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DERIVATIVE USE OF TURKISH INVESTMENT FUNDS DURING THE 2008-09 FINANCIAL CRISIS

Burak Pirgaip[1†] **--- Aslıhan Taşdemir**[2]
[1]*Assist. Prof., Department of Banking and Finance, Cankaya University, Turkey*
[2]*Research Assist., Department of Business Administration, Hacettepe University, Turkey*

ABSTRACT

This paper centers on the question of how derivatives were utilized by investment fund managers in the course of 2008-09 global financial crisis. In this vein, we analyze investment funds defined as mutual funds and investment trusts, by comparing them in terms of derivative use under three fund categories. With respect to 193 investment funds, our first categorization is "investment objectives" and our results show that the 43.40 % (22.12%) [51.85%] of the funds invested in only equity (bonds) [both equity and bonds] used derivatives. Secondly, in terms of their "legal structures", we find that 56.67% of the closed-ended and 27.61% of the open-ended funds used derivatives. In the final category, i.e. "fund-type", it is observed that 51.89% (8.03%) of the A-type (B-type) funds used derivatives. We proceed with logit analysis in order to identify the relation between of fund characteristics and derivative use. We find for each category that the likelihood of derivative use increased as the turnover of funds escalated. Furthermore, we make univariate analyses to compare distributional parameters between derivative users and non-users. In terms of "investment objectives", users having bond-dominated portfolios had higher standard deviation, idiosyncratic risk and skewness, while those of non-users had higher beta and timing beta. For the structural categorization, users significantly had higher standard deviation, idiosyncratic risk and skewness and yet non-users had a higher beta and timing beta. In case of "fund type", non-users had a higher beta yet a lower kurtosis. Lastly, we apply regression analyses to test relation between risk change and fund's previous performance. The empirical results indicate that there was a negative relationship, which was weaker for derivative users.

Keywords: Derivatives, Mutual funds, Investment trusts, Financial crisis, Closed-ended funds, Open-ended funds, Turkey.
JEL Classification: G10, G19.

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Contribution/ Originality

This study contributes in the existing literature in not only being the first study in Turkish capital markets that tries to explain derivative use in investment funds, but also being one of very few studies which investigates the role of derivatives in portfolio management throughout the 2008-2009 financial crises.

† Corresponding author
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1. INTRODUCTION

Since February 4th, 2005, when the opening bell rang in Turkish Derivatives Exchange (TurkDEX), the market had witnessed a stupendous volume growth. As of 2009 year-end, annual trading volume had exceeded TL 334 bn, which is 161% and 11.030% of that of 2008 and 2005, respectively. Derivatives market currently offers futures and options on debt instruments, equities, foreign exchange rates and commodities, and the trading volume is about TL 1.135 bn as of 2015 year-end.

Capital Markets Board (CMB), analogously the Turkish SEC, allowed investment funds to use derivatives in 2005, but the uncertainty in tax regime for derivatives was removed in 2006 by making such investments tax exempt for investment funds. This move inevitably increased derivative use, and in 2007, CMB set rules regarding fund risk management systems to cope with risks associated with derivatives. Despite the fact that investment funds performed a significant portion of derivatives activity, relatively little is known concerning the rationale behind it. Especially when the 2008-09 crisis period is considered, it would really be interesting to know whether or not investment funds benefited from such an investment and regulatory climate set for derivatives.

The key question in this regard is how Turkish investment funds used derivative instruments during the 2008-09 global financial crisis. In this study, we attempt to address this issue firstly by defining investment funds as mutual funds and investment trusts. Although vast literature focusing on either investment funds or derivative use, to the best of our knowledge there have been a few research addressing our question. Therefore, this study plays a contributory role to the limited body of literature on derivative use of investment funds from various aspects.

To simply mention a few studies bearing on this question, covering 679 equity mutual funds in the U.S., Koski and Pontiff (1999) focus on derivative use and whether there exists any performance differences between derivative users and non-users. The results show that 20.8% of managers utilize derivatives. Besides, the findings for performance and return distributions point to "no significant difference" between funds those do and do not invest in derivatives. In another study, Johnson and Yu (2004) following Koski and Pontiff (1999) analyze 988 Canadian mutual funds and observe that the percentage of derivative use in the total sample is 21.36%, where the percentage in fixed income funds and foreign and domestic equity funds is 10.74%, 23.32% and 28.12%, respectively. Furthermore, the study assesses that while risk-return differences do not exist between user and non-user foreign equity funds, risks and returns are higher for user fixed-income funds. In case of domestic equity funds, it is observed that users display lower returns and higher risks than non-users.

Apart from these, in some studies researchers examine derivative use through conducting surveys such as Bodnar *et al.* (1995); Grant and Marshall (1997) and El-Masry (2006). Bodnar *et al.* (1995) present evidence which indicates that larger firms tend to use derivatives. This survey also reveals that of the 530 U.S. non-financial firms in the total sample 35% use derivatives. Grant and Marshall (1997) document the results of two surveys of the financial managers of the top 250 U.K. companies. According to the findings of these surveys, majority of the companies uses financial derivative instruments, particularly, options and forwards to reduce their interest risks and currency risks. The findings of El-Masry (2006) however, demonstrate that larger firms, public companies and international firms have higher proportion of derivative use within the 173 U.K. non-financial companies.

Derivative use is linked with size, as already noted by some surveys above, by Heaney and Winata (2005) whose sample consists of 374 Australian companies. Their findings imply that larger companies have a tendency to use derivatives. However, Whidbee and Wohar (1999) with a sample of 175 listed bank-affiliated companies, assert that managerial incentives and external supervision have leading effects on using derivatives in risk reduction in banking industry. Moreover, they claim that bank managers tend to use derivatives when their equity share decreases, which is inconsistent with the results of Geczy *et al.* (1997). Further, Sinkey and Carter (2000) who aim at finding the financial characteristics of U.S. banks, present evidence that non-user banks have more conservative and less risky

capital structure. Likewise, more recently Yong *et al.* (2009) analyze Asia-Pacific banks so as to measure the linkage between their derivative activities and exposures in interest and exchange rates. The results point out that derivative use increases (decreases) long-term (short-term) interest rate exposure. The link between derivative use and exchange rate exposure, on the other hand, is not significant.

Heaney and Winata (2005) also reported that the main theoretical motivation for derivative use is to maximize company value or maximize management utility, which is also supported by Smith and Stulz (1985); Geczy *et al.* (1997); Berkman and Bradbury (1996) and Allayannis and Weston (2001). Besides, Hentschel and Kothari (2001) analyze 425 large U.S. corporations and they find that derivative use does not have a direct effect on the firms' riskiness and exposures.

Melting all in a single pot, we anticipate that portfolios of derivative users should have demonstrated improved performance when compared to similar portfolios of non-users, bearing in the mind that, especially in the aftermath of the recent credit crunch, derivatives were widely accused of having been used as financial weapons of mass destruction.

According to CMB legislation, mutual funds are open-ended funds having no legal entity and variable capital[1]. Investment trusts, however, are closed-ended funds having legal entity and fixed capital[2]. Investment trusts' shares are traded in Borsa Istanbul (BIST), formerly known as Istanbul Stock Exchange (ISE), so the net asset value *(NAV-calculated as net assets/number of shares)* differs significantly from share value *(as determined in the market)*. In the ISE, the market price of a trust share is often lower than per share NAV, which is said to be selling at a discount to per share NAV. Although, funds and trusts are different in legal structure, they are almost the same in essence with regards to portfolio management.

In the sampling period, there were two types of investment funds, which are called "A" and "B" type. A type funds had to invest 25% of their cash in stocks, on the other hand B type ones did not have such a constraint[3]. Type classification was removed by the new capital markets law as of 2012.

Investment funds have several investment objectives. Some of them invest dominantly in stocks; some of them invest in fixed income securities or precious metals such as gold or silver, or foreign securities or derivatives, or mixture of each. In Turkey, however, it is possible to simply classify funds investing in stocks, bonds and a blend of them as other instruments are rarely held in portfolios.

Hence, we analyze derivative use in investment funds by assessing the return features of users and non-users comparatively within a threefold categorization: "Investment Objective *(Equity vs. Bond vs. Balanced Portfolios)*", "Structure *(Open-Ended vs. Closed-Ended)*", and "Type *(Type A vs. Type B)*".

Given this categorization, we first consider that derivative user investment funds may have different risk schemes than non-user ones. After that, we investigate the potential effects of derivatives on the intertemporal relation between fund performance[4] and risk, which has been already put by some researchers previously[5]. By means

[1] First Turkish mutual fund was established in 1986 and its participation certificates were issued in 1987. The regulation in force superseded the old (1986) one in 1996. As of 31.12.2009, there are 299 mutual funds in Turkish capital markets with net asset value summing up 20 bn $.

[2] The first Turkish investment trust was established and its shares were offered to the public in 1991. The regulation in force superseded the old (1983) one in 1992. As of 31.12.2009, there are 33 investment trusts in Turkish capital markets with net asset value summing up 479 m $.

[3] Fundamentally, this distinction stems from tax reasons. In order to encourage investments in shares and increase liquidity in the stock market, A type funds had been tax-free until 2006, while B type funds holders had to pay witholding tax of 10%. This tax favor has been removed as of 2006, but the type distinction continues for strategical reasons.

[4] Grinblatt and Sheridan, (1989). Report that performance of funds in different investment objective categories is also different.

[5] See Chevalier and Glenn (1997). Brown, Harlow and Starks (1996). and Koski and Pontiff (1999).

of this paper, we provide the first empirical evidence regarding derivative use in Turkish investment fund industry in 2008-09 financial crisis period. Our findings show that a considerable amount of mutual funds did not use derivatives while more than half of investment trusts were derivative users. From the total sample of 163 mutual funds and 30 investment trusts, 27.61% and 56.67% used derivatives. We also find that equity-dominated and balanced portfolios preferred derivatives more than bond-dominated ones. Lastly, derivative use was concentrated in A-type funds. Turnover was the most significant reason behind derivative use as the likelihood of derivative use increased as turnover of funds escalated.

We find substantial variations in risk between derivative user funds and non-user funds in each fund category. Derivative users having bond-dominated portfolios had higher standard deviation, idiosyncratic risk and skewness, while those of non-users have higher beta and timing beta. Derivative user open-ended funds had higher standard deviation, idiosyncratic risk and skewness and yet non-users had a higher beta and timing beta. Derivative user Type-A funds had a higher kurtosis. On the other hand, derivative use is related with neither risk exposure nor higher moments of return distributions in case of investment trusts, funds having equity and balanced portfolios and B type funds.

The regression results point out that past performance is negatively and significantly linked with risk change. However, exposure of derivative user funds to risk change was significantly negligible.

In this framework, a brief data description is provided in Section II. Results are reported in Sections III. Section IV is the concluding part.

2. DATA

2.1. Sample Selection

We collect data for all investment funds, i.e. mutual funds and investment trusts, registered to CMB and stayed alive during January 2008 to December 2009. We exclude hedge funds, special funds, capital guaranteed funds and capital protected funds; since the former two do not supply adequate information about their portfolios, while the latter two use derivatives just for hedging purposes due to regulatory requirements. We consider future contracts traded in the derivatives market only, since TurkDEX was not offering options at that time.

In the next step, the prospectuses/articles of association[6] of funds are tracked in order to find the ones allowed to invest in derivatives. We define non-users as investment funds that do not use derivatives although they had the permission to do. We set those that are not permitted to use derivatives aside and deem that they do not invest in derivatives for regulatory reasons.

We use mainly CMB and BIST data. In addition, we confirm the data collected with statistics disclosed by TKYD[7] and FINNET[8]. As a result, we reach a final sample of 193 funds, which includes derivative users and non-users.

[6] According to CMB regulations, investment funds have to make a clear statement regarding the use of derivatives in their prospectuses and articles of association. In case of inexistence of such a statement, derivative use fo that fund is considered to be dissallowed.

[7] Turkish Association of Institutional Investment Managers' of Turkey (TKYD) established in 1999 aims at promoting incentives for the development of institutional investors *(www.tkyd.org.tr)*.

[8] FINNET is a database company which disseminates data about fund industry *www.fonbul.com*.

2.2. Descriptive Characteristics

Table I exhibits the use of derivatives with respect to three fund categories. 62, or 32.12%, of 193 funds used derivatives. This number was higher when compared to Koski and Pontiff (1999) and Johnson and Yu (2004) in which the percentage of derivative use in the total sample is 20.8% and 21.36%, respectively.

Table-1. Derivative Use by Investment Funds The table classifies the total sample of 193 funds. The percentage of funds for a given fund category is in parentheses.

Category	Group	# of funds	# (%) of funds using derivatives	# (%) of funds not using derivatives
Investment Objective	Equity	53	23 (43.40%)	30 (56.60%)
	Bond	113	25 (22.12%)	88 (77.88%)
	Balanced	27	14 (51.85%)	13 (48.15%)
Structure	Closed-ended	30	17 (56.67%)	13 (43.33%)
	Open-ended	163	45 (27.61%)	118 (72.39%)
Type	A	106	55 (51.89%)	51 (48.11%)
	B	87	7 (8.05%)	80 (91.95%)
Overall		193	62 (32.12%)	131 (67.88)

Table I shows that the proportion of funds using derivatives for investment objective category ranged from 22.12% to 51.85%; for structure category ranged from 27.61% to 56.67%, and for type category ranged from 8.05% to 51.89%, and proportional differences were significant in each category *(χ^2 test, p-value = 0.002, 0.001 and 0.000, respectively)*. Another descriptive study portrayed in Table 2 includes logit analysis examining any possible relationship between derivative use and fund characteristics. Dependent variable is one if the fund is a derivative user. We include fund age, the market share of the fund managers' portfolios, expense ratio of the fund, founder of the fund, fund turnover and dummy variables for each category as explanatory variables. The age[9] variable of the fund is included as an indicator of experience in derivative investment. The start-up, however, is not the establishment date but the first portfolio composition date of the fund. Portfolio managers of fund in Turkey are generally the founder itself or an affiliated company of the founder. Portfolio market share, as derived from net asset values of managed portfolios, is assumed to be a good performance estimator and derivatives may be used to increase market share. For regulatory purposes, derivative user funds have to establish an internal control and risk management system and employ qualified portfolio managers, which likely increase costs. Hence, derivative use may lead to high expense ratio for funds. In the sampling period, most funds were used to be established by banks. As a matter of fact, banks, being dominant in Turkish economy, tend to use derivatives more than other parties. This makes us think that bank founded funds were potential users of derivatives. Annual turnover measures trading activity, which is believed to have a positive impact on the probability of derivative use.

The findings imply that the probability of derivative use increased as the turnover of funds escalated for all three categories.

[9] A study by Almazan, Brown, Carlson and Chapman (2004). Highlights that older funds are more likely to being constrained in terms of prohibitions against derivatives.

Table-2. Link between Fund Characteristics and Derivative Use The table shows results of a logit analysis. The fund age (AGE) is determined as the number of years elapsed from the year of establishment. Market represents the market share of fund manager's portfolios (in percent). Expense ratio is the log of funds' expense. Turnover is annual and calculated logarithmically (in percent). Founder of the fund (FOUNDER) is a dummy equal to one if founder is a bank. Marginal probabilities are calculated at the mean values of the independent variables. *p*-value comes from a χ^2 test of the null hypothesis that the coefficient is zero.

	Variable	Marginal Probabilities	p-value	Odds Ratio
Investment Objective	Intercept	0.0050	0.0058	-
	Age	0.6160	0.2514	1.003897
	Market Share	0.4450	0.2209	0.965348
	Expense Ratio	0.5660	0.8671	1.022818
	Founder	0.4820	0.8407	0.903246
	Turnover	0.9590	0.0030	1.314183
	Dummy Equity	0.5030	0.9103	1.047647
	Dummy Balanced	0.5090	0.5960	1.296375
Structure	Intercept	0.0046	0.0077	-
	Age	0.6230	0.2202	1.004145
	Market Share	0.4420	0.2034	0,963890
	Expense Ratio	0.5620	0.8775	1,021377
	Founder	0.4782	0.8110	0,886124
	Turnover	0.9610	0.0031	1,320845
	Dummy Open-ended	0.5160	0.8785	1,078466
Type	Intercept	0.004	0.0030	-
	Age	0.6000	0.3319	1.003356
	Market Share	0.4450	0.2109	0,965517
	Expense Ratio	0.6270	0.7402	1,044752
	Founder	0.4880	0.8950	0,936224
	Turnover	0.9340	0.0094	1,259052
	Dummy A	0.6240	0.0707	2,521757

3. RESULTS

3.1. Risk

So as to examine the effects of derivative use to return distributions, we mainly analyze fund risk proxied by standard deviation, idiosyncratic risk and beta with inspiration of Koski and Pontiff (1999).

Standard deviation (STD) is derived from standard deviation of the monthly fund return, $\sqrt{((1/(N-1))\sum_{i=1\_}^{N}(r_i-\bar{r})^2)}$. Idiosyncratic risk (IDIO) is the standard deviation of the error term from a CAPM, $\sqrt{((1/(N-2))\sum_{i=1}^{N}e_i^{\,2})}$. Beta (BETA) is the beta coefficient in a CAPM. IDIO (unsystematic risk) and BETA (systematic risk) are the components of STD. We also make use of another variable, market timing beta (UPBETA)[10] developed by Treynor and Mazuy (1966) and employed by Jiang *et al.* (2007); Ferson and Schadt (1996); Cesari and Panetta (2002) in their earlier studies. The Treynor and Mazuy (1966) market timing model is measured as:.

$$r_{p,t} = \alpha_p + \beta_p\, r_{m,t} + \gamma_p\, r^2_{m,\,t} + \varepsilon_{p,t}$$

where $r_{p,t}$ denotes for the excess return on a fund at time t, $r_{m,t}$ represents the excess return on the market, and γ_p measures timing ability. As pointed out by Cumby and Glen (1990) and Gallagher (2001) a significantly positive γ_p indicates that the fund managers exhibit market timing ability. If managers are informed on and can promptly respond to market movements by means of derivatives, then derivative user funds will have higher market timing

[10] Apart from this model, Metron, and Henriksson (1981). and Henriksson (1984). Also develop a market timing model. Latter study that examines 116 open-ended mutual funds during the period of 1968-1980, does not offer further support for fund managers with market timing ability.

betas.Funds may have used derivatives in order to pave the way for expected profit or loss. Hence, we examine skewness to measure lopsidedness of return distributions. We measure skewness (SKEW) of the monthly return of a fund, as $\sum_{i=1}^{N} z_i^3 N/(N-1)(N-2)$, where $z_i = (r_i - \bar{r})/STD$.

Kurtosis is also included to measure peakedness of return distributions. The probability to confront with higher kurtosis increases given the monthly variation of STD. So, funds may use derivatives in order to get rid of infrequent extreme deviations. We use the following formula in order to get kurtosis (KURT) statistic of the monthly fund return, $\left(\sum_{i=1}^{N} \frac{z_i^4 N(N+1)}{(N-1)(N-2)(N-3)}\right) - \left(\frac{3(N-1)^2}{(N-2)(N-3)}\right)$

As a result, we have mean estimates of the risk variables STD, IDIO, BETA and UPBETA, and of higher moments, SKEW and KURT[11].

3.1.1. Comparison of Distributional Parameters

Table III illustrates mean values of each risk variable and higher moment for three fund categories each clustered on the basis of derivative use. In terms of investment objectives, users having bond-dominated portfolios had higher standard deviation, idiosyncratic risk and skewness, while those of non-users had higher beta and timing beta. Moreover, users' bond-dominated portfolios seem to be negatively skewed insomuch that funds probably used derivatives for their bond-dominated portfolios so as to hedge against losses. Why did bond portfolios attract derivatives? Table I depicts that percentage of derivative use *(22.12%)* was the least one for bond-dominated portfolios within the context of investment objective. However, they had the most significant statistics among others. In our study, we find that trading activity *(turnover)* and size *(net asset value)* of bond portfolios was higher than equity and balanced portfolios on average. We also realize that a considerable portion of derivatives in portfolios had stock index and foreign exchange as underlying assets and were used for hedging purposes. Funds managers may have desired to reduce bond portfolio risk via derivatives, but derivative users tended to be riskier than non-users, and this risk stemmed from the fund itself, not from the market. For the structure category, open-ended users significantly had higher standard deviation, idiosyncratic risk and skewness, and non-users had a higher beta and timing beta. In case of closed-ended funds, derivative use makes no difference. This is reasonable, because, investors of open-ended funds may redeem their shares when necessary, while this is not the case for closed-ended funds. Continuous redemption, as a matter of fact, sometimes creates enormous cash flows into and out of open-ended funds, which is a potential risk for portfolio maintenance. Thus, derivative use may have been preferable for them to handle this risk. Negative and significantly different skewness statistic was also evidence. Finally, for the fund type category, derivative user A type funds had a higher kurtosis. On the other hand, derivative user A type funds were negatively skewed, while B types were positively skewed. Although differences between derivative users and non-users were not significant, one can easily say that return distributions of B type funds had relatively few high values. A type and B type funds, by definition, are potential holders of bond and equity-dominated portfolios, respectively. As illustrated in Table III, regarding bond-dominated portfolios, however, is that; derivative use made significant differences, e.g., negative skewness. We find that main portion of funds

[11] The notations given above formulations stands for number of months *(N)*, return for month i *(r_i)*, mean return for the fund ($\bar{r}_i$), market model residual *(e_i)*.

Table-3. Risk Variables and Higher Moments by Fund Category and Derivative Use

		Investment Objective				Structure				Type			
		Overall 53-27-113)	Users (23-14-25)	Nonusers (30-13-88)	t-test (p value)	Overall (163-30)	Users (45-17)	Nonusers (118-13)	t-test (p value)	Overall (106-87)	Users (55-7)	Nonusers (51-80)	t-test (p value)
STD	Equity	9,440	9,649	9,279	0,613								
	Balanced	2,979	6,046	5,635	0,381								
	Bond	4,926	3,898	1,860	0,000								
	OE					4,554	6,726	3,726	0,000				
	CE					5,899	5,962	5,816	0,892				
	A									7,433	7,138	7,751	0,283
	B									1,511	1,638	1,500	0,759
IDIO	Equity	4,362	4,513	4,246	0,638								
	Balanced	1,522	3,323	2,627	0,209								
	Bond	3,162	2,256	1,263	0,000								
	OE					1,703	3,278	1,907	0,000				
	CE					10,589	3,485	3,666	0,800				
	A									3,564	3,583	3,544	0,914
	B									1,168	1,379	1,149	0,602
BETA	Equity	1,250	1,073	1,385	0,212								
	Balanced	0,359	0,653	0,760	0,095								
	Bond	8,100	1,463	4,463	0,000								
	OE					1,503	1,135	3,582	0,000				
	CE					4,677	1,138	1,654	0,508				
	A									0,843	0,782	0,909	0,077
	B									4,886	3,909	4,972	0,452
UPBETA	Equity	0,180	0,337	0,060	0,060								
	Balanced	-0,343	-0,021	-1,376	0,345								
	Bond	4,276	0,423	2,455	0,208								
	OE					0,492	-0,051	1,629	0,105				
	CE					1,863	1,196	0,594	0,717				
	A									0,098	0,142	0,050	0,174
	B									2,386	1,460	2,467	0,761
SKEW	Equity	-0,561	-0,679	-0,470	0,299								
	Balanced	-0,308	-0,578	-0,633	0,817								
	Bond	-0,056	-0,439	0,091	0,015								
	OE					-0,148	-0,436	-0,002	0,003				
	CE					-3,098	-0,886	-1,084	0,570				

	A									-0,637	-0,697	-0,573	0,349
	B									0,213	0,521	0,186	0,357
KURT	**Equity**	0,668	1,606	-0,052	0,053								
	Balanced	0,356	0,855	0,530	0,513								
	Bond	3,516	1,102	1,805	0,261								
	OE					0,736	1,150	1,113	0,933				
	CE					7,081	1,455	2,528	0,435				
	A									0,835	1,334	0,296	0,035
	B									1,749	0,442	1,863	0,213

Having bond-dominated portfolios came from B type funds, but derivative user bond dominated portfolios were mostly A type[12].

Thus, we conclude that type category turned to be significant for bond-dominated portfolios in terms of derivative use, i.e. when A type funds followed a different strategy as opposed to its definition, their portfolios carried more risk when compared to B type funds, and they made use of derivatives to hedge[13] against this risk.

3.1.2. Dispersion of Distributional Parameters

Data evaluated by means of Table III summarizes that there are significant differences between funds that use derivatives and those that do not for each category. However, Table III will not reflect dispersion in distributional parameters as it is based on mean values. Table IV reports the standard deviation of each variable, and the 10th and 90th percentiles.

For investment objective category, that idiosyncratic risk, beta and timing beta seem to be widely dispersed for derivative user funds when compared to non-users. The standard deviations of the latter two were higher for non-users, meaning that their return distributions had greater variations in extreme values. Hence, the similarities in mean estimates of these variables for equity-dominated and balanced portfolios obscured greater variation in distributions. When we examine the results for structure and type categories, except for timing beta, mean estimates of variables for closed-ended and A type funds did not obscure variation. Lastly, higher moments, skewness and kurtosis data shows us that the similarities in mean estimates of them for equity dominated portfolios (skewness), open-ended funds (kurtosis), A and B type funds (skewness and kurtosis) obscured greater variation in distributions.

Table-4. Dispersion of Distributional Parameters

		Users				Nonusers				
		N	**SD**	**10%**	**90%**	**N**	**SD**	**10%**	**90%**	**F-test (p value)**
STD	**Equity**	23	2,302	7,512	12,308	30	2,845	3,483	11,474	0,283
	Balanced	14	1,373	4,927	7,740	13	0,971	5,083	6,342	0,229
	Bond	25	2,263	1,311	5,802	88	1,587	0,698	4,242	0,051
	OE	45	3,577	1,715	10,757	118	3,638	0,733	10,370	0,863
	CE	17	2,422	3,684	9,449	13	3,402	1,843	9,912	0,238
	A	55	2,955	4,158	10,757	51	2,887	4,092	11,414	0,865
	B	7	0,899	0,884	2,833	80	1,153	0,669	2,981	0,292
IDIO	**Equity**	23	2,541	3,038	6,511	30	1,557	2,765	5,730	0,021
	Balanced	14	1,898	1,703	5,259	13	0,442	2,125	3,179	0,000
	Bond	25	1,202	0,901	3,570	88	1,178	0,362	2,667	0,955
	OE	45	2,364	1,091	4,754	118	1,589	0,371	4,276	0,003
	CE	17	1,545	1,869	5,526	13	2,333	1,600	6,784	0,154
	A	55	2,149	1,619	5,613	51	1,538	2,081	5,128	0,017
	B	7	0,925	0,572	2,648	80	1,125	0,359	2,555	0,393
BETA	**Equity**	23	0,346	0,642	1,342	30	1,140	0,913	1,434	0,000
	Balanced	14	0,097	0,557	0,763	13	0,209	0,630	0,841	0,012
										Continue

[12] Indeed, in our sample, 84 out of 87 B type funds have bond dominant portfolios and 7 of those are derivative users. On the other side, 51 out of 106 A type funds have equity dominant portfolios. The number of funds having bond-dominated portfolios is 29 and of that the number of derivative users is 18. Thus, from a sum of 113 bond-dominated portfolios, 84 belong to B type and 29 belong to A type funds. But, from derivative use point of view, A type bond-dominated portfolios outweigh B type ones (18-7).

[13] Recall that a considerable portion of derivatives in portfolios had stock index as underlying assets and were used for hedging purposes, which was also true for bond-dominated portfolios.

	Bond	25	2,296	0,174	4,981	88	3,695	0,644	8,844	0,001
	OE	45	1,257	0,343	1,930	118	3,506	0,672	7,222	0,000
	CE	17	2,029	0,400	1,178	13	2,166	0,524	3,097	0,833
	A	55	0,377	0,343	1,318	51	0,351	0,515	1,371	0,617
	B	7	3,341	0,499	6,594	80	3,589	2,041	9,435	0,679
UPBETA	**Equity**	23	0,538	-0,101	0,943	30	0,505	-0,278	0,405	0,772
	Balanced	14	0,330	-0,228	0,221	13	5,260	-0,186	0,273	0,000
	Bond	25	5,615	-0,355	0,926	88	7,440	-1,990	8,715	0,062
	OE	45	2,473	-0,135	0,926	118	6,738	-1,675	7,574	0,000
	CE	17	5,466	-0,872	0,302	13	2,594	-0,354	3,717	0,007
	A	55	0,437	-0,279	0,727	51	0,203	-0,206	0,285	0,000
	B	7	11,144	-6,280	9,593	80	8,129	-2,447	9,451	0,436
SKEW	**Equity**	23	1,009	-1,585	0,089	30	0,367	-0,904	-0,145	0,000
	Balanced	14	0,706	-1,171	-0,208	13	0,480	-1,309	-0,247	0,182
	Bond	25	0,901	-1,332	0,664	88	0,963	-0,905	1,072	0,636
	OE	45	0,931	-1,124	0,622	118	0,765	-0,859	1,007	0,140
	CE	17	0,725	-1,620	-0,236	13	1,157	-2,303	-0,233	0,107
	A	55	0,846	-1,511	0,066	51	0,436	-1,171	-0,177	0,000
	B	7	0,434	0,060	0,923	80	0,947	-0,656	1,111	0,001
KURT	**Equity**	23	4,521	-0,404	3,136	30	0,683	-0,540	0,473	0,000
	Balanced	14	1,365	-0,426	2,414	13	1,169	-0,412	2,195	0,586
	Bond	25	2,251	-0,296	2,470	88	2,863	-0,250	4,187	0,111
	OE	45	3,316	-0,394	2,371	118	2,151	-0,444	3,358	0,002
	CE	17	2,695	-0,422	2,977	13	4,682	-0,418	5,899	0,059
	A	55	3,305	-0,384	3,056	51	1,065	-0,537	1,455	0,000
	B	7	1,044	-0,770	1,610	80	2,965	-0,242	4,583	0,000

As an overall evaluation, derivative users among our sample were the riskier ones when compared to non-users, notwithstanding, when we analyze risk into its components, systematic risk was lower for users whereas idiosyncratic risk was higher. Hence, derivative use, given that derivatives are traded in an organized market is favorable for risk management.

3.2. Risk Management

Our last analysis is to find out whether there is a link between derivative use and the return distributions conditional on past performance. According to relevant literature, past performance and risk changes are negatively related, which gives a hint for managerial incentive gaming[14]. Brown *et al.* (1996) document that past performance has a negative effect on changes in risk due to the mutual fund tournament by studying on 334 growth-oriented mutual funds for the period of 1976-1991. Furthermore, in a related article, Chen and Pennacchi (2009) suggest that the manager tenure is the leading factor of tournament behavior. There is also an alternative hypothesis suggested by Koski and Pontiff (1999). According to their cash flow hypothesis "*if fund risk changes due to cash flows, then the relation between prior performance and changes in risk will be weaker for funds that use derivatives than for those that do not*."

To analyze whether derivative user fund managers trades derivatives to shift their fund risk after a given performance period, we estimate the following pooled cross-sectional regression model as previously employed by Koski and Pontiff (1999):

$$\Delta RISK = \alpha + \beta_1 D + \beta_2 PERF + \beta_3 D * PERF + \beta_4 LagRISK + \sum_j \beta_j Dummy_j$$

[14] Managerial incentive gaming approach hypothesize that fund risk will increase (decrease) after poor (good) performance.

In this model, $\Delta RISK$ denotes for change in risk variables between two halves of the year; *D* is one if the fund is a derivative user; PERF is the mean excess return on the fund during the first half of the year, and LagRISK, the value of the risk variable during the first half of the year. We employ dummy variables for fund categories as well.

Table V reports that past performance is significantly negative in all three measures. These findings align with that of Koski and Pontiff (1999) and Chevalier and Glenn (1997) and are in favor of both the managerial incentive gaming and the cash flow management hypotheses.

Table-5. Regressions of Risk Change on Past Performance Findings of regression analysis examining relation between the change in risk variable between two halves of the year and fund performance during the first half of the year. Results are reported using OLS.

Variable	Intercept	D	PERF	D*PERF	LagRISK
Δ STD	-3.8318	16.4883	-5.6773	13.7654	-0.5233
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Δ IDIO	-1.5000	0.7865	-3.0815	0.1438	-0.7212
	(0.0046)	-0.4952	(0.00)	-0.868	(0.00)
Δ BETA	-7.3402	5.1251	-5.5151	4.7675	-0.3017
	(-0.001)	(-0.0074)	(-0.0002)	(-0.0014)	(-0.1613)

The coefficient on D*PERF is positive and significant for STD and BETA. We bond insignificance of IDIO to the fact that derivatives are traded in an organized market, instead of an over-the-counter one. We reject our hypothesis that derivative user fund managers would like to trade derivatives to change risk after a given performance period, because the negative relation between past performance and change in risk seems to be weaker for derivative user funds. We suggest that funds used derivatives to reduce the effect of past performance on risk.

4. CONCLUSIONS

This paper tries to gain insight into hows and whys of derivative use of Turkish investment funds in 2008-09 financial crisis period, where derivatives were relatively in their crawling period. Derivatives, as it is for all innovated financial products, are attractive tools for fund managers providing them to increase performance and/or reduce risk of their portfolios. It is clear that derivatives are vital financial instruments having a softening role for Turkish economic system, an emerging market exposed economic downturns.

We gather data for an overall sample of 193 funds *(163)* / trusts *(30)* of which over 30% actively use derivatives. We examine the sample in a threefold categorization taking the investment style *(equity, bond, and balanced portfolios)*, structural *(open-ended and closed-ended)* and typical *(A and B type)* characteristics of funds into consideration. The likelihood of derivative use increased as the turnover of funds escalated.

Our univariate analyses show that, in general, derivative users were the risky ones when compared to non-users. On the other hand, systematic risk was lower for users whereas idiosyncratic risk was higher. In details, although equity-dominated and balanced portfolios preferred derivatives more than bond-dominated ones, the latter using derivatives was riskier than those of non-users. Moreover, users' bond-dominated portfolios seem to be negatively skewed indicating hedge against losses. We believe that this was because of turnover and size of bond portfolios. Open-ended users and A type funds had higher risk variables.

We reject our hypothesis that there is a stronger relation between past performance and risk change for derivative user funds, since our findings show that the relation was weaker for derivative users. Therefore, we assert that funds used derivatives to reduce the impact of past performance on risk.

This paper is an attempt to provide an insight on derivative use by investment funds by comparing them in terms of derivative use in Turkey in the 2008-09 financial crisis period. A notable limitation of the study is the inadequate fund

categorization in terms of investment objective, which is based on financial instruments *(equity, bond and a blend of them)*. It would sound better to use exact objectives such as growth, income, aggressive etc. portfolios. However, CMB regulations regarding funds do not include such a categorization, except for pension funds. Hence, we leave derivative use for pension funds for a future study.

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REFERENCES

Allayannis, G. and J.P. Weston, 2001. The use of foreign currency derivatives and firm market value. Review of Financial Studies, 14(1): 243-276.

Almazan, A., K.C. Brown, M. Carlson and D.A. Chapman, 2004. Why constrain your mutual fund manager? Journal of Financial Economics, 73(2): 289-321.

Berkman, H. and M.E. Bradbury, 1996. Empirical evidence on the corporate use of derivatives. Financial Management, 25(2): 5-13.

Bodnar, G.M., G.S. Hayt, R.C. Marston and C.W. Smithson, 1995. Wharton survey of derivatives usage by U.S. non-financial firms. Financial Management, 24(2): 104-114.

Brown, K.C., W.V. Harlow and L.T. Starks, 1996. Of tournaments and temptations: An analysis of managerial incentives in the mutual fund industry. Journal of Finance, 51(1): 85-110.

Cesari, R. and F. Panetta, 2002. The performance of Italian equity funds. Journal of Banking & Finance, 26(1): 99-126.

Chen, H. and G.G. Pennacchi, 2009. Does prior performance affect a mutual fund's choice of risk? Theory and further empirical evidence. Journal of Financial and Quantitative Analysis, 44(4): 745–775.

Chevalier, J. and E. Glenn, 1997. Risk taking by mutual funds as a response to incentives. Journal of Political Economy, 105(6): 1167-1200.

Cumby, R.E. and J.D. Glen, 1990. Evaluating the performance of international mutual funds. Journal of Finance, 45(2): 497-521.

El-Masry, A.A., 2006. Derivatives use and risk management practices by UK nonfinancial companies. Managerial Finance, 32(2): 137-159.

Ferson, W.E. and R.W. Schadt, 1996. Measuring fund strategy and performance in changing economic conditions. Journal of Finance, 51(2): 425–461.

Gallagher, D.R., 2001. Attribution of investment performance: An analysis of Australian pooled superannuation funds. Accounting and Finance, 41(1-2): 41-62.

Geczy, C., B.A. Minton and C. Schrand, 1997. Why firms use currency derivatives. Journal of Finance, 52(4): 1323–1354.

Grant, K. and A.P. Marshall, 1997. Large UK companies and derivatives. European Financial Management, 3(2): 191-208.

Grinblatt, M. and T. Sheridan, 1989. Mutual fund performance: An analysis of quarterly Portfolio holdings. Journal of Business, 62(3): 393-416.

Heaney, R. and H. Winata, 2005. Use of derivatives by Australian companies. Pacific-Basin Finance Journal, 13(4): 411 – 430.

Henriksson, R.D., 1984. Market timing and mutual fund performance: An empirical investigation. Journal of Business, 57(1): 73-96.

Hentschel, L. and S.P. Kothari, 2001. Are corporations reducing or taking risks with derivatives? Journal of Financial and Quantitative Analysis, 36(1): 93-118.

Jiang, G.J., T. Yao and T. Yu, 2007. Do mutual funds time the market? Evidence from Portfolio holdings. Journal of Financial Economics, 86(3): 724–758.

Johnson, L.D. and W.W. Yu, 2004. An analysis of the use of derivatives by the Canadian mutual fund industry. Journal of International Money and Finance, 23(6): 947-970.

Koski, J.L. and J. Pontiff, 1999. How are derivatives used? Evidence from the mutual fund industry. Journal of Finance, 54(2): 791-816.

Metron, R.C. and R.D. Henriksson, 1981. On market timing and investment performance. II. Statistical procedures for evaluating forecasting skills. Journal of Business, 54(4): 513-533.

Sinkey, J.F.J. and D.A. Carter, 2000. Evidence on the financial characteristics of banks that do and do not use derivatives. Quarterly Review of Economics and Finance, 40(4): 431–449.

Smith, C.W. and R.M. Stulz, 1985. The determinants of companies hedging policies. Journal of Financial and Quantitative Analysis, 20(4): 391– 405.

Treynor, J. and K. Mazuy, 1966. Can mutual funds outguess the market? Harvard Business Review, 44(4): 131–136.

Whidbee, D.A. and M. Wohar, 1999. Derivative activities and managerial incentives in the banking industry. Journal of Corporate Finance, 5(3): 251–276.

Yong, H.H.A., R. Faff and K. Chalmers, 2009. Derivative activities and Asia-pacific banks interest rate and exchange rate exposures. Journal of International Financial Markets, Institutions & Money, 19(1): 16–32.