Accepted Manuscript

Risk Shifting Consequences Depending on Manager Characteristics

Laura Andreu, José Luis Sarto, Miguel Serrano

PII:	S1059-0560(17)30359-3
DOI:	10.1016/j.iref.2019.03.009
Reference:	REVECO 1775
To appear in:	*International Review of Economics and Finance*
Received Date:	30 April 2017
Accepted Date:	14 March 2019

Please cite this article as: Laura Andreu, José Luis Sarto, Miguel Serrano, Risk Shifting Consequences Depending on Manager Characteristics, *International Review of Economics and Finance* (2019), doi: 10.1016/j.iref.2019.03.009

RISK SHIFTING CONSEQUENCES DEPENDING ON MANAGER CHARACTERISTICS

Laura Andreu[a*], José Luis Sarto[a], Miguel Serrano[a]

[a] *Accounting and Finance Department, University of Zaragoza, Zaragoza, Spain*

March 2019

Abstract

This paper investigates the performance consequences of the risk shifting behavior shown by domestic equity mutual funds through the analysis of monthly portfolio holdings. The objective of this paper is to assess the implications of risk shifting for mutual fund investors. Specifically, we study the performance consequences of different mechanisms of risk shifting, such as the change in the composition between equity and cash holdings and the change of the systematic or idiosyncratic risk within the equity positions. We find that funds that increase their risk level obtain significantly better performance than funds with stable or reduced risk levels. This finding is robust when controlling for fund characteristics such as past performance and fund size. Additionally, we examine whether the performance consequences of risk shifting depends on fund manager characteristics and find that manager gender, education and level of specialization are revealed as important variables to differentiate the performance consequences of risk shifting.

Keywords: Fund Characteristics, Manager Characteristics; Monthly Portfolio Holdings; Performance Consequences; Risk-Shifting.

JEL Code: G23, G11

[*] This study is part of the research project ECO2013-45568-R supported by the Spanish Ministerio de Economía y Competitividad. Address for correspondence: Laura Andreu, Department of Accounting and Finance, University of Zaragoza, Gran Via 2, 50.005 Zaragoza (Spain). Tel: +34 976762308, Fax Number +34 976-761769, E-mail: landreu@unizar.es.

RISK SHIFTING CONSEQUENCES DEPENDING ON MANAGER CHARACTERISTICS

March 2019

Abstract

This paper investigates the performance consequences of the risk shifting behavior shown by domestic equity mutual funds through the analysis of monthly portfolio holdings. The aim is to assess the implications of risk shifting for mutual fund investors. Specifically, we study the performance consequences of different mechanisms of risk shifting, such as the change between equity and cash holdings and the change of the systematic or idiosyncratic risk within the equity positions. We find that funds that increase their risk level obtain significantly better performance than funds with stable or reduced risk levels. This finding is robust when controlling for fund characteristics such as past performance and fund size. Additionally, we examine whether the performance consequences of risk shifting depends on manager characteristics and find that manager gender, education and level of specialization are revealed as important variables to differentiate the performance consequences of risk shifting.

Keywords: Fund Characteristics, Manager Characteristics; Monthly Portfolio Holdings; Performance Consequences; Risk-Shifting.

JEL Code: G23, G11

RISK SHIFTING CONSEQUENCES DEPENDING ON MANAGER CHARACTERISTICS

1. Introduction

The financial literature has deeply analyzed the causes and incentives of mutual fund managers to change risk since the seminal paper of Brown, Harlow and Starks (1996). These authors found evidence that portfolio managers increase the volatility of their portfolio in the second half of the year when they underperform in the first half. The incentive to shift risk is the disproportionately large amount of money flows into top performing funds compared to the outflows of poorly performing funds. The researchers argue that this asymmetry creates a tournament in which the winner is compensated by management fees earned on the assets acquired; managers of poorly performing funds can increase their chances of winning the tournament by increasing their portfolio volatility. If these managers perform well, they win more than they could lose if they perform poorly.[1] Similarly, Taylor (2003) also suggests that the optimal response of a fund manager to the fund's interim performance is an adjustment of its risk taking, because this maximizes the fund's probability of achieving a top position at the end of the year.

Later, other studies also highlight the important role of compensation incentives in explaining risk taking and risk shifting behavior. Specifically, Kempf, Ruenzi and Thiele (2009) examine the influence of employment risk and compensation incentives on risk taking. They find that, when employment risk is more important than compensation incentives, fund managers with a poor midyear performance tend to decrease risk relative to leading managers to prevent potential job loss. However, if employment risk is low, compensation incentives become more relevant, and fund managers with a poor midyear performance increase risk to match the midyear winners. Similarly, Massa and Patgiri (2009) also test how incentives affect performance and risk taking in the US mutual fund industry. The researchers show that contractual incentives play an important role in increasing the risk taking and performance of mutual funds. The higher performance is

[1] Later, Chevalier and Ellison (1997) and Sirri and Tufano (1998), among others, also demonstrate that fund investors tend to chase past performance investing in portfolios with good records but do not penalize poor performance equally.

due not only to the higher risk of the fund strategies but also to an improvement in fund management.

More recently, Lee, Trzcinka and Venkatesan (2015) also argue that the compensation contracts of portfolio managers can be as important as the response of flows to past performance to determine risk shifting behavior, because the vast majority of US portfolio managers have a contract with variable compensation based on the mutual fund's performance relative to their benchmark.[2] However, these contracts are asymmetric; therefore, the manager is not penalized if the fund underperforms the benchmark. Therefore, portfolio managers have incentives to shift the volatility of the fund to maximize the value of their compensation. Additionally, fund managers can change risk to impress fund investors (see, e.g. Chevalier and Ellison, 1997; Sias, 2007; and Huang, Sialm and Zhang, 2011) or to manipulate taxes.[3]

Overall, previous studies tend to hypothesize that risk shifting behavior is harmful to investors without focusing on its performance consequences. However, risk shifting behavior can be driven by very different reasons; therefore, the consequences can also be different. Obviously, risk shifting is undesirable for financial investors whether this behavior is motivated by the trades of unskilled fund managers or agency-prone managers who trade to increase their personal compensation. However, risk shifting can also be the result of trades of skilled managers who trade to take advantage of their stock selection and/or market timing abilities. In this case, risk shifting behavior would be desirable for fund investors, because they would benefit from superior performance. In fact, there is evidence that more active fund managers have superior investment abilities (see, e.g. Kacperczyk, Sialm and Zheng, 2005; Cremers and Petajisto, 2009 and Fama and French, 2010).

The prior literature has only focused on analyzing the existence of risk shifting or tournament behavior through risk measures mainly based on fund returns (see, e.g., Daniel and Wermers, 2000). Therefore, it is important to extend previous evidence to investigate the performance consequences of risk shifting behavior using a holdings-based measure of risk; only the recent paper of Huang, Sialm and Zhang (2011) address this issue. However, these authors examine semiannual or quarterly holdings while we provide more accurate results by using monthly holdings. Monthly portfolios

[2] Ma, Tang and Gómez (2019) investigates portfolio manager compensation in the US mutual fund industry.
[3] Grau-Carles, Doncel and Sainz (2019) provides a method to identify top stable funds and therefore, to help investors to evaluate fund managers' ability.

significantly reduce the impact of intra-quarter round-trip trades on the empirical analyses of mutual fund trading (Elton *et al*.; 2010). Therefore, the first aim of the paper is to provide robust results about the performance consequences of risk shifting behavior by using monthly portfolio holdings.[4]

The second aim is to examine whether the consequences of mutual funds' risk shifting behavior are the same in a developed market like the US and in less developed markets through the examination of a European market like the Spanish mutual fund industry. By the end of 2017, the Spanish fund industry was ranked eighth in the Euro Zone fund industry in terms of assets (European Fund and Asset Management Association, 2018). Additionally, the Spanish fund industry deserves attention due to some particularities.[5] On one hand, the market is highly concentrated. The top 10 of the existing 87 Spanish fund companies control more than 75% of the total fund assets (Inverco, 2017). If we compare these figures with the US mutual fund industry, we find that competition in Spain is much more concentrated than that in the largest fund market in the world, where the top 10 companies manage approximately 58% of the total assets in 2016 (Investment Company Institute, 2017). On the other hand, the median fund size in Spain is much smaller than in the US market (as of December 2016 around $2,026 million per fund in US as opposed to below $100 million in Spain). Finally, the Spanish market was used due to the availability of monthly portfolio holdings to assess the implications to fund investors as opposed to the usual quarterly portfolio holdings available for other markets.

Finally, the third aim is to examine the performance consequences of risk shifting not only based on the mechanisms used by managers i.e. changes in the composition between equity and cash holdings or by changing the systematic or idiosyncratic risk within the equity positions but also depending on fund manager characteristics such as age, gender, tenure, and education.[6]

As opposed to the findings obtained in the US market, we find that funds that increase risk tend to perform better than funds that reduce or maintain stable risk levels. Hence, risk shifting appears to be an indicator of skilled fund managers adjusting their

[4] Andreu, Matallín-Sáez and Sarto (2018) also use monthly portfolio holdings in their performance attribution model to assess market timing skills.

[5] Golez and Marin (2015) provide some insights about the particularities of the Spanish mutual fund industry.

[6] The financial literature has previously investigated the impact of these characteristics on fund performance and the level of risk. However, there are no studies examining the consequences of risk shifting depending on them.

portfolio composition to take advantage of investment skills. This finding is robust using different performance measures, several risk shifting proxies or mechanisms and controlling by fund characteristics. We also find evidence that all mechanisms of risk shifting are important. Finally, we also find robustness in the main finding of the paper when examining the performance consequences of risk shifting depending on manager characteristics. Specifically, the results provide evidence that, although increasing the risk level tends to always provide better performance than stable or decreasing risk levels, the decision of increasing risk is better when it is made by a female or specialist manager.

This paper contributes to several strands of the financial literature. First, this study provides a more powerful test for analyzing the performance consequences by using monthly portfolio holdings and the daily return data of the portfolios, which can provide more robust results than the previous paper by Huang, Sialm and Zhang (2011) analyzing semiannual or quarterly holdings, as well as monthly returns. Second, as far as we know, this is the first paper outside the US market that analyzes the performance consequences of risk shifting. Moreover, to the best of our knowledge, this paper is the first analyzing the performance consequences of risk shifting depending on the sociodemographic characteristics of fund managers.

The remainder of this paper is organized as follows. Section 2 introduces the holdings-based measure of risk shifting and describes the methodology used. Section 3 describes the data. Section 4 documents the main findings obtained in the study and Section 5 concludes.

2. Methodology: The Risk Shifting measure

2.1 Portfolio Holdings Returns and Volatility

Mutual fund managers can change the risk level of their portfolio by holding assets with different risk characteristics or by changing the asset allocation of the portfolio. These two different strategies also allow fund managers to time the market through an appropriate decision of the securities that must be overweighted/underweighted in the first case or by an appropriate asset mix (proportion in equities vs proportion in fixed-income and cash) in the second case. The financial literature has traditionally focused on managers' motivation to shift risk by comparing the standard deviations of fund returns over two non-overlapping time periods (see, e.g., Brown, Harlow and Starks, 1996; Busse, 2001, Elton, Gruber and Blake, 2003). Certain exceptions are the studies by Chevalier and Ellison (1997) and Kempf, Ruenzi and Thiele (2009) who use mutual fund

holding data to compute changes in risk levels. However, as stated by Huang, Sialm and Zhang (2011), the comparison of risk levels between two non-overlapping time periods may capture exogenous changes in market conditions in addition to manager intentional changes in portfolio risk.[7] Therefore, in accordance with Huang, Sialm and Zhang (2011), we calculate the risk shifting behavior of mutual funds through the analysis of their portfolio holdings using identical time periods to estimate the realized volatility and the current holdings volatility. Consequently, the risk shifting measure will be able to capture the risk changes induced by changes in the portfolio composition and will be unbiased by changes in market conditions.

To calculate the current holdings volatility, we first must calculate the fund holdings return over time. The return of the fund portfolio holdings represents the return of a buy-and-hold strategy, because it captures the return that the fund would have achieved if the holdings of the disclosed portfolios were maintained for the time period analyzed. The holdings returns can be calculated using portfolio weights or using the number of securities held (see, e.g., Meier and Schaumburg, 2006).

This study uses the number of securities held in the last trading day of the month for which the portfolio is disclosed instead of the portfolio weights, because portfolio weights capture both the active trading and the passive changes that occur because of stock price changes. Hence, our study differentiates from Huang, Sialm and Zhang (2011), because these authors use constant portfolio weights to measure the current holdings volatility. We believe that our approach is more accurate, since the portfolio weights of the assets are time-varying depending on the manager decision to overweight/underweight a security and depending on the returns of the assets.

The database shows, for each reported portfolio, the money invested in each asset in the last trading day of the month. Therefore, setting that day as $t=0$, we calculate the number of securities held in each asset by each fund. This calculation is only valid on the reporting day $t=0$. The prices of securities vary over time; therefore, the number of securities is also changeable. Using the daily price information of the securities, we calculate the money invested in each security by each mutual fund from reporting day $t=0$ to day $t= -62$ to consider the days of a given quarter and have sufficient observations

[7] Kempf, Ruenzi and Thiele (2009) find that, in bear markets, employment risk is more important than the compensation incentives for fund managers. Hence, fund managers with poor midyear performance tend to decrease the risk level to prevent the potential job loss. However, in bull markets where the employment risk is low, managers with poor midyear performance tend to increase the risk to match the midyear winners.

to perform the estimation.[8] Once the money invested in each asset is calculated from *t=0* to *t= -62*, the daily total assets under management (AUM) of mutual fund *p* in day *t* is calculated as follows:

$$AUM^{H}_{p,t} = \sum_{j=1}^{n} AUM_{j,t} \quad (1)$$

Where: $AUM_{j,t}$ captures the money invested in security *j* in day *t*, and $AUM^{H}_{p,t}$ captures the money invested in mutual fund *p* in day *t* according to the most recent portfolio holdings.

Hence, the daily return of the portfolio holdings of mutual fund *p* in day *t* ($R^{H}_{p,t}$) is calculated as follows:

$$R^{H}_{p,t} = \frac{AUM^{H}_{p,t} - AUM^{H}_{p,t-1}}{AUM^{H}_{p,t-1}} \quad (2)$$

Note that the variance of the holdings' return of mutual fund *p* at day *t* depends on the money invested in the various securities held by the fund and on the NxN variance-covariance matrix of the individual securities. However, to facilitate the calculation of the current holdings volatility, in accordance with the approach of Huang, Sialm and Zhang (2011), we calculate the standard deviation of the return of a hypothetical portfolio that held the most recently disclosed positions over the prior 3 months (i.e., the prior quarter or prior 62 days in our case), since it is computationally easier to calculate the volatility of a time series of portfolio returns than to estimate a variance-covariance matrix of stock returns. Hence, we calculate the standard deviation of R^{H}_{pt} daily returns from day *t= 0* to *t= -62* to capture the current holdings volatility (σ^{H}_{pt}). Therefore, the volatility patterns associated with risk shifting are examined in an interval that begins three months before each reporting date (month) and ends in the reporting date.

2.2 Realized Fund Returns and Volatility

From the database of the daily net asset values (NAV) of mutual funds, the daily fund return is calculated for each fund as the relative change in NAV. However, the NAV return is net of the different fees charged by the fund while the return of fund holdings does not consider these expenses. Thus, we calculate the gross daily return of a given mutual fund *p* in day *t* as follows:

[8] We consider stock splits, reserve splits and other capital operations when calculating the number of securities in a given asset.

$$R_{p,t}^{R} = \frac{1 + NetReturn_{p,t}^{R}}{1 - Fees_{p,t}} - 1 \quad (3)$$

Where: $R_{p,t}^{R}$ is the realized gross return of mutual fund *p* in day *t*, and $Fees_{p,t}$ compiles both management and custodial fees charged by mutual fund *p* in day *t*.

Then, we calculate the realized volatility of fund *p* at time *t* (σ_{pt}^{R}) as the standard deviation of the actual daily gross returns over the prior 3 months (62 days). Hence, this volatility captures the total risk assumed by the fund. The use of daily instead of monthly returns as in previous studies (see, e.g. Huang, Sialm and Zhang, 2011) allows us to consider the recent past of the mutual fund and not 3 years of monthly data to have sufficient observations to calculate the realized volatility. Note that the consideration of long-term periods can introduce a bias due to possible changes in market conditions.

2.3 Risk Shifting Measure

As in Huang, Sialm and Zhang (2011), the risk shifting of a mutual fund *p* at time *t* is measured through the following expression:

$$RS_{pt} = \sigma_{P,t}^{H} - \sigma_{P,t}^{R} \quad (4)$$

Where: σ_{pt}^{H} is the current holdings volatility based on the fund's most recently disclosed portfolio, and σ_{pt}^{R} is the past realized volatility based on the fund's realized returns.

The realized volatility would be identical to the current holdings volatility only if the fund maintains constant portfolio weights over the prior 3 months. In this case, there is no risk shifting. In contrast, the risk shifting measure $RS_{p,t}$ is positive if the most recently disclosed holdings exhibit a higher volatility than the actual holdings over the prior 3 months and is negative otherwise. Thus, a positive risk shifting measure indicates that a mutual fund has increased the portfolio risk during the time period analyzed, which can be achievable either by holdings assets with higher risk levels or by changing the asset allocation of the portfolio.

The use of identical time periods to estimate both volatilities allows us to capture the changes in risk induced by changes in the portfolio holdings and is unaffected by changes in market conditions. Nevertheless, the *RS* measure can be biased due to the following reasons. First, the measure may capture the impact of interim trades, window dressing or other unobserved actions of fund managers because the current holdings volatility is based on disclosed portfolio holdings (see, e.g., Kacperczyk, Sialm and Zheng, 2008). However, the use of monthly portfolio holdings instead of semi-annual or

quarterly holdings as in previous studies reduces this problem.[9] Second, the *RS* measure is defined as the difference between two volatility measures; therefore, it can be affected by the volatility level of the fund. However, this problem can be addressed by defining the metric as a ratio, as we will discuss later.

3. Data

The study focuses on the performance consequences of risk shifting of actively managed Spanish domestic equity funds from December 1999 to December 2011. However, since we need daily return data of a quarter to compute the risk shifting measure of each mutual fund, we lose the first three months of the return and holdings information of all funds. Thus, the final time period covers from March 2000 to December 2011.

For our empirical study, we merge the portfolio holdings information of the mutual fund database provided by the Spanish Securities Exchange Commission (*CNMV*) and the Morningstar Direct database. Specifically, the *CNMV* database has information on daily returns and monthly/yearly fund characteristics such as the total net assets, the number of investors, the management fees and the name of the management company for all Spanish mutual funds. This database also contains quarterly portfolio holdings' information for all Spanish mutual funds over time. Therefore, this database is free of survivorship bias.

In addition to this information, *CNMV* provided us monthly portfolio holdings from December 1999 to December 2006 for research purposes; this overcomes any problem of reporting selection bias that can be present in previous literature using high frequency portfolios where management companies voluntarily supply the portfolio holdings of their funds to private data providers (see, e. g., Elton, Gruber, Blake, Krasny and Ozelge, 2010).[10] Consequently, the Morningstar Direct database is only used to complete the *CNMV* quarterly portfolio holdings from January 2007 onwards with monthly holdings when available. As stated by Elton, Gruber and Blake (2012), Morningstar as well as *CNMV* holdings data not only include holdings of traded equity but also holdings of bonds, preferred stock, other mutual funds, nontraded equity, derivatives and cash. Both

[9] Note that Spanish management companies must only report their holdings to fund investors on a quarterly basis. Hence, monthly holdings are not available for individual investors, and they should not suffer from window dressing practices.

[10] Monthly portfolio holdings provided by *CNMV* contains disclosed and undisclosed months, since management companies in Spain must report to investors on a quarterly basis, which is more frequent than the European Union's requirement of semiannual portfolio reports. The fiscal year of Spanish management companies is the natural year. Therefore, mandatory reports are those at the end of each quarter.

databases were matched by fund names and fund ISIN code (International Securities Identification Numbering).

We focus on actively managed Spanish domestic equity funds. Therefore, we eliminate balanced, bond, international or index funds. The initial sample includes 173 funds that report at least one year of daily returns and 11 portfolio holdings. From this sample, we eliminate funds that do not fulfil the official investment requirement of this investment category to ensure that all portfolios analyzed were appropriately classified as Spanish domestic equity funds.[11] The final sample consists of 144 Spanish domestic equity funds. The removal of these misclassified funds implies no bias in the sample. The matching of *CNMV* and Morningstar datasets has allowed us to analyze a total number of 10,730 portfolio holdings, which represent 81.9% of all the fund-months in the sample period.

In relation to the security returns, our study mainly relies on DataStream, which provides daily information regarding the returns of domestic and foreign stocks considering capital operations such as stock splits, the payment of dividends and seasoned equity offering. Hence, we have information about the daily returns of stocks across the entire sample period. The ISIN code of each stock is used to link portfolio holdings with the stock returns. Additionally, the returns of Treasury Bills and other fixed-income securities are calculated using indices published by *Analistas Financieros Internacionales* (AFI). Finally, a low percentage of fund total assets (see Table 1) are non-controlled securities, which, together with cash and cash equivalents, receive a zero return. The Ibex-35 total return index is used as a proxy for the market return, while one-day T-bill Repos yield is the proxy for the risk-free rate.

Table 1 reports summary statistics for the 144 distinct funds in our sample of Spanish domestic equity funds during the 2000-2011 period. The number of funds ranges from 102 in 2000 to 72 in 2011. Specifically, Table 1 summarizes statistics on fund total net assets (TNA), percentage money flow (PMF), number of investors, average number of stocks held in the portfolios, annual turnover, active share (computed as in Cremers and Petajisto, 2009 using the Ibex35 as equity benchmark), age and annual management and custodial fees.

Table 1 also summarizes information regarding the portfolio holdings of Spanish domestic equity funds. The holdings database includes not only the long positions in

[11] These funds must invest at least 75% of their assets in equities in any month.

domestic common stocks but also other non-equity holdings. Since we focus our analysis on equity mutual funds, the average percentage of the portfolios invested in stocks (79%) represents the most important asset class, with the remaining assets invested in fixed-income, other mutual fund units and cash or cash equivalents. Non-controlled securities only take an average value of 3.4% of our portfolios. This low percentage reinforces the quality of our database.

Table 1. Summary statistics of Spanish domestic equity fund

The table summarizes the characteristics of mutual funds in the sample over the time period analyzed: March 2000-December 2011. The table reports the mean and median values of the variables and their standard deviation over the time. Specifically, the table shows the number of funds analyzed, their size (TNA), the monthly percentage money flows (PMF), the number of investors, the average number of distinct stocks held by the portfolios, the annual turnover, the active share and the age of the portfolios as well as the distribution of the portfolio holdings into the different asset classes (% invested in stocks, fixed-income securities, other fund units and cash and cash equivalents).

Variables	Mean	Median	Std. Dev.
Number of Funds	91	96	12
Total Net Asset (thousand €)	56,913.8	26,045.1	89,164.9
Monthly Percentage Money Flow (thousand €)	-927.9	-168.6	7,461.7
Number of Investors	2,352	832	3,873
Average No. of stocks held	35.7	35.0	11.51
Annual Turnover (%)	43.6%	35.5%	31.9%
Active Share (%)	39.3%	34.8%	19.7%
Age (in Years)	9.2	9.1	4.9
Annual Management Fees (%)	1.9%	2.0%	0.5%
Stock Proportion (%)	78.8%	80.0%	14.6%
Fixed-Income Securities (%)	14.8%	11.8%	12.3%
Other Mutual Fund Units (%)	5.2%	4.4%	4.5%
Cash and Cash Equivalents (%)	19.9%	18.2%	13.5%
Non-controlled Securities (%)	3.4%	1.4%	5.9%

4. EMPIRICAL FINDINGS

4.1 Characteristics of Risk Shifters

Table 2 summarizes the characteristics of risk shifters by averaging funds in five portfolios sorted according to the most recent *RS* measure. Portfolio 1 gathers those funds that have reduced their risk level the most (decile 1), while Portfolio 5 compiles those mutual funds that have increased their risk level the most (decile 10). Specifically, funds in portfolio 1 decrease risk on average by 0.46% per month. Conversely, funds in portfolio 5 increase risk by 0.39% per month. Thus, funds exhibit significant changes in their

overall risk levels over time. We observe that funds in portfolio 5 exhibit the highest current holdings volatility, and their realized volatility is not very different from the mean realized volatility. In contrast, funds in portfolio 1 have the highest realized volatility, and their current holdings volatility is not substantially different from the mean holdings volatility.

Table 2 also reports that funds that increase risk share similar characteristics to funds that decrease risk. Funds that increase risk (funds in decile 10) are smaller, younger than funds with more stable risk levels.

Table 2: Fund Characteristics by Risk Shifting

This table summarizes the average characteristics of portfolios of mutual funds sorted according to the most recent risk shifting measure. The difference in current holdings volatility and past realized volatility is defined as the risk shifting measure (*RS*). TNA is measured in thousands of Euros, # of investors represents the number of people putting their money in the mutual fund, and age is defined in years.

Portfolio	RS Range	RS Mean	Current Holdings Volatility	Past Realized Volatility	TNA	# of Investors	Age
1	Decile 1	-0.0046	0.0095	0.0141	54,748	2,709	7.54
2	Deciles 2-3	-0.0023	0.0109	0.0131	90,694	4,226	9.22
3	Deciles 4-7	0.0000	0.0122	0.0121	63,239	2,915	8.36
4	Deciles 8-9	0.0025	0.0127	0.0102	48,937	1,607	7.85
5	Decile 10	0.0039	0.0136	0.0097	34,185	1,064	8.03

4.2 Performance Consequences of Risk Shifting

The financial literature usually adjusts for risk and style by estimating the factor loadings for each fund over a rolling window using prior data and then computing abnormal returns in the subsequent period as the difference between the actual fund return and the expected fund return based on the estimated factor loadings. As stated by Huang, Sialm and Zhang (2011), this methodology is not appropriate in our paper, since we focus on funds that change their risk exposures over time. The factor loadings estimated over prior windows may not be accurate for funds that shift risk levels. Therefore, we use a portfolio approach in which we form the previously explained five portfolios of funds with similar risk shifting levels according to their most recent *RS* measure and estimate the risk exposures in the sample based on the returns of these portfolios.

We use various performance measures to evaluate the performance consequences of shifting risk. Hence, we compare the performance of funds that increase or decrease the risk level of the portfolio with the performance of funds with more stable risk

properties. Specifically, six different performance measures for the fund portfolios are used. We compute gross returns and net returns (the former are relevant to evaluate the management performance, while the latter are relevant from an investors' perspective) and excess market returns to evaluate the performance against the value-weighted market portfolio. Additionally, to adjust for risk and style effects, the one-factor CAPM alpha, the Fama and French (1993) alpha and the Carhart (1997) alpha are examined.[12]

Portfolio returns are computed as the equal-weighted mean returns of all funds in the corresponding *RS* portfolio over the next month (*t+1*) and the next quarter (*t+3*). The alphas of the portfolios are estimated using the time-series of fund portfolio gross returns. The results are summarized in Panels A and B of Table 3.

Table 3. Performance Consequences of Risk Shifting

This table reports the performance of mutual fund portfolios sorted according to the most recent risk shifting measure (*RS* measure). Panel A summarizes the performance consequences of risk shifting in the short-term (next month), while Panel B summarizes the results in the next quarter. All measures are expressed in % terms. *; ** and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A:			**t+1**			
RS Portfolio	**Gross Return**	**Net Return**	**Excess Market**	**CAPM**	**Fama-French**	**Carhart**
1	0.11%	-0.05%	-0.13%*	-0.15%***	-0.17%***	-0.20%***
2	0.28%	0.11%	0.03%	0.04%	0.02%	0.04%
3	0.19%	0.03%	-0.05%	-0.03%	-0.07%	-0.06%
4	0.41%	0.25%	0.16%	0.21%**	0.11%	0.11%
5	0.29%	0.13%	0.04%	0.10%	0.02%	0.06%
# 5-1	0.17%	0.18%	0.17%	0.24%***	0.19%***	0.26%***
# 5-3	0.09%	0.10%	0.09%	0.13%**	0.09%	0.12%**
# 1-3	-0.08%	-0.08%	-0.08%	-0.11%*	-0.10%*	-0.14%**
Panel B:			**t+3**			
RS Portfolio	**Gross Return**	**Net Return**	**Excess Market**	**CAPM**	**Fama-French**	**Carhart**
1	0.35%	-0.13%	-0.53%***	-0.59%***	-0.70%***	-0.90%***
2	0.88%	0.40%	0.00%	0.02%	-0.02%	0.05%
3	0.74%	0.26%	-0.15%	-0.09%	-0.21%**	-0.20%**
4	1.36%*	0.90%	0.48%**	0.61%***	0.30%**	0.31%**
5	1.01%	0.54%	0.12%	0.29%	0.07%	0.20%
# 5-1	0.65%	0.67%	0.65%**	0.88%***	0.77%***	1.11%***
# 5-3	0.27%	0.28%	0.27%	0.39%***	0.28%***	0.40%***
# 1-3	-0.39%	-0.40%	-0.40%**	-0.49%***	-0.49%***	-0.70%***

[12] The factors of size, book to market and momentum have been calculated in accordance with the same procedure detailed on the website of Kenneth French considering the stocks traded in the Spanish stock market (see, e.g., http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).

Table 3 shows that funds that reduce the risk level the most obtained a negative and statistically significant performance regardless of the time period examined (*t+1* and *t+3*). In contrast, funds that assumed the highest risk level (portfolio 5) obtained a positive but not significant performance, while funds in portfolio 4 achieve a positive and statistically significant performance. This finding indicates that the improvement in performance is not sequential. This fact is observed in the different performance measures (CAPM, Fama and French and Carhart alpha) and in both panels.

This finding of superior performance for funds increasing the risk level contrasts with the result in the US market where increasing risk is harmful for financial investors (see, e.g., Huang, Sialm and Zhang; 2011). The table also shows that funds that increase risk experience better subsequent abnormal performance than funds with stable or reduced risk levels. This finding provides evidence that risk shifting is not harmful to investors; instead, it is the opposite.

4.3 Mechanisms of Risk Shifting

Mutual funds can change the risk level of their portfolios through several mechanisms. First, mutual funds can change the composition between equity holdings and cash holdings. Second, within their equity holdings, funds can change their exposure to systematic risk by switching between stocks with high or low beta; they can change their idiosyncratic risk exposures by deviating from their benchmarks or by changing the portfolio concentration in particular industries and styles.

We construct alternative *RS* measures based on some of these mechanisms of risk shifting and investigate the performance consequences using each alternative measure. These alternative *RS* measures are detailed below.

- *Risk Shifting Ratio:* We calculate the ratio between the current holdings volatility and the past realized volatility.

$$RS\ Ratio^{H}_{p,t} = \frac{\sigma^{H}_{p,t}}{\sigma^{R}_{p,t}} \tag{6}$$

- *Systematic Risk Shifting:* Fund managers may shift risk in an effort to take advantage of investment opportunities due to their management skills. Fund managers may change their exposure to systematic risk if they believe that they have superior market timing abilities. The systematic risk shifting measure is defined as follows:

$$RS^{\beta}_{P,t} = \beta^{H}_{P,t} - \beta^{R}_{P,t} \tag{7}$$

Where: β_{pt}^{H} is the weighted average of the CAPM, Fama and French and Carhart market beta of the most recently disclosed holdings[13], and β_{pt}^{R} is the CAPM, Fama and French and Carhart market beta of the daily realized returns over the prior year.

- *Idiosyncratic Risk Shifting:* Fund managers may change the idiosyncratic risk of their portfolio if they believe that they have stock selection ability. Specifically, the idiosyncratic risk shifting measure is defined as follows:

$$RS_{P,t}^{idiosync} = \sigma_{pt}^{H,\,idiosync} - \sigma_{pt}^{R,\,idiosync} \quad (8)$$

Where: $\sigma_{pt}^{H,\,idiosync}$ is the idiosyncratic volatility of the most recently disclosed fund holdings return, and $\sigma_{pt}^{R,\,idiosync}$ is the idiosyncratic volatility of the past realized fund return. The idiosyncratic volatilities are computed as the standard deviations of the residuals from the CAPM, Fama and French or the Carhart factor regressions over the prior year.

- *Equity-based Risk Shifting*: Fund managers can also modify the risk level through a change in the composition of the portfolios. Specifically, by increasing the percentage that equity holdings represent in the portfolios, fund managers increase the risk level and vice versa. Therefore, we define the following equity-based risk shifting measure:

$$RS_{pt}^{equity} = w_{P,t}^{equity} - \overline{w}_{P,t}^{equity} \quad (9)$$

Where: w_{pt}^{equity} is the most recently disclosed proportion invested in equity securities, and $\overline{w}_{P,t}^{equity}$ is the average percentage invested in equity securities over the prior quarter.

Table 4 reports the performance consequences of risk shifting based on the abovementioned four alternative *RS* measures. Panel A shows the consequences in the next month *(t+1)*, while Panel B shows the consequences in the next quarter *(t+3)*. The first column compiles the five *RS* portfolios analyzed. These portfolios are formed as in Table 3. Columns 2-4 report the results for the *RS* ratio; columns 5-7 report the results for the systematic *RS* measure. Columns 8-10 report the results for idiosyncratic *RS* measure, while columns 11-13 report the results for the equity-based *RS* measure. The table shows the CAPM, Fama and French and Carhart alphas as measures of abnormal performance for fund portfolios formed according to each of these alternative *RS* measures.

[13] The betas of individual stocks are estimated using the one-factor model, 3-factor model or 4-factor model with one year daily returns prior to the portfolio reporting date.

Table 4. Performance Consequences using alternative Risk Shifting Measures

This table reports the CAPM, Fama and French and Carhart alphas of portfolios of mutual funds sorted according to the most recent risk shifting measure. We compute four different measures of risk shifting: the ratio between the current holdings volatility and the past realized volatility, the systematic risk shifting, the idiosyncratic risk shifting, and the equity-based risk shifting measures. Panel A shows the results for the next month (period *t+1*), and Panel B shows the results for the next quarter (period *t+3*). *; ** and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A						**t+1**					
RS Portfolio	**RS ratio**			**Systematic RS**			**Idiosyncratic RS**			**Equity-based RS**		
	CAPM	**Fama-French**	**Carhart**	**CAPM**	**Fama-French**	**Carhart**	**CAPM**	**Fama-French**	**Carhart**	**CAPM**	**Fama-French**	**Carhart**
1	-0.07%	-0.09%	-0.13%**	0.01%	0.00%	0.02%	0.02%	0.00%	-0.01%	-0.12%	-0.17%**	-0.19%**
2	0.01%	-0.01%	0.01%	0.01%	-0.01%	0.01%	0.03%	0.00%	0.01%	0.04%	0.00%	0.01%
3	-0.03%	-0.07%	-0.06%	0.00%	-0.04%	-0.04%	0.06%	0.02%	0.03%	0.02%	-0.04%	-0.03%
4	0.16%	0.07%	0.07%	0.21%**	0.12%	0.12%	0.11%	0.04%	0.07%	0.00%	-0.06%	-0.05%
5	0.15%	0.06%	0.09%	0.08%	0.00%	0.06%	0.00%	-0.10%	-0.07%	-0.04%	-0.10%	-0.10%
# 5-1	0.21%***	0.14%***	0.22%***	0.07%**	0.00%	0.04%	-0.02%	-0.10%	-0.06%	0.08%	0.08%	0.08%
# 5-3	0.18%***	0.13%**	0.15%***	0.09%	0.05%	0.10%*	-0.06%	-0.12%**	-0.09%*	-0.06%	-0.06%	-0.07%
# 1-3	-0.03%	-0.02%	-0.06%	0.01%	0.04%	0.06%	-0.04%	-0.02%	-0.03%	-0.14%**	-0.13%**	-0.15%***
Panel B						**t+3**					
RS Portfolio	**RS ratio**			**Systematic RS**			**Idiosyncratic RS**			**Equity-based RS**		
	CAPM	**Fama-French**	**Carhart**	**CAPM**	**Fama-French**	**Carhart**	**CAPM**	**Fama-French**	**Carhart**	**CAPM**	**Fama-French**	**Carhart**
1	-0.30%***	-0.37%***	-0.50%***	-0.11%	-0.13%*	-0.12%*	0.04%	-0.04%	-0.03%	-0.29%**	-0.39%***	-0.51%***
2	-0.11%	-0.167%*	-0.14%	-0.07%	-0.11%	-0.04%	0.03%	-0.02%	-0.01%	0.07%	-0.04%	0.00%
3	-0.09%	-0.21%**	-0.20%**	-0.02%	-0.14%	-0.12%	0.13%	-0.01%	0.00%	0.03%	-0.14%	-0.16%
4	0.47%***	0.19%	0.21%	0.68%***	0.37%***	0.35%**	0.29%*	0.11%	0.19%	-0.08%	-0.29%***	-0.29%**
5	0.46%**	0.20%	0.31%*	0.15%	-0.06%	0.12%	-0.05%	-0.36%*	-0.23%	0.06%	-0.11%	-0.11%
# 5-1	0.75%***	0.57%***	0.81%***	0.25%***	0.07%	0.25%***	-0.09%	-0.32%***	-0.20%*	0.35%***	0.28%**	0.40%***
# 5-3	0.55%***	0.41%***	0.51%***	0.17%	0.07%	0.24%**	-0.19%*	-0.35%***	-0.23%***	0.03%	0.03%	0.05%
# 1-3	-0.21%**	-0.16%*	-0.30%***	-0.09%	0.00%	-0.01%	-0.09%	-0.03%	-0.03%	-0.32%***	-0.25%***	-0.35%***

Table 4 shows that the results are not affected qualitatively by using the *RS* ratio. The results of the *RS* ratio are consistent with those obtained in Table 3. The findings indicate that funds that reduce risk have poor subsequent performance both in the next month and in the next quarter (see Panel A and B, respectively). If we compare the portfolios, we can observe that funds that increase risk obtain a positive and statistically significant outperformance compared with funds that maintain stable risk levels and funds that reduce their risk. Note that the results in Panel B of Table 4 are more significant than the findings in Panel A.

Similar to the *RS* measure and the *RS* ratio, we also find that those funds that decrease their risk level through alternative measures tend to experiment negative performance that is statistically significant in some cases. Furthermore, we also find a positive and statistically significant difference in the performance among funds that increase and reduce the risk through the systematic and equity-based *RS* measures when examining the consequences in the next quarter.

However, the findings obtained when using the idiosyncratic risk are slightly different. Table 4 shows that increasing the idiosyncratic risk, which occurs when funds increase their portfolio concentration, leads to underperformance. This finding is consistent with the paper by Huang, Sialm and Zhang (2011) and suggests that the driver of the poor performance for increasing idiosyncratic risk is the poor stock-picking abilities.[14]

4.4 Robustness analysis of the Performance Consequences of Risk Shifting.

In order to provide robustness to previous results obtained in Tables 3 and 4, we carried out two additional analyses to control for fund characteristics given that previous literature has documented their influence on fund performance and the risk level assumed by funds. Tables 3 and 4 are univariate given that they only consider the performance consequences depending on the *RS* measure. However, certain fund characteristics (i.e., fund size, past performance) can influence on both fund performance and the risk shifting behavior. For that reason, we firstly carried out a multivariate analysis by double sorting fund portfolios.

First, for each fund characteristic examined we divide mutual funds in each month into two groups depending on whether the fund characteristic is above or below the

[14] Ang *et al*. (2006) report that stocks with high idiosyncratic volatility based on daily returns tend to exhibit relatively poor abnormal returns in the subsequent month.

median value. Second, we further divide the two groups of funds into five portfolios according to their most recent *RS* measure. The results obtained are summarized in Table 5. Panel A of Table 5 shows the results for the subsequent CAPM alphas for the ten mutual fund portfolios whereas Panel B shows the results for Carhart's alphas. Specifically, the fund characteristics considered include past performance, fund size, fund age and fund management fees. These variables are similar to those used in the paper of Huang, Sialm and Zhang (2011).

Fund past performance may reveal the ability and incentives of fund managers. As previously discussed, different authors like Brown, Harlow and Starks (1996) and Chevalier and Ellison (1997) suggest that past winners and losers have different incentives to take and change risk. The first columns of Table 5 sort mutual funds by their prior year excess return and the *RS* measure. Similarly, fund size, fund age and management fees can also be a determinant of both, fund performance and risk shifting given that previous literature has documented certain agency problems between fund characteristics and investor attitude.

Table 5 provides robustness to our previous finding given that increasing risk leads to a higher performance than reducing risk (see, comparison 5-1). This performance difference is always positive and it is statistically significant in the majority of the cases. Specifically, we find that increasing risk instead of reducing it leads to outperformance both in winner and loser funds when past performance is examined and in both young and old funds (see, e.g., Panel B). Hence, Table 5 provides evidence that increasing risk leads to better performance even after controlling for mutual funds characteristics.

Secondly, we carried out a multivariate regression analysis to investigate the relation between the *RS* measure and subsequent fund performance. This methodology also allows us to control for additional fund characteristics. We run the following regression:

$$Perf_{p,t} = \beta_0 + \beta_1 RS_{p,t-1} + \beta_2 Excess\ Return_{p,t-1} + \beta_3 LogAge_{p,t-1} + \beta_4 LogTNA_{p,t-1} + \beta_5 Fees_{p,t-1} + \beta_6 Turnover_{p,t-1} + \beta_7 Flow_{p,t-12} + \varepsilon_{p,t} \quad (10)$$

Where: the dependent variable (*Perf*) in each cross-section is one of the three performance measures mostly used in the paper (Excess Return, CAPM alpha or Carhart's alpha) of mutual fund *p* in a particular month *t*. $RS_{p,t-1}$ is the risk shifting measure as defined in equation 4 for mutual fund *p* in the prior month *t-1*. The additional control variables are the prior-year excess market return ($Excess\ Return_{p,t-1}$), the age of the fund defined as logarithm ($LogAge_{p,t-1}$), the total net assets defined as logarithm ($LogTNA_{p,t-1}$), the

management funds charged ($Fees_{p,t-1}$), the turnover ratio ($Turnover_{p,t-1}$) as defined by Elton *et al*. (2010) and the percentage money flow over the prior year ($Flow_{p,t-12}$).

The regression has been estimated by using the Fama and MacBeth (1973) methodology. This method firstly run cross-sectional regressions each month and then, in a second step, the means of the cross-sectional coefficients over the whole time period are calculated.

Table 6 reports the multivariate regression estimates. The table shows a positive and statistically significant relationship between the level of risk shifting (*RS* measure) and the subsequent performance when CAPM and Carhart's alphas are examined. This statistically significant relationship is observed in both specifications, when only the *RS* measure is examined and when the additional control variables are introduced. Therefore, once again, our finding points out that increasing risk leads to a subsequent better performance. In relation with the control variables, the only variable that seems to be relevant is the lagged excess return. Its positive coefficient indicates some performance persistence.

Table 5. Performance Consequences by Fund Characteristics

This table reports the future performance of the portfolios of mutual funds sorted according to their level of risk-shifting and fund characteristics that are related to risk shifting incentives (prior-year excess return, fund size, fund age, and fund management fees). Mutual funds are first sorted into two equal-sized groups according to whether the characteristic is above or below it median value. Then, funds are further divided into five groups according to their risk shifting level. Specifically, Panel A reports the CAPM alphas for the next month (period *t+1*), while Panel B reports the Carhart alphas. The table reports the performance of the ten portfolios formed for each fund characteristic and the differences in the future performance between the selected portfolios. *; ** and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A:	**Prior Year Fund Performance**			**Fund Size**			**Fund Age**			**Fund Management Fees**		
RS Portfolio	**Low**	**High**	**L-H**	**Small**	**Large**	**S-L**	**Young**	**Old**	**Y-O**	**Low**	**High**	**L-H**
1	-0.26%***	-0.04%	-0.21%**	-0.12%	-0.12%*	0.00%	-0.20%*	-0.10%	-0.10%	-0.19%*	-0.14%*	-0.05%
2	0.01%	0.00%	0.00%	0.04%	0.03%	0.01%	0.05%	0.03%	0.02%	0.10%*	0.01%	0.09%
3	-0.13%**	0.01%	-0.14%**	0.01%	-0.06%	0.06%	0.00%	-0.05%	0.05%	0.01%	-0.08%	0.09%
4	-0.09%	0.40%***	-0.50%***	0.20%*	0.25%**	-0.05%	0.13%	0.36%***	-0.23%**	0.30%***	0.14%	0.17%
5	-0.19%	0.21%*	-0.40%***	0.04%	0.22%*	-0.17%	0.07%	0.14%	-0.07%	0.26%**	-0.06%	0.32%***
# 5-1	0.07%	0.25%**	-0.19%**	0.16%	0.34%***	-0.18%	0.27%***	0.23%***	0.04%	0.45%***	0.08%	0.37%***
# 5-3	-0.06%	0.20%***	-0.26%***	0.04%	0.28%***	-0.24%***	0.07%	0.19%***	-0.12%	0.25%***	0.02%	0.23%***
# 1-3	-0.12%*	-0.05%	-0.07%	-0.13%*	-0.06%	-0.06%	-0.20%***	-0.04%	-0.16%**	-0,20%***	-0.06%	-0.14%***

Panel B:	**Prior Year Fund Performance**			**Fund Size**			**Fund Age**			**Fund Management Fees**		
RS Portfolio	**Low**	**High**	**L-H**	**Small**	**Large**	**S-L**	**Young**	**Old**	**Y-O**	**Low**	**High**	**L-H**
1	-0.32%***	-0.11%	-0.21%**	-0.16%	-0.15%*	-0.02%	-0.30%***	-0.11%	-0.19%*	-0.27%***	-0.20%**	-0.07%
2	0.02%	0.01%	0.01%	0.06%	0.04%	0.02%	0.05%	0.04%	0.02%	0.10%*	0.02%	0.09%
3	-0.15%**	-0.06%	-0.09%	-0.03%	-0.08%	0.05%	-0.04%	-0.07%	0.03%	-0.02%	-0.10%*	0.08%
4	-0.10%	0.24%**	-0.35%***	0.10%	0.13%	-0.04%	0.02%	0.24%**	-0.22%**	0.19%*	0.07%	0.13%
5	-0.14%	0.10%	-0.23%*	-0.02%	0.22%*	-0.23%**	0.04%	0.11%	-0.07%	0.25%***	-0.09%	0.33%***
# 5-1	0.18%*	0.21%*	-0.03%	0.15%	0.37%***	-0.22%*	0.33%***	0.21%***	0.12%	0.52%***	0.11%	0.41%***
# 5-3	0.01%	0.16%**	-0.15%**	0.01%	0.30%***	-0.28%***	0.08%	0.17%***	-0.09%	0.27%***	0.01%	0.26%***
# 1-3	-0.17%***	-0.05%	-0.12%*	-0.14%**	-0.07%	-0.07%	-0.26%***	-0.04%	-0.22%***	-0,25%***	-0.10%	-0.15%**

Table 6. Multivariate Performance Regression

This table reports the relationship between the performance of mutual fund portfolios and the risk shifting measure controlling for additional fund characteristics. The dependent variable in each cross-section is a performance measure. Specifically, in order to adjust for risk and style, we use three different performance measures: (1) Excess Market Return, (2) CAPM alpha and (3) Carharts' alpha. The risk shifting measure used here is that defined in equation 4 (measured as difference in risk). The additional control variables are the prior-year excess market return of a fund, the age of the fund defined as logarithm, the logarithm of the assets under management, the management fees, the turnover ratio, and the annual money flows over the prior year. *; ** and *** denote significance at the 10%, 5%, and 1% level, respectively using the Fama-MacBeth methodology.

	Excess Return		**CAPM**		**Carhart**	
RS	0.3411	0.0391	0.0270***	0.0147***	0.0206***	0.0107***
Excess Market Return		0.0283***		0.0028***		0.0020***
Age		0.0004		0.0000		0.0000
Size		0.0001		0.0000		0.0000*
Management Fees		-0.0611		-0.0024**		-0.0016
Turnover		0.0072*		0.0001		0.0001
Flow		0.0005		0.0000		0.0000
Intercept	0.0010	-0.0008	0.0000	0.0000	0.0000	0.0000

4.5 Performance Consequences of Risk Shifting depending on Manager Characteristics.

Previous studies such as those by Chevalier and Ellison (1999b), Prather and Middleton (2002), and Bliss, Potter and Schwarz (2008) indicate that manager characteristics such as age, gender and tenure can affect the risk profiles of the portfolios managed.

Chevalier and Ellison (1999b) find that younger managers take on less unsystematic risk than older managers. Chevalier and Ellison (1999a) also find that mutual fund managers who attended more selective undergraduate institutions have higher performance than mutual fund managers who attended less selective undergraduate institutions. Menkhoff, Schmidt and Brozynskia (2006) argue that experienced fund managers are less overconfident and take lower risks.

As can be observed, there is a large variety of studies analyzing the impact of manager characteristics on performance and risk taking. We contribute to this literature by going a step forward through the analysis of the performance consequences of risk shifting depending on certain characteristics of fund managers.

To collect information on fund managers' characteristics, we use the database, Morningstar Direct, which provides information on the managers' name and the date on which the manager assumed responsibility for the fund. We match all funds from the *CNMV* database to the funds in the Morningstar database using the fund ISIN code. We focus on those fund-periods where mutual funds from our sample are single managed, since the objective is to analyze the performance consequences of risk shifting depending

on manager characteristics.[15] Therefore, we exclude fund-month observations for which Morningstar reports a management team or provides multiple manager names for a given date.

For certain mutual funds, Morningstar does not report the manager name. Hence, in this section, we only consider those fund-observations where Morningstar reports the manager name. The Appendix shows the performance consequences of risk shifting for those funds where Morningstar provides manager information. Panel A of Table A1 in Appendix suggests the same conclusions as Tables 3 and 4. Those mutual funds that increase their risk level obtained significantly better performance than funds with stable or decreased risk. Hence, we can conclude that the existence of missing information on the variable manager name does not bias our findings.

Panels B and C disaggregate the results in Panel A splitting those fund-months with team managed funds and single managed funds, respectively. The findings once more confirm the outperformance of managers with an increase in the risk level.

Similar conclusions are obtained in Table A2 in Appendix when the alternative *RS* measures are examined**.** Finally, it is important to highlight the increase experienced by the performance values for those funds for which Morningstar provides managers' information (Panel A of Tables A1 and A2 in comparison with Panel A of Tables 3 and 4); this appears to suggest that poor performing funds do not have incentives to report their managers' names.

The manager characteristics that we consider include gender (female vs male managers), level of specialization (generalists versus specialists' managers), tenure in the industry, age, and education (managers with a master degree or without).

4.5.1 Performance Consequences of Risk Shifting depending on Gender

Whether women behave differently from men has been extensively studied and reveals robust gender differences. The literature in economics and finance has concluded that women are more risk averse than men. Schmidt and Traub (2002) show women to be more loss averse than men. Beckmann and Menkhoff (2008) show that women are significantly more risk averse, tend to be less overconfident and behave less competitively oriented. More recently, Welch and Wang (2013) also find evidence that female managers have a lower risk tolerance than males.

[15] Baer, Kempf and Ruenzi (2011) show that team managed funds and single managed funds behave differently, and it is not clear how the skills of single team members translate into the skills of a team.

The financial literature has not only researched gender differences in manager decisions but also investor decisions. Jianakoplos and Bernasek (1998) find that single women exhibit relatively more risk aversion in financial decision making than single men. Conversely, Dwyer, Gilkeson and List (2002) find that women exhibit less risk taking than men in their most recent and riskiest fund investment decisions.

Due to the abovementioned evidence, we analyze whether the performance consequences of risk shifting are different depending on manager gender. One could expect better performance results when women increase the risk of the portfolios due to their lower tolerance to risk. Women's lower tolerance to risk will only lead them to increase their risk exposure when they have clearly detected an investment opportunity. Table 7 summarizes the performance consequences using the *RS* measure and the alternative metrics depending on the manager gender for the next month.[16]

First, we observe that the performance consequences of increasing risk are positive regardless of manager gender and the risk shifting mechanism examined, although this figure only tends to be statistically significant for male managers. Second, Panel A (CAPM alpha) reveals that the consequences of increasing risk (*RS* measure) are stronger for male than for female managers, while it is the opposite in Panel B (Carhart alpha). This finding appears to suggest that male managers obtain superior levels of performance when increasing the risk level of their portfolios following investment strategies based on size, book to market or momentum. However, when these factors are considered, the male managers' alphas suffer a relevant decrease. Therefore, as expected, women obtain better performance results than men when increasing the risk level of the overall portfolio, if the performance is calculated using the Carhart alpha; however, the difference between men and women in *RS5* is not statistically significant.

Finally, Table 7 also highlights the timing ability of male managers (Equity-based *RS* measure); especially in bear markets since it can be observed a positive and statistically significant performance of male managers when reducing their exposure to the equity market.

[16] Hereafter, tables only report the results obtained when analyzing the performance consequences for the next month (*t+1*). However, all the analyses have also been performed considering the consequences for the next quarter (*t+3*). The results are qualitative the same than for next month and therefore they are not reported here, although they are available upon request to the authors. Similarly, the tables hereafter do not report the results for the *RS* ratio due to their similarity to those obtained by using the *RS* measure. Nevertheless, those results are available upon request to the authors.

Table 7. Performance Consequences of Risk Shifting by Gender.

This table reports the future performance of portfolios of mutual funds sorted according to their level of risk shifting and the manager gender. Specifically, Panel A reports the CAPM alphas for the next month (period *t+1*), while Panel B reports the Carhart alphas. Mutual funds are first sorted into male and female groups; then, they are further divided into five groups according to their risk shifting level. The table reports the performance of the ten portfolios formed for each *RS* measure and the differences in the future performance between the selected portfolios. *; ** and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A	**RS measure**			**Systematic RS**			**Idiosyncratic RS**			**Equity-based RS**		
RS Portfolio	**Man**	**Woman**	**M - W**	**Man**	**Woman**	**M - W**	**Man**	**Woman**	**M - W**	**Man**	**Woman**	**M - W**
1	0.01%	-0.08%	0.09%	0.04%	0.08%	-0.04%	0.32%*	-0.02%	0.35%***	0.46%***	-0.27%	0.73%
2	-0.05%	0.11%*	-0.16%***	-0.05%	0.03%	-0.08%	0.18%	0.10%	0.08%	0.29%**	0.06%	0.23%
3	0.29%**	-0.12%	0.41%***	0.28%**	-0.02%	0.30%**	0.46%***	-0.01%	0.46%***	0.32%**	0.10%	0.22%**
4	0.65%***	0.00%	0.65%**	0.76%***	0.00%	0.76%**	0.26%**	0.55%**	-0.29%	0.20%*	-0.01%	0.21%
5	0.51%***	0.21%	0.31%	0.41%***	0.07%	0.34%	0.18%	-0.43%	0.61%	0.31%**	0.06%	0.25%
# 5-1	0.50%***	0.28%***	0.22%***	0.37%***	-0.01%	0.38%***	-0.14%	-0.40%***	0.27%	-0.15%	0.33%**	-0.48%***
# 5-3	0.22%*	0.33%***	-0.10%	0.13%	0.09%	0.04%	-0.27%**	-0.42%***	0.15%	-0.01%	-0.04%	0.03%
# 1-3	-0.28%**	0.04%	-0.32%***	-0.23%**	0.10%	-0.34%***	-0.13%	-0.02%	-0.12%	0.14%	-0.37%***	0.51%***
Panel B	**RS measure**			**Systematic RS**			**Idiosyncratic RS**			**Equity-based RS**		
RS Portfolio	**Man**	**Woman**	**M - W**	**Man**	**Woman**	**M - W**	**Man**	**Woman**	**M - W**	**Man**	**Woman**	**M - W**
1	0.02%	-0.08%	0.10%	0.04%	0.11%	-0.07%	0.23%	-0.01%	0.25%***	0.33%**	-0.24%	0.56%***
2	-0.06%	0.14%**	-0.2%***	-0.02%	0.04%	-0.06%	0.17%	0.16%	0.01%	0.20%	0.16%	0.05%
3	0.13%	-0.12%	0.26%**	0.11%	-0.03%	0.14%	0.31%***	0.03%	0.27%***	0.10%	0.12%	-0.02%
4	0.45%***	0.29%	0.16%	0.59%***	0.26%	0.33%	0.17%	0.89%***	-0.73%***	0.10%	-0.10%	0.20%
5	0.36%***	0.48%	-0.12%	0.27%**	-0.07%	0.34%	0.00%	-0.04%	0.03%	0.15%	0.17%	-0.02%
# 5-1	0.35%***	0.56%***	-0.21%***	0.23%***	-0.18%*	0.41%***	-0.24%	-0.03%	-0.21%	-0.17%	0.41%**	-0.59%***
# 5-3	0.23%**	0.60%***	-0.38%***	0.16%	-0.05%	0.20%**	-0.31%***	-0.07%	-0.24%**	0.05%	0.05%	-0.01%
# 1-3	-0.12%	0.04%	-0.16%	-0.07%	0.13%	-0.20%**	-0.07%	-0.05%	-0.03%	0.22%**	-0.36%***	0.58%***

4.5.2 Performance Consequences of Risk Shifting depending on Level of Specialization

Management companies can have incentives to assign portfolio managers depending on their abilities. Zambrana and Zapatero (2017) show that it is optimal to assign managers with market timing ability to generalist responsibilities (generalist managers are those who run funds comprising several investment objectives) and managers with stock-picking ability to specialist responsibilities (they run portfolios on one investment objective).[17] Consequently, we would expect that specialist managers are those with superior stock picking abilities and therefore, the managers who obtain better results when modifying the idiosyncratic risk of their portfolios. Similarly, we would expect that generalist managers exhibit more skills to time the market (i.e., to modify the portfolio asset allocation).

In accordance with Zambrana and Zapatero (2017), we measure the degree of specialization of the manager in each time period based on the difference between the overall number of funds managed by the manager and the number of funds managed in an investment vocation (in our case domestic equity mutual funds). When all mutual funds managed (or all expect one) belong to domestic equity funds, we classified this manager as a specialist; otherwise, the manager is classified as a generalist.

Table 8 summarizes the performance consequences of risk shifting depending on the level of the managers' specialization. This table reinforces, once more, the main finding of this paper. That is, increasing the risk level of portfolios has positive performance consequences regardless of the level of specialization of the fund managers. Similar to Table 7, we also observe different behavior between specialist and generalist managers that increase risk (portfolio 5), whether we examine CAPM alpha (Panel A) or Carhart alpha (Panel B). When considering the CAPM alpha, we observe that generalist managers tend to outperform specialist managers although without statistical significance. This finding appears reasonable because generalist managers are expected to be more skilled when following size, book to market or momentum investment strategies. Hence, it is not surprising that the generalist managers' performance decreases when Carhart alphas are examined. Concretely, specialist managers are those that outperform when increasing the overall and systematic risk level of the portfolios

[17] Fang, Kempf and Trapp (2014) also indicate that fund families allocate managers to market segments depending on their management skills. Specifically, fund families allocate their most skilled managers to inefficient markets to exploit the inefficiencies and generate higher performance.

considering the Carhart alpha. Hence, we can see that specialist managers are able to add value in their portfolios when they increase the risk level even when controlling for the 4-factors.

However, Table 8 does not exhibit a superiority of specialist managers' vs generalists in increasing the idiosyncratic risk. Similarly, Table 8 does not exhibit outperformance of generalist managers compared with specialists in terms of their abilities to time the market (increase or decrease the percentage invested in equity holdings).

4.5.3 Performance Consequences of Risk Shifting depending on Manager Tenure

Several empirical studies have analyzed whether risk taking changes with manager experience. Graham (1999), Li (2002) and Boyson (2003) find that risk aversion increases with manager experience. Similarly, Clement and Tse (2005) and Menkhoff, Schmidt and Brozynski (2006) also highlight that experienced managers are less overconfident and take fewer risks. However, other studies observe a positive relation between risk taking and experience (see, Chevalier and Ellison, 1999b; Hong, Kubik and Solomon, 2000 and Lamont, 2002).

Conversely, prior literature also indicates that managers with more industry tenure are more aware of the true volatility of asset prices which might lead to better investment decisions. Hence, despite the contradictory evidence about the relationship between risk taking and manager tenure, we hypothesize that we should observe superior performance consequences when more experienced managers increase the risk level of their portfolios because they have "more to lose" in personal wealth and reputation than less experienced managers if they fail.

Tenure in the industry is calculated from the first year that Morningstar reports for a manager in the database. Then, we divide mutual funds in each period into two groups depending on whether the manager tenure is above or below the median value. In a second step, we further divide the two groups of funds into five portfolios according to their most recent *RS* measure and estimate the CAPM and Carhart alphas of the portfolios formed.

Table 9 summarizes the performance consequences of risk shifting depending on manager tenure. The table first shows that there are few statistically significant differences between more and less experienced managers.[18]

[18] Note that the differences increase their significance when examining the consequences in the next quarter.

Table 8. Performance Consequences of Risk Shifting by Level of Specialization.

This table reports the future performance of portfolios of mutual funds sorted according to their level of risk shifting and the type of responsibilities of fund managers. Managers are classified as generalist whether they run funds belonging to several investment objectives while they are classified as specialists whether they run funds on just one investment objective. Specifically, Panel A reports the CAPM alphas for the next month (period *t+1*) while Panel B reports the Carhart alphas. Mutual funds are first sorted into specialist and generalist groups and then they are further divided into five groups according to their risk shifting level. The table reports the performance of the ten portfolios formed for each *RS* measure and the differences in the future performance between the selected portfolios. *; ** and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A:	**RS measure**			**Systematic RS**			**Idiosyncratic RS**			**Equity-based RS**		
RS Portfolio	**Specialist**	**Generalist**	**S - G**	**Specialist**	**Generalist**	**S - G**	**Specialist**	**Generalist**	**S - G**	**Specialist**	**Generalist**	**S - G**
1	-0.02%	0.13%	-0.15%	0.06%	-0.04%	0.11%*	-0.02%	0.09%	-0.11%	0.33%**	-0.04%	0.37%***
2	0.06%	0.00%	0.06%	0.10%	-0.06%	0.16%**	0.19%	0.20%	-0.01%	0.27%*	0.15%	0.12%
3	0.12%	0.25%***	-0.13%	0.17%	0.21%**	-0.04%	0.26%**	0.34%***	-0.08%	0.21%*	0.25%*	-0.04%
4	0.45%***	0.47%***	-0.02%	0.53%***	0.71%***	-0.17%	0.47%***	0.14%	0.33%***	0.00%	0.25%*	-0.25%*
5	0.39%**	0.46%***	-0.07%	0.38%**	0.35%**	0.03%	-0.02%	0.16%	-0.18%	0.32%*	0.02%	0.30%
# 5-1	0.41%***	0.33%*	0.08%	0.32%***	0.39%***	-0.07%	0.00%	0.07%	-0.07%	-0.01%	0.05%	-0.07%
# 5-3	0.27%**	0.21%**	0.06%	0.21%	0.14%	0.07%	-0.28%**	-0.18%	-0.10%	0.10%	-0.23%*	0.33%***
# 1-3	-0.14%	-0.12%	-0.02%	-0.11%	-0.25%***	0.14%	-0.28%**	-0.25%**	-0.03%	0.12%	-0.29%**	0.40%***

Panel B:	**RS measure**			**Systematic RS**			**Idiosyncratic RS**			**Equity-based RS**		
RS Portfolio	**Specialist**	**Generalist**	**S - G**	**Specialist**	**Generalist**	**S - G**	**Specialist**	**Generalist**	**S - G**	**Specialist**	**Generalist**	**S - G**
1	-0.01%	0.16%	-0.17%	0.07%	-0.05%	0.12%*	-0.09%	0.08%	-0.16%	0.34%**	-0.08%	0.42%***
2	0.07%	0.00%	0.07%	0.12%	-0.07%	0.18%***	0.19%	0.15%	0.04%	0.34%**	-0.01%	0.34%***
3	0.02%	0.15%	-0.13%	0.07%	0.07%	0.00%	0.26%**	0.17%	0.10%	0.10%	0.06%	0.05%
4	0.45%***	0.36%**	0.09%	0.54%***	0.56%***	-0.02%	0.41%***	0.10%	0.31%***	-0.11%	0.20%	-0.31%**
5	0.40%***	0.22%	0.18%	0.34%**	0.20%	0.14%	-0.22%	0.09%	-0.31%**	0.15%	-0.12%	0.27%
# 5-1	0.42%***	0.07%	0.35%***	0.27%***	0.25%***	0.02%	-0.13%	0.02%	-0.15%	-0.19%	-0.04%	-0.15%
# 5-3	0.39%***	0.07%	0.31%***	0.27%*	0.13%	0.14%	-0.48%***	-0.07%	-0.40%***	0.05%	-0.18%	0.23%*
# 1-3	-0.03%	0.01%	-0.04%	0.00%	-0.12%	0.12%	-0.35%***	-0.09%	-0.26%**	0.23%*	-0.14%	0.37%***

Table 9. Performance Consequences of Risk Shifting by Tenure.

This table reports the future performance of the portfolios of mutual funds sorted according to their level of risk shifting and the level of tenure of fund managers. Managers are classified by high and low tenure to form two equal-sized groups according to whether the characteristic is above or below its median value. Specifically, Panel A reports the CAPM alphas for the next month (period *t+1*), while Panel B reports the Carhart alphas. Mutual funds are first sorted into high and low tenure groups and then they are further divided into five groups according to their risk shifting level. The table reports the performance of the ten portfolios formed for each *RS* measure and the differences in the future performance between the selected portfolios. *; ** and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A:	**RS measure**			**Systematic RS**			**Idiosyncratic RS**			**Equity-based RS**		
RS Portfolio	**High**	**Low**	**H - L**	**High**	**Low**	**H - L**	**High**	**Low**	**H - L**	**High**	**Low**	**H - L**
1	0.09%	-0.09%	0.18%	0.04%	0.02%	0.02%	0.02%	0.12%	-0.10%	0.18%	0.04%	0.14%
2	-0.02%	0.13%*	-0.16%**	0.02%	-0.04%	0.07%	0.09%	0.25%	-0.16%	0.29%**	0.10%	0.19%
3	0.30%***	0.06%	0.24%*	0.25%**	0.13%	0.12%	0.43%***	0.19%	0.25%**	0.27%**	0.17%	0.11%
4	0.32%*	0.64%***	-0.32%	0.53%***	0.57%***	-0.04%	0.18%	0.41%***	-0.23%	0.19%	-0.03%	0.23%
5	0.46%***	0.43%***	0.03%	0.33%**	0.42%**	-0.10%	-0.06%	0.01%	-0.07%	0.11%	0.30%	-0.19%
# 5-1	0.37%***	0.52%***	-0.15%***	0.29%***	0.41%***	-0.12%**	-0.08%	-0.11%	0.03%	-0.07%	0.26%	-0.33%**
# 5-3	0.16%*	0.37%***	-0.21%***	0.08%	0.30%**	-0.22%**	-0.49%***	-0.17%	-0.32%***	-0.17%	0.13%	-0.30%**
# 1-3	-0.21%***	-0.15%	-0.06%	-0.21%**	-0.11%	-0.10%	-0.41%***	-0.07%	-0.35%***	-0.10%	-0.13%	0.03%

Panel B:	**RS measure**			**Systematic RS**			**Idiosyncratic RS**			**Equity-based RS**		
RS Portfolio	**High**	**Low**	**H - L**	**High**	**Low**	**H - L**	**High**	**Low**	**H - L**	**High**	**Low**	**H - L**
1	0.15%*	-0.12%	0.27%*	0.07%	0.03%	0.04%	0.01%	0.13%	-0.12%	0.12%	0.06%	0.07%
2	-0.02%	0.14%*	-0.16%**	0.03%	-0.05%	0.07%	-0.01%	0.24%	-0.25%	0.21%	0.15%	0.06%
3	0.20%***	-0.06%	0.26%**	0.12%	0.01%	0.10%	0.28%***	0.14%	0.14%	0.05%	0.06%	-0.01%
4	0.06%	0.53%***	-0.47%**	0.31%*	0.51%**	-0.20%	0.14%	0.33%**	-0.19%	0.10%	-0.08%	0.18%
5	0.36%**	0.45%***	-0.09%	0.19%	0.32%**	-0.13%	-0.15%	-0.14%	-0.01%	0.02%	0.18%	-0.16%
# 5-1	0.21%***	0.57%***	-0.36%***	0.12%**	0.29%***	-0.17%***	-0.16%	-0.27%**	0.11%	-0.10%	0.13%	-0.23%*
# 5-3	0.17%**	0.51%***	-0.35%***	0.07%	0.31%***	-0.24%**	-0.43%***	-0.27%**	-0.15%	-0.03%	0.12%	-0.15%
# 1-3	-0.04%	-0.06%	0.01%	-0.05%	0.02%	-0.07%	-0.27%***	0.00%	-0.27%***	0.07%	0.00%	0.08%

Second, we observe that experienced managers tend to obtain significantly better performance when they maintain stable risk levels in the overall portfolio and according to the idiosyncratic risk (see, e.g., Panels A and B). Third, Table 9 also confirms the main finding of this paper; increasing the overall level of risk and the systematic risk of fund portfolios leads to better performance than stable or decreasing risk levels, being this improvement in performance higher in less experienced managers.

4.5.4 Performance Consequences of Risk Shifting depending on Manager Age

As with previous manager characteristics, the financial literature has also analyzed whether risk taking increases or decreases with manager age. Chevalier and Ellison (1999b) find that younger managers take on less unsystematic risk than older managers. The researchers argue that younger managers have implicit labor market incentives, i.e., they are more likely to lose their jobs if their fund's beta or unsystematic risk level deviates from the mean of their objective group. Similarly, Avery and Chevalier (1999) also indicate that managers herd early in their careers and diverge in their actions later.

As the managers' age is not explicitly provided in the Morningstar database, we compute the age by collecting the birth dates from specialized websites such as citywire or LinkedIn when available.[19] Similar to industry tenure, we divide mutual funds in each period into two groups depending on whether manager age is above or below the median value. In a second step, we further divide the two groups of funds into five portfolios according to their most recent *RS* measure and estimate the CAPM and Carhart alphas of the portfolios formed.

Table 10 summarizes the performance consequences of risk shifting depending on manager age. Similar to previous analyses, Table 10 also highlights the positive performance consequences of those portfolios increasing the total risk level. However, in contrast with previous manager characteristics, manager age is not revealed as an important variable to differentiate the performance consequences of risk shifting. There are few statistically significant differences in the future performance between young and old managers, a finding similar to the result obtained in the analysis of manager tenure. The only remarkable finding is that old managers outperform young managers when they maintain stable risk levels. This finding is very similar to that obtained with manager tenure.

[19] Whether the birth date was not available and we have information about the year in which a manager got their university degree we follow Chevalier and Ellison (1999b) and assume that a manager was 21 upon university graduation.

Table 10. Performance Consequences of Risk Shifting by Manager Age.

This table reports the future performance of portfolios of mutual funds sorted according to their level of risk shifting and the age of fund managers. Managers are classified as young and old to form two equal-sized groups according to whether the characteristic is above or below its median value. Specifically, Panel A reports the CAPM alphas for the next month (period *t+1*), while Panel B reports the Carhart alphas. Mutual funds are first sorted into young and old manager groups; then, they are further divided into five groups according to their risk shifting level. The table reports the performance of the ten portfolios formed for each *RS* measure and the differences in the future performance between the selected portfolios. *; ** and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A:	**RS measure**			**Systematic RS**			**Idiosyncratic RS**			**Equity-based RS**		
RS Portfolio	**Young**	**Old**	**Y - O**	**Young**	**Old**	**Y - O**	**Young**	**Old**	**Y - O**	**Young**	**Old**	**Y - O**
1	0.02%	0.04%	-0.02%	0.01%	0.15%	-0.14%	0.08%	0.75%	-0.67%	0.21%	0.13%	0.09%
2	0.00%	-0.06%	0.07%	-0.01%	-0.02%	0.01%	0.43%	0.38%	0.04%	0.10%	0.26%	-0.16%
3	0.11%	0.60%***	-0.49%***	0.17%*	0.54%***	-0.38%**	0.41%	0.76%*	-0.34%	0.09%	0.69%***	-0.60%***
4	0.41%***	0.74%***	-0.33%	0.47%**	0.81%***	-0.34%	0.67%	0.23%	0.44%	-0.04%	0.34%*	-0.38%**
5	0.57%	0.55%	0.02%	0.58%	0.41%	0.17%	0.47%	0.20%	0.28%	0.64%	0.26%	0.38%
# 5-1	0.55%***	0.52%***	0.03%	0.57%	0.26%*	0.30%***	0.39%	-0.56%	0.95%	0.42%***	0.13%	0.29%**
# 5-3	0.46%***	-0.04%	0.50%***	0.41%***	-0.13%	0.54%***	0.06%	-0.56%	0.62%	0.54%***	-0.44%**	0.98%***
# 1-3	-0.09%	-0.56%***	0.47%***	-0.15%	-0.39%**	0.24%**	-0.33%	0.00%	-0.33%	0.12%	-0.57%***	0.69%***
Panel B:	**RS measure**			**Systematic RS**			**Idiosyncratic RS**			**Equity-based RS**		
RS Portfolio	**Young**	**Old**	**Y - O**	**Young**	**Old**	**Y - O**	**Young**	**Old**	**Y - O**	**Young**	**Old**	**Y - O**
1	0.03%	0.08%	-0.05%	0.03%	0.13%	-0.10%	0.06%	1.25%	-1.19%	0.12%	0.08%	0.03%
2	-0.01%	-0.02%	0.02%	0.01%	0.00%	0.00%	0.24%	0.39%	-0.15%	0.20%	0.03%	0.17%
3	0.01%	0.35%*	-0.34%*	0.02%	0.28%	-0.27%	0.42%	0.66%	-0.25%	-0.02%	0.32%*	-0.34%*
4	0.28%**	0.42%*	-0.14%	0.43%**	0.48%**	-0.05%	0.63%	0.30%	0.33%	-0.09%	0.19%	-0.28%
5	0.45%	0.40%	0.04%	0.37%	0.31%	0.06%	0.38%	-0.19%	0.57%	0.45%	0.16%	0.30%
# 5-1	0.42%***	0.32%**	0.10%	0.34%***	0.18%	0.16%***	0.32%	-1.44%	1.76%***	0.33%**	0.07%	0.26%*
# 5-3	0.43%***	0.05%	0.38%***	0.36%***	0.03%	0.32%***	-0.03%	-0.85%*	0.82%*	0.47%***	-0.17%	0.63%***
# 1-3	0.02%	-0.27%	0.28%***	0.01%	-0.15%	0.16%*	-0.35%	0.59%	-0.94%**	0.13%	-0.24%	0.37%***

4.5.5 Performance Consequences of Risk Shifting depending on Manager Education

Prior studies have also investigated the importance of manager education and how it affects portfolio performance and risk. Chevalier and Ellison (1999a) find that mutual fund managers who attended more selective undergraduate institutions have higher performance than mutual fund managers who attended less selective undergraduate institutions. These authors argue that this difference is due to educational training, reinforcing that systematic risk is the sole type of risk that is compensated (not unsystematic risk).

Gottesman and Morey (2006) find that managers who held MBAs from the highest ranked schools outperformed those with MBAs from unranked schools and those without MBAs entirely. Switzer and Huang (2007) show that managers with an MBA degree are more likely to take on extra risk by investing in high beta funds because they know that only systematic risk pays as a compensation for the risk assumed. Dincer, Gregory-Allen, and Shawky (2010) examine portfolio managers based on three educational factors (CFA, MBA, and experience) and determine their performance while controlling for risk and style methods. The researchers conclude that those managers with CFAs reduced portfolio risk while those with MBAs increased it.

As occurred with industry tenure, we should expect that the level of education impacts the risk shifting strategies of fund managers; consequently, more educated managers (managers with a master degree) should be more aware of the true volatility of asset prices; this may lead to superior investment decisions and therefore, superior performance consequences (see, e.g., Menkhoff, Schmidt and Brozynskia, 2006).

Table 11 summarizes the performance consequences of risk shifting depending on manager education (managers with a master degree versus managers without a master degree). Manager education appears to be an important variable to discriminate the performance consequences of risk shifting. First, if we explain the difference between increasing risk and maintaining stable risk levels or reducing them, we can observe that both managers holding a master's degree and those without significantly outperform when increasing the overall risk level and systematic risk (see, e.g., the comparison of portfolio 5 vs 1 and portfolio 5 vs 3). Second, the use of the *RS* measure or the Systematic *RS* provides evidence in favor of managers with a master degree, because these managers significantly outperform the remaining managers both when they increase their risk level and particularly when they maintain stable risk levels. However, this performance

improvement disappears when the 4-factor alphas are considered. Conversely, the findings also reveal that managers with a master's significantly increase the value added to their portfolios when they decrease the idiosyncratic risk; that is, when they diversify their portfolios.

5 Conclusions

This article analyzes the performance consequences of risk shifting through the analysis of monthly portfolio holdings to detect whether this behavior is explained by unskilled or agency-prone fund managers who trade for personal motivations, such as promotion or compensation, or is the result of skilled managers who trade to take advantage of their investment skills.

Our paper documents that funds that increase risk obtain a positive and statistically significant outperformance compared to funds that maintain stable risk levels and funds that reduce their risk in subsequent periods. This finding, in contrast to previous evidence in the US mutual fund industry, provides evidence that risk shifting is not harmful to investors in less developed markets; instead, it is the opposite. We also find that this result is very robust regardless of the mechanism of risk shifting used by managers (mainly changes in asset allocation and changes in the systematic risk). The findings obtained when using the idiosyncratic risk are slightly different. We obtain that increasing the idiosyncratic risk, which occurs when funds increase their portfolio concentration, leads to underperformance. This finding suggests that the driver of poor performance for increasing idiosyncratic risk is poor stock-picking abilities.

Finally, we also document that the positive performance consequences of increasing risk are robust to manager socio-demographic variables, such as age, gender, tenure, level of specialization and education. However, there are statistically significant differences depending on manager characteristics. Specifically, the decision of increasing risk is superior when it is made by a female or a specialist manager.

Acknowledgements

This work was supported by FEDER and FSE Aragón "Construyendo Europa desde Aragón" (268-245) and by University of Zaragoza (268-246).

Table 11. Performance Consequences of Risk Shifting by Manager Education.

This table reports the future performance of the portfolios of mutual funds sorted according to their level of risk-shifting and the education of the fund managers. Managers are classified based on their education into two groups: managers with a master degree and managers without master degree. Specifically, Panel A reports the CAPM alphas for the next month (period *t+1*), while Panel B reports the Carhart alphas. Mutual funds are first sorted into Master and No Master groups; then, they are further divided into five groups according to their risk shifting level. The table reports the performance of the ten portfolios formed for each *RS* measure and the differences in the future performance between the selected portfolios. *; ** and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A:	**RS measure**			**Systematic RS**			**Idiosyncratic RS**			**Equity-based RS**		
RS Portfolio	**Master**	**No Master**	**M - NM**	**Master**	**No Master**	**M - NM**	**Master**	**No Master**	**M - NM**	**Master**	**No Master**	**M - NM**
1	0.07%	-0.10%	0.17%	0.10%	-0.12%	0.21%**	0.29%*	-0.08%	0.37%***	0.12%	0.17%	-0.04%
2	-0.02%	0.12%*	-0.15%**	0.05%	-0.02%	0.07%	0.20%	0.09%	0.11%	0.28%*	0.19%	0.09%
3	0.29%*	-0.02%	0.31%***	0.27%*	0.07%	0.20%**	0.43%***	0.05%	0.38%***	0.43%***	-0.09%	0.52%***
4	0.64%***	0.15%	0.49%***	0.69%***	0.24%*	0.44%***	0.43%***	0.20%	0.22%*	0.24%*	0.03%	0.20%
5	0.78%	0.17%	0.62%	0.58%	0.13%	0.45%	0.01%	0.24%	-0.23%	0.20%	0.08%	0.13%
# 5-1	0.72%***	0.27%	0.45%***	0.49%***	0.25%**	0.24%***	-0.28%*	0.31%***	-0.60%***	0.08%	-0.09%	0.17%
# 5-3	0.50%***	0.19%**	0.31%**	0.31%**	0.06%	0.25%*	-0.42%***	0.19%	-0.61%***	-0.22%	0.17%*	-0.39%***
# 1-3	-0.22%	-0.08%	-0.14%	-0.17%	-0.19%**	0.01%	-0.13%	-0.12%	-0.01%	-0.30%**	0.26%***	-0.56%***

Panel B:	**RS measure**			**Systematic RS**			**Idiosyncratic RS**			**Equity-based RS**		
RS Portfolio	**Master**	**No Master**	**M - NM**	**Master**	**No Master**	**M - NM**	**Master**	**No Master**	**M - NM**	**Master**	**No Master**	**M - NM**
1	0.11%*	-0.24%	0.35%	0.12%**	-0.13%	0.24%**	0.27%	-0.09%	0.36%***	0.09%	0.17%	-0.09%
2	-0.04%	0.12%	-0.15%*	0.06%	-0.02%	0.09%	0.14%	0.20%**	-0.06%	0.19%	0.24%*	-0.06%
3	0.10%	-0.03%	0.13%	0.04%	0.05%	-0.01%	0.27%***	0.06%	0.21%*	0.20%	-0.11%	0.31%***
4	0.40%***	0.23%*	0.17%	0.48%**	0.26%**	0.22%*	0.28%*	0.20%	0.08%	0.14%	-0.11%	0.24%
5	0.47%	0.17%	0.30%	0.35%	0.12%	0.23%	-0.21%	0.14%	-0.35%	-0.01%	-0.04%	0.03%
# 5-1	0.36%***	0.41%*	-0.05%	0.23%***	0.24%**	-0.01%	-0.48%***	0.23%***	-0.71%***	-0.09%	-0.21%	0.12%
# 5-3	0.37%***	0.20%**	0.17%	0.31%**	0.07%	0.24%*	-0.48%***	0.08%	-0.56%***	-0.21%	0.07%	-0.28%**
# 1-3	0.01%	-0.21%**	0.22%	0.07%	-0.17%**	0.25%*	0.00%	-0.15%	0.15%	-0.12%	0.28%***	-0.40%***

References

Andreu, L., Matallín-Sáez, J.C., and Sarto, J.L. (2018). Mutual fund performance attribution and market timing using portfolio holdings. *International Review of Economics and Finance*, 57, 353–370.

Ang, A., Hodrick, R. J., Xing, Y., and Zhang, X. (2006). The cross–section of volatility and expected returns. *Journal of Finance*, 61(1), 259–299.

Avery, C. N., and Chevalier, J. A. (1999). Herding over the career. *Economics Letters*, 63(3), 327–333.

Baer, M., Kempf, A., and Ruenzi, S. (2011). Is a team different from the sum of its parts? Evidence from mutual fund managers. *Review of Finance*, 15(2), 359–396.

Beckmann, D., and Menkhoff, L. (2008). Will women be women? Analyzing the gender difference among financial experts. *Kyklos*, 61(3), 364–384.

Bliss, R. T., Potter, M. E., and Schwarz, C. (2008). Performance characteristics of individually-managed versus team-managed mutual funds. *The Journal of Portfolio Management*, 34(3), 110–119.

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

Boyson, N. M. (2003). Why do experienced hedge fund managers have lower returns? *Working Paper*, Purdue University.

Busse, J. A. (2001). Another look at mutual fund tournaments. *Journal of Financial and Quantitative Analysis*, 36(01), 53–73.

Carhart, M. M. (1997). On persistence in mutual fund performance. *Journal of Finance*, 52(1), 57–82.

Chevalier, J., and Ellison, G. (1997). Risk taking by mutual funds as a response to incentives. *Journal of Political Economy*, 105(6), 1167–1200.

Chevalier, J., and Ellison, G. (1999a). Are some mutual funds managers better than others? Cross-Sectional patterns in behavior and performance. *Journal of Finance*, LIV(3), 875–899.

Chevalier, J., and Ellison, G. (1999b). Career concerns of mutual fund managers. *Quarterly Journal of Economics*, 114(2), 389–432.

Clement, M. B., and Tse S. Y. (2005). Financial analyst characteristics and herding behavior in forecasting. *Journal of Finance*. 60(1), 307–341.

Cremers, K. M., and Petajisto, A. (2009). How active is your fund manager? A new measure that predicts performance. *Review of Financial Studies*, 22(9), 3329–3365.

Daniel, N. D., and Wermers, R. (2000). Risk-Taking behavior by mutual fund managers: Do managers. "Walk Away" from the tournament? *Working Paper*.

Dincer, O. C., Gregory-Allen, R. B., and Shawky, H. A. (2010). Are you smarter than a CFA'er? *Working Paper, SSRN 1458219*.

Dwyer, P. D., Gilkeson, J. H., and List, J. A. (2002). Gender differences in revealed risk taking: Evidence from mutual fund investors. *Economics Letters*, 76(2), 151–158.

European Fund and Asset Management Association. (2018). Quarterly Statistical Release: Trends in the European Investment Fund Industry in the Fourth Quarter of 2017 and Results for the full year of 2017, Brussels.

Elton, E. J., Gruber, M. J., and Blake, C. R. (2003). Incentive fees and mutual funds. *Journal of Finance*, 58(2), 779–804.

Elton, E. J., Gruber, M. J., Blake, C. R., Krasny, Y., and Ozelge, S. O. (2010). The effect of holdings data frequency on conclusions about mutual fund behavior. *Journal of Banking and Finance*, 34(5), 912–922.

Elton, E. J., Gruber, M. J., and Blake, C. R. (2012). An examination of mutual fund timing ability using monthly holdings data. *Review of Finance*, 16(3), 619–645.

Fama, E. F., and French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, 33(1), 3–56.

Fama, E. F., and French, K. R. (2010). Luck versus skill in the cross-section of mutual fund returns. *Journal of Finance*, 65(5), 1915–1947.

Fama, E. F., and MacBeth, J. D. (1973). Risk, return, and equilibrium: Empirical tests. *Journal of Political Economy*, 81(3), 607–636.

Fang, J., Kempf, A., and Trapp, M. (2014). Fund manager allocation. *Journal of Financial Economics*, 111(3), 661–674.

Graham, J. R. (1999). Herding among investment newsletters: Theory and evidence. *Journal of Finance*, 54(1), 237–268.

Grau-Carlos, P., Doncel, L. M., and Sainz, J. (2019). Stability in mutual fund performance rankings: A new proposal. *International Review of Economics and Finance*, Forthcoming.

Gottesman, A. A., and Morey, M. R. (2006). Manager education and mutual fund performance. *Journal of Empirical Finance*, 13(2), 145–182.

Hong, H., Kubik, J. D., and Solomon, A. (2000). Security analysts' career concerns and herding of earnings forecasts. *Journal of Economics*, 31(1), 121–144.

Huang, J., Sialm, C., and Zhang, H. (2011). Risk shifting and mutual fund performance. *Review of Financial Studies*, 24(8), 2575–2616.

Inverco, Asociación de Instituciones de Inversión Colectiva y Fondos de Pensiones. (2017), Fondos de Inversión. Estadísticas Diciembre 2017, Madrid.

Investment Company Institute. (2017). Investment Company Fact Book, 57th ed. Washington, D.C.

Jianakoplos, N. A., and Bernasek, A. (1998). Are women more risk averse? *Economic Inquiry*, 36(4), 620–630.

Kacperczyk, M., Sialm, C., and Zheng, L. (2008). Unobserved actions of mutual funds. *Review of Financial Studies*, 21(6), 2379–2416.

Kacperczyk, M., Sialm, C., and Zheng, L. (2005). On the industry concentration of actively managed equity mutual funds. *Journal of Finance*, 60(4), 1983–2011.

Kempf, A., Ruenzi, S., and Thiele, T. (2009). Employment risk, compensation incentives, and managerial risk taking: Evidence from the mutual fund industry. *Journal of Financial Economics*, 92(1), 92–108.

Lamont, O. (2002). Macroeconomic forecasts and microeconomic forecasters. *Journal of Economic Behavior and Organization*, 48(3), 265–280.

Lee, J. H., Trzcinka, C., and Venkatesan, S. (2015). Mutual fund risk-shifting and management contracts. *Working Paper.*

Li, X., (2002). Performance, herding, and career concerns of individual financial analysts. *Working Paper, Vanderbilt University, SSRN 300889.*

Ma, L., Tang, Y., and Gómez, J. P. (2019). Portfolio manager compensation in the US mutual fund industry. *Journal of Finance,* Forthcoming.

Massa, M., and Patgiri, R. (2009). Incentives and mutual fund performance: higher performance or just higher risk taking?. *Review of Financial Studies*, 22(5), 1777–1815.

Meier, I., and Schaumburg, E. (2006). Do funds window dress? Evidence for U.S. domestic equity mutual funds. *Working Paper*.

Menkhoff, L., Schmidt, U., and Brozynski, T. (2006). The impact of experience on risk taking, overconfidence, and herding of fund managers: Complementary survey evidence. *European Economic Review*, 50(7), 1753–1766.

Prather, L. J., and Middleton, K. L. (2002). Are N+ 1 heads better than one?: The case of mutual fund managers. *Journal of Economic Behavior and Organization*, 47(1), 103–120.

Schmidt, U., and Traub, S. (2002). An experimental test of loss aversion. *Journal of Risk and Uncertainty*, 25(3), 233–249.

Sias, R. W. (2007). Causes and seasonality of momentum profits. *Financial Analysts Journal*, 63(2), 48–54.

Sirri, E. R. and Tufano, P. (1998). Costly search and mutual fund flows. *Journal of Finance*, 53(5), 1589–1622.

Switzer, L. and Huang, Y. (2007). Management characteristics and the performance of small and mid cap mutual funds. (Doctoral dissertation, Concordia University).

Taylor, J. (2003). Risk-taking behavior in mutual fund tournaments. *Journal of Economic Behavior and Organization*, 50(3), 373–383.

Welch, S., and Wang, Y. (2013). Is manager gender important in the performance of mutual funds? *Working Paper*.

Zambrana, R., and Zapatero, F. (2017). A Tale of Two Types: Generalists vs. Specialists in Mutual Funds Asset Management. *Working Paper*.

Appendix: Analysis of Risk Shifting consequences in funds with manager information.

Table A1. Performance Consequences of Risk Shifting for those funds with manager information.

This table reports the performance of mutual fund portfolios with manager information sorted according to the most recent risk shifting measure (*RS* measure). Specifically, the table summarizes the performance consequences in the short-term (next month, *t+1*). The table is divided into three panels. Panel A summarizes the performance consequences for those funds that report manager information in Morningstar regardless of the type of management structure. Then, the results of Panel A are split into Panel B whether the funds are team managed and into Panel C whether the funds are single managed. All measures are expressed in % terms. *; ** and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A: Funds with manager information						
RS Portfolio	**Gross Return**	**Net Return**	**Excess Market**	**CAPM**	**Fama-French**	**Carhart**
1	0.15%	0.00%	-0.09%	-0.10%*	-0.12%**	-0.11%*
2	0.31%	0.15%	0.07%	0.07%	0.06%	0.08%*
3	0.26%	0.10%	0.02%	0.03%	-0.01%	-0.01%
4	0.67%*	0.51%	0.42%**	0.48%***	0.35%***	0.33%***
5	0.65%	0.49%	0.41%**	0.46%***	0.37%***	0.40%***
# 5-1	0.50%	0.49%	0.50%	0.56%***	0.48%***	0.51%***
# 5-3	0.39%	0.39%	0.39%	0.43%***	0.38%***	0.41%***
# 1-3	-0.11%	-0.10%	-0.11%	-0.13%***	-0.11%***	-0.10%***
Panel B: Team Managed Funds						
RS Portfolio						
1	0.00%	-0.14%	-0.26%***	-0.26%***	-0.27%***	-0.28%***
2	0.26%	0.10%	0.02%	0.03%	0.02%	0.07%
3	0.24%	0.08%	0.02%	0.04%	0.01%	0.03%
4	0.35%	0.20%	0.11%	0.14%	0.08%	0.13%
5	0.51%	0.36%	0.22%	0.27%*	0.17%	0.23%*
# 5-1	0.50%	0.50%	0.48%	0.53%***	0.44%***	0.52%***
# 5-3	0.27%	0.28%	0.20%	0.24%***	0.16%***	0.20%***
# 1-3	-0.24%	-0.22%	-0.28%	-0.29%***	-0.28%***	-0.32%***
Panel C: Single Managed Funds						
RS Portfolio						
1	0.24%	0.09%	0.00%	-0.01%	-0.04%	-0.01%
2	0.20%	0.05%	0.04%	0.04%	0.03%	0.04%
3	0.40%	0.25%	0.16%	0.19%**	0.11%	0.07%
4	0.66%	0.50%	0.50%***	0.54%***	0.41%***	0.39%***
5	0.63%	0.46%	0.38%**	0.44%***	0.34%***	0.35%***
# 5-1	0.38%	0.37%	0.38%	0.45%***	0.38%***	0.36%***
# 5-3	0.22%	0.21%	0.22%	0.24%***	0.24%***	0.28%***
# 1-3	-0.16%	-0.16%	-0.16%	-0.21%***	-0.15%***	-0.08%***

Table A2. Performance Consequences using alternative Risk Shifting Measures for those funds with manager information.

This table reports the CAPM, Fama and French and Carhart alphas of portfolios of mutual funds sorted according to the most recent risk shifting measure. We compute four different measures of risk shifting: the ratio between the current holdings volatility and the past realized volatility, the systematic risk shifting, the idiosyncratic risk shifting, and the equity-based risk shifting measures. Specifically, the table summarizes the performance consequences in the short-term (next month, *t+1*). The table is divided into three panels. Panel A summarizes the performance consequences for those funds that report manager information in Morningstar regardless of the type of management structure. Then, the results of Panel A are split into Panel B whether the funds are team managed and into Panel C whether the funds are single managed. All measures are expressed in % terms. *; ** and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A: Funds with manager information

RS Portfolio	RS ratio			Systematic RS			Idiosyncratic RS			Equity-based RS		
	CAPM	Fama-French	Carhart	CAPM	Fama-French	Carhart	CAPM	Fama-French	Carhart	CAPM	Fama-French	Carhart
1	-0.11%*	-0.11%**	-0.12%**	0.01%	0.00%	0.03%	0.11%	0.08%	0.07%	-0.05%	-0.09%	-0.07%
2	0.07%	0.04%	0.08%	0.04%	0.02%	0.04%	0.16%**	0.12%	0.14%*	0.14%*	0.11%	0.12%*
3	0.05%	0.01%	0.01%	0.05%	0.01%	0.02%	0.19%***	0.14%**	0.13%**	0.16%**	0.09%	0.06%
4	0.42%***	0.31%***	0.28%**	0.59%***	0.45%***	0.41%***	0.28%***	0.21%**	0.22%**	0.12%	0.04%	0.04%
5	0.55%***	0.42%***	0.44%***	0.33%***	0.22%*	0.26%**	0.10%	-0.03%	0.00%	0.15%	0.09%	0.08%
# 5-1	0.65%***	0.53%***	0.56%***	0.31%***	0.22%***	0.22%***	-0.01%	-0.11%	-0.07%	0.19%**	0.17%**	0.15%*
# 5-3	0.50%***	0.41%***	0.43%***	0.28%***	0.21%***	0.24%***	-0.09%	-0.16%***	-0.13%**	-0.01%	0.00%	0.02%
# 1-3	-0.15%**	-0.12%**	-0.13%**	-0.03%	-0.01%	0.01%	-0.08%	-0.06%	-0.06%	-0.21%***	-0.17%***	-0.14%**

Panel B Team Managed Funds

RS Portfolio	RS ratio			Systematic RS			Idiosyncratic RS			Equity-based RS		
	CAPM	Fama-French	Carhart	CAPM	Fama-French	Carhart	CAPM	Fama-French	Carhart	CAPM	Fama-French	Carhart
1	-0.27%***	-0.29%***	-0.31%***	-0.09%	-0.10%	-0.07%	0.04%	0.02%	-0.01%	-0.18%	-0.20%*	-0.19%
2	0.17%*	0.14%	0.18%*	0.08%	0.06%	0.08%	0.05%	0.05%	0.07%	0.08%	0.06%	0.08%
3	0.00%	-0.02%	0.00%	0.08%	0.05%	0.10%	-0.01%	-0.04%	-0.01%	0.05%	0.00%	0.04%
4	0.10%	0.05%	0.10%	0.17%	0.10%	0.12%	0.23%*	0.19%	0.27%**	0.02%	-0.02%	0.00%
5	0.28%*	0.18%	0.24%*	0.19%	0.11%	0.16%	0.15%	0.06%	0.16%	-0.05%	-0.08%	-0.05%
# 5-1	0.55%***	0.47%***	0.55%***	0.29%***	0.20%**	0.23%**	0.10%	0.04%	0.17%*	0.13%	0.12%	0.15%
# 5-3	0.27%***	0.20%***	0.24%***	0.12%	0.06%	0.05%	0.16%**	0.10%	0.17%**	-0.10%	-0.08%	-0.09%
# 1-3	-0.27%***	-0.27%***	-0.31%***	-0.17%**	-0.15%*	-0.18%**	0.05%	0.06%	0.00%	-0.23%***	-0.20%***	-0.23%***

(continued)

Panel C: Single Managed Funds												
RS Portfolio	**RS ratio**			**Systematic RS**			**Idiosyncratic RS**			**Equity-based RS**		
	CAPM	**Fama-French**	**Carhart**	**CAPM**	**Fama-French**	**Carhart**	**CAPM**	**Fama-French**	**Carhart**	**CAPM**	**Fama-French**	**Carhart**
1	-0.06%	-0.08%	-0.08%	0.04%	0.03%	0.06%	0.11%	0.06%	0.08%	0.11%	0.05%	0.07%
2	0.08%	0.05%	0.09%	0.00%	-0.04%	-0.01%	0.20%*	0.15%	0.17%	0.23%**	0.19%*	0.20%*
3	0.16%	0.08%	0.05%	0.21%**	0.13%	0.09%	0.31%***	0.23%***	0.19%**	0.21%**	0.12%	0.06%
4	0.50%***	0.37%***	0.36%***	0.62%***	0.49%***	0.48%***	0.34%***	0.26%***	0.25%**	0.15%	0.06%	0.04%
5	0.52%***	0.41%***	0.40%***	0.31%**	0.21%*	0.22%*	0.01%	-0.12%	-0.13%	0.13%	0.02%	0.02%
# 5-1	0.57%***	0.48%***	0.48%***	0.27%***	0.19%***	0.16%***	-0.10%	-0.19%**	-0.22%**	0.02%	-0.03%	-0.05%
# 5-3	0.36%***	0.33%***	0.35%***	0.10%	0.08%	0.13%	-0.30%***	-0.35%***	-0.32%***	-0.09%	-0.09%	-0.03%
# 1-3	-0.21%**	-0.16%*	-0.13%	-0.17%*	-0.10%	-0.03%	-0.20%**	-0.16%*	-0.11%	-0.10%	-0.06%	0.01%