



BBR - Brazilian Business Review

E-ISSN: 1807-734X

bbronline@bbronline.com.br

FUCAPE Business School

Brasil

Faustino Matos, Paulo Rogério; Modesto Penna, Christiano; Gomes Silva, Ana Balbina
Mutual Investments Funds in Shares in Brazil : Incentives, Management and Convergence
BBR - Brazilian Business Review, vol. 12, núm. 2, marzo-abril, 2015, pp. 110-144
FUCAPE Business School
Vitória, Brasil

Available in: <http://www.redalyc.org/articulo.oa?id=123035866006>

- How to cite
- Complete issue
- More information about this article
- Journal's homepage in redalyc.org

redalyc.org

Scientific Information System

Network of Scientific Journals from Latin America, the Caribbean, Spain and Portugal

Non-profit academic project, developed under the open access initiative

Mutual Investments Funds in Shares in Brazil: Incentives, Management and Convergence

Paulo Rogério Faustino Matos[†]
Ceará Federal University

Christiano Modesto Penna^Ω
Ceará Federal University

Ana Balbina Gomes Silva[¥]
SEBRAE

ABSTRACT

This article analyzes patterns of convergence in series of return of investment funds in shares in Brazil, from the use of the methodology of Phillips and Sul (2007). Unlike the theory of portfolios and in disagreement with the characteristics of this market - regulation, transparency, efficiency and informational transaction costs -, it shows a heterogeneous behavior, from the formation of four clubs with specific transition and composition dynamics. The private nature of the management legal entity, the incentives associated with the recovery of low administrative fees, in addition to rates of performance and the emphasis on gains offset by risks, differentiate funds that are losers or winners.

Keywords: Stock investment funds in Brazil. Clubs of convergence. Performance weighted by risk. Private and public management. Collection of fees and incentives.

JEL Codes: G11; G23

Received on 15/07/2010; reviewed on 01/10/2010; accepted on 16/12/2010; disclosed on 05/03/2012

**Author for correspondence:*

[†]. PhD in Economy by Getulio Vargas Foundation (EPGE/FGV-RJ)
Institution: Professor in Ceará Federal University
E-mail: paulomatos@caen.ufc.br

^Ω Doctor in Economy by Ceará Federal University
Institution: Professor in Ceará Federal University
E-mail: cmp@caen.ufc.br

[¥] Master in Economy by Ceará Federal University
Institution: SEBRAE Consultant
E-mail: anabalbina@ig.com.br

Note from editor: This article was accepted by Emerson Mainardes



This article has a [Creative Commons License - Attribution 3.0 Not Adapted](https://creativecommons.org/licenses/by/3.0/).

1 INTRODUCTION

The relevance of the financial market in a society can be associated with the use that economic agents make of the products and services available, with a view to a more intertemporally efficient allocation of resources and over the possible uncertain states of nature, and, for this reason, many existing instruments, with different characteristics and idiosyncrasies.

In this context, the gradual growth and sustainable versatile and diversified "industry of mutual investment funds" is observed not only in more developed countries, but rather as a world trend. In keeping with the Latin America, for example, the total volume of assets under management of investment funds, at the end of 2010, was of 1.13 trillion dollars, an amount exceeding 30% of Gross Domestic Product (GDP) of these countries, according to data from reports of the International Monetary Fund, the Investment Company Institute (ICI) and the *Federación Iberoamericana de Fondos de Inversión* (FIAFIN).

This percentage aggregate is captained, mainly, by the Brazilian economy, with ratio close to 50 %, it is possible to observe that this relationship in developed economies is still well above it. In France and in the United States, the volume managed by funds reaches 65% and 80% of their respective GDPs. In addition to moving volumes representative in these developing countries, this industry shows annual growth of net equity of 11 %, during the years 2007 to 2010¹. This evolution consists in a reality - unlike evidenced in the case of other financial assets less anchored in foundation - with theoretical counterpart, just to do this, observe one of the consequences of the Ownership of the Separation addressed in classical work and pioneering developed by Markowitz (1952).

In Brazil, the closing of 2010, supplied by the Brazilian Association of Entities of Financial and Capital Market (*Associação Brasileira das Entidades dos Mercado Financeiro e de Capitais* - ANBIMA), indicate that the country is the sixth largest market in the world, with more than 10,000 products and approximately 11 million investors, being the net worth over \$1 trillion, with annual growth rates of the order of 20 %.

Despite the numerical evidence about the relevance of this segment, there is still a gap in the evolution of specific theoretical and empirical finance literature designed to measure

¹ See <http://www.ici.org/research/stats/worldwide>, <http://www.imf.org/external/pubs/ft/weo/2011/01/weodata/index.aspx> and <http://www.fiafin.org/estadisticasdinamicas.aspx?idRep=PaiTri>

the performance, to modeling, to pricing, to forecast returns and prices or even the analysis of contracts with punishments and incentives typical of the management of mutual investment funds.

Among the few articles found in the international literature, it is highlighted the work of Fama and French (2010), according to which, in comparing portfolios formed by funds and portfolios of traditional market by means of simulations via bootstrap, few funds would be able to generate returns compatible with industry benchmarks to point to compensate for the costs of active management characteristic of the funds.

For the Brazilian case, an interesting and comprehensive survey of descriptive was written by Varga and Wengert (2010), with emphasis on the evolution of the market for investment funds, its regulatory scenario, its organization and the types of investors. In keeping with the derivation of pricing models and forecasting, possibly one of the first jobs was that of Matos and Rocha (2009). According to the authors, the models of linear factors capturing better than *Capital Asset Pricing Model* the risks associated with the investment funds with higher net worth and with greater gap of performance in relation to the Ibovespa. As a result of this aspect of modeling specific pricing of funds include Matos, Zech and Linhares (2012), and Matos and Silva (2011).

Still in the segment of Brazilian funds of investment in stock, Matos and Castro (2012) explore the construction of dynamic portfolios composed only by funds, according to various risk-return performance metrics, while Matos, Padilha and Benegas (2013) examine the question under aspects related to frontier efficiency associated with accounting headings of active and passive funds in years of *economic boom* and crisis.

Adding to this literature on funds in stock/shares, to observe the evolution of actual return accumulated panels of these assets for long periods of time, the researcher might be interested in examining the evidence on the convergence or non-convergence of such time series, in addition to wanting to analyze which factors could be useful in the understanding of such behavior.

In this sense, this Article consists of a work of an exploratory, once it is not necessarily based on a theoretical framework that constitutes the need for a behavior convergent or not. The article deals with empirical issues associated with the effects caused by incentives, by nature and experience in the management of the fund, by size, by risk-return performance, by the metrics of risk and by other administrative variables capable of

characterizing robust evidence that, even in a period of high efficiency informational and financial dynamism, this competitive industry of mutual investment funds in shares in Brazil presents paradoxical high levels of divergence. Following Antzoulatos et al. (2008), Higson, Holly and Petrella (2009), Caporale, Erdogan and Kuzin (2009) and Matos, Penna and Landim (2013), it is here used of the semiparametric technique proposed by Phillips and South (2007) - robust heterogeneity present in the funds over time market, by relying on the formulation of a model of nonlinear factors idiosyncratic element composed of a time-variant factor and a common stochastic trend - applied to a monthly panel containing 68 funds in shares during the period from January 1998 to June 2007.

The lack of a common trend is reinforced by the evidence of the formation of four clubs of convergence, whose transition dynamics and composition are quite specific. The results suggest that the compositions of the distinct groups of funds follow standards so that better positioned funds are mainly associated with the following variables: greater financial incentives generated to the management of the fund and from contracts that foresee the rates of *outperformance vis-à-vis benchmarks* on stock market or metrics of inflation, lower values of administrative fees, shorter maturity or time of operation, significant presence of private financial institutions in the management, emphasis in the management of portfolios in metrics of risk-return performance. The effects caused by the size of the fund or the management on the basis of other moments focusing the distribution of the returns do not seem to be very useful in the characterization of the groups.

The article is structured as follows: section 2 deals with a concise history and relevance of the market for investment funds in shares in Brazil; section 3 is a review of the literature in terms of framework and fund market; section 4 describes, in detail, the methodology for identifying the clubs of convergence; section 5 presents the empirical exercise, in addition to the discussion of the results. The final considerations are made in the sixth section.

2 THE MARKET FOR INVESTMENT FUNDS IN SHARES IN BRAZIL

2.1 HISTORY

Throughout history, the market for investment funds in Brazil and its role in economic development has been gaining importance and interest. The investment funds, according to Alves Júnior (2003), were direct fruit from the conduct of economic policy, and its initial development associated with the regulatory initiative in the late 1950s was very incipient. Thus, the first Brazilian mutual fund, the CRESCINCO, dated 1957 - beginning of Juscelino Kubitschek's government and the developmentalist era - and had as objective

channeling the funding to the nascent Brazilian base industry, according to Oliveira Filho (2008). Varga and Wengert (2010) indicate that, in 1959, the current Ministry of Finance issued the first official document to deal with mutual funds. A great advance was made in the market of investment funds in Brazil since the 1960s, with the reform of the national financial system, especially in the period from 1964 to 1966.²

The establishment and development of the National Financial System occurred in fact from the year 1964, with the creation of the National Monetary Council (*Conselho Monetário Nacional* - CMN), the Central Bank of Brazil (*Banco Central do Brasil* - BCB) and in 1967, when it began in Rio de Janeiro the National Association of Investment Banks (*Associação Nacional dos Bancos de Investimento* - ANBID). Already in 1976, it was established that the *Comissão de Valores Mobiliários* (CVM), these were some of the milestones of early standardization of specific operation of investment funds in Brazil.

Before ascension of investment funds, incentives were granted, such as the regulatory innovation of 1967. Then, the *Fundos Fiscais de Investimento em Renda Variável* were created, popularly known as *Fundos 157*. Still according to Oliveira Filho (2008), the decree granting tax incentives for companies to launch shares on a stock market and for which the individuals invest in these roles, having represented one of the major driving forces in the capital market and the mutual fund industry in Brazil.

However, the macroeconomic imbalances, as the speculative crisis of 1971 in the stock markets and the oil shock in 1974, were the decisive factors for the decline of the fund industry, which trajectory was interrupted by the appearance of fixed income funds in the 1980s, coinciding with the *Banco Central's* role in combating inflation. In this context, the 1990s are a milestone toward the expansion of investment funds. First, the ANBID consolidates itself as the main provider of information in the capital market, creating the first counting profitability rate of funds system, with the adoption of single criterion for the market as a whole. Secondly, there is the gradual liberalisation and opening up of the financial system, and the Brazilian mutual fund industry now captures external resources with the creation of foreign investment funds³.

Another important point is the internationalisation of the financial system, with the presence of foreign banks in Brazil, change that brought the segmentation of activities in the

² Alves Junior (2003) argues that the reform "was aimed at the establishment of a financial system capable of expanding the private provision of financial resources in the long term, supported both in loans and in capital markets".

³ For more details, see Alves Junior (2003) and Oliveira Filho (2008).

administration of funds of the countries of origin, considered more appropriate financial systems with universal banks.

Even in the 1990s, with the objective of encouraging the financial investment, was created the Financial Investment Funds (*Fundo de Investimento Financeiro* - FIF) and a fund of funds, known as *Fundo de Aplicação in Cotas de FIF*, responsible for absorbing all the current fixed income funds.

From the year 2000, the mutual fund industry has gone through a number of liberalizing reforms, whose aim was to increase the freedom of management of funds and stimulate the differentiation of the segment. During this period, the Comissão de Valores Mobiliários has taken on greater responsibility for the monitoring and supervision of funds, at the same time that the *Associação Nacional de Bancos de Investimento* - ANBID has developed the Code of Self-Regulation. Already in 2004, the CVM emits its Instruction no. 409, currently in force, which constitutes the main legal device to regulate the investment funds in Brazil. Features on the constitution, the administration, the functioning and the dissemination of information, in order to enhance the efficiency and improve the standards of monitoring and supervision.

2.2 RELEVANCE OF THE MARKET OF FUNDS

Possibly, a way to justify the study of a segment is to analyze its evolution over time and the order of magnitude of the amounts involved. Thus, by observing the data of the market, it is possible to realize that the amount of investment funds operating regularly increased from approximately 1750 to almost 4800, in an interval of 11 years, an average annual growth rate of 9.8% per year, which was accompanied by an average annual increase of 23.8% in net worth household, passing this industry to move almost R\$ 1.5 trillion at the end of 2009, while this volume, at the end of 1998, was only R\$ 150 billion.

So, there is a market with growth rates higher than those observed in the real economy, in addition to amounts comparable with the own National Gross Domestic Product, which makes Brazil the current sixth largest segment of funds in the world, having reached the volume of assets invested in order to nearly \$785 million in December 2009.

Decomposing this segment in its various categories, a first interesting evidence consists in the change of trend, until then excessively conservative, reflected in almost 70% of abstraction associated with the fixed income funds until 2002, a quite different scenario from 2009. As seen in Table 1, the inclusion of this category rose to approximately 26%, in

the same order of magnitude of the sector of funds market. Thirdly, it has been the industry of referential DI, with 14% of the capture, and fourthly, the variable income funds or investment stock, with about 12%, which must invest at least 67% of their assets in shares traded on the Stock Exchange or organized over-the-counter market, with little restriction on the composition of 33% residual.

Table 1 - Participation of Categories on the Market of Investment Funds in Brazil (%)^A

Type of Fund	2002	2003	2004	2005	2006	2007	2008	2009
Short Term	-	2,7	3,6	2,7	2,5	2,4	3,2	3,6
Referenced DI	24,6	18,9	18,0	20,2	17,8	14,6	16,2	14,2
Fixed Income	32,9	33,4	30,2	39,6	33,8	30,3	29,0	27,1
Multimarket	25,8	27,5	28,6	17,2	22,7	23,6	23,5	24,2
Cambial	1,7	1,3	0,8	0,3	0,1	0,1	0,1	0,0
Shares	8,9	7,9	8,3	8,3	10,2	15,5	10,1	11,4
Foresight	2,9	4,3	5,8	6,9	7,9	8,0	9,8	10,3
interests	-	-	-	-	-	-	2,2	2,6
Off Shore	3,2	3,6	3,6	2,6	2,7	3,1	2,1	2,9
Other	0,2	0,4	1,2	2,1	2,3	2,6	3,9	3,8

Source: Yearbook ANBIMA

An important statistic on this category, according to data from Quantum Investments, is the accumulated return from January 2002 to December 2009 in the order of 250 %, more than all the others, such as multimarket, with 200%, and the Index of the São Paulo's Stock Exchange (Bovespa), with 170 %, approximately.

3 RELATED LITERATURE

3.1 STUDIES ON FINANCIAL INTEGRATION

Assuming that there is an almost perfect correlation between the international markets shares in long time horizons and that these markets share a common trend, was developed a literature of financial integration, according to which, the returns of shares adjusted by risk recorded in a common currency would be the same in all countries.

This approach had its beginning with the analyzes Von Furstenberg and Jeon (1989), involving the return of daily actions from 1986 to 1988 for the USA, Japan, Great Britain and Germany. The principal evidence were about the strong correlation and trend of joint development, reinforcing the concept of financial integration between the international markets.

The continuity was given by Littell (1997), Securato (1997) and Lombard, Roulet and Solnik (1999), who found the same evidence, suggesting that the level of development of the countries (or another similarity between them), can keep some

relationship with the process of integration. Making use of other techniques, but with the same purpose, also stand out Kasa (1992), Corhay et al. (1993) and Rangvid (2001). All these analyzes assume that all markets are perfectly integrated, or perfectly segmented, or even partially integrated, but with a degree of integration relatively constant.

Higson et al. (2009) analyze whether the indices of stock markets in the 26 countries of the European Union came converging from 1985 to the present, but by means of the analysis of convergence proposed by Phillips and Sul (2007). The hypothesis of convergence is not rejected, confirming the idea that economic integration has been intensified in those countries, although relatively slow. Using this same semiparametric technique, Antzolauros et al. (2009) show that there is no convergence process for 13 indices of financial development applied to a panel of 38 countries (developed and developing) in the period from 1990 to 2005. Matos, Penna and Landim (2011) sought evidence of convergence of monthly accumulated return indices of 36 of the major stock exchanges throughout the world during the period 1998 to 2007. The analysis performed by the authors suggests the formation of three clubs of convergence. One of them is a club composed of few indices, which returns of the indices are smaller, but that does not show explicit standards of conditioning. A second club, whose returns are the highest and that incorporates three grants associated with the BRIC's economies - this club would be characterized by quite volatile indexes; in reasonable stock exchanges level of maturity; that are associated with developing economies, with high rates of inflation and found mostly in Latin America. And, finally, a third club, composed of indices that offer relatively minor risk and return. This last club would contain most of the stock markets analyzed, which are marked by a greater level of maturity of the financial markets, located basically in the developed countries of Europe, North America and Asia.

Common to all these studies, is the assumption from a theoretical framework about the financial integration between financial markets situated in several economies. While there is no direct applicable and fundamental counterpart to an internal market composed of investment funds in the same category, analyzing the main informational aspects, accounting, financial and regulatory changes comes to be a reasonable question about the level of integration and competitiveness among the components of this industry.

3.2 THEORETICAL FRAMEWORK

In the literature of Theory of Assets Pricing, the biggest challenge is possibly associated with the ability to develop preferably microfoundations frameworks such that are accommodated the main empirical evidence in more diverse financial markets, in temporal

dimensions or in cross-section. Surveys such as Cochrane (2001, 2006) are excellent sources on pricing models of individual actions, and can demonstrate that, in spite of very legitimate, this excessive concern can be put in the background, other markets, mainly the investment funds, recognized as relevant and with one of the largest potential for growth.

Faced with this evidence on a sort of absence of a specific literature that stick to mutual funds for investment in shares, or even investment funds in other categories, it is essential to ask what could be developed in terms of theoretical modeling to price or to predict the returns of these dynamic portfolios, on the history of the industry, or even management techniques. This literature still little explored, in addition to the contribution of Fama and French (2010) comparing portfolios of funds and portfolios of traditional market, it is important to highlight Haslem's (2010). The author covers from the historical aspect, passing through the services offered and the regulations on the industry of American funds, until the analysis of tools for managing the funds. Interesting working papers in this area, but more focused on analysis of composition of portfolio and performance, and not necessarily modeling pricing, are Adcock et al. (2009), Bessler et al. (2010) and Ferreira et al. (2010). Still on the behavior of investors, it is worth quoting Rubbany et al. (2010) and Brookfield and Cortez (2010).

3.2.1 Modeling of Pricing of Investment Funds in Brazil

Pointing to the pricing and forecast of returns, one of the first papers consists of Matos and Rocha (2009), which highlights that the models of linear factors similarly to Fama and French (1992) and (1993) capture better than the CAPM - originally developed by Sharpe (1964), Lintner (1965), Mossin (1966) - the risks associated with the investment funds with higher net worth (PL) and with larger gap of performance in relation to the Ibovespa, although it does not appear to be that sufficient improvement. This motivation was followed by Matos, Linhares and Zech (2012), according to which there is evidence of the existence of dynamic behavior distinct for the return of investment funds, over time, depending on the non-linearity characteristic when Threshold CAPM (TCAPM) is used, in the same way, for example, the model TAR (Threshold Autoregressive) originally proposed by Tong (1978) and by Tong and Lim (1980).

An interesting and successful extension was developed in Matos, Correa and Silva (2012), which tested in exercises of pricing and forecasting *in-sample*, a framework model of linear factors. Following the methodology developed in Fama and French (1992, 1993), they built factors, which consist of zero cost equal weighted portfolios composed only by funds,

capable of capturing the size effects and performance of these assets, being the same as those used in various applications in an extended version of the CAPM, for a panel composed of the 75 investment funds in shares in Brazil, from January 1998 to December 2008. The size effects and performance evidenced by the inadequacy of the CAPM model in funds with higher net worth and very high or low performances, seem to be very well accommodated when the incorporation of factors, which showed significant, isolated and jointly, in almost 50% of the 75 funds analyzed. The main evidence obtained from regressions individual temporal are supported when the test in panel with random effects, in that both effects are indispensable in the explanation of the returns of the funds for investment in shares in Brazil.

3.2.2 Management and Performance of Investment Funds in Brazil

Specifically on the management of portfolios, an interesting study applied to Brazil consists in Varga (2001), which implements various statistical measures of performance assessment to the ten largest stock funds offered in the Brazilian market, showing the different classifications of funds according to each of these indicators. Already Varga and Wengert (2003) identify business strategies common to investment funds offered in the Brazilian market, while Nephew (2003) studied the effectiveness of active management of investment funds in shares to obtain, in a consistent and lasting manner, superior returns than Ibovespa, noting the risk that these funds incurred and the ability of its managers to buy stock understated and diversify their portfolio. According to this work, 70,46% of these funds have not been able, by means of a pro-active management, overcome the Ibovespa.⁴

Monteiro (2006) evaluates 112 Brazilian funds through measures of profitability, selection of assets, market timing and measures that combine the last two, with daily data in windows of three months and a year, for the period of January 1998 to December 2005, using the methodology of Bollen and Busse (2005). The evidence suggests the existence of persistence of performance by selectivity and market timing for up to six months for a small number of funds, with the stronger results for the 10 per cent of best performance of the sample. Duvernoy (2009), using stochastic factors of allowable non-parametric discounts, does a study on the performance of investment funds in the Brazilian industry. Under the hypotheses of incomplete markets and non-arbitration, are certain limits to the performance of funds when based on admissible measures. In addition, the author presents a variation of this method in which is excluded the possibility of very high Indices of Sharpe persisted in a

⁴ On analysis of the performance of investment funds through the through the indexes of Sharpe, Treynor and Jensen, see Oliveira Filho (2005) or Matsumoto (2005).

market in balance. In a monthly sample of 33 multimarket funds, for a period of approximately eight years, the results show that the performance of funds can vary greatly depending on the measure. Even for the segment of Brazilian funds investment stock, Matos and Castro (2012) explore the construction of dynamic portfolios composed only by funds, according to various risk-return performance metrics.

3.3 CONTRIBUTION

In spite of the unquestionable relevance to discuss the modeling of pricing and forecast of future returns, or even the question of the management of portfolios managed by investment funds, investors and financiers are before an industry with not yet explored idiosyncrasies, in which, by regulation, is a need for at least 67% of the portfolio be composed of shares traded on the São Paulo Stock Exchange (Bovespa), which limits the possibilities in this dynamic and competitive market, and which financial information, administrative and accounting are all disclosed on a monthly basis on CVM and, consequently, were made available to the public.

Thus, there is a market with a high level of regulation and transparency, characterized by low costs associated with the transaction of purchase of quotas, with change itself on the fund to invest and which divergence in terms of return between distinct funds would not be expected by the Property of Separation developed in Markowitz (1952) - the differences between the optimal risky portfolios in each fund could be associated with the restrictions imposed by expertise of management or technical capability or financial volume available by the fund. From the perspective of the investor, only an inertia or the low level of financial knowledge could be partially explaining the imbalance evident when the sharp divergence between returns of different funds. In this context in that there are aspects that suggest that there is some degree of integration in the market of investment funds in shares, from the development of methodologies for the analysis of convergence, it is important to address the issue of the existence or not of a common trend of cumulative return. Was there in fact a common trend? If not, what standards could be associated with the formation of clubs identified? Would there be a relationship with financial and administrative aspects of management of funds?

The simple observation of the evolution of the returns accrued makes it possible to highlight the signs of imbalance in this market during January of 1998 to June of 2007, in which, in addition to the pronounced divergence, there is a scenario with very high

outperformance in relation to the Ibovespa, with the Prosper Adinvest Investment Fund (*pros*), generating a real aggregate gain net of 1580 %.

This level of accumulated return is vastly superior to its gain of the Ibovespa, at 188 %. There is an unusual amount of funds with underperformance in relation to the same benchmark of market, about 27 of the 68 funds, the worst accumulated return being the Alfamaís Fund (*alpha*), with less than 35% of accumulated gain. An alternative in terms of statistical framework would be the use of the analysis Q, building typology, analysis of classification, or even cluster analysis, a technique that aims to (internal) homogeneity of objects within the same group and the (external) heterogeneity between the groups. Unfortunately, in spite of the versatility of the technique, this is very sensitive to the sample used and generally characterized as descriptive, not been a greater theoretical basis and not been possible to ensure the uniqueness of the results, or even allow outline statistical inferences. In this sense, this article analyzes the patterns of convergence in a series of actual accumulated return for a panel with 68 investment funds in shares in Brazil, identifying a set of financial variables, accounting and administrative provisions which seem to be able to characterize the possible clubs of convergence.

In quite different contexts, but aligned conceptual and methodological approach to this article in the sense of the need to examine the convergence or divergence of temporal series, confirming or rejecting theories about the behavior of long-term series, is worth mentioning Penna and Linhares (2009) on empirical exercises of trajectories of GDP, Matos, Penna and Landim (2011), about an application of Phillips and Sul (2007) for stock exchanges, or even Matos, Penna and Vasconcelos (2013), whose object of study was the credit market. Here, the use of this non-linear framework aims to model the heterogeneous behavior of idiosyncratic elements associated with the funding of investments in shares in Brazil. As the contribution of this study on the discussion of Brazilian industry is isolated and restricted to the temporal dimension, a natural extension and interesting is to test the hypothesis from Hansen (2000) the convergence or divergence in cross-section size. See Penna and Linhares (2013) for applications of this nature.

4 METHODOLOGY

Been X_{it} a panel of data containing the actual gain accumulated for all 68 funds for investment in shares in Brazil survivors during the period in question, in that $i=1,...,N$ and $t=1,...,T$ denote, respectively, the 68 funds and the amount of time, so

that X_{it} can be decomposed into two components, a systematic, a_{it} , and a transient, g_{it} , through the following relationship:

$$X_{it} = a_{it} + g_{it} \quad (1)$$

The empirical strategy of Phillips and Sul (2007) consists in modeling the data panel in such a way that the common components and idiosyncratic could be distinguished, that is,

$$X_{i,t} = a_{i,t} + g_{i,t} = \left(\frac{a_{i,t} + g_{i,t}}{\mu_t} \right) \mu_t = b_{i,t} \mu_t, \quad (2)$$

In that μ_t it is a component that determines the trajectory of long-term, i.e., a common history of growth of accumulated gain by funds, and $b_{i,t}$ it is an idiosyncratic element that varies in time, capable of measuring the individual effects of transition.⁵

In these terms, it will be possible to test the convergence of long-term ($t \rightarrow \infty$) where the heterogeneity not observable to dissipate, that is to say, where $g_{i,t} \rightarrow g_i$. The inferences about the behavior of $b_{i,t}$ are not possible without the imposition of any restriction in its dynamics, because the number of unknown parameters in $b_{i,t}$ is equal to the number of observations. Thus, an alternative to model the elements of transition can be derived from the construction of a coefficient of transition on, $h_{i,t}$, defined as:

$$h_{i,t} = \frac{\hat{x}_{i,t}}{N^{-1} \sum_{i=1}^N \hat{x}_{i,t}} = \frac{b_{i,t}}{N^{-1} \sum_{i=1}^N b_{i,t}} \quad (3)$$

Where $\hat{x}_{i,t}$ represents the accumulated gain of the fund without the component of economic cycles.⁶ Thus, the curves drawn by $h_{i,t}$ define a trajectory of transition on and, at the same time, measure the extent to which the gain of the fund i moves in relation to the trajectory of common growth, μ_t . In this way, $h_{i,t}$ can differ among the funds in the short

⁵ $b_{i,t}$ Can be idealized as the trajectory of the individual transition of i , given your travel around the common trajectory, μ_t , been necessary to emphasize that, although this heterogeneity among the funds, the financial market still holds common characteristics that compound them; such common characteristics can be influenced in any permanent contagion effect or cultural, technological (such as argue Phillips and Sul in macroeconomic models), institutional, socioeconomic, governmental factors and other not observable factors, hence the assumption of common component.

⁶ In practice, the variable used can be described as $\log y_{i,t} = b_{i,t} \cdot \mu_t + \kappa_{i,t}$, in which $\kappa_{i,t}$ represents an effect of business cycle. The removal cycles of the cycle component can be performed through the use of a Whittaker-Hodrick-Prescott (WHP) filter. This approach does not require any specification a priori to μ_t and it is very convenient, because it requires a single *smooth* parameter as *input*.

term, but admits convergence in the long term if $h_{i,t} \rightarrow 1$ for all i when $t \rightarrow \infty$. If this occurs, in the long term the cross-section variance of $h_{i,t}$ will converge to zero, i.e.:

$$\sigma_t^2 = N^{-1} \sum_{i=1}^N (h_{i,t} - 1)^2 \rightarrow 0, \text{ When } t \rightarrow \infty. \quad (4)$$

Thus, on the basis of this modeling, Phillips and Sul (2007) developed a convergence analysis based on what they called test $\log t$.

The authors assume that the coefficients of transition are estocastic linear trends and allow heterogeneity between the trajectories over time of gain in each fund.

To model these coefficients, it is proposed the follows semiparametric form:

$$b_{i,t} = b_i + \frac{\sigma_i \xi_{i,t}}{L(t)t^\alpha} \quad (5)$$

In that $L(t)$ is a slowly varying function increasing and diverging from the infinity (SV), $\xi_{i,t} \sim i.i.d(0,1)$, α governs the rate of decrease in the variation of the cross-sectional units over time and $\sigma_i > 0$ And $t \geq 1, \forall i$. Note that $L(t) \rightarrow \infty$ When $t \rightarrow \infty$, then this formulation ensures that $b_{it} \rightarrow b_i \forall \alpha \geq 0$, ensuring the convergence if $b_{i,t} \rightarrow b_i$ and divergence, otherwise. In fact, it has the two conditions for convergence of the model.

$$(I) \lim_{k \rightarrow \infty} b_{i,t+k} = b \Leftrightarrow b_i = b \text{ e } \alpha \geq 0 \quad \text{And}$$

$$(II) \lim_{k \rightarrow \infty} b_{i,t+k} \neq b \Leftrightarrow b_i \neq b \text{ ou } \alpha < 0.$$

It is possible to establish a test of the null hypothesis of convergence against a non-convergence alternative hypotheses. This test is based on the following assumptions:

$$\text{Null Hypothesis: } H_0 : b_i = b \text{ \& } \alpha \geq 0 \quad (6)$$

$$\text{Alternative Hypotheses: } \begin{cases} H_{A1} : b_i = b, \forall i \text{ \& } \alpha < 0 \\ H_{A2} : b_i \neq b, \text{ to any } i \text{ \& } \alpha \geq 0 \text{ or } \alpha < 0 \end{cases}$$

This approach also allows testing the formation of clubs of convergence. For example, there are two clubs $\{G_1, G_2\}$; $G_1 + G_2 = N$, The alternative hypothesis can be described as follows:

$$H_A : b_{it} \rightarrow \begin{cases} b_1 \text{ and } \alpha \geq 0 \text{ if } i \in G_1 \\ b_2 \text{ and } \alpha \geq 0 \text{ if } i \in G_2 \end{cases} \quad (7')$$

To test (6), assuming $L(t) = \log t$, It is estimated the following regression:

$$\log \frac{H_1}{H_t} - 2 \log[L(t)] = \beta_0 + \beta_1 \log t + u_t \quad \text{For } t = T_0, \dots, T \quad (8)$$

In that H_1 / H_t represents the ratio of cross-section variance found through $H_t = N^{-1} \sum_{i=1}^N (h_{it} - 1)^2$ and $h_{it} = \hat{w}_{it} / N^{-1} \sum_{i=1}^N \hat{w}_{it}$. Under the null hypothesis, it can be inferred about the significance of the coefficients of (7) on the basis of a test t that is unilateral, robust to autocorrelation and heteroscedasticity. For a level of 5 %, for example, the null hypothesis of convergence must be rejected if $t_{\hat{\beta}_1} < -1.65$. For that initial observations do not exert strong influence on the results, Phillips and Sul suggest that the regression (7) is estimated after discarding a sample fraction. Based on the Monte Carlo simulations, these authors suggest that, in order to achieve ideal properties in terms of size and power, the relation (7) is that regressed after cut, approximately one-third of initial observations. Finally, the rejection of the null hypothesis of convergence for the entire panel can indicate the existence of separate points of balance or multiple stationary states. When this occurs, you can take the divergence of some states or the formation of clubs. In this context, an algorithm that applies sequentially the test $\log t$ enables the identification of clubs of convergence without recourse to usual observable characteristics that prejudice the grouping this club. The algorithm is in the appendix.

5 EMPIRICAL EXERCISE

5.1 DATABASE

Before *trade-off* usual during implementation of empirical exercises, as regards the data base in its temporal dimensions (T) and the cross-section (N), we decided to use the complete time series that compose the available database on the web site www.fortuna.com.br.

On this basis, there is information of prices, net worth and cadastral/administrative data of stock funds in Brazil. Thus, we chose to use the funds classified by ANBIMA as Stock Investments, type Ibovespa Ativo. Been limited to funds with complete series between January 1998 and June 2007, 114 monthly observations, 68 funds were selected.

A lesser quantity of months would not be advisable due to the asymptotic aspect of the methodology, while the adoption of a larger quantity of months could considerably reduce the cross-section of funds used. It is important to note that the framework used is not robust to the presence of structural breaks, so that the strong declines in the evolution of the temporal series analyzed - evidenced in part in the second half of 2007 and more strongly from 2008, due to the financial crisis - limited the use of a better dashboard, which could

comprehend until the month of December 2009, although it had not been reduced the amount of funds.

In addition, because they are funds of the Ibovespa active type, using it as a benchmark of the traditional Stock Exchange Index values of São Paulo (Ibovespa), for purposes of direct comparison of metrics of expected gain, risk and performance.

In order to make both the series of monthly returns and accumulated return real, it was made using the *Índice Nacional de Preços ao Consumidor Amplo* (IPCA), which source was the institution website itself, the Brazilian Institute of Geography and Statistics (IBGE).

5.2 DESCRIPTIVE STATISTICS OF FUNDS FOR INVESTMENTS IN SHARES

Possibly, a more detailed manner to analyze the divergence - in which the fund Prosper Adinvest (*pros*) reaches a real return net of accumulated 1,580 %, while the Ibovespa reaches the level of 188% and the Alfamaís (*alpha*) only the order of magnitude of 35 %, during the period from January 1998 to June 2007 - is to observe not only the evolution of earnings accumulated, but the moments of the distribution of returns, as well as the associated metrics performance and size, these statistics are reported in Table 2.

In this table, are defined the codes associated with the respective funds, bearing in mind the aim to facilitate the exposure of the them in other tables used in the course of this work.

Over the same period analyzed in this article, while assets taken as a benchmark of the money market, more specifically of fixed income, such as investments in savings and short-term title of the Brazilian government yielded approximately 4% and 13% a year, and had annual volatility of the order of magnitude of 7% and 9 %, respectively, are to be found, of course, values much higher than for the large majority of funds selected. In the capital market, the traditional Ibovespa index yielded, on average, more than 18% a year, but having as counterpart a volatility higher than 70 %.

Except the *pros* and *small* funds, which average real monthly earnings were above 2.5 %, there are 12 funds with gains ranging between 1.5% and 2% monthly and 21 others with returns between 1% and 1.5 %. Only 6 funds had actual net returns below the 1% level a month, having these, therefore, generated investors gains smaller than those obtained in applications with titles of the federal government. All funds had greater gains than the savings.

Table 2 - Main Descriptive Statistics of Investment Funds in Shares in Brazil ^{A, B, C}

Investment Funds	Code	Return Metrics		Risk Metrics			3rd and 4th Moments		Performance Metrics				Financial Metrics		
		Cumulative Real Ret.	Average Real Ret.	Standard Deviation	Downside risk	Market Beta	Assimmetry	Curtose	Sharpe	Treynor	Sortino	Alfa Jensen	PL médio (R\$ Million)	Ranking PL	
Prosper Adinvest Fundo De Investimento Em Ações	pros	1580,23%	3,08%	11,76%	3,38%	0,88	3,15	24,07	0,24	0,03	0,91	0,08	4,89	10	15,80%
Small Cap Valuation Ib Fia	smal	1252,81%	2,72%	8,96%	2,39%	0,83	-0,51	4,57	0,28	0,03	1,14	0,04	64,41	58	12,53%
Dynamo Cougar Fia	dyna	1209,96%	2,51%	6,85%	3,34%	0,55	0,01	2,37	0,33	0,04	0,75	0,04	274,98	67	12,10%
Geração Fundo De Investimento Em Ações	gera	1025,34%	2,55%	9,08%	2,69%	0,84	0,03	1,56	0,25	0,03	0,95	0,04	42,40	52	10,25%
Saфра Multidividendos Fi Ações	safr2	926,60%	2,29%	6,84%	3,48%	0,60	-0,16	2,36	0,30	0,03	0,66	0,04	104,01	63	9,27%
Comercial Master Fundo De Investimento Em Ações	come	914,34%	2,47%	9,36%	2,77%	0,83	0,87	4,15	0,24	0,03	0,89	0,05	6,99	16	9,14%
Opportunity Logica Ii Fi Ações	oppo	865,97%	2,53%	10,54%	3,04%	0,94	0,85	2,87	0,22	0,02	0,83	0,05	811,72	68	8,66%
Ip Participações Fundo De Investimento Em Ações	ip	728,88%	2,16%	7,63%	3,31%	0,65	-0,05	3,53	0,25	0,03	0,65	0,04	103,83	61	7,29%
Saфра Setorial Bancos Fi Ações	safr4	703,95%	2,31%	9,62%	3,59%	0,85	-0,15	1,15	0,21	0,02	0,64	0,05	62,24	57	7,04%
Fama Challenger Fic Fi Ações	fama	599,15%	2,09%	8,65%	3,49%	0,76	-0,14	1,89	0,21	0,02	0,60	0,05	25,75	39	5,99%
Gradual Pavarini Fundo De Investimento Em Ações	grad	591,56%	2,04%	8,09%	2,23%	0,78	-0,14	1,65	0,22	0,02	0,91	0,03	13,62	24	5,92%
Itau Opportunity Logica Ii Ações Ficfi	Itau11	561,70%	2,19%	10,03%	2,58%	0,96	-0,37	2,94	0,19	0,02	0,85	0,04	10,40	20	5,62%
Hg Top Ações Ficfi Ações	hg	551,67%	2,02%	8,34%	1,85%	0,83	-0,77	4,01	0,21	0,02	1,09	0,03	15,82	26	5,52%
Fi Fator Jaguar Ações	jagu1	485,22%	2,05%	9,56%	2,06%	0,94	-1,06	3,93	0,19	0,02	1,00	0,03	20,26	32	4,85%
Itau Private Expertise Ações Ficfi	itau10	455,44%	1,91%	8,81%	2,39%	0,85	-0,27	3,19	0,19	0,02	0,80	0,03	7,74	17	4,55%
Itau Institucional Ibrx Ativo Ações Fi	itau5	416,99%	1,89%	9,11%	1,37%	0,93	-0,72	3,84	0,18	0,02	1,37	0,02	19,13	31	4,17%
Btg Pactual Andromeda Fi De Ações	btg1	412,46%	1,96%	10,01%	1,47%	0,99	-0,37	2,51	0,17	0,02	1,33	0,03	22,82	35	4,12%
Saфра Private Fi Ações	safr3	404,88%	1,97%	10,14%	2,04%	0,99	-0,56	2,77	0,17	0,02	0,96	0,04	23,96	36	4,05%
Sul America Equilibrium Fundo De Investimento Em Ações	sula	383,47%	1,76%	8,59%	2,00%	0,85	-0,16	1,19	0,18	0,02	0,88	0,03	8,97	18	3,83%
Bradesco Prime Fic De Fia Active	brad6	380,15%	1,86%	9,54%	1,36%	0,98	-0,60	2,12	0,17	0,02	1,36	0,02	6,68	15	3,80%

Fi Fator Ações Institucional	fato	360,94%	1,80%	9,24%	2,18%	0,91	-0,89	3,30	0,17	0,02	0,83	0,03	36,68	47	3,61%
Elite Fundo De Investimento Em Ações	elit	352,95%	1,69%	8,29%	2,54%	0,80	-0,71	2,93	0,17	0,02	0,66	0,03	1,85	1	3,53%
Santander Fi Inst Ações	sant2	351,87%	1,79%	9,45%	1,04%	0,97	-0,53	2,28	0,16	0,02	1,73	0,02	29,35	41	3,52%
Credit Suisse “Fig” Premium Fundo De Investiment	crsu	334,88%	1,79%	9,72%	1,67%	0,98	-0,62	1,51	0,16	0,02	1,07	0,03	24,05	37	3,35%
Legg Mason Ações Ibovespa Ativo Silver Ficfi	legg2	333,82%	1,81%	9,95%	0,99%	1,03	-0,59	2,35	0,16	0,02	1,83	0,02	90,84	60	3,34%
Unibanco Institucional Ibx Fi Ações	unib2	331,15%	1,66%	8,37%	1,70%	0,85	-0,92	3,57	0,17	0,02	0,97	0,02	13,25	23	3,31%
Real Fundo De Investimento Em Ações Institucionale	real	323,72%	1,68%	8,96%	1,92%	0,90	-0,38	0,89	0,16	0,02	0,87	0,03	21,15	33	3,24%
Fibra Vic Fundo De Inv Em Ações	fibr	321,00%	1,62%	8,43%	2,39%	0,82	-0,20	1,33	0,16	0,02	0,68	0,03	2,67	4	3,21%
Bradesco Fic De Fia Ibovespa Ativo	brad7	319,60%	1,71%	9,26%	1,40%	0,92	-0,61	2,62	0,16	0,02	1,22	0,03	39,07	49	3,20%
Coinvalores Fundo De Investimento Em Ações	coin	311,57%	1,72%	9,58%	1,99%	0,95	-0,38	2,41	0,15	0,02	0,86	0,03	4,33	7	3,12%
Bradesco Private Fia Ibovespa Alavancado	brad1	311,46%	1,70%	9,23%	1,27%	0,95	-0,82	3,14	0,16	0,02	1,34	0,02	4,96	11	3,11%
Unibanco Timing Fi Ações	unib5	308,61%	1,54%	7,73%	3,47%	0,69	-0,32	0,36	0,17	0,02	0,44	0,04	9,89	19	3,09%
Itau Institucional Ibovespa Ativo Ações Fi	itau4	270,14%	1,65%	9,74%	0,89%	1,01	-0,59	2,87	0,14	0,01	1,84	0,02	38,52	48	2,70%
Gap Fdo De Investimento Multimercado	gap	254,35%	1,65%	10,12%	1,40%	1,03	-0,46	2,93	0,14	0,01	1,18	0,02	12,37	21	2,54%
Itau Private Ativo Ações Fi	itau9	242,56%	1,59%	9,82%	1,02%	1,01	-0,55	2,87	0,14	0,01	1,56	0,02	18,70	29	2,43%
Itau Personnalite Ações Ficfi	itau8	226,01%	1,41%	8,39%	1,82%	0,85	-0,96	3,82	0,14	0,01	0,78	0,02	30,29	42	2,26%

Investment Funds	Code	Return Metrics		Risk Metrics			3rd and 4th Moments		Performance Metrics				Financial Metrics	
		Cumulative Real Ret.	Average Real Ret.	Standard Deviation	Downside risk	Market Beta	Assimmetry	Curtose	Sharpe	Treynor	Sortino	Alfa Jensen	PL Mean (R\$ million)	Ranking PL
Prosper Adinvest Fundo De Investimento Em Ações	pros	1580,23%	3,08%	11,76%	3,38%	0,88	3,15	24,07	0,24	0,03	0,91	0,08	4,89	10
Small Cap Valuation Ib Fia	smal	1252,81%	2,72%	8,96%	2,39%	0,83	-0,51	4,57	0,28	0,03	1,14	0,04	64,41	58
Dynamo Cougar Fia	dyna	1209,96%	2,51%	6,85%	3,34%	0,55	0,01	2,37	0,33	0,04	0,75	0,04	274,98	67

Geracao Fundo De Investimento Em Ações	gera	1025,34%	2,55%	9,08%	2,69%	0,84	0,03	1,56	0,25	0,03	0,95	0,04	42,40	52	2,01%
Safr Multidividendos Fi Ações	safr2	926,60%	2,29%	6,84%	3,48%	0,60	-0,16	2,36	0,30	0,03	0,66	0,04	104,01	63	2,00%
Comercial Master Fundo De Investimento Em Ações	come	914,34%	2,47%	9,36%	2,77%	0,83	0,87	4,15	0,24	0,03	0,89	0,05	6,99	16	1,96%
Opportunity Logica Ii Fi Ações	oppo	865,97%	2,53%	10,54%	3,04%	0,94	0,85	2,87	0,22	0,02	0,83	0,05	811,72	68	1,94%
Ip Investment Fund holdings on shares	ip	728,88%	2,16%	7,63%	3,31%	0,65	-0,05	3,53	0,25	0,03	0,65	0,04	103,83	61	1,92%
Safr Sector Banks Fi shares	safr4	703,95%	2,31%	9,62%	3,59%	0,85	-0,15	1,15	0,21	0,02	0,64	0,05	62,24	57	1,83%
Fama Challenger Fic Fi shares	fama	599,15%	2,09%	8,65%	3,49%	0,76	-0,14	1,89	0,21	0,02	0,60	0,05	25,75	39	1,83%
Gradual Pavarini Investment Fund on shares	grad	591,56%	2,04%	8,09%	2,23%	0,78	-0,14	1,65	0,22	0,02	0,91	0,03	13,62	24	1,77%
Itau Opportunity Logical Ii Ficfi Shares	Itau11	561,70%	2,19%	10,03%	2,58%	0,96	-0,37	2,94	0,19	0,02	0,85	0,04	10,40	20	1,69%
Hg Top Ficfi Shares	hg	551,67%	2,02%	8,34%	1,85%	0,83	-0,77	4,01	0,21	0,02	1,09	0,03	15,82	26	1,60%
Fi Jaguar Factor Shares	jagu1	485,22%	2,05%	9,56%	2,06%	0,94	-1,06	3,93	0,19	0,02	1,00	0,03	20,26	32	1,53%
Itau Private Expertise Ficfi Shares	itau10	455,44%	1,91%	8,81%	2,39%	0,85	-0,27	3,19	0,19	0,02	0,80	0,03	7,74	17	1,48%
Itau Instucional IBRX Active Fi Shares	itau5	416,99%	1,89%	9,11%	1,37%	0,93	-0,72	3,84	0,18	0,02	1,37	0,02	19,13	31	1,44%
Btg Pactual Andromeda Fi of Shares	btg1	412,46%	1,96%	10,01%	1,47%	0,99	-0,37	2,51	0,17	0,02	1,33	0,03	22,82	35	1,43%
Safr Private Fi Shares	safr3	404,88%	1,97%	10,14%	2,04%	0,99	-0,56	2,77	0,17	0,02	0,96	0,04	23,96	36	1,41%
Sul America Equilibrium Investment Fund on Shares	sula	383,47%	1,76%	8,59%	2,00%	0,85	-0,16	1,19	0,18	0,02	0,88	0,03	8,97	18	1,41%
Bradesco Prime Fic From Fia asset	brad6	380,15%	1,86%	9,54%	1,36%	0,98	-0,60	2,12	0,17	0,02	1,36	0,02	6,68	15	1,36%
Fi Factor Institutional Shares	fato	360,94%	1,80%	9,24%	2,18%	0,91	-0,89	3,30	0,17	0,02	0,83	0,03	36,68	47	1,36%
Elite Investment Fund on Shares	elit	352,95%	1,69%	8,29%	2,54%	0,80	-0,71	2,93	0,17	0,02	0,66	0,03	1,85	1	1,34%
Santander Fi Inst Shares	sant2	351,87%	1,79%	9,45%	1,04%	0,97	-0,53	2,28	0,16	0,02	1,73	0,02	29,35	41	1,32%
Credit Suisse "Fig" Premium Investment Fund on Shares	crsu	334,88%	1,79%	9,72%	1,67%	0,98	-0,62	1,51	0,16	0,02	1,07	0,03	24,05	37	1,26%
Legg Mason Shares Ibovespa asset Silver Ficfi	legg2	333,82%	1,81%	9,95%	0,99%	1,03	-0,59	2,35	0,16	0,02	1,83	0,02	90,84	60	1,10%
Unibanco Institutional IBX Fi Shares	unib2	331,15%	1,66%	8,37%	1,70%	0,85	-0,92	3,57	0,17	0,02	0,97	0,02	13,25	23	1,05%
Real Investment Fund in Institutional Shares	real	323,72%	1,68%	8,96%	1,92%	0,90	-0,38	0,89	0,16	0,02	0,87	0,03	21,15	33	1,03%
Fibra Vic Inv fund In Shares	fibr	321,00%	1,62%	8,43%	2,39%	0,82	-0,20	1,33	0,16	0,02	0,68	0,03	2,67	4	0,99%
Bradesco Fic of Fia Ibovespa asset	brad7	319,60%	1,71%	9,26%	1,40%	0,92	-0,61	2,62	0,16	0,02	1,22	0,03	39,07	49	0,88%
Coinvalores Investment Fund on Assets	coin	311,57%	1,72%	9,58%	1,99%	0,95	-0,38	2,41	0,15	0,02	0,86	0,03	4,33	7	0,84%

Bradesco Private Fia Ibovespa Leveraged	brad1	311,46%	1,70%	9,23%	1,27%	0,95	-0,82	3,14	0,16	0,02	1,34	0,02	4,96	11	0,73%
Unibanco Timing Fi Shares	unib5	308,61%	1,54%	7,73%	3,47%	0,69	-0,32	0,36	0,17	0,02	0,44	0,04	9,89	19	0,71%
Itau Institutional Shares Ibovespa Fi assets	itau4	270,14%	1,65%	9,74%	0,89%	1,01	-0,59	2,87	0,14	0,01	1,84	0,02	38,52	48	0,65%
Gap Multimarket Investment fund	gap	254,35%	1,65%	10,12%	1,40%	1,03	-0,46	2,93	0,14	0,01	1,18	0,02	12,37	21	0,61%
Itau Private assets Fi Shares	itau9	242,56%	1,59%	9,82%	1,02%	1,01	-0,55	2,87	0,14	0,01	1,56	0,02	18,70	29	0,35%
Itaú Personnalité Ficfi Shares	itau8	226,01%	1,41%	8,39%	1,82%	0,85	-0,96	3,82	0,14	0,01	0,78	0,02	30,29	42	

Table 2 (Cont.) - Financial Descriptive Statistics of Investment Funds Panel in Shares in Brazil^{a,b,c}

Investment Funds	Code	Return Metrics		Risk Metrics			3rd and 4th Moments		Performance Metrics				Financial Metrics	
		Cumulative Real Ret	Average Real Ret.	Standard Deviation	Downside Risk	Market Beta	Asymmetry	Curtose	Sharpe	Treynor	Sortino	Alfa Jensen	PL Mean (R\$ Million)	Ranking PL
Safr shares Fi shares	safr6	201,35%	1,45%	9,50%	1,59%	0,97	-0,73	2,86	0,13	0,01	0,91	0,02	35,00	45
Fi shares Santander shares	sant1	199,80%	1,42%	9,31%	1,19%	0,96	-0,63	2,52	0,12	0,01	1,19	0,02	43,72	52
Safr Energy Sector Fi shares	safr5	195,96%	1,45%	9,96%	4,14%	0,87	-0,01	2,66	0,12	0,01	0,35	0,05	14,68	25
Alfa Special - Investment Fund on Shares	alfa1	193,79%	1,41%	9,39%	1,33%	0,97	-0,71	2,74	0,12	0,01	1,06	0,02	32,16	44
Legg Mason Private Focus Fic Fi shares	legg1	192,24%	1,46%	9,92%	1,17%	1,02	-0,59	2,36	0,12	0,01	1,25	0,02	26,99	40
Atico Ações Fi Em Ações	atico	183,03%	1,29%	8,58%	3,10%	0,82	-0,15	1,41	0,12	0,01	0,41	0,04	4,68	8
Itau Ibovespa Select Ações - Fic Fi	Itau12	183,00%	1,39%	9,53%	0,90%	0,99	-0,61	2,37	0,12	0,01	1,55	0,01	140,40	66
Credit Suisse Ibovespa Index Fundo De Investimento	crsu2	176,62%	1,37%	9,54%	0,83%	0,99	-0,57	2,28	0,12	0,01	1,65	0,01	4,72	9
Fi Votorantim Em Ações	voto1	168,51%	1,38%	9,83%	1,96%	1,00	-0,74	2,67	0,11	0,01	0,71	0,02	5,44	13
Banrisul Índice Fi Em Ações	banr1	159,80%	1,35%	9,80%	1,17%	1,01	-0,86	3,28	0,11	0,01	1,16	0,02	5,16	12
Unibanco Strategy Fi Ações	unib4	153,33%	1,27%	9,28%	1,44%	0,96	-0,73	2,55	0,11	0,01	0,88	0,02	88,96	59
Itau Personnalité Marche Ibovespa Ações Ficfi	itau6	147,68%	1,28%	9,58%	0,83%	1,00	-0,69	2,39	0,11	0,01	1,54	0,01	41,54	50
Legg Mason Portfolio Ações Fi	legg4	143,73%	1,30%	9,90%	1,25%	1,02	-0,59	2,36	0,11	0,01	1,04	0,02	61,25	56
Bnb Fi Ações	bnb	143,26%	1,21%	9,06%	2,08%	0,91	-0,62	3,22	0,11	0,01	0,58	0,03	3,14	5
Hsbc Fdo Inv Em Cotas Fdos Inv Em Ações	hsbc3	141,32%	1,26%	9,49%	1,41%	0,97	-0,83	4,07	0,11	0,01	0,89	0,02	41,99	51
Fundo Banestes De Investimento Em Ações	bane	140,62%	1,15%	8,47%	2,56%	0,83	-0,53	4,90	0,11	0,01	0,45	0,03	2,65	3

Hsbc Fundo De Investimento Em Ações Top	hsbc2	136,21%	1,24%	9,54%	0,95%	0,99	-0,73	3,08	0,10	0,01	1,30	0,01	51,41	55
Safrá Indicial Fi Ações	safr1	135,77%	1,23%	9,51%	0,86%	0,99	-0,67	2,42	0,10	0,01	1,42	0,01	21,41	34
Itau Índice Ações Ibovespa Ficfi	itau3	133,94%	1,24%	9,70%	0,82%	1,01	-0,67	2,56	0,10	0,01	1,52	0,01	36,60	46
Real Fundo De Investimento Em Quotas De Fdos Investe	realp1	132,37%	1,19%	9,17%	2,30%	0,92	-0,81	2,94	0,10	0,01	0,52	0,03	15,82	27
Itau Personalite Technique Ações Fi	itau7	125,52%	1,32%	10,47%	1,74%	1,07	-0,93	4,57	0,10	0,01	0,76	0,02	18,71	30
Itau Carteira Livre Ações Fi	itau2	110,11%	1,17%	9,92%	1,24%	1,03	-0,70	2,95	0,09	0,01	0,94	0,02	121,24	65
Unibanco Blue Fi Ações	unib1	105,04%	1,05%	8,89%	1,57%	0,92	-0,75	2,75	0,09	0,01	0,67	0,02	103,94	62
Bradesco Fia Super Acao	brad3	102,88%	1,13%	10,01%	2,54%	0,99	-0,19	2,87	0,09	0,01	0,45	0,03	31,53	43
Fundo De Investimento Em Ações Caixa Ibovespa	caix	99,25%	1,09%	9,60%	1,06%	1,00	-0,61	2,30	0,09	0,01	1,03	0,01	114,81	64
Alfa Dinamico - Fic Fi Em Ações	alfa2	87,87%	1,01%	9,27%	1,68%	0,95	-0,75	2,95	0,08	0,01	0,60	0,02	5,96	14
Fundo De Investimento Em Ações Brb Ações	brb	84,27%	0,87%	8,00%	2,78%	0,80	-0,62	1,82	0,08	0,01	0,31	0,03	4,05	6
Real Fundo De Investimento Ações Energy	abn1	73,36%	0,94%	9,37%	3,61%	0,86	-0,41	3,65	0,07	0,01	0,26	0,04	24,50	38
Fic Fi Ações Santander Onix	sant4	70,76%	0,94%	9,44%	1,39%	0,98	-0,75	3,01	0,07	0,01	0,68	0,02	16,76	28
Bb Ações Ibovespa Ativo Ficfi	bb3	64,92%	0,91%	9,50%	1,38%	0,98	-0,61	2,39	0,07	0,01	0,66	0,01	48,08	54
Slw Fundo De Investimento - Ações	slw	61,16%	0,83%	8,79%	2,69%	0,86	-0,76	3,58	0,06	0,01	0,31	0,03	1,90	2
Alfamais Fic De Fi Em Ações	alfa	34,99%	0,72%	9,28%	1,77%	0,96	-0,81	3,28	0,05	0,00	0,41	0,02	12,80	22

^a Panel containing actual Returns Monthly Time Series Liquid 68 Investment Funds Shares (1998.1 a 2007.06, 114 observações)

^b Provision of funds : descending order by accumulated net real return

^c Data source: Site www.fortuna.com.br

As regards the metrics of risk, there is no clear trend in standard deviation, in the market beta, not even in the downside risk, the latter obtained from the Ibovespa Index as a benchmark. In other words, little can be inferred about the behavior of total risk and systemic between funds arranged in descending order in accumulated gain. Nevertheless, an interesting evidence consists in the clear pattern for the performance metrics used. The Sharpe Index - the most common of all and initially called *reward-to-propose ratio*, which origin is associated with Sharpe (1964) - consists of the ratio between the risk premium paid for the share in question and its volatility, if this can be adequately approximated by the standard deviation.⁷

In the case of the Treynor Index due to the contribution of Jack L. Treynor (1965), this metric measures the compensation of additional gain on the risk-free asset for systemic risk unit (instead of total risk also incorporates the idiosyncratic risk) of incurred market being captured by β of the market, obtained when using the CAPM regression.

Observing these two metrics, there is a tendency toward a reduction of performance for funds with less accumulated gain, evidence that may indicate that the first two moments of the distribution relevant to the analysis made by the investor, justifying the fact that funds taken as *winners* were more focused on such metrics. In more precise analyzes of *portfolio management*, it is usually preferable the use of excess return as a compensation of pricing model based risk, such as the CAPM or linear factors, or even the use of the Index of Sortino, proposed by Brian Rom in 1986, that provides a value for the compensation of additional gain regarding a minimally attractive *benchmark* per risk asymmetric unit, which penalizes only deviations below the mean or the defined reference, unlike the standard deviation which penalizes deviations from good and bad surprises.

Thus, as regards the alpha of Jensen, once again it shows a behavior to increase of this metric of performance relative to the increase of accumulated gain, the same was not observed for the index of Sortino. In relation to the third and fourth moments, the great majority of funds has mild asymmetry to the left, except 5 funds of high profitability *pros*, *dyna*, *gera*, *come* and *oppo*, and has relatively low density tails, because the values for kurtosis are moderate, ranging between 1 and 3 for almost all of the funds, with the exception for the kurtosis extreme of the fund *pros*. In both cases without an explicit pattern related to accumulated return. Finally, there seems to be an apparent negative correlation between medium net worth (PL) and the accumulated gain of funds, being possible to observe

⁷ Only in 1994 this metric was entitled with the name of William Forsyth Sharpe.

funds with PLs in the order of R\$ 5 million to R\$ 7 million with performance very close to funds with PL of approximately R\$275 million. In order to summarize the information in the sample, the observation of median values reported at the end of Table 2, robust to the presence of outliers, allows us to infer an accumulated gain, of the order of almost 250% greater than the Ibovespa Index in the same period, result accompanied by a systemic risk slightly less than 1.0, according to the beta of the market of this industry, which median in terms of PL suggests a level higher than the R\$ 20 million.

5.3 IDENTIFICATION OF CLUBS OF CONVERGENCE AND THE PROVISION OF TRANSITION

The methodological procedures described in section 4 were applied to a panel containing the monthly cumulative return of 68 funds for investments in shares, during the period of January 1998 to June 2007, including even at the Bovespa Index, in order to be able to identify in which club this index would be in, in addition to the evidence that funds converge to the benchmark, a sign of passive strategy of this fund. Initially, we tested the overall convergence of accumulated return of funds by means of the equation (7).⁸

The results indicate an estimation of β_1 equal to -1.2163, with its statistical t of -22.0158, value of less than -1.65, rejecting the null hypothesis of global convergence to a common level. The first evidence is, therefore, to confirm that there is no convergence of accumulated gain in market of investment funds in shares in Brazil.

Been discarded the hypothesis of absolute convergence, it is possible that there will be the return of a group of funds is converging. Thus, has continued the procedure previously described for the identification of possible clubs of convergence. Due to the small size of the sample, we sought a greater parsimony in the determination of the clubs, by setting $c^* = 0$. A summary of estimates obtained for the clubs of convergence identified is shown in Table 3. In short, initially it was formed a first nucleus of convergence composed by: **pros**, **smal**, **dyna** and **gera**. The algorithm continued adding funds to the core, ending by identifying the first club formed by 13 funds administered by private financial institutions and non-traditional, whose codes are: **come**, **dyna**, **fama**, **gera**, **grad**, **hg**, **ip**, **Itau11**, **oppo**, **pros**, **safr2**, **safr4** and **smal**. The test of the hypothesis that the remaining indices form a second group of convergence was rejected, given the statistics of $t_{\hat{\beta}_1} = -38.055 < -1, 65$. The

⁸ $\log \frac{H_1}{H_t} - 2 \log(\log t) = \beta_0 + \beta_1 \log t + u_t$ For $t = T_0, \dots, T$

sequence of analysis suggested the end formation of 3 other clubs of convergence, while the isolated *alpha* fund, not have converged to none of them. Longer-term trends of 4 clubs are presented in Figure 1, with emphasis on the detachment for the first club.⁹

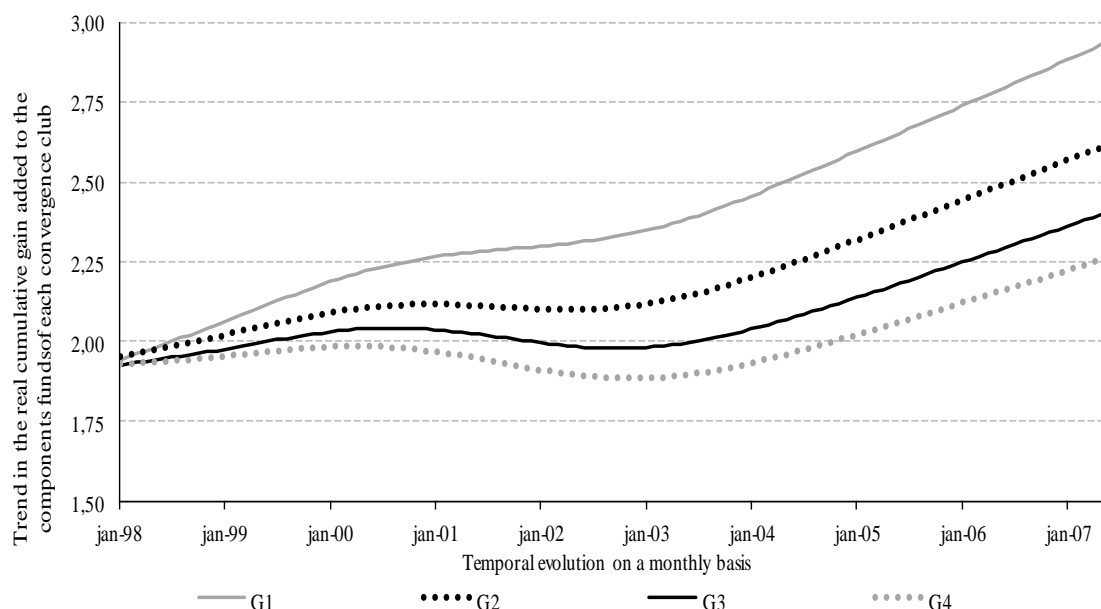


Figure 1 - Long-term Trend of the four clubs of convergence identified

Note in Table 3 that the second club is composed of 21 funds, there is no public institutions as managers, but the presence of two of the largest and most traditional banks in the country: Bradesco and Itaú. In Figure 5, in which they were portrayed the transition dynamics of the funds that make up the second club, calls attention to the presence of the fund *voto1*, which presented the lowest medium real liquid return of the club, in addition to the smaller indices of Sharpe and Treynor.

⁹ The transition dynamics of each fund participant in groups 1, 2, 3 and 4 are not reported in the article, but available to the authors.

Table 3 - Identification of clubs of convergence ^a

							Parameter	Estat. <i>t</i>	Parameter	Estat. <i>t</i>	restante
1° club	come	grad	dyna	hg	oppo	smal					
	fama	ip	gera	safr4	pros	itau11	-4,271	-11,944	0,033	0,398*	-38,055
	safr2										
2° club	brad1	fato	brad6	fibr	real	elit					
	brad7	itau10	btgl	itau4	sant2	voto1	-5,686	-14,226	0,455	4,899*	-16,086
	coin	itau5	unib2	jagu1	sula	unib5					
	crsu	safr3	legg2								
3° club	IBOV	gap	bane	itau6	legg1	crsu2					
	alfa1	hsbc2	banr1	itau7	legg4	itau9	-5,994	-61,358	0,560	24,671*	-9,055
	atico	Itau12	safr5	sant1	realp1	unib4					
	bnb	safr6	itau8								
4° club	abn1	brb	bb3	hsbc3	itau3	unib1					
	alfa2	caix	sant4	brad3	safr1	slw	-4,944	-9,331	-0,108	-0,873*	-
	itau2										

^a Methodology developed by Phillips and Sul (2007), that the convergence analysis is based on a unilateral t test of the null hypothesis of convergence against alternative hypothesis of no convergence or partial convergence between subgroups.

* It is not rejected the null hypothesis of convergence to a 5% significance level.

The third club consists of 20 funds, which converge together as the Ibovespa, being timid in presence of public institutions in the management of component funds, in addition to the striking presence of Banco Itaú, with 24% of the funds. In Figure 6, the Ibovespa appears as a component of the third club that has a dynamic that presents higher end value, and there is still an apparent detachment by lower values of convergence because of the fund *unib4*. The club room is composed of remaining funds for smaller performances accumulated for the considered period, being even more significant participation of public banks fund management components of this last club, of approximately 15 %.

5.4 DISCUSSION OF RESULTS GENERAL

An analysis that seeks to detect common patterns of behavior in long and volatile time series of returns in samples with a high amount of financial assets, from the descriptive statistics in Table 2, for example, it is often inaccurate and inconclusive, if we do not make use of a statistical technique to reduce the sample of *N* assets for *K* groups of assets.

Thus, on the basis of the grouping obtained from the technique of Phillips and Sul (2007), already described in section 4, the composition of which is reported in Table 3, there

will be made analyzes of patterns of key financial variables and administrative reported in Table 4.

Table 4 - Main Financial and Administrative Features of Identified Convergence Clubs ^{A,B}

	1° Club	2° Club	3° Club	4° Club
Financial variables				
Average real net return (%)	2,381%	1,758%	1,359%	1,051%
Accumulated net real return amplitude	(551% - 1.580%)	(168% - 485%)	(125% - 254%)	(61% - 141%)
Average PL (R\$ million)	118,54	20,55	32,62	44,06
PL amplitude (R\$ million)	(4,89 - 811,72)	(1,85 - 90,84)	(2,65 - 140,40)	(1,90 - 14,24)
Standard deviation amplitude	(6,843% - 11,756%)	(7,735% - 10,143%)	(8,394% - 10,474%)	(7,999% - 10,014%)
Market beta amplitude	(0,554 - 0,957)	(0,690 - 1,027)	(0,818 - 1,070)	(0,795 - 1,025)
Downside risk amplitude	(1,854% - 3,593%)	(0,894% - 3,472%)	(0,830% - 4,136%)	(0,818% - 3,607%)
Asymmetry amplitude	(-0,772 - 3,145)	(-1,062 - -0,162)	(-0,959 - -0,010)	(-0,832 - -0,189)
Curtosis amplitude	(1,148 - 24,070)	(0,358 - 3,932)	(1,406 - 4,896)	(1,825 - 4,068)
Sharpe Index amplitude	(0,193 - 0,329)	(0,114 - 0,188)	(0,101 - 0,138)	(0,065 - 0,105)
Treynor Index amplitude	(0,020 - 0,041)	(0,011 - 0,019)	(0,010 - 0,014)	(0,007 - 0,010)
Sortino Index amplitude	(0,599 - 1,140)	(0,444 - 1,845)	(0,352 - 1,650)	(0,260 - 1,518)
Alpha Jensen amplitude	(0,027 - 0,081)	(0,016 - 0,039)	(0,011 - 0,055)	(0,012 - 0,044)
Administrative variables				
Average Management fee	2,50%	1,95%	2,63%	3,35%
Administration fee amplitude	(1% - 4%)	(0% - 6%)	(0% - 4%)	(0% - 5%)
Performance fee amplitude	(15% - 20%) s/ Ibov ou s/IGP-M	(18% - 25%) s/ Ibov ou s/IGP-M	0%	0%
Participation of public financial institutions as manager	0%	0%	5%	15%
Participation of private financial institutions as manager	100%	100%	95%	85%
Managing financial institution with greater participation in club	15% - Safra	15% - Bradesco -14% Itaú 10% - Unibanco	24% - Itaú 10% - Safra	15% - Itaú 8% - Unibanco 8% - Safra
Average length of existence	14,69 anos	16,71 anos	17,7 anos	18,8 anos

^a panel containing monthly time series of net real returns of 68 shares in investment funds (1998.1 to 2007.06, 114 observations)

^b Identification of clubs from the Phillips and Sul (2007) methodology

A first interesting aspect is that the exercise is not only to segregate the funds by observing only the final values of cumulative returns, but the temporal evolution, so that funds as the *vote1*, with accumulated return of 168,51 %, are in the second club, even if there are multiple funds with higher returns, such as the *gap*, which gain was 254,35 %. Another non-trivial result consists in the presence of funds *bane*, *hsbc2*, *realp1* and *itau7* in the third club.

Another aspect is the gap between funds managed by the same financial institution. The Bank Safra manages funds between the various offered, which accumulated gains in almost ten years range from 926,60% up to 135,77 %, while at Itaú and at Bradesco, such disparities are the following maximum and minimum values, respectively: 561,70% to 125,52% and 380,15% to 102,88 %.

A specific analysis of the third club suggests that there are 1/3 of the funds assuming market efficiency and adopting a passive strategy following the benchmark of the market and only featuring gentle losses in relation to this, because of failed active strategies. A strong signal, if it reflects the reality, of irrationality on the part of economic agents that do not punish the *loser* funds, changing positions and migrating to the systematically *winner* funds.

On the basis of Table 4, as would be expected, there is a clear distinction between the actual monthly average returns of clubs, respectively, 2.38 %, 1.76 %, 1.36% and 1.05 %, been the distance between the first club and others the greater distance, which corroborates the offset by higher values in the dynamics. On the net worth of each club, evidence-if an *outlier behavior* on the part of the first club, which has average values of the order of 3 to 4 times the PL of other clubs, even possessing funds with medium PL below R\$ 10 million.

According to the metrics of risk used, except when the use of *downside risk*, the clubs seem to have a pattern of increasing risk to the extent that have less accumulated gain.¹⁰ Paradoxically, the funds with the greatest gains have even lower levels of total risk and systematic. Already abide by the *downside risk*, the second club would be the less volatile, while the first club would be the highest risk.

Analyzing the third and fourth moments of the identified clubs, as well as in disaggregated analysis, the coefficient of asymmetry suggests clubs invariably with

¹⁰ Although desirable, not all the metrics of risk used here satisfy all the criteria suggested in Artzner et al. (1999)

asymmetry to the left, with lower intensity in the first club, and they all moderately dense tails.

Due to higher expected returns and lower levels of risk, the component funds of clubs considered as winners not only hit the market, as the other funds, but exhibit the highest performance metrics, been the order of magnitude of the indexes of Sharpe and Treynor of the first club of two to 3 times the level of the third and fourth clubs. Considering the Index of Sortino, the best performance would be the funds from the second club.

All these evidences are financial corroborated when in the even more aggregate analysis from equal-weighted portfolios formed from the funds of each club, whose statistics are reported in Table 5 and whose evolution is in Figure 2.

Table 5 - Financial Descriptive Statistics of Portfolios of Component Funds of Convergence Clubs ^{A,B}

Metrics		<i>Equal-weighted portfolio of component funds of convergence clubs</i>			
		Funds components of the 1st club	Funds components of the 2nd club	Funds components of the 3rd club	Funds components of the 4th club
Return	Average real net return	2,381%	1,758%	1,359%	1,051%
	Real cumulative net return	928,2%	461,3%	181,3%	100,9%
Risk	Standard dev.	7,993%	8,869%	9,228%	9,114%
	<i>Downside risk</i>	1,780%	0,971%	0,980%	1,119%
	Market beta	0,791	0,919	0,959	0,948
3rd and 4th moments	asymmetry	-0,099	-0,709	-0,758	-0,767
	Curtose	2,539	2,482	2,884	2,852
Performance	Sharpe	0,266	0,169	0,120	0,087
	Treynor	0,027	0,016	0,012	0,008
	Sortino	1,338	1,810	1,387	0,939
	Alfa Jensen	0,027	0,013	0,012	0,011

^a panel containing monthly time series of net real returns of 68 shares in investment funds (1998.1 to 2007.06, 114 observations)

^b Identification of clubs from the Phillips and Sul (2007) methodology .

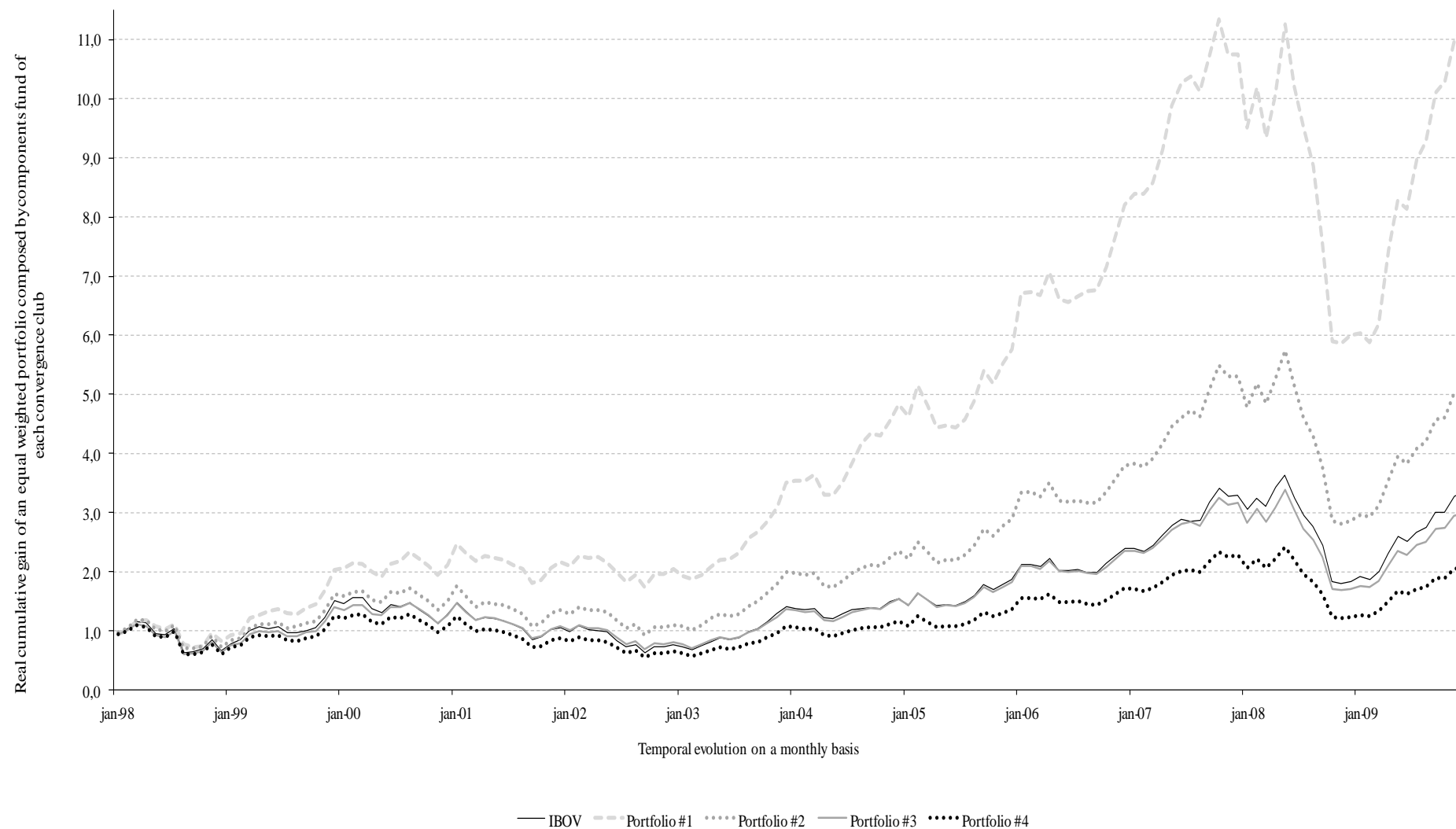


Figure 2 - Accumulated Performance from the four *equal-weighted* portfolios of investment funds in component shares of the identified clubs (1998.1 to 2009.12)

It is worth emphasizing the detachment even more evident in *portfolio #1* composed of the 14 funds of the first club, which, in addition to having better performance up to June of 2007, is the one that presents *drawdown* which order of magnitude is less than that of the Ibovespa Index of other *portfolios*, having been the only *portfolio* capable of recovering the loss with the financial crisis, until December of 2009, a strong evidence in favor of the expertise of active management of private institutions that adopt incentive mechanisms and punishment.

In relation to administrative variables, it is noted that the administration rate of 68 funds in this study had a great breadth, ranging from 0.40% to 7.5% and that, on average, administration rates are larger the smaller the profitability of clubs. The rate of total performance, only 12 of the 68 funds charge this type of fee, which generally consists of percentage ranging from 15% to 25% of the that exceed the Ibovespa or the General Price Index of the Market (*Índice Geral de Preços do Mercado* - IGP-M). An important observation is that all the funds that adopt performance rate - this type of mechanism with variable incentive to the manager who consistently beats the market or the established *target* - are invariably in *winner* clubs, an evidence of that, having no punishment on the part of investors in terms of the redemption of the amount applied on the fund by reason of bad results, the design of mechanism should provide for a contract with variable gain to the manager.

According to these data, the selected funds started its activities, on average, 17 years ago, and there is a curious inverse relation of profitability of clubs with the maturity of the same. Finally, there is only the presence of private financial institutions as managers of the funds that make up the first two clubs, with emphasis on Banco Safra, with 15% of the funds from the first club, the Banco Itaú and Bradesco both representing 14% in the formation of the 2nd club.

6 CONCLUSION

In the literature of investment funds in shares, it is discussed the ability of managers to opt for active strategies able to obtain accumulated gains greater than the market. There is no consensus in this still little developed literature, what would be expected in a market with a high level of regulation and transparency, characterized by low costs associated with the transaction of purchase of quotas, as the change of funds itself?

In contrast to the characteristics of this market and the portfolios' theory itself, it is evident that the Brazilian industry has a quite divergent pattern of real accumulated returns - in that there are funds with accumulated gain between January 1998 and June 2007 of the order of 8 times the real gain of the Ibovespa - and without a common trend. Due to higher expected returns and lower levels of risk, the component funds of clubs considered more well positioned not only "beat" the market, as the other funds, but also present much higher performance metrics weighted by risk. On these *winner* funds, in addition to being, on average, more recent and managed mainly by private financial institutions, it is observed that the levying of lower administration rates than *losers* funds and the adoption, in their majority, of billing policy of performance rates, indicating the relevance of the financial incentives created by this rate mechanism.

Regarding the possible extensions of this work, it is necessary to recognize the limitation in terms of the database. In other words, the sample of funds for investment in shares in Brazil, apparently wide, with tens of thousands of funds, suffers a strong reduction regarding the need for homogeneity of base, having in view the econometric technique used. In the case of the framework of Phillips and Sul (2007), it is not possible to get rid of survival bias criticism, for example, because all funds needed to be present throughout the whole analyzed time period. This restriction is actually imposing strict limits on temporal dimensions and *cross-section*, in addition to complicate the implementation of robustness testing from the change of temporal window. In this article, were suggested and tested discrete changes of windows, without any major changes in qualitative results, but certainly future articles on this complex industry that focuses to test the hypothesis of convergence dimension in *cross-section*, following Hansen (2000), for example, or that make use of techniques that do not require the survival bias, that will be useful to corroborate or not the preliminary evidence here reported.

REFERENCES

- ADCOCK, C. et al. **Does the use of downside risk adjusted measures impact performance rankings of UK investments trusts?** 6th PFN, Azores Island, 2010.
- ALVES JÚNIOR, A. Fundos Mútuos de Investimentos no Brasil: A expansão da indústria nos anos 1990 e perspectivas para o futuro. **Textos para Discussão CEPAL-IPEA**, LC/BRS/R.173/2003, 2003.
- ANTZOLAUTOS, A.; PANOPOLOU, E.; TSOUMAS, C. Do Financial Systems Converge? **Working paper**. Disponível em SSRN: <http://ssrn.com/abstract=1413971>, 2008.

ARTZNER, P. et al. Coherent Measure of Risk. **Mathematical Finance**, 9:203–228, 2009.

BESSLER, W. et al. **Why does Mutual Fund Performance not Persist?** The Impact and Interaction of Fund Flows and Manager Changes. 6th PFN, Azores Island, 2010.

BOLLEN, N.; BUSSE, J. Short-Term Persistence in Mutual Fund Performance. **Review of Financial Studies**, 18: 569–597, 2005.

BROOKFIELD, D.; BANGASSA, K.; SU, C. **Investment style performance of UK unit trusts**. 6th PFN, Azores Island, 2010.

CAPORALE, G.; ERDOGAN, B.; KUZIN, V. Testing for Convergence in Stock Markets: A Non-Linear Factor Approach. **CESifo Working Paper Series 2845**, CESifo Group Munich, 2009.

COCHRANE, J. **Asset pricing**. Princeton University Press, 2001.

_____. **Financial markets and the real economy**. Edward Elgar Publishing, 2006.

CORHAY, A.; TOURANI, A.; URBAIN, J. Common stochastic trends in European stock markets. **Economics Letters**, 42:385–390, 1993.

DUVERNOY, T. **Avaliação de Performance de Fundos de Investimento Utilizando Fatores Estocásticos de Desconto Admissíveis Não Paramétricos**. Dissertação de mestrado submetida à Escola de Pós-Graduação em Economia da Fundação Getúlio Vargas como requisito parcial para obtenção do título de Mestre em Economia, Rio de Janeiro, 2009.

FAMA, E.; FRENCH, K. The cross-section of expected stock returns. **Journal of Finance**, 47:427–465, 1992.

_____. Common risk factors in the returns on stocks and bonds. **Journal of Financial Economics**, 33:3–56, 1993.

_____. Luck versus skill in the cross section of mutual fund returns. **Journal of Finance**, 65:1915–1947, 2010.

FERREIRA, M.; MATOS, P.; PEREIRA, J. **Do foreigners know better?** A comparison of the performance of local and foreign mutual fund managers? 6th PFN, Azores Island, 2010.

FRANSES, P.; KOFMAN, P.; MOSER, J. Garch Effects on a Test of Cointegration. **Review of Quantitative Finance and Accounting**, 4:19–26, 1994.

FMI. Fundo Monetário Internacional. **World Economic Outlook** - April 2011 Edition. Disponível em: <http://www.imf.org/external/pubs/ft/weo/2011/01/weodata/index.aspx>. 2011.

HANSEN, B. Sample splitting and threshold estimation. **Econometrica**, 68:575–603, 2000.

HASLEM, J. **Mutual Finds: Portfolio Structures, Analysis Management and Stewardship**. John Wiley & Sons, 2010.

- HIGSON, C.; HOLLY, S.; PETRELLA, I. The Financial Integration of the European Union: Common and Idiosyncratic Drivers. **Working Paper** / FINESSE 1.1d, DIW Berlin, German Institute for Economic Research, 2009.
- KASA, K. Common stochastic trends in international stock markets. **Journal of Monetary Economics**, 29:95–124, 1992.
- LITTELL, C. Correlation trends in global markets. **Emerging Markets Quarterly**, 1:35–39, 1997.
- LOMBARD, T.; ROULET, J.; SOLNIK, B. The Pricing of Domestic and Multinational Firms. **Financial Analysts Journal**, 1:35–50, 1999.
- MANTALOS, P. ECM-Cointegration test with GARCH(1,1) Errors. **Working paper** disponível em: <http://interstat.statjournals.net/YEAR/2001/articles/0103003.pdf>. 2001.
- MARKOWITZ, H. Potfolio selection. **Journal of Finance**, 7:77–91, 1952.
- MATOS, P.; CASTRO, A. Fundos de investimento em ações no Brasil: performance e expertise de gestão. **Brazilian Business Review**, volume especial, 1–38, 2012.
- MATOS, P.; CORREA, W.; SILVA, F. Há bons gestores de fundos de investimento em ações no Brasil? **Working Paper ANBIMA**, 2012.
- MATOS, P.; LINHARES, F.; ZECH, G. Análise do Efeito Não Linear do Patrimônio Líquido no Apreçamento de Fundos de Investimento em Ações. **Brazilian Business Review**, 9:1–27, 2012.
- MATOS, P.; PADILHA, G.; BENEGAS, M. On the management of efficiency of the Brazilian stock mutual funds. **Anais...** First International Workshop in Financial Econometrics, 2013.
- MATOS, P.; PENNA, C.; LANDIM, M. Análise de convergência de performance das bolsas de valores: a situação do Ibovespa no cenário mundial. **Revista Brasileira de Finanças**, 9:437–459, 2011.
- MATOS, P.; PENNA, C.; MATIAS, G. On the convergence of returns on Brazilian bank stocks. **Anais...** XI Encontro Brasileiro de Finanças, 2011.
- MATOS, P.; PENNA, C.; VASCONCELOS, J. Política creditícia no Brasil: o sertão vai virar mar? **Economia**, 14:1–29, 2013.
- MATOS, P.; ROCHA, A. Ações e fundos de investimento em ações: fatores de risco comuns? **Brazilian Business Review**, 6:22–43, 2009.
- MATSUMOTO, A. Vale à pena correr risco em fundos de investimentos alavancados no Brasil? 5º Congresso USP Controladoria e Contabilidade, 2005, São Paulo. **Anais...** 5º Congresso USP Controladoria e Contabilidade, 2005.
- MONTEIRO, R. **Persistência de Performance nos Fundos de Investimento em Ações no Brasil**. Dissertação (Mestrado em Finanças) IBMEC, São Paulo, 2006.

OLIVEIRA FILHO, E. **Avaliação do desempenho de fundos de investimento através dos índices de Sharpe e Treynor**. Trabalho de Conclusão de Curso apresentado ao Programa de Pós-Graduação, exigência parcial à obtenção do título de MBA da Universidade Federal de Itajubá, 2005.

OLIVEIRA FILHO, E. **Análise de Desempenho de Fundos de Investimento em Ações Brasileiros**. Dissertação (Mestrado em Administração de Empresas) - Fundação Getulio Vargas – SP, 2008.

PENNA, C.; LINHARES, F. Convergência e Formação de Clubes no Brasil sob a Hipótese de Heterogeneidade no Desenvolvimento Tecnológico. **Revista Econômica do Nordeste**, 40:781–796, 2009.

PENNA, C.; LINHARES, F. Há controvérsia entre as análises de beta e sigma-convergência no Brasil? **Revista Brasileira de Economia**, 67:121–145, 2013.

PHILLIPS, P.; SUL, D. Transition Modeling and Econometric Convergence Tests. **Econometrica**, 75:1771–1855, 2007.

RANGVID, J. Increasing convergence among European stock markets? A recursive common stochastic trends analysis. **Economic Letters**, 71:383–389, 2001.

RUBBANIY, G.; VAN LELYVELD, I.; VERSCHOOR, W. **Home Bias and Dutch Pension Funds' Investment behavior**. 6th PFN, Azores Island, 2010.

SECURATO, J. Medindo o Nível de Globalização da América Latina e dos Estados Unidos. **Working paper**, FEA-USP, 1997.

SHARPE, W. Capital asset prices: a theory of market equilibrium under conditions of risk. **Journal of Finance**. 19:425–42, 1964.

SORTINO, F.; LEE, N. Performance measurement in a downside risk framework. **The Journal of Investing**, 3:59–64, 1994.

TONG, H. **On a threshold model**. In **Pattern Recognition and Signal Processing**. ed. C. H. Chen, Amsterdam: Sijthoff and Noordhoff, 1978.

TONG, H.; LIM, K. Threshold autoregression, limit cycles and cyclical data. **Journal of Royal Statistical Society, Series B**, 42:245–292, 1980.

TREYNOR, J. How to rate management of investment funds. **Harvard Business Review**, 43:63–75, 1965.

SOBRINHO, J. Estratégias de Gestão de Fundos de Investimentos em Ações: Análise da Performance de Fundos de Gestão Ativa no Período de 1996 a 2000. **Anais... VI Semead - Seminários de Administração**, 2003.

VARGA, G. Índice de Sharpe e outros Indicadores de Performance Aplicados a Fundos de Ações Brasileiros. **Revista de Administração Contemporânea**, 5:215–245, 2001.

VARGA, G.; WENGERT, M. **Riscos comuns em fundos de investimentos em Gestão de riscos no Brasil**. Keyword Editora, 2003.

_____. The Growth and Size of the Brazilian Mutual Fund Industry. **Working paper**. Disponível em: SSRN: <http://ssrn.com/abstract=1575510>. 2010.

VON F.; JEON, B. **International stock price movements**: links and messages. Brookings Papers on Economic Activity, Economic Studies Program, The Brookings Institution, 20, 125-180, 1989.

APPENDIX: ALGORITHM DESCRIPTION

1) Sort the funds according to the real accumulated gain final period.

2) Select the k first funds with higher gain, forming a subgroup G_k for some $2 \leq k < N$.

Estimate the regression $\log t$ and calculate the statistical convergence $t_k = t(G_k)$ for this subgroup. Choosing a group formed by k * funds such that, t_k is maximized on k in accordance with: $k^* = \arg \max_k \{t_k\}$ Subject to $\min \{t_k\} > -1,65$. If the condition $\min \{t_k\} > -1,65$ is not valid for $k = 2$, then the fund with greater gain is excluded from the sample and a new subgroup. $G_{2j} = \{2, \dots, j\}$ to $3 \leq j < N$, is formed. Repeating this step and forming the statistic $t_j = t(G_{2j})$. If the condition $\min \{t_k\} > -1,65$ is not valid for all pairs of sequential funds, it should be concluded that the panel has no clubs of convergence;

3) Add one fund at a time to the primary group with k * members and estimate the regression $\log t$ again; always include a new fund to the convergence club if the statistic t is greater than the criterion for fixing, c^* . When T is small ($T \leq 30$), the criterion for fixing, c^* , can be zero to ensure a conservative selection; if T is great, c^* can go asymptotically for the critical value of 5 %, that is, -1.65 . Repeat this procedure for all the remaining funds and form the first subgroup of convergence from the primary group G_{k^*} supplemented by funds that meet the criteria for the application.

4) Form a second group with funds in which the rule of fixation fails in step 3; estimate the regression $\log t$ and if it does, checks if $t_{\hat{\beta}} > -1,65$, that portrays the level of significance of the test for convergence. If this condition is met conclude that there are two groups of different convergence: the primary group G_{k^*} and the second group. Otherwise, if the condition is not met, repeat from step 1 to step 3 to check if this second group can be subdivided into a greater number of convergence clubs. There is a set composed of $k \geq 2$ funds in step 2 with $t_k > -1,65$ it is concluded that the remaining funds cannot be subdivided into subgroups and, therefore, such funds do not converge to a common level.