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Survivorship bias in Brazilian stock funds

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Abstract

This article investigates the survivorship bias of a sample of 1119 equity mutual funds in Brazil between 2004 and 2013. There is indication that survivorship bias increases when very small funds and those that did not have share prices for at least 12 contiguous months are not discarded. Results indicate that the sample with non-surviving funds frequently presented average returns lower than a sample with only surviving funds in a given year. Association to a large financial conglomerate and longevity may also favor fund survivorship.

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1. Introduction

This article investigates survivorship bias in actively managed Brazilian stock funds. Its data ranges from January 2004 through February 2013. Evidence from US stock funds indicates that performance is key factor in keeping a fund operating. Malkiel (1995) found that operating funds present better performance than that of the discontinued funds. Brown and Goetzmann (1995) indicate that inferior performance relative to the S&P500 increases the probability of a fund being discontinued. Weak performers are also more likely to be absorbed by other funds, as investigated by Elton, Gruber, and Blake (1996).

The Brazilian investment fund industry was the largest in Latin America and the eleventh in the world with USD 731 billion in assets under management (AUM), excluding funds of funds, corresponding to 2.0 percent of the world AUM at the end of the third quarter of 2015. Yet, stock funds accounted for only 5.7 percent of assets under management in Brazil given the predominance of fixed income funds the attractiveness of interest rates in the country (International Investment Funds Association, 2016).

Results for Brazilian stock funds indicate that the sample with non-surviving funds frequently presented average returns lower than a sample with only surviving funds in a given year. However, other factors, in addition to performance, may play a role in fund survivorship, such as being associated to a large financial conglomerate and longevity. Institutions that specialize in asset management and run most US stock funds are usually not associated to commercial banks (Malkiel, 1995). In Brazil, contrastingly, there is a mix of asset managers that are either independent or are associated to large financial conglomerates, many with a commercial bank at its center. Mendonça Jr., Campani and Leal (forthcoming) indicate that returns tend to be lower for funds managed by these latter asset managers. There is indication that the survivorship bias increases when very small funds and those that did not have share prices for at least 12 contiguous months are not discarded.

This article continues with a short literature review section, followed by the description of the sample, the discussion of the results, and conclusions and brief comments on how this preliminary investigation will continue.

2. Literature review

Elton *et al*. (1996) examined what happens to all funds that existed from a specific time onwards. The authors analyze US equity mutual funds in existence in 1976 and follow their performance until the end of 1993. Funds may remain in operation, terminate and return its assets to investors, or be absorbed into another fund. They gather that absorbed funds are weak performers.

Malkiel (1995) used a US sample containing all stock mutual funds in existence during the period between 1971 and 1991. The average fund return was less than that of the main stock indices, even when considering returns before all expenses, such as transaction costs and management fees. The author also found that funds in continuous operation from 1982 through 1991 exhibited average annual returns greater than those of all funds that operated during the same period. Even so, funds in operation during the whole period underperformed the S&P500. Using year-by-year data, Malkiel (1995) found that the average annual returns of funds that remained in operation throughout the 1982-1991 period is statistically greater than those of discontinued funds in the same period.

Brown and Goetzmann (1995) indicate that an inferior performance relative to the S&P500 increases the probability that a fund will cease operations. They analyzed US stock mutual funds during the 1976-1988 period and included discontinued fund data in their sample. Their evidence conveys that funds in continuous operation throughout the whole sample period displayed greater average annual returns than discontinued ones. This difference is more accentuated for smaller funds. Thus, they conclude that smaller funds with a weak performance are more likely to be discontinued or absorbed into other funds. Brown and Goetzmann (1995) also conjecture that weak performance is the main fund discontinuation predictor, and add that larger and older funds are less likely to terminate. The inflow of new money also reduces the probability that the fund will end, but to a lesser extent.

Previous Brazilian articles that considered liquidated funds include Laes and Silva (2015) and Mendonça Jr. *et al*. (forthcoming) that examine the ability or luck of asset managers in alpha generation and a scoring model for the ex-ante selection of superior stock funds, respectively. They did not, however, examine the differences in performance among surviving and liquidated funds, which is a contribution of this preliminary research.

3. Sample

The sample includes stock mutual funds in existence from January 2004 through February 2013. The data covers funds still operating in February 2013 and those discontinued during the sample period and comes from the Quantum Axis® database. Information about discontinued funds was kindly provided for this study. The fund sample includes only those classified as actively managed, eliminating sector, private equity, index, and exchange traded funds. The sample does not include funds, in operation or discontinued, with a track record shorter than 12 contiguous months of returns.

The same database provides the type of fees and target clientele for funds in operation only. Funds are classified in three fee categories: those that charge solely a management fee; those that levy management and incentive fees; and those that do not charge a fee. Master funds comprise 75 of the 85 funds that do not charge fees. Managers use master funds to receive investments from funds of funds (FoF) or feeder funds, which charge fees. Seven of the remaining ten funds that do not charge fees are exclusive funds and the other three target institutional investors. The classification according to the type of target clientele is: exclusive funds; non-exclusive funds for qualified investors; and non-exclusive funds available to the general public. These classifications are based on fund information at the time of data collection (April 2013).

The sample only includes funds with a minimum average value for the daily assets under management (AUM) of R$10 million (about US$ 5 million) in at least one of the calendar quarters in the sample period. This exclusion eliminated very small funds whose behavior may differ from the most representative portion of the Brazilian mutual fund industry. Nonetheless, the sample still covered around 99 percent of the AUM of all initially selected funds. The initial sample of 1119 stock funds in operation or discontinued in February 2013 decreased to 850 after the minimum AUM filter and finally to 608 funds after the application of the contiguous 12 months of returns and active management filters.

Table 1 presents the number of funds and AUM for each year according to the survivorship, fee and clientele classifications. The number and the AUM of stock funds increased almost seven and nine times, respectively, in the sample period. The number of discontinued funds was larger between 2007 and 2010. Contrastingly, the number of funds increased more rapidly in this same

period, suggesting a dynamic environment in the industry in a period of strong economic growth in Brazil (4.6 percent average gross domestic product growth between 2007 and 2010 according to World Bank data).

Table 1
Number of stock funds and assets under management (AUM)

Panel A: According to survivorship						
	In operation		Discontinued		All funds	
Year	No.	AUM	No.	AUM	No.	AUM
2004	78	10.7	80	4.2	158	14.9
2005	92	12.5	79	4.6	171	17.1
2006	116	19.2	79	7.2	195	26.5
2007	159	37.6	90	10.1	249	47.8
2008	221	26.6	95	5.6	316	32.2
2009	310	48.5	89	6.4	399	54.9
2010	388	63.0	99	7.7	487	70.8
2011	494	64.7	83	5.2	577	69.9
2012	585	92.6	20	0.8	605	93.4
Feb/2013	598	96.3	10	0.3	608	96.5
Panel B: According to clientele, funds in operation in February 2013						
	Exclusive		Qualified		General public	
Year	No.	AUM	No.	AUM	No.	AUM
2004	11	5.1	9	0.9	58	4.7
2005	15	6.4	10	1.3	67	4.8
2006	26	9.7	14	2.1	76	7.5
2007	48	15.1	23	5.1	88	17.4
2008	82	13.7	35	3.8	104	9.1
2009	126	23.1	46	7.2	138	18.1
2010	169	29.7	57	12.3	162	21.0
2011	206	32.3	81	12.9	207	19.5
2012	244	44.3	103	19.4	238	28.9
Feb/2013	249	44.7	108	20.1	241	31.5
Panel C: According to compensation fees, funds in operation in February 2013						
	Management fee only		Management and incentive fees		No fees	
Year	No	AUM	No	AUM	No	AUM
2004	40	6.0	27	2.6	11	2.2
2005	49	7.2	32	2.6	11	2.6
2006	61	11.6	42	3.8	13	3.9
2007	85	21.9	60	7.6	14	8.1
2008	125	14.0	77	4.6	19	8.0
2009	168	25.8	112	9.4	30	13.3
2010	210	32.8	132	12.0	46	18.2
2011	262	30.5	165	12.5	67	21.7
2012	305	44.0	196	17.8	84	30.8
Feb/2013	310	45.3	203	18.4	85	32.5

Note: The data are for the end of each. AUM are in R$ billion. The table includes only actively managed funds with average daily AUM greater than R$ 10 million in any calendar quarter and with a minimum of 12 contiguous months of returns in the sample period. Exclusive funds are for qualified investors but "qualified" funds are not exclusive. Ten of the 608 sampled funds (1.6% of the total) in February 2013 were discontinued between February 2013 – the last date considered for the sample period – and April 2013, when data was collected.

Forty-two percent of the funds in operation in February 2013 were exclusive, 18 percent targeted qualified investors but were not exclusive, and 40 percent aimed at the general public.

The proportion of total AUM of funds for qualified investors seem to have increased while it decreased for those targeting the general public and remained about the same for exclusive funds. Fifty-two percent of funds charge solely a management fee, 34 percent also add an incentive fee, and 14 percent do not charge fees (mostly exclusive funds). The proportion of funds charging solely the management fee is stable in the period, hovering around 54 percent according to the number of funds, but decreased to about 47 percent according to the AUM.

4. Results

The survivorship analysis includes all stock mutual funds that were in operation during the sample period for at least 12 contiguous months. It does not provide information about clientele and fee types because it was no longer available for discontinued funds in the Quantum Axis® database. Table 2 shows annualized equally and AUM weighted average returns. Malkiel (1995) offer results solely for value weighted returns, whereas Brown and Goetzmann (1995) use both. Table 2 also displays average annual returns with and without the minimum AUM filter, which excludes the very small funds. Table 3 shows statistical tests comparing the average returns achieved by different groups of funds in each year.

Table 2 shows that the average returns for funds in operation at the end of the sample period (new and surviving funds) were greater than those of all funds (including those discontinued). Interestingly, funds that survived during the entire sample period display a smaller equally weighted annualized return than all funds, but this does not happen for the value weighted annualized return. This suggests an overestimation of performance if discontinued funds are not considered. Moreover, the smaller funds, particularly if the filter for the very small ones is not applied, contribute to the lower return of the survivor group. Only the new and surviving funds generate an average return greater than the one registered by the IBrX index.

Table 2
Average annual returns

	All funds	Survivors	New and survivors	Ibovespa	IBrX
Any AUM:					
EW	16.18	15.81	18.57		
VW	17.08	17.05	18.19	13.82	17.66
Min. AUM					
EW	17.80	16.47	19.62		
VW	17.14	17.07	18.22		

Note: Annual percentage returns are expressed in nominal Brazilian currency terms. The sample period ranges from January 2004 through February 2013. “All funds” includes operating and discontinued stock funds with at least a one-year track record. “Survivors" includes only funds in operation throughout the entire sample period. “New and survivors” includes only funds in operation at the end of the sample period with at least a one-year track record. The minimum size rule selected funds with AUM greater than R$10 million (about US$ 5 million) in at least one quarter during the sample period. Ibovespa and IBrX are two widely followed stock indices in Brazil. EW and VW mean equally weighted and value weighted, respectively. T-tests comparing results found for the different groups for each year are presented in Table 3.

Table 3
Average annual returns by year and survivorship

Panel A: Survivorship by year				
	All funds		New and survivors	
Year	Average return	No. of funds	Average return	No. of funds
2004	30.8	158	36.6	78
2005	25.9	171	26.3	92
2006	34.8	195	38.6	116
2007	40.1	249	42.9	159
2008	-38.0	316	-40.1	221
2009	82.5	399	84.7	310
2010	8.5	487	10.1	388
2011	-10.8	577	-10.2	494
2012	17.6	605	17.8	585
Panel B: Funds not surviving until February 2013				
Year	Average return	No. of funds	Mortality rate	t-test
2004	25.0	80	50.6	4.69*
2005	25.5	79	46.2	0.46
2006	29.2	79	40.5	4.11*
2007	35.1	90	36.1	2.56*
2008	-33.2	95	30.1	-1.76
2009	74.6	89	22.3	2.80*
2010	1.9	99	20.3	5.22*
2011	-14.2	83	14.4	2.97*
2012	14.3	20	3.3	0.86
Panel C: Funds discontinued in the following year				
Year	Average return	No. of funds	Mortality rate	t-test
2004	20.7	13	8.2	4.24*
2005	21.5	19	11.1	1.52
2006	25.1	24	12.3	3.22*
2007	29.0	28	11.2	3.41*
2008	-19.9	28	8.9	-1.67
2009	70.5	11	2.8	1.03
2010	-1.3	40	8.2	4.56*
2011	-15.0	69	12.0	3.42*
2012	14.3	20	3.3	1.21

Note: Average returns in percentage form in nominal Brazilian currency terms. All funds include those with at least a one-year track record. New and survivor funds in Panel A includes those that remained in operation until the end of the sample period, even if they initiated during it. Funds not surviving until Feb/2013 includes those that were discontinued after the year under analysis (i.e., 2006 values consider funds discontinued as from 2007). Funds discontinued in the following year include only those discontinued in the year after the year under analysis (i.e., 2006 values consider only funds discontinued during 2007). Mortality rate calculates the proportion of funds discontinued in relation to stock funds in existence in that year. The t-tests compare the average return of funds that survive until the end of the sample period in Panel A with the average return of discontinued funds in Panels B and C. * indicates significance at the 5 percent level.

Table 2 also suggests that including the funds initiated during the sample period increases average returns. This is consistent with Brazilian results in Mendonça Jr. *et al*. (forthcoming) and Matos, Pena, and Silva (2015) that associate younger funds to greater returns. Malkiel (1995),

contrastingly, found that the value weighted average annual return of all funds in his US sample was lower than that of funds in operation during the whole period studied. It is possible that funds created during the sample period in Brazil initiated operations in a favorable economic and stock market environment, as pointed out earlier in this article and by Mendonça Jr. *et al*. (2016) as well. Thus, these new funds may be driving the results in Table 2, despite the possible negative drag of smaller funds.

Table 3 presents average annual returns in each year of the sample period and disregards very small funds. Malkiel (1995) finds that the average return of the surviving funds is significantly greater than those recorded by non-survivors in all years of his sample. Average returns of funds in operation at the end of the sample period (Panel A) are greater than those of discontinued funds (Panel B) for every year, except 2008, with significance in 6 out of the 9 years. This confirms that the larger annualized returns of funds in operation in Table 2 are often significantly larger than discontinued ones. Panel C of Table 3 shows a comparison of the average returns of funds that survive until the end of the sample period with that of discontinued funds in each year. The average annual returns of surviving funds are greater than those of discontinued funds in the following year in all years, with the exception of 2008, with significance in 5 out of the 9 years. The results in Panel C are similar to those depicted in Panel B, which shows the differences for funds discontinued at any moment in time.

The Brazilian stock fund mortality rates in Table 3 are greater than those in the US sample of stock funds in Malkiel (1995). US stock fund mortality rates varied from five to 18 percent, depending on the year. Panel B of Table 3 shows mortality rates between 14 and 51 percent after disregarding 2012 because the 2013 data did not cover the whole year. The mortality rate of a fund in the year following the period analyzed is approximately 9% in Panel C of Table 3. Maybe the more volatile nature of the Brazilian stock market and economy induces a greater dynamic in the fund industry.

5. Conclusions

Disregarding discontinued funds may lead to overestimation of the average stock fund performance. The equally weighted average annual return of surviving Brazilian stock funds is nearly two percentage points greater than a sample with surviving and discontinued funds between January 2004 and February 2013. This figure drops to little over one percent for the AUM weighted average stock fund return, suggesting that the AUM of discontinued stock funds was smaller. The difference in performance, nonetheless, was not statistically significant in every sample year. This suggests that other factors may affect performance besides survivorship, such as fund longevity and association to large financial conglomerates that predominantly cater to the general banking clientele. Mendonça *et al*. (forthcoming) argue that younger funds or those run by independent asset managers that target qualified investors tend to perform better but Laes and Silva (2015) point out that only little over 1 percent of Brazilian stock fund managers are able to generate alphas that are not attributable to just luck.

A limitation of this study is that it was not possible to analyze discontinued funds in terms of their clientele or fee types because the Quantum database does not keep this information for liquidated funds. Only historical daily fund share prices and net asset values were available for these funds. Fund performance may play a more important role for funds dedicated to institutional investors. It is reasonable to assume that institutional investors can be more engaged in monitoring fund performance and may replace managers more easily due to inferior

performance. Funds that charge incentive fees may be discontinued by their managers once they lag their benchmark. The high watermark rule prevents funds from charging incentive fees for funds underperforming their benchmarks. These findings about survivorship bias motivate a new appraisal of Brazilian stock fund selection and performance analysis, particularly those in Sanematsu (2013), who suggested that funds oriented to general public and that charge incentive fees are more prone to present evidence of share price manipulation and agency conflicts. These finds could be more severe in liquidated funds, which this author did not consider.

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