

## Performance Evaluation of Bond and Money Market Mutual Funds via the Modigliani and Modigliani Measure

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### ABSTRACT

Chiefly encouraged by the works of F. Modigliani and L. Modigliani (1997); Badillo, Chang, Lagamayo, and Lim (2003); Arugaslan, Edwards, and Samant (2008); Varamini and Kalash (2008); and Almonte (2013b); the  $M^2$  measure, together with return and the Sharpe ratio, were used to evaluate the performance of Philippine bond and money market mutual funds for the period 2008-2012. The results showed that the top outlier fund was “Cocolife Fixed Income Fund, Inc.” [the website of the Philippine Investment Funds Association (PIFA, <http://www.pifa.com.ph/factsfignavps.asp>, 2013, October 12) was utilized for the mutual fund list and types [emulated Almonte’s (2013b) choice of source]]. Furthermore, in terms of both the  $M^2$  measure and leverage factor, bond funds were significantly different from money market funds.

**Keywords:** Modigliani and Modigliani measure,  $M^2$  measure, Sharpe ratio, mutual funds, fund performance

**Author’s notes:** (a) An earlier version of this paper, “The Performance Evaluation of Philippine Mutual Funds via the  $M^2$  Measure,” was published in the “Proceedings of the Society of Interdisciplinary Business Research – Universiti Kuala Lumpur (SIBR-UniKL) Conference: Interdisciplinary Business and Economics Research,” 2014, 3(1), k14-063 (pp. 1-14). Publisher: Society of Interdisciplinary Business Research (Copyright 2014 by Catherine Kalayaan S. Almonte) and (b) one fund was also part of the sample of Badillo et al. (2003). The researcher believed that this was a non-issue chiefly because the Badillo et al. (2003) research was more than a decade old and excluded the  $M^2$  measure.

## 1. INTRODUCTION

### 1.1. Overview

Based on historical data [average yearly values from monthly data sourced from Technistock Philippines, Inc. (ca. 2013) [shared the raw data of Almonte (2013b)]] of the Philippine stock and fixed income markets – the representatives used were the PSEi (Almonte, 2004, 2012a, 2012c, 2012d, 2013b; J.J.F. Lago, personal communication, 2013, January 9) [the PSEi was used to be called “the Phisix” (The Philippine Stock Exchange, Inc., 2011, May, p. 2)] and the rates of the 365-day fixed income security (Nooney and Devi, 2012; Almonte, 2013b; J.J.F. Lago, personal communications, 2013, January 9, 2013, January 11, 2013, September 19) – from 2007-2012, the stock market rose by approximately 52.38% while the rates of the fixed income market declined by about 59.04%. From 2007-2012 (using the unrounded yearly average values), the PSEi and the rates of the 365-day fixed income security had a correlation of  $r_s = -.829$ ,  $p < .10$ . The researcher would like to point out that if monthly

data were used, the correlation was slightly lower at  $r_s = -.772$ ,  $p < .0001$ . (Please refer to the Methodology section for a more detailed explanation and/or references used.)

The Philippine Investment Funds Association (PIFA, <http://www.pifa.com.ph/factsfignavps.asp>, 2013, October 12) listed 32 funds denominated in Philippine Pesos: eight balanced, 10 bond, 10 equity, and four money market funds.

Fund performance was reported via the return metric (PIFA, <http://www.pifa.com.ph/factsfignavps.asp>, 2013, October 12). Other techniques were a cut above (Reilly and Brown, 2012). Although some approaches were more advanced than the simple return measurement, they posed a challenge for an ordinary person's understanding (F. Modigliani and L. Modigliani, 1997).

More than 30 years after Treynor (1965) and Sharpe (1966) published their works, F. Modigliani and L. Modigliani (1997) conceived another way to evaluate portfolios. Their model was popularly identified as the  $M^2$  measure (e.g. Edwards and Samant, 2003; Le Sourd, 2007; Arugaslan, Edwards, and Samant, 2008; Varamini and Kalash, 2008; Arugaslan and Samant, 2010, 2012). It could be used for financial strategy by referring to the leverage factor (F. Modigliani and L. Modigliani, 1997; Edwards and Samant, 2003; Arugaslan, et al., 2008; Arugaslan and Samant, 2010, 2012).

## 1.2. Objective

Moved by the works of F. Modigliani and L. Modigliani (1997), Edwards and Samant (2003), and Arugaslan, et al. (2008), the foremost objective of this research was to contribute to the literature regarding the use of the  $M^2$  measure as a tool for evaluating the performance of Peso-denominated bond and money market mutual funds.

## 1.3. Hypotheses

Both hypotheses were encouraged by the works of F. Modigliani and L. Modigliani (1997); Badillo, Chang, Lagamayo, and Lim (2003); Arugaslan, et al. (2008); Varamini and Kalash (2008); and Almonte (2013b):

*Hypothesis 1 The  $M^2$  measures of bond mutual funds were significantly different from the  $M^2$  measures of money market mutual funds.*

*Hypothesis 2 The leverage factors of bond mutual funds were significantly different from the leverage factors of money market mutual funds.*

## 2. LITERATURE

### 2.1. Studies that Used the $M^2$ Measure

F. Modigliani and L. Modigliani (1997), credited with the  $M^2$  measure, employed seven mutual funds in their research. They used a Treasury bill to represent the risk-free security and the S&P 500 Index as the benchmark (F. Modigliani and L. Modigliani, 1997). They mentioned that the Sharpe ratio and  $M^2$  measure generated the same rankings (F. Modigliani and L. Modigliani, 1997, p. 51). Four out of seven funds earned returns higher than the benchmark, just 28.57% of the funds had better  $M^2$  measures (matched up against the benchmark), three out of seven funds had leverage factors above or equal to 1, and two out of three funds that generated returns lower than the S&P 500 did better (based on the  $M^2$  measure) than said benchmark (F. Modigliani and L. Modigliani, 1997).

Two of the earlier researchers of the  $M^2$  measure were Edwards and Samant (2003). Like F. Modigliani and L. Modigliani's (1997) work, they used a Treasury bill to represent the

risk-free security and the S&P 500 Index as the funds' benchmark (Edwards and Samant, 2003). They conducted their study using several periods and noted that the Sharpe ratio and  $M^2$  measure generated the same rankings (Edwards and Samant, 2003). Some of the results of the shorter period revealed that only seven out of 23 funds earned returns higher than the benchmark, just 17.39% of the funds had better  $M^2$  measures (matched up against the benchmark), and only one out of 16 funds that generated returns lower than the S&P 500 did better (based on the  $M^2$  measure) than said benchmark (Edwards and Samant, 2003). Some of the results of the other period revealed that just 20% of the funds earned returns higher than the benchmark, just 20% of the funds had better  $M^2$  measures (matched up against the benchmark), and only one out of eight funds that generated returns lower than the S&P 500 did better (based on the  $M^2$  measure) than said benchmark (Edwards and Samant, 2003).

Several years after Edwards and Samant published their paper (Edwards and Samant, 2003), they collaborated again – this time with Arugaslan as a co-author – to scrutinize the performance of funds in the United States of America (Arugaslan, et al., 2008). As with the Edwards and Samant (2003) research, a Treasury bill was used to represent the risk-free security, the S&P 500 Index was used as the benchmark, several periods were studied, and they noted that the Sharpe ratio and  $M^2$  measure generated the same rankings (Arugaslan, et al., 2008). Some of the results of the shorter period revealed that 17 out of 20 funds earned returns higher than the benchmark, 85% of the funds had better  $M^2$  measures (matched up against the benchmark), 16 out of 20 funds had leverage factors above or equal to 1, and only one out of three funds that generated returns lower than the S&P 500 did better (based on the  $M^2$  measure) than said benchmark (Arugaslan, et al., 2008). Some of the results of the other period revealed that 11 out of 20 funds earned returns higher than the benchmark, 80% of the funds had better  $M^2$  measures (matched up against the benchmark), 14 out of 20 funds had leverage factors above or equal to 1, and six out of nine funds that generated returns lower than the S&P 500 did better (based on the  $M^2$  measure) than said benchmark (Arugaslan, et al., 2008).

In another research, Arugaslan and Samant (2010) used a Treasury bill to represent the risk-free security and the MSCI EAFE Index as the benchmark to study American Depositary Receipts (ADRs). They noted that the Sharpe ratio and  $M^2$  measure generated the same rankings (Arugaslan and Samant, 2010). Some of the results showed that only 17 out of 38 ADRs earned returns higher than the benchmark, just 21.05% of the ADRs had better  $M^2$  measures (matched up against the benchmark), no ADR had a leverage factor above or equal to 1, and zero out of 21 ADRs that generated returns lower than the MSCI EAFE did better (based on the  $M^2$  measure) than said benchmark (Arugaslan and Samant, 2010).

About two years after Arugaslan and Samant published their work (Arugaslan and Samant, 2010), they conducted a similar study (Arugaslan and Samant, 2012). They noted that the Sharpe ratio and  $M^2$  measure generated the same rankings (Arugaslan and Samant, 2012). Some of the results showed that 12 out of 13 ADRs earned returns higher than the benchmark, 100% of the ADRs had better  $M^2$  measures (matched up against the benchmark), only two out of 13 ADRs had leverage factors above 1, and the single asset that generated returns lower than the MSCI EAFE did better (based on the  $M^2$  measure) than said benchmark (Arugaslan and Samant, 2012).

Another study (concentrated on bond funds) that used the  $M^2$  measure was done by Wiberg (2006). According to some of his findings, only a sole fund earned a return higher than the benchmark, just 8.57% of the funds had better  $M^2$  measures (matched up against the benchmark) and only three out of 34 funds that generated returns lower than the index did better (based on the  $M^2$  measure) than the benchmark (Wiberg, 2006).

Varamini and Kalash (2008) applied the concept of market efficiency (Fama, 1970) in their study of diverse kinds of funds with consideration for capitalization. Varamini and Kalash's (2008) study revealed that value funds (that were low-capitalized) had better Sharpe and  $M^2$  measures matched up against those of higher capitalized value funds. Please see Varamini and Kalash (2008) for detailed information.

## 2.2. Other Studies About Mutual Funds

The Canadian Foundation for Advancement of Investor Rights (Canadian FAIR; 2010, March 11) said that a lot of money market funds in Canada did poorly.

Nooney and Devi (2012) used the following benchmarks: Bombay Stock Exchange (BSE) Sensex (for stock and balanced funds) and the one-year Treasury bill (for bond and money market funds). In addition to the BSE Sensex, Nooney and Devi (2012) also used other benchmarks for stock funds.

In the Philippines, Badillo et al. (2003) noted that the Sharpe ratios of different fund types were statistically equal. On the other hand, Almonte (2012d, 2013b) singled out top outlier funds.

For other literature, please refer to Almonte (2012d, 2013b).

## 2.3. Research Gap

The researcher had not found published literature on the  $M^2$  measure that used samples from the Philippines. Moreover, the researcher built on the contributions of F. Modigliani and L. Modigliani (1997), Badillo, et al. (2003), Arugaslan, et al. (2008), Varamini and Kalash (2008), and Almonte (2013b) by conducting hypotheses testing concerning the  $M^2$  measure and leverage factor of bond funds and money market funds.

## 3. METHODOLOGY

### 3.1. Sample

The sample composed of 10 mutual funds denominated in Philippine Pesos: eight bond funds and two money market funds. The website of the PIFA (<http://www.pifa.com.ph/factsfignavps.asp>, 2013, October 12) was utilized for the mutual fund list and types [emulated Almonte's (2013b) choice of source]. The study covered the years 2008–2012.

Emulating Almonte (2013b), monthly data of mutual funds (net asset value per share) was sourced from Technistock Philippines, Inc. (ca. 2013). The researcher used the following data of Almonte (2013b): (a) the PSEi [monthly data sourced from Technistock Philippines, Inc. (ca. 2013)], (b) the rates of the 365-day fixed income security [monthly data sourced from Technistock Philippines, Inc. (ca. 2013)], and (c) the annual yields of the 91-day Treasury bill [collected from the Bureau of the Treasury (as cited by the Bangko Sentral ng Pilipinas (BSP), <http://www.bsp.gov.ph/statistics/sdds/tbillsdds.htm>, 2013, April 2)]. Although the raw data was shared, this study dealt with a lengthier period than Almonte's (2013b) work.

The 365-day fixed income security was used as the benchmark for bond and money market funds (idea came from Nooney and Devi, 2012; Almonte, 2013b; J.J.F. Lago, personal communication, 2013, September 19).

### 3.2. Computations and Data Analyses

Emulating Lyroudi, Subeniotis, and Komisopoulos (2002) and Almonte (2004, 2012a), returns were determined based on the change in value.

This research was chiefly based on the works of F. Modigliani and L. Modigliani (1997), Badillo, et al. (2003), Arugaslan, et al. (2008), Varamini and Kalash (2008), and Almonte (2013b). As such, this study (1) generally emulated Almonte (2013b) with regards to choice of data and benchmark, method of computations, software used, etc., (2) was encouraged by the works of Badillo, et al. (2003) and Varamini and Kalash (2008), and (3)

used the formulae of the  $M^2$  measure and leverage factor as they appeared in the work of Arugaslan, et al. (2008, pp. 12-13) [the  $M^2$  measure was based on Sharpe (1966) and F. Modigliani and L. Modigliani (1997), while the leverage factor was based on F. Modigliani and L. Modigliani (1997)].

This paper emulated the works of F. Modigliani and L. Modigliani (1997), Edwards and Samant (2003), and Almonte (2013b) in the use of arithmetic means. Furthermore, as with the style of Almonte (2013b): (a) Goodwin's (1998, p. 37) paper was used as a reference in annualizing figures, (b) Reilly and Brown's (2012, pp. 939–940) work was used as a reference in determining the Sharpe ratio, (c) the 91-day Treasury bill rates for 2008–2012 were averaged (also emulated the style of Almonte, 2012d), (d) Microsoft Excel (version 2007) was utilized to determine the values (also emulated Almonte, 2012d), and (e) XLSTAT (version 2011.4.02) was the chosen statistical program (emulated Almonte's, 2012a, 2012b, 2012c, 2013a choice of program). Please refer to Almonte (2012d, 2013b) for detailed information.

The foundation for selecting Spearman correlation was Siegel and Castellan, Jr. (1988) [Spearman correlation was also carried out in XLSTAT by Almonte (2013b)]. The Mann-Whitney test was chosen due to the explanation of Addinsoft (<http://www.xlstat.com/en/products-solutions/feature/non-parametric-tests-on-two-independent-samples.html>), ca. 1995–2014).

According to F. Modigliani and L. Modigliani (1997), Edwards and Samant (2003), Arugaslan, et al. (2008), and Arugaslan and Samant (2010, 2012), when the formula of the  $M^2$  measure was applied to the benchmark, the benchmark's  $M^2$  measure equaled the return (this was verified in this study). Furthermore, emulating F. Modigliani and L. Modigliani (1997), Arugaslan, et al. (2008), and Arugaslan and Samant (2010, 2012), when the formula of the leverage factor was applied to the benchmark, the benchmark's leverage factor was 1.

The use of ranking was obtained from the works of F. Modigliani and L. Modigliani (1997), Edwards and Samant (2003), Arugaslan et al. (2008), Arugaslan and Samant (2010, 2012), and Almonte (2012d, 2013b). Ranking and sorting were accomplished via Microsoft Excel (version 2007).

The inclusion of the leverage factor was encouraged by the works of F. Modigliani and L. Modigliani (1997), Edwards and Samant (2003), Wiberg (2006), Arugaslan et al. (2008), and Arugaslan and Samant (2010, 2012).

This paper matched up the funds' standard deviations against their respective returns (encouraged by the work of Gitman, 2009), matched up the funds' returns against their respective  $M^2$  measures (F. Modigliani and L. Modigliani, 1997; Edwards and Samant, 2003; Wiberg, 2006; Arugaslan et al., 2008; Arugaslan and Samant, 2010, 2012), matched up the funds' values against their respective benchmarks (F. Modigliani and L. Modigliani, 1997; Edwards and Samant, 2003; Wiberg, 2006; Arugaslan et al., 2008; Arugaslan and Samant, 2010, 2012; Nooney and Devi, 2012; Almonte, 2012d, 2013b), identified funds with returns lower than the benchmark and matched up these funds'  $M^2$  measures with that of the benchmark to see if the funds did better than the benchmark (F. Modigliani and L. Modigliani, 1997), and acknowledged funds deemed to be outliers (F. Modigliani and L. Modigliani, 1997; Edwards and Samant, 2003; Arugaslan, et al., 2008; Arugaslan and Samant, 2010, 2012; Nooney and Devi, 2012; Almonte, 2012d, 2013b).

Emulating Redman, Gullett, and Manakyan (2000) and Almonte (2004, 2012a, 2012b, 2012c), summary statistic(s) were included in the discussion.

### 3.3. Limitations

One bond fund was also part of the sample of Badillo et al. (2003). The researcher believed that this was a non-issue chiefly because the Badillo et al. (2003) research was more than a decade old and excluded the  $M^2$  measure. Given that recent studies relating to balanced

and/or equity mutual funds were done by Almonte (2012d, 2013b), only bond and money market funds denominated in Philippine Pesos comprised this research.

Discrepancies in dates (the discrepancies involved the days, the month and year were still identical) were ignored and the data was still used (emulated Almonte, 2013b, p. 53, limitation number six). Furthermore, see limitation numbers two and five of Almonte (2013b, p. 53).

As this research used small samples, the results ought to be understood with care (Bland, 2008, July).

## 4. RESULTS

### 4.1. Risk, Return, Sharpe ratio, $M^2$ measure, Leverage Factor, and Ranking

Bond funds (Table 1): all funds [except for “Prudentiallife Fixed Income Fund Inc.” [the website of the PIFA (<http://www.pifa.com.ph/factsfignavps.asp> , 2013, October 12) was utilized for the mutual fund list and types [emulated Almonte’s (2013b) choice of source]]] had lower risk matched up against their respective returns. All funds [except for “Prudentiallife Fixed Income Fund Inc.” [the website of the PIFA (<http://www.pifa.com.ph/factsfignavps.asp> , 2013, October 12) was utilized for the mutual fund list and types [emulated Almonte’s (2013b) choice of source]]] had lower  $M^2$  measures matched up against their respective returns. Seven out of eight funds earned returns higher than the benchmark, only one out of eight funds had better Sharpe ratios and  $M^2$  measures (matched up against the benchmark), and no fund had a leverage factor above 1. The only fund that generated a return lower than the benchmark still did not do better (based on the  $M^2$  measure) than the benchmark. “Cocolife Fixed Income Fund, Inc.” [the website of the PIFA (<http://www.pifa.com.ph/factsfignavps.asp> , 2013, October 12) was utilized for the mutual fund list and types [emulated Almonte’s (2013b) choice of source]] had the highest return, Sharpe ratio, and  $M^2$  measure.

Money market funds (Table 1): “Sun Life Prosperity Money Market Fund, Inc.” [the website of the PIFA (<http://www.pifa.com.ph/factsfignavps.asp> , 2013, October 12) was utilized for the mutual fund list and types [emulated Almonte’s (2013b) choice of source]] had higher risk matched up against its return. All funds had higher  $M^2$  measures matched up against their respective returns. No fund earned a return higher than the benchmark, no fund had a better Sharpe ratio and  $M^2$  measure (matched up against the benchmark), and no fund had a leverage factor above 1. The two funds that generated returns lower than the benchmark still did not do better (based on the  $M^2$  measure) than the benchmark. “Philam Managed Income Fund, Inc.” [the website of the PIFA (<http://www.pifa.com.ph/factsfignavps.asp> , 2013, October 12) was utilized for the mutual fund list and types [emulated Almonte’s (2013b) choice of source]] had the highest return, Sharpe ratio, and  $M^2$  measure but did not do better than the benchmark.

According to Table 1, the rankings (based on the Sharpe ratio and  $M^2$  measure) were the same (consistent with F. Modigliani and L. Modigliani, 1997; Edwards and Samant, 2003; Le Sourd, 2007; Arugaslan, et al., 2008; Arugaslan and Samant, 2010, 2012).

Furthermore, as per Table 1, when bond and money market funds were combined, only five funds had consistent: (a) return and Sharpe ratio rankings; (b) return and  $M^2$  measure rankings; and (c) return, Sharpe ratio, and  $M^2$  measure rankings. According to Table 1, the top outlier fund in terms of return, and/or Sharpe ratio, and/or  $M^2$  measure was “Cocolife Fixed Income Fund, Inc.” [the website of the PIFA (<http://www.pifa.com.ph/factsfignavps.asp> , 2013, October 12) was utilized for the mutual fund list and types [emulated Almonte’s (2013b) choice of source]].

The poor performance of bond and money market funds could be due to the very good performance of the local equity market and the low interest rates (as mentioned earlier, the PSEi and the 365-day fixed income security were negatively correlated; see Section 1.1).

**Table 1 Standard deviations, returns, Sharpe ratios, M<sup>2</sup> measures, leverage factors, and rankings**

<i>Fund</i>	Standard Deviation	Return	Rank (Return)	Sharpe Ratio	Rank (Sharpe Ratio)	M <sup>2</sup> Measure	Rank (M <sup>2</sup> Measure)	Leverage Factor	Rank (Leverage Factor)
<i>Fund</i>									
ALFM Peso Bond Fund, Inc. <sup>a</sup>	1.727%	5.984%	5	1.582	2	4.061%	2	0.296	3
Cocolife Fixed Income Fund, Inc. <sup>a</sup>	3.129%	8.794%	1	1.771	1	4.158%	1	0.164	6
First Metro Save and Learn Fixed Income Fund, Inc. <sup>a</sup>	3.682%	8.094%	2	1.315	3	3.925%	3	0.139	7
Philam Bond Fund, Inc. <sup>a</sup> †	3.939%	6.374%	4	0.793	6	3.657%	6	0.130	8
Philam Managed Income Fund, Inc. <sup>b</sup>	1.190%	1.828%	9	-1.196	9	2.639%	9	0.430	1
Philequity Peso Bond Fund, Inc. <sup>a</sup>	2.813%	6.575%	3	1.181	4	3.856%	4	0.182	4
Prudentialife Fixed Income Fund Inc. <sup>a</sup>	4.415%	2.787%	8	-0.105	8	3.198%	8	0.116	9
Sun Life of Canada Prosperity Bond Fund, Inc. <sup>a</sup>	2.863%	5.755%	6	0.874	5	3.699%	5	0.179	5
Sun Life Prosperity GS Fund, Inc. <sup>a</sup>	4.783%	5.344%	7	0.437	7	3.475%	7	0.107	10
Sun Life Prosperity Money Market Fund, Inc. <sup>b</sup>	1.212%	0.546%	10	-2.232	10	2.109%	10	0.422	2
<i>Benchmark</i>									
365-day Fixed Income Security	0.512%	4.105%	-	1.667	-	4.105%	-	1.000	-

Notes: See Methodology for detailed references.  
 The column headings of Table 1 were partially adapted from "Risk-adjusted performance: How to measure it and why," by F. Modigliani and L. Modigliani, 1997, *The Journal of Portfolio Management*, 23, p. 50. Copyright 1997 by Institutional Investor, Inc. (Institutional Investor).  
 The mutual fund list and types in Column 1 (the left-most column) were obtained from "NAVPS performance (as of 10/11/2013)" in "Facts & figures," by the Philippine Investment Funds Association, <http://www.pifa.com.ph/factsfignavps.asp>, 2013, October 12. Copyright 2004 by Philippine Investment Funds Association [Philippine Investment Fund Association (PIFA)]. The researcher combined the fund types in order to have a different way of presenting Column 1. Since the mutual fund list and types were presented in a table, quotation marks were not utilized.  
 The dash meant that ranking was not performed [emulated F. Modigliani and L. Modigliani (1997) and Almonte (2013b); F. Modigliani and L. Modigliani (1997) left the cell unfilled while Almonte (2013b) used a different notation instead of a dash]: Please see "Risk-adjusted performance: How to measure it and why," by F. Modigliani and L. Modigliani, 1997, *The Journal of Portfolio Management*, 23, p. 50. Copyright 1997 by Institutional Investor, Inc. (Institutional Investor) and "The Risk-adjusted Performance of Equity and Balanced Funds in the Philippines" by C.K.S. Almonte, 2013, *International Journal of Information Technology and Business Management*, 14, pp. 57-59. Copyright 2012 JITBM and ARF.  
 The 365-day fixed income security was used as the benchmark for bond and money market funds (idea came from Nooney and Devi, 2012; Almonte, 2013b; J.J.F. Lago, personal communication, 2013, September 19).  
<sup>a</sup>bond fund. <sup>b</sup>money market fund.  
 †part of the sample of Badillo, et al. (2003).

## 4.2. Statistical Results

According to Table 2, bond funds have a higher average M<sup>2</sup> measure than money market funds while money market funds have a higher average leverage factor than bond funds.

**Table 2 Summary statistics: Bond and money market funds**

	M <sup>2</sup> Measure	Leverage Factor
<i>Bond Funds</i>		
Observations	8	8
Minimum	0.032	0.107
Maximum	0.042	0.296
Mean	0.038	0.164
Standard Deviation	0.003	0.060
<i>Money Market Funds</i>		
Observations	2	2
Minimum	0.021	0.422
Maximum	0.026	0.430
Mean	0.024	0.426

Standard Deviation	0.004	0.006
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Notes: See Methodology for detailed references. Some items in the Summary Statistics for bond and money market funds were not presented in percentage form.

The Mann-Whitney test (Table 3) determined that both the  $M^2$  measures and leverage factors of bond and money market funds were significantly different.

Thus, the information presented in Section 4.1 appeared to have been confirmed by the statistical results.

**Table 3 Mann-Whitney test**

	$M^2$ Measure	Leverage Factor
<i>Mann-Whitney Test</i>		
U	16.000*	0.000*
Expected Value	8.000	8.000
Variance (U)	14.667	14.667

Notes: See Methodology for detailed references.

\* $p < .05$ , two-tailed.

## 5. CONCLUSION

In terms of return, bond funds did well as all save for one fund did better than the benchmark. However, in terms of the Sharpe ratio and  $M^2$  measure, only one fund did better than the benchmark.

The performance of money market funds were worse than bond funds as no fund did better than the benchmark in terms of return, the Sharpe ratio, and the  $M^2$  measure.

“Cocolife Fixed Income Fund, Inc.” [the website of the PIFA (<http://www.pifa.com.ph/factsfignavps.asp> , 2013, October 12) was utilized for the mutual fund list and types [emulated Almonte’s (2013b) choice of source]] was the top outlier fund.

In terms of both the  $M^2$  measure and leverage factor, bond funds were significantly different from money market funds.

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