocks from the economic crisis. At the same time, the government made use of excessive counter cyclical policies to compensate for the downturn in commodity prices and their effects on economic growth. All this turbulence can have a huge impact in a manager's ability to deliver consistent results.

5.2 Style Analysis

Style analysis results (Tables 3, 4, 5 and 6) demonstrate that funds are well classified: DI and IDA (or IMA-S and IDA) account for the greatest amount of returns. As the first index relates to the bank market (or public debt market in the case of IMA-S) and the second refers to corporate debt market, evidence demonstrates that funds are adequately classified. It is worth mentioning that corporate bonds are not marked to market in Brazil, which poses challenges to accurately measuring corporate bonds' average return.

Tables 3 and 4– Style Analysis (SA) – Regression results

Style Analysis	(3)	(4)	Style Analysis	(3)	(4)
VARIABLES	RegSA	RegSA-DI	VARIABLES	RegSA	RegSA-DI
IMAB	0.0471***	0.0460***	IMAB	0.0471***	0.0460***
	(0.0162)	(0.0162)		(0.0162)	(0.0162)
IMAC	0.00242	0.00211	IMAC	0.00242	0.00211
	(0.0110)	(0.0110)		(0.0110)	(0.0110)
IMAS	0.727***		IMAS	0.727***	
	(0.198)			(0.198)	
IRFM	-0.0273	-0.0297	IRFM	-0.0273	-0.0297
	(0.0205)	(0.0205)		(0.0205)	(0.0205)
IDA	0.240***	0.248***	IDA	0.240***	0.248***
	(0.0450)	(0.0445)		(0.0450)	(0.0445)
SELIC	-0.0690	-0.116	SELIC	-0.0690	-0.116
	(0.180)	(0.192)		(0.180)	(0.192)
DI_Adj		0.763***	DI_Adj		0.763***
		(0.208)			(0.208)
Constant	0.00789	0.00825	Constant	0.00789	0.00825
	(0.00653)	(0.00653)		(0.00653)	(0.00653)
Observations	10,649	10,649	Observations	10,649	10,649
Number of fund_id	323	323	Number of fund_id	323	323

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Tables 5 and 6 – Style Analysis (SA) – Determinants of funds'returns

	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
IMAB	.0439273	.0161018	2.73	0.006	.0123682	.0754863
IMAC	.0020727	.0109763	0.19	0.850	-.0194404	.0235858
DI_Adj	.837315	.1992878	4.20	0.000	.4467182	1.227912
IRFM	-.0288694	.0204446	-1.41	0.158	-.06894	.0112013
IDA	.2575493	.0438209	5.88	0.000	.1716619	.3434367
SELIC	-.111995	.1924173	-0.58	0.561	-.489126	.2651361
_cons	.0074607	.0065003	1.15	0.251	-.0052796	.020201

	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
IMAB	.0453745	.0161536	2.81	0.005	.013714	.077035
IMAC	.0023914	.0109705	0.22	0.827	-.0191103	.0238931
IMAS	.7966472	.1878477	4.24	0.000	.4284725	1.164822
IRFM	-.0263124	.0204511	-1.29	0.198	-.0663959	.0137711
IDA	.2476396	.0444917	5.57	0.000	.1604376	.3348416
SELIC	-.0657402	.1800241	-0.37	0.715	-.4185811	.2871006
_cons	.0071434	.006497	1.10	0.272	-.0055904	.0198773

Banco Votorantim's FI funds dominate the group of best performers. Top five FI funds have an average monthly performance of 2.5%. The five worst performers had an average monthly performance of -0.7%. The vast majority of top and bottom quintile players are private credit funds.

5.3 Negative market timing puzzle

Some studies suggest that the existence of negative market timing is due to the existence of asymmetric correlation, establishing that asset correlations are less strong in bull markets than in bear markets. Matallín et al (2009) argue, "It does not seem likely that informed managers time the market in precisely the opposite way". We summarize some of the literature explanations they mention in Table 7. Some authors argue that unconditional models or higher frequency data would solve the problem. Others argue that negative market timing coefficients exist because of the nonlinearity of payoff structure of options and option-like securities. Fixed Income securities, however, do not seem to fall under these explanations.

Table 7: Explanations for the negative market timing puzzle and suggested improvements

Authors	Rationale
Ferson and Warther (1996) and Ferson and Schadt (1996)	Traditional measures of market timing are based on unconditional models. Conditional approach would avoid the puzzle.
Warther (1995), Ferson and Warther (1996), and Edelen (1999)	Investors' inflows anticipate upward markets, so if managers do not allocate these funds, cash holdings increase, which generates negative market timing.
Bollen and Busse (2001)	Higher frequency data (daily) would help in not finding negative coefficients.
Jagannathan and Korajczyk (1986)	Negative market timing exists due to the asymmetry of the fund's holding assets. Payoff structure of options and option-like securities is nonlinear.
Matallín-Sáez (2006)	A benchmark that proxies small caps should be included, in order to avoid the negative bias caused by omitting relevant benchmarks.

Source: Elaborated by authors

5.4 Robustness Checks

In order to check whether economic conditions account for the lack of timing abilities, we also run market-timing regressions for a sub-sample from 2012 to 2016, and results remain unchanged. It is interesting to note that when IMA-B rates jumped, fund managers did not seem to anticipate this movement, which reinforces our evidence of no market timing ability (Graph 2). In order to check if style analysis is robust, we run equations (2) and (3) for a sub-sample from January 2014 to April 2016, which goes from reelection of President Dilma Rousseff to right before the Senate's Impeachment vote. Even during a period of significant economic and political turbulence, style analysis remains unchanged.

Graph 2: IMA-B spike and market timing ability
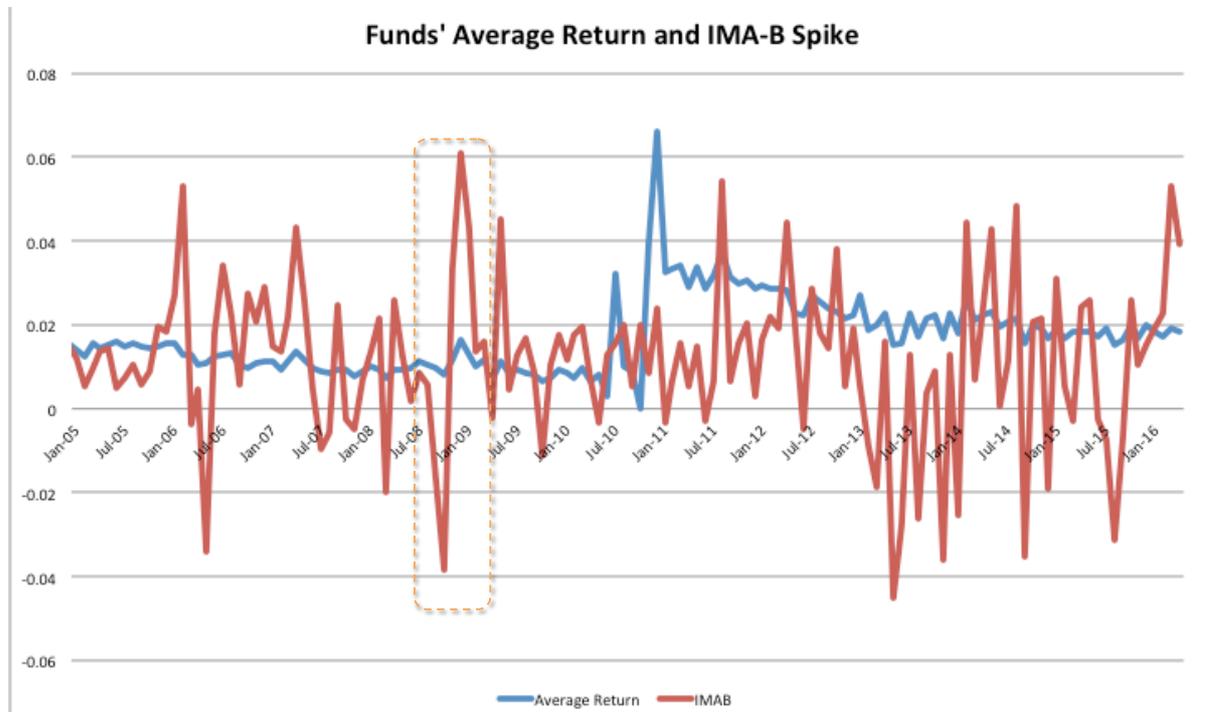
6. CONCLUSION

The purpose of this study is to investigate the performance of Brazilian fixed income (FI) Funds, using market timing regressions and style analysis. Our database contains information on 338 Brazilian FI funds, from January 2003 to April 2016. Our results demonstrate that, as an industry, managers delivered inferior returns than the market, and these findings remain unchanged when only sub-periods of the sample are used. We raise a note of caution here, as our sample period covers a very turbulent moment for the Brazilian economy, and one should not take these findings as a demonstration of the quality of the fund management business in Brazil. Style Analysis demonstrates that funds are adequately classified. Further analysis should include the study on the determinants of market timing ability.

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