MANAGEMENT DIVERSITY AND FIRM PERFORMANCE

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Abstract

We introduce a diversity measure of the top management team based on three attributes: compensation, gender and age. On average, firms with greater diversity of the top management team have a positive relation with abnormal returns based on the Fama-French 3-Factor model. However, our calendar-time valued-weighted portfolio approach shows that the relation between the diversity measure and abnormal return is negative. Overall, we conclude that the relation between diversity of the top management team and firm performance is not robust.

Keywords: Diversity; Top management; Firm performance; Calendar portfolio

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Table of Contents

Approval ..... **ii**

Abstract ..... **iii**

Acknowledgements ..... **iv**

Table of Contents ..... **v**

List of Figures ..... **vi**

List of Tables ..... **vii**

1: Introduction **1**

2: Literature review & hypotheses **4**

2.1 Compensation diversity 4

2.2 Gender diversity 5

2.3 Age diversity 6

3: Data and Diversity Index **8**

3.1 Data Sources 8

3.2 Creating the Index of Diversification on Top Executives 8

3.3 Summary Statistics 10

4: Methodology and Empirical Results **12**

4.1 Approach One: Compare the Difference between Mean of Alphas 12

4.2 Approach Two: Test the Positivity of Coefficient of Diverse 13

4.3 Approach Three: Calendar time Portfolios and Trading Strategy Approach 13

4.4 Risk and Diversification 15

5: Conclusion **16**

Appendices **17**

Bibliography **26**

List of Figures

Figure 1 Variation of Diversity Measure 17
Figure 2 Accumulated Returns of Value-weighted Portfolio 18
Figure 3 Accumulated Returns of Equal-weighted Portfolio Approach 19

List of Tables

Table 1 T-test the Difference between Means of Monthly Returns of Each Group 20
Table 2 Empirical Results for Three Approaches 21
Table 3 Risk and Diversification 25

1: Introduction

In recent years, diversity in the top management groups of a firm has been a focus of attention. Diversity within the top management team can be defined by many elements, such as, gender, age, compensation, race and culture. There are many studies that have focused on one of the elements of diversity. Several studies of management diversity have found that it is positively related to firm performance (Cox et al., 1991; Watson et al., 1993), however, others have claimed that heterogeneity of the management team leads to lower performance than homogeneous management (Pelled et al., 1999; Tsui et al., 1992). Richard et al. (2004) finds a nonlinear relationship relation between racial and gender diversity and risk taking and innovativeness within the firm.

Furthermore, these studies insinuate that the influence of diversity of the top management team encompasses both gains and setbacks to firms. For example, the advantages of diversity are that of, problem-solving and decision-making, which are improved by heterogeneity due to a broader view and critical analysis (Perryman et al., 2016). Moreover, risk preference has a significant impact on firm performance (Bowman, 1982). Impact of increased diversity in executives may lead to firm having fewer extreme losses because of steady performance and having less extreme return because of less risk taking. Thus, diversity in the top management will influence firm performance via its risk-taking. In addition, diversity can also bring negative impacts on firm performance. The disadvantages of diversity are that it can delay actions due to different views and options and may create segregation and increase conflict between executives overall

(Tanikawa & Kim, 2017). The diversity in top management therefore becomes a critical area related to organization performance. The primary motivation for this study is to investigate how diversity in the top management team can influence firm performance. Our argument rests on the premise that greater diversity in the top management team can be contributed to equal pay, more women as executives, greater dispersion of age over executives. Particularly, we start by reviewing the relevant literatures of gender diversity, age diversity and compensation diversity across the top management team to see how different diversity factors influence firm performance. We argue that to quantify diversity more accurately, one has to devise a measure that combines various diversity factors, which broadens the filed by providing insights to the difference between firms with heterogenous executives and firms with homogenous management teams.

In our study, we create a Diverse Index, by adding the diversity effects of three variables, compensation, age and gender within the top management groups. We divide companies into four groups of diversity with different degrees of diversity of management. Additionally, we find that there is no significantly differences of firm performance among the four diversity groups. However, there is a significant difference between executives with equal pay and executives with greater dispersion of compensation. Firms that have the top management with equal compensation seem to perform better than firms with greater dispersion of compensation of executives. Moreover, our examination also shows that, on average, companies with greater diversity in the top management team have a positive relation with abnormal returns based on the Fama-French 3-Factor model.

In addition, in order to quantify an aggregate perspective of firms' performance, we build calendar-time portfolios (equal weighted and value weighted) of different diversity groups to compare their market returns. Our value weighted portfolios show that greater diversity in the top management team may have a negative impact on firm performance. The result contrasts to the former finding where this impact is positive. This value-weighted result may imply that there may be too much diversity in large firms that makes it counterproductive. Furthermore, by investing in firms with less degree of heterogenous management and shorting firms with greater degree of heterogenous management, we can have a significant abnormal return, which indicates that diversity in the top management team is negatively related to firm performance.

2: Literature review & hypotheses

In what follows we partition the literature by the different types of diversity that we employ in our aggregate measure.

2.1 Compensation diversity

In order to capture diversity in the top management, compensation of executives is one of the most important variables of diversity. It can be tournament incentives based on promotion or can be alignment incentives based on equal compensation over the executives. Tournament theory says that the dispersion of pay will increase as one moves up in the corporate hierarchy (Rosen 1986), because the value of winning not only includes the prize but also includes the possibility to win larger when the competition level moves up. Hence, tournament theory also suggests that the CEO needs extra promotion since there is no higher level existed in the company. Therefore, the dispersion between CEO and other executives becomes larger. Moreover, intense promotion incentives push individuals to work on their own effort instead of helping them (Drago and Gamey, 1998). Lazear (1995) also points out that the incentive part of compensations may be critical in the payment structure. Companies can use this large salary spread to reduce randomness effect, because performance can be contributed to luck or other random components. On the other hand, the fairness of the tournament incentive structure has been questioned, which in turn, may destroy performance (Kale, 2009). Executives with lower compensation may have no incentive to optimize firm performance. CEO also want to have a good relationship with other executives (Garvey and Swan, 1992). Thus, alignment incentives based on equal pay can induce all executives to maximize firm

performance (Kale, 2009). Overall, most studies have claimed that there is a positive relation between promotion-based compensation and firm performance (Tor Eriksson, 1999). We aim to use compensation as our first variable of diversity in the top management team to investigate the effect of the dispersion of executives' compensation on firm performance.

2.2 Gender diversity

Although women in leadership roles seem to have led to some positive returns for companies (Echeverri-Carroll et al.,2018), they are still a minority within the top management (Catalyst, 2018). As data shows, there are barriers that women encounter in the United States (Trianaa et al., 2019). The number of women in the top management is not critical (Andrevski et al., 2014). Therefore, there are many studies on the effect of gender diversity on overall management performance (Dwyer et al., 2003), with several examples that focus on gender diversity of the executives (Ruiz-Jimenez and Fuentes-Fuentes, 2016). In addition, two theories referred to as critical mass and tokenism, respectively, investigate the gender diversity by considering the minority effect (Laible, 2013). Critical mass theory states that the underrepresented group will not have a consequential impact on the team unless a critical baseline proportion has been reached. On the other hand, tokenism theory claims that decision-making is not significantly affected by underrepresented group, as they can only add token value to the team (Kanter, 1977). Hence, the two theories suggest that the influence of gender diversity in the top management could be positive or limited on firm performance, depending on the impact of the underrepresented group (Laible, 2013). Furthermore, some scholars suggest that gender diversity alone may not be advantageous; however, organizational culture can be

regarded as a positive mediator between gender diversity and firm performance (Richard et al., 2013). Culture of organization, defining as beliefs or shared value of companies, is critical because it can improve employees' understanding of firm functioning and corporate practice (Dwyer, Richard, Chadwick, 2003). Moreover, another important factor when concerning gender diversity is the risk preference between men and women (Perryman et al., 2016). Women are assumed to be more risk averse than men. Therefore, different risk preferences in gender diversity may show different strategies made by the executives (Charness & Gneezy, 2012). We aim to investigate the gender diversity as our second part of the aggregate effect of diversity in the top management on firm performance.

2.3 Age diversity

In the top management team, age is regarded as a measure of experience (Herrmann and Datta, 2005), which can add value (Hambrick and Mason, 1984). Thus, different psychological constructions drive different decision-makings of strategies, which can influence the performance of firm (Hambrick and Mason, 1984). But there are two arguments of theories about age diversity, one is based on similarity-attraction paradigm (Byrne, 1971) and social categorization theory (Tajfel, 1981), another is based on decision-making and information (Tziner and Eden, 1985). The first argument supports that age diversity in top management team is negatively related to firm performance. Social categorization theory states that people are more favorable to cooperate with those people who are similar to them (van Knippenberg and Schippers, 2007). In the same way, the similarity-attraction paradigm suggests that the similarity can develop attractions and connections between people. Because people can interact with

each other easier due to similar backgrounds and experiences (Williams and O'Reilly, 1998). This similarity also imposes people's perspectives and acceptance. This view implies that dissimilarity is challengeable, leading to diminished and distorted communications between people (Williams and O'Reilly, 1998). Contrary to this, the alternative view is that age diversity can provide resources of skills and information. It also broadens the knowledge of people and increases the pool of suggestions and options (van Knippenberg and van Ginkel, 2010).

According to the above discussion, we point out that heterogeneity in management may imply the difference in risk taking, as a result, affects firm performance. We hypothesize that:

Hypothesis 1: Diversity in top management team is related to firm performance.

Hypothesis 2: Firms with greater level of diversity in the top management team are associated with less risk than firms with lower levels of diversity of management.

3: Data and Diversity Index

3.1 Data Sources

The security data of this research are drawn from Monthly Stock File, CRSP (The Center for Research in Security Prices), WRDS (Wharton Research Data Services). In our research, we keep the identification information of each stock, their historical monthly returns and other information relating to our analysis. The information of top executives is drawn from Execucomp, Compustat - Capital IQ from Standard & Poor's, WRDS. This dataset contains: (1) Personal information of top executives, such as gender, historical age and first/last names; (2) Compensation information, such as total compensation (including salary, bonus and compensation in other forms); (3) Identification information of the company. The Fama-French 3-factors are drawn from Factors-Monthly Frequency, Fama-French & Liquidity Factors, WRDS. The corresponding factors are: Small Minus Big (SMB), High Minus Low (HML), Excess Return on the Market (MKTRF). The One Month Treasury Bill Rate (RF) is included in this dataset. The three datasets in our research start from January 1992 and end in December 2018.

3.2 Creating the Index of Diversification on Top Executives

In our analysis, we measured the diversification of top executives with regard to three dimensions: gender composition, age structure and compensation structure. Gender composition refers to having a female in the top five executives of the company. Age structure refers to whether top management are made up of executive at similar age or different age. Compensation structure refers to whether top executives get paid evenly or

based on a competitive system where the top manager is paid much more than the next in line. According to the definition of three dimensions, we define three sub-indices (Women, Age and Compensation) to measure the diversity on each dimension and the overall diversity index (Diverse) made up of three sub-indices.

Women: If there are female members among the top executives in one company, it means the company is diversified in gender composition. We assign 1 to this sub index for this company at corresponding year. Whereas if they are all male members, there is no diversity. We assign 0 to this sub-index.

Age: First, because the age data from Execucomp represents the present age of executives, we need to calculate historical age of each executive at corresponding year in our analysis. Next, we calculate the standard deviation of the historical ages of top executives by each company and each year. If the top management team consists of executives from different age stages, the standard deviation of age should be greater, and the company is more diversified in age structure, vice versa. Finally, partition age into two groups based on the degree of standard deviation. Assign 1 to top 50%, 0 to bottom 50%.

Compensation: It is the most diversified case in compensation structure if the top management team are paid equally. The least diversified case occurs when only one of the executives get paid. In our analysis, we only take the executives with highest five compensations into consideration. To build this sub-index, we create an intermediate variable HHI, which is the percentage of one executive's compensation in each company, each year. HHI ranges from 0.2 (Evenly compensated) to 1 (Only one executive compensated). Then standardize HHI by taking square of it and sum HHI within one

company at each year. Finally, partition compensation into two groups based on the degree of these summations. Assign 0 to in top 50%, 1 to bottom 50%.

Diverse: Diverse is the summation of the three sub-indices, Women, Age and Compensation. It has discrete scores of 0, 1, 2, 3, among which 0 means the company is the least diversified in corresponding years; 3 means the most diversified. During the process of creating the Diverse Index, we find out that the number of firms in our dataset increases annually. One main reason is that we only choose the top five executives by their compensation. There are lots of firms that do not have five executives during the earlier time.

3.3 Summary Statistics

To perceptually describe how the diversity measure changes over the observed years, we calculate the mean of each index at each year and plot the trend in Figure 1. The total diversity measure remains stable at a level of 1.3; Women increases steadily over 26 years from 0.07 to 0.408; Both Age and Compensation show a decreasing trend over these years.

After we generate a set of indices, we merge datasets of stock files, diversity measures and Fama-French factors together and keep observations where key variables perfectly match in the merge. We further summarized basic statistics of monthly stock returns in respective index group in Table 1. First, for the mean of raw monthly returns of each index group, we test the significance of the differences between these means. The average returns of Diverse = 2 is 0.12495% higher than Diverse =0 at a 90% significant level; the average returns of Compensation =1 is 0.16993% higher than Compensation =

0 at a 99% significant level. However, the differences of other Diverse pairs are not significant. One possible reason is that the positive influence from diversified compensation structure is counteracted by the negative impact from diversified gender composition.

The characteristics of the distribution of monthly returns are different with respect to each indices. For Diverse, most of the returns fall in Diverse = 1 (127,409). Only 19,287 returns fall in Diverse = 3. For Women, the returns fall in Women = 0 (210,093) are much more than in Women = 1 (88,854). For Age and Compensation, the monthly returns are almost evenly distributed in group 0 or 1.

4: Methodology and Empirical Results

Before we analyze how the diversity measure will benefit or affect the performance of a company in stock market, we note that we use the diversification in current year (T) for analyzing performance in next year (T+1). We do so because we want to test for out-of-sample predictability. We use three different methodological approaches to test if diversification generates significant and positive abnormal returns. Then we analyze the correlation between the volatility of returns and the diversification index to see if there is a positive or negative relationship between risk and diversification.

4.1 Approach One: Compare the Difference between Mean of Alphas

This approach uses Fama-French 3-factor model (formula as shown below) to regress monthly return of each company at each year. In each regression for each company at each year we can generate corresponding abnormal return. Then we use T-test to compare the means of these alphas of each diverse group. R_i is monthly return of company i. Rf is risk free rate. α_i is abnormal return. $\beta_{1-3,i}$ are coefficients of corresponding three factors.

$$R_i - Rf = \alpha_i + \beta_{1,i}RMF + \beta_{2,i}SMB + \beta_{3,i}HML$$

Panel A of Table 2 exhibits the empirical results of Approach One. We run a T-test to test the difference of means of alphas between each diversity group. Among these tests: (1) The average alpha of Diverse 1 is 0.19304% lower than Diverse 2; (2) The average alpha of Diverse 0 and 1 is significantly 0.17258% lower than Diverse 2 and 3. These two differences support our hypothesis that diversity is related to performance.

However, the results are not very robust as we fail to find significance for D3-D0, D2-D0 and D3-D1. One possible reason comes from the small sample of Diverse = 3.

4.2 Approach Two: Test the Positivity of Coefficient of Diverse

In this approach, we run regressions of monthly returns on the three Fama-French factors (formula as shown below) for each firm while add Diverse as a new independent variable. Then we test to see if the coefficient $\beta_{4,i}$ of Diverse is significant and positive.

$$R_i - Rf = \alpha_i + \beta_{1,i}RMF + \beta_{2,i}SMB + \beta_{3,i}HML + \beta_{4,i}Diverse_i$$

We find most of the results shown in Panel B of Table 2 are not significant. The absolute value of coefficient is very small, which indicates that Diverse measure almost have no influence on the excess return. Only the coefficient of Compensation = 0 is significantly different from 0 with a value of 0.0021057. Based on this approach, the diversity measures may have a significant influence on the performance of some specific companies. However, from a macro view, this influence on performance is neither significant nor considerable.

4.3 Approach Three: Calendar time Portfolios and Trading Strategy Approach

The portfolio calendar approach is based on Fama-French 3-factor model (first formula as shown below). We first build eight portfolios, four value-weighted portfolios of Diverse = 0, 1, 2, 3 and four equal-weighted portfolios of Diverse = 0, 1, 2, 3, over the observed years based on monthly stock returns. Figure 2 and Figure 3 show the accumulated effects of value/equal-weighted portfolios of different Diverse groups based on historical raw returns. Figure 2 exhibits that there are obvious differences in

accumulated effect between Diverse groups. However, the differences are not obvious between equal-weighted portfolios in Figure 3.

Then we construct long-short strategy to find if there are pairs of Diverse groups that can generate significant abnormal returns. We also applied portfolio returns into Fama-French 3-factor model (second formula as shown below). $RP_{Long/Short}$ represents the return of portfolio with a long/short position. $RP_{V/E}$ represents the return of value/equal-weighted portfolio.

$$RP_{V/E} - Rf = \alpha_i + \beta_{1,i}RMF + \beta_{2,i}SMB + \beta_{3,i}HML$$

$$RP_{Long} - RP_{Short} = \alpha_i + \beta_{1,i}RMF + \beta_{2,i}SMB + \beta_{3,i}HML$$

Panel C of Table 2 shows the regression results of this approach. For value-weighted portfolios: (1) Only Diverse = 2 generates a significant abnormal return of -0.35877%, which is not explained by Fama-French 3-Factor model. In this case, diversity leads a negative impact on the performance. (2) There are two significant and positive long/short strategies. First, we can long the portfolio of Diverse = 0 and short the portfolio of Diverse = 2 with an abnormal return of 0.38445%. Second, we can long the portfolio of Diverse = 1 and short the portfolio of Diverse = 2 with an abnormal return of 0.31831%. However, the low adjusted R^2 also indicates the three factors are not able to explain these strategies well.

For equal-weighted portfolios: (1) No Diverse groups generate significant abnormal returns. (2) Moreover, none of these long/short strategies between equal-weighted portfolios are able to generate significant alphas. The low adjusted R^2 of these strategies also indicates the three factors are not able to explain these strategies well. Therefore,

equal-weighted portfolio eliminates the possible diversification effect on the performance.

4.4 Risk and Diversification

We modelled this relationship in the regression below. $Volatility_i$ represents risk and is measured by the volatility of monthly stock returns of each company i in each year. $Years$ controls for the time trend.

$$Volatility = \alpha + \beta Years + \beta_D Diverse$$

Panel A of Table 3 shows the mean of volatility increases as Diverse increases. This trend may imply a positive relationship between risk and diversity, which admittedly is counterintuitive However, after controlling for the time trend, we find no significant influence of diversity on volatility, according to the statistically insignificant and small coefficients shown in Panel B of Table 3.

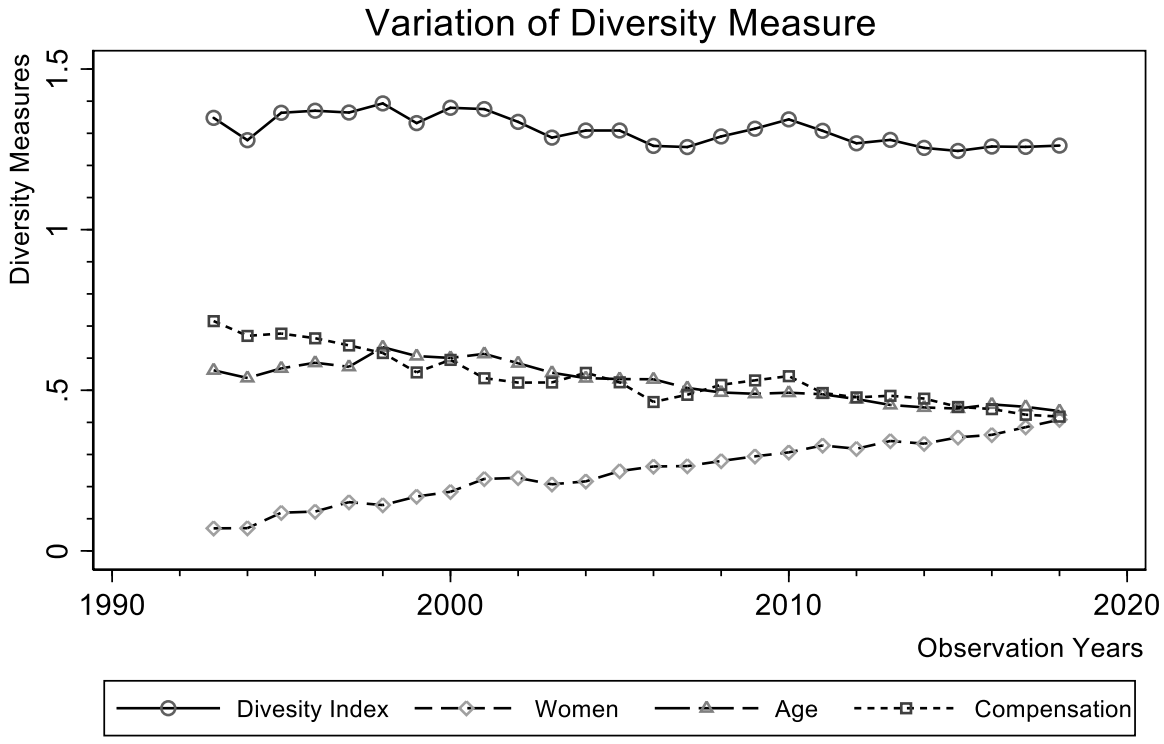
5: Conclusion

The aim of this study is to add to the current literature by examining the economic impact of diversity in the top management team on firm performance. The influence of diversity on performance is positive on average, however, this relation does not hold in the value-weighted portfolio approach. We conclude that the results concerning diversity and performance are not robust.

Our research differs from prior analysis in terms of investigating the economic result of diversity in top management team rather than diversity within the board of directors, which has been the focus of past work. Moreover, we advance the literature by taking on an aggregate perspective of firms' performance instead of a specific firm characteristic. Our analysis employs the calendar portfolio approach to quantify a measurable economic influence of diversity. For future research on this topic, we suggest that diversity influence can be tested on both large-sized and small-sized companies. Furthermore, different holding periods can be applied to the calendar-time portfolio approach.

Appendices

Figure 1: This figure provides the trend about variations of the diversity index, Diverse; and three sub-indices, Women, Age and Compensation over 26 observed years. The points on each line represent the average level of respective indices at corresponding year. The Diverse index is the summation of each individual sub-indices. The higher the indices, the more diversified the top management with respect to corresponding dimensions.



Source: WRDS

This figure shows the variation of average of indices. Diversity Index = Women + Age + Compensation.

Figure 1 Variation of Diversity Measure

Figure 2: This figure provides the accumulated returns of investing initial $100 to value-weighted portfolios of each Diverse group over 26 observed years. The x-axis varies from January 1993 to December 2018. The y-axis shows the accumulated returns of the monthly returns on an initial investment of $100. Legend indicates each Diverse group.

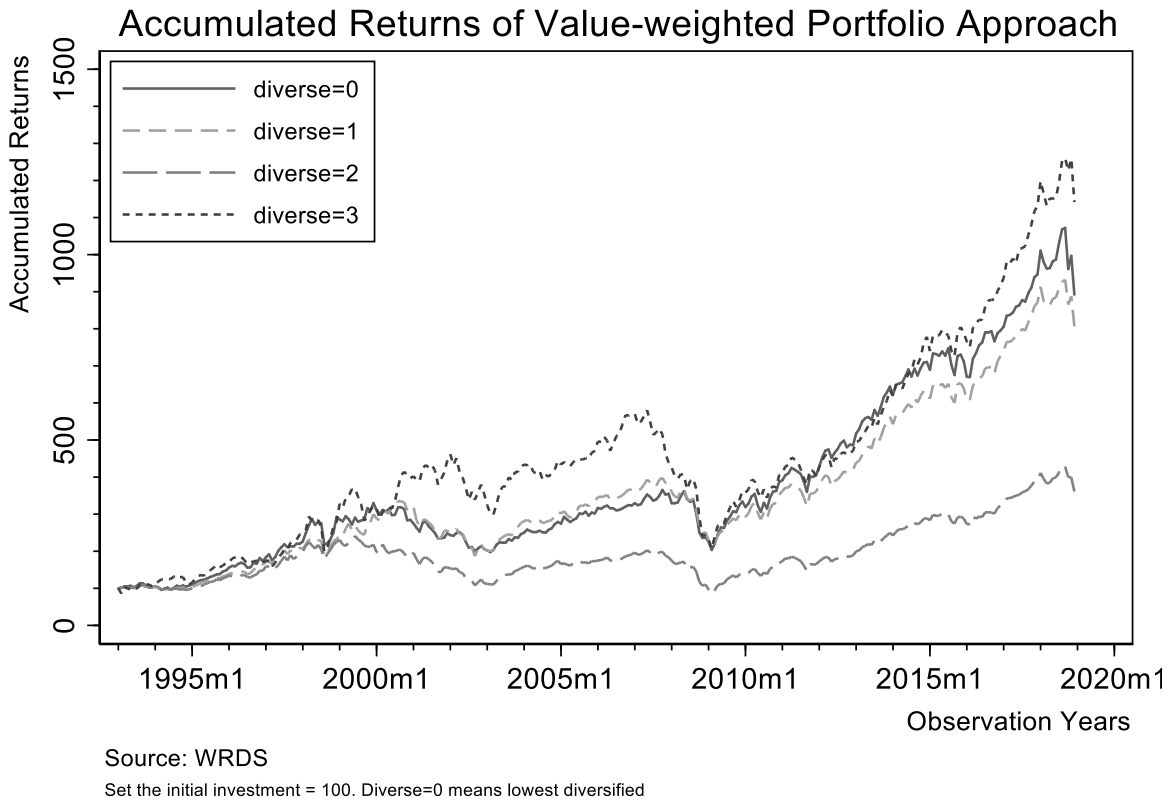


Figure 2 Accumulated Returns of Value-weighted Portfolio

Figure 3: This figure provides the accumulated returns of investing initial $100 to equally-weighted portfolios of each Diverse group over 26 observed years. The x-axis varies from January 1993 to December 2018. The y-axis shows the accumulated returns of the monthly returns on an initial $100 investment. Legend indicates each Diverse group.

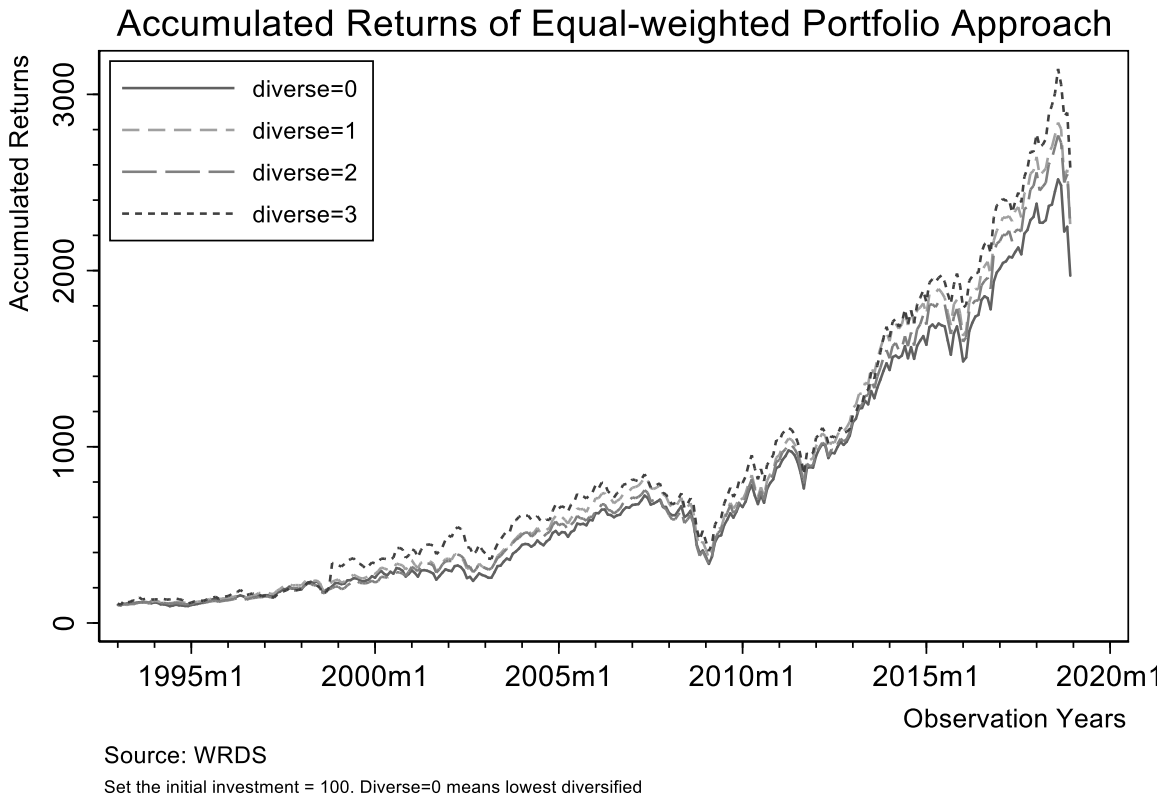


Figure 3 Accumulated Returns of Equal-weighted Portfolio Approach

*Table 1: This table provides the t-test on the differences (%) between means of monthly stock returns of each index groups. The first column exhibits four diversity indices, scoring from 0 to 3. Observations represents how many monthly stock returns distributed in each diversity group. Mean of returns (%) is the average monthly stock returns of each diversity group. D3-D0 refers to the difference (%) between the mean of monthly return of group Diverse = 3 and the mean of monthly return of group Diverse = 0. The letters, D, W, A and C indicate Diverse, Women, Age and Compensation, respectively. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.*

Table 1 T-test the Difference between Means of Monthly Returns of Each Group

	Observations	Mean of Returns	Difference between Means (%)		t-stats of Difference
Diverse = 0	52,105	1.12369	D3-D0	0.12852	1.2265
Diverse = 1	127,409	1.17957	D2-D0	0.12495	1.7877(*)
Diverse = 2	99,606	1.24864	D1-D0	0.05588	0.8855
Diverse = 3	19,827	1.25222	D3-D1	0.07264	0.7558
			D2-D1	0.06906	1.2732
			D3-D2	0.00358	0.0337
Women = 0	210,093	1.22224	W1-W0	-0.08269	-1.6192
Women = 1	88,854	1.13955			
Age = 0	151,231	1.17413	A1-A0	0.04762	1.0201
Age = 1	147,716	1.22175			
Compensation = 0	149,415	1.11266	C1-C0	0.16993	3.6404(***)
Compensation = 1	149,532	1.2826			

*Table 2: This table provides regression results from Approach One that generates an alpha for each firm-year based 12 monthly observations; Approach Two that generates coefficient of diversity indices for each firm; Approach Three generates an alpha from a calendar time portfolio for each diversity index and trading strategy. Three approaches are based on Fama-French 3-factor model. The letters, D, W, A and C refer to Diverse, Women, Age and Compensation, respectively. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.*

Panel A provides information about the t-test on the differences (%) between means of abnormal returns of each index groups, which are generated in Approach 1 based on the regression $R_i - Rf = \alpha_i + \beta_{1,i}RMF_t + \beta_{2,i}SMB + \beta_{3,i}HML$. *The first column exhibits four diversity indices. Observations represents how abnormal returns distribute in each diversity group. Mean of abnormal returns (%) is the average of abnormal returns of each diversity group. D23-D10 refers to the difference (%) between the mean of abnormal returns of group Diverse = 2&3 and the mean of abnormal returns of group Diverse = 0&1.*

Table 2 Empirical Results for Three Approaches

Panel A: T-test the Difference of Means of Alphas between Each Group

	Observations	Mean of Alphas	Difference between Means (%)		t-stats of Difference
Diverse = 0	4,395	0.37137	D3-D0	0.0738	0.5081
Diverse = 1	10,762	0.36647	D2-D0	0.18814	1.2990
Diverse = 2	8,408	0.55951	D1-D0	-0.0049	-0.0600
Diverse = 3	1,680	0.44517	D3-D1	0.0787	0.6156
			D2-D1	0.19304	1.9198(*)
			D3-D2	-0.11434	-0.4945
			D23-D10	0.17258	2.0624(**)
Women = 0	17,722	0.39963	W1-W0	0.12492	1.3939
Women = 1	7,523	0.52455			
Age = 0	12,770	0.43557	A1-A0	0.0026	0.0318
Age = 1	12,475	0.43817			
Compensation = 0	12,625	0.38371	C1-C0	0.1063	1.2967
Compensation = 1	12,620	0.49002			

Panel B provides information about the t-test on the significance of the mean of coefficient of each index, which are generated in Approach2 based on the regression $R_i - Rf = \alpha_i + \beta_{1,i}RMF + \beta_{2,i}SMB + \beta_{3,i}HML + \beta_{4,i}Diverse$. *The first column exhibits four diversity indices. Observations represents how coefficients distribute in each diversity group. Mean of coefficients (%) is the average of coefficients of each diversity group.*

Panel B: T-test the Coefficients of Diversity Variables

Group	Observations	Mean of Coefficient	t statistics of Mean
Diverse = 0	397	.0022764	1.5630
Diverse = 1	1,050	.0008146	0.7803
Diverse = 2	771	-.0006463	-0.5742
Diverse = 3	172	.000654	0.2571
Diverse = 0, 1	943	-.0004091	-0.3972
Diverse = 2, 3	1,447	.0012157	1.4196
Total Diverse	2,390	.0005746	0.8721
Women = 0	1,630	-.0001481	-0.3075
Women = 1	760	-.0009904	-0.9803
Total Women	2,390	-.000416	-0.9053
Age = 0	1,216	.0007742	0.9985
Age = 1	1,174	-.0007529	-0.7897
Total Age	2,390	.000024	0.0393
Compensation = 0	1,187	.0021057	1.9840(**)
Compensation = 1	1,203	.0000523	0.0425
Total Compensation	2,390	.0010722	1.3181

Panel C provides information about the regression results of each diversity groups and trading strategies by using approach 3, the portfolio and long/short strategy approach, based on the regression $RP_{Long} - RP_{Short} = \alpha_i + \beta_{1,i}RMF + \beta_{2,i}SMB + \beta_{3,i}HML$, $RP_{V/E} - Rf = \alpha_i + \beta_{1,i}RMF + \beta_{2,i}SMB + \beta_{3,i}HML$.

Panel C: Regression Results of Portfolio and Trading Strategy Approach

	Alpha	Market	SMB	HML	Adj R^2
Value weighted					
Diverse = 0	.0002568	.9448021***	-.152141***	.0273856	0.7758
	(0.21)	(32.61)	(-3.90)	(0.67)	
Diverse = 1	-.0004046	.9809837***	-.1446549***	.0293361	0.9334
	(-0.65)	(65.52)	(-7.17)	(1.38)	
Diverse = 2	-.0035877***	1.031183***	-.0556585	.1905895***	0.8831
	(-4.01)	(47.95)	(-1.92)	(6.25)	
Diverse = 3	.0004387	1.004574***	-.0269042	.3289112***	0.5923
	(0.22)	(20.93)	(-0.42)	(4.83)	
Long-Short					
D0-D3	-.0001819	-.0597722	-.1252368*	-.3015256***	0.0397
	(-0.08)	(-1.07)	(-1.67)	(-3.81)	
D0-D2	.0038445**	-.0863806**	-.0964825*	-.1632039***	0.0358
	(2.33)	(-2.18)	(-1.81)	(-2.90)	
D0-D1	.0006614	-.0361816	-.0074861	-.0019505	-0.0052
	(0.49)	(-1.11)	(-0.17)	(-0.04)	
D1-D3	-.0008433	-.0235906	-.1177508	-.2995751	0.0466
	(-0.40)	(-0.47)	(-1.74)	(-4.20)	
D1-D2	.0031831***	-.0501989*	-.0889964**	-.1612534***	0.0538
	(2.68)	(-1.76)	(-2.32)	(-3.99)	
D2-D3	-.0040264*	.0266083	-.0287543	-.1383217*	0.0031
	(-1.84)	(0.51)	(-0.41)	(-1.86)	
Equally weighted					
Diverse = 0	.0009548	1.128021***	.4602863***	.2567776***	0.9085
	(1.01)	(49.60)	(15.03)	(7.96)	
Diverse = 1	.0012182	1.108515***	.441067***	.3578612***	0.9394
	(1.64)	(62.27)	(18.40)	(14.18)	

Panel C: Continued

	Alpha	Market	SMB	HML	Adj R^2
Diverse = 2	.0012479	1.049201***	.4869926***	.479575***	0.9048
	(1.36)	(47.67)	(16.43)	(15.37)	
Diverse = 3	.0021661	1.124577***	.4828389***	.4252204***	0.5553
	(0.81)	(17.56)	(5.60)	(4.69)	
Long-Short					
D0-D3	-.0012114	.0034447	-.0225526	-.1684428	0.0021
	(-0.46)	(0.05)	(-0.26)	(-1.88)	
D0-D2	-.0002931	.0788204	-.0267063	-.2227974	0.1688
	(-0.30)	(3.41)	(-0.86)	(-6.80)	
D0-D1	-.0002634	.019506	.0192193	-.1010836	0.0414
	(-0.30)	(0.92)	(0.67)	(-3.36)	
D1-D3	-.000948	-.0160612	-.0417719	-.0673592	-0.0073
	(-0.36)	(-0.26)	(-0.49)	(-0.76)	
D1-D2	-.0000297	.0593144	-.0459255	-.1217138	0.1423
	(-0.05)	(4.01)	(-2.30)	(-5.80)	
D2-D3	.0009182	.0753756	-.0041536	-.0543546	-0.0031
	(0.34)	(1.18)	(-0.05)	(-0.60)	

Table 3: This table provides descriptive information on the volatility of returns of each Diverse group in Panel A and regression results between volatility and diversity in Panel B. Volatility is derived from 12 monthly returns of each company in each year. In Panel B, we in turns exclude one diverse group sample in the first four regressions and then regress total diverse sample.

Table 3 Risk and Diversification

Panel A: Summary Statistics of Volatility

Diverse	Observations	Mean of Volatility	Standard Deviation
= 0	4,395	0.097900	0.064448
= 1	10,762	0.102744	0.066827
= 2	8,408	0.107021	0.081927
= 3	1,680	0.110151	0.094201

Panel B: Relationship between Volatility and Diversity

Diverse	Coefficient	T-statistics	Adj R^2
Exclude Diverse = 0	-.0024399	-1.07	0.3901
Exclude Diverse = 1	-.0003612	-0.49	0.4205
Exclude Diverse = 2	-.0002309	-0.32	0.4735
Exclude Diverse = 3	.0002508	0.40	0.4439
All Diverse Groups	.0000791	0.14	0.4293

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