Human Capital Efficiency and Equity Funds’ Performance during
the COVID-19 pandemic.

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This preprint research paper has not been peer reviewed. Electronic copy available at: https://ssrn.com/abstract=3626151
Abstract

The paper investigates the impact of human capital efficiency (HCE) on equity funds’ performance during three stages of the COVID-19 pandemic. We collected data for 799 open-ended equity funds across five EU countries and ranked them in five categories of HCE and compare their risk-adjusted performance across these categories. The results suggest that during the COVID-19 outbreak, the equity funds that were ranked higher in HCE outperformed their counterparts. We suggest that fund managers should invest in human capital to improve funds’ coping ability and resilience during periods of extreme stress.

Keywords: COVID-19, mutual funds, human capital efficiency, risk-adjusted performance.
1. Introduction

In a rational setting, the funds with better skilled managers should outperform their counterparts. Previous literature reports the positive linkages between managers’ skills and mutual fund performance (e.g., Berk & van Binsbergen, 2015; Yi et al., 2018; Cai et al., 2018; Muñoz, 2019), however, there is limited evidence on the impact of Human Capital Efficiency (HCA) on equity funds’ performance, and it is not clear whether this impact varies in different market conditions. COVID-19 pandemic and its severe economic and social consequences provide unique settings to examine the impact of investment in human capital and its efficiency on the mutual funds’ performance. In this paper, we explore whether mutual funds with higher human capital efficiency demonstrate higher resilience to the COVID-19 crisis shock or not.

The diverse impacts of the COVID-19 pandemic on financial markets and institutions have been analyzed in the recent literature from several sets of perspectives. Zhang et al. (2020) report substantial increase in volatility in global markets due to the outbreak of the COVID-19. Corbet et al. (2020a) explore the impact of corporate identity associations with ‘corona’ on the stock performance before and during the pandemic. Goodell and Huynh (2020) assess the US industry-level market reactions to COVID-19 pandemic and COVID-related news announcements. Yarovaya et al. (2020) analyze the response of equity, bond, precious metals and cryptocurrency markets to the COVID-19 shock, and results demonstrate heterogeneous patterns of reaction and recovery across different asset classes and within each class of assets. Goodell and Goutte (2020) employed wavelet coherence approach to investigate the Bitcoin reaction to the COVID-19 pandemic. The results indicate that during the peak of the pandemic, from 5th April to 29th April 2020, the levels of COVID-19 caused a rise in Bitcoin prices. Similar approach used by Sharif et al. (2020) in analysis of the impact of the COVID-19, EPU, geopolitical index and oil price on the US stock markets in first three months of the pandemic, from 21st January to 30th March 2020.
Results show that oil shock hit the US stock markets stronger than the spread of the COVID-19 virus itself.

The financial effects originated by the COVID-19 pandemic has been also explored across stock markets, commodities, and cryptocurrencies (Akhtaruzzaman et al., 2020; Corbet et al., 2020b; Yarovaya et al., 2020b). The comprehensive overview of the COVID-19 contagion and unique characteristics of this new crisis is provided by Yarovaya et al. (2020c), while Goodell (2020) further highlights the direction for future COVID-19 research. Owing to the active investment strategies, mutual funds usually act as panic healers and fund managers are expected to produce consistent positive alphas (Huang et al., 2019). Rizvi et al. (2020) reported varying mutual funds’ performance during the COVID-19 outbreak in EU. They also pointed out the drift in investment styles of fund managers as a response to the evolving situation. While new evidence on financial effects of the COVID-19 rapidly become available, to our best knowledge, this paper is the first attempt to analyze the impact of investment in human capital on coping mechanism of the mutual funds and their resilience to the COVID-19 crisis. The investment in human capital is very strategic in nature (Hitt et al., 2001) and contributes towards value creation (Lopez-Cabrales et al., 2006). The relevance of human resource increases manifold for services (Nieves & Quintana, 2018) and mutual funds represent an important cluster of financial services that has significant dependence on human capital. Therefore, it is important to assess if mutual funds’ performance vary with the human capital efficiency.

Thus, in this paper, we analyze the linkages between the human capital efficiency and the mutual fund performance in five European economies that been severely affected by the COVID-19 pandemic, i.e. Spain, Italy, France, Germany and Belgium, and account for 14.8% of the global cases and 28.4% of the mortality count (see Table 1 for COVID-19 statistics in these countries). While early papers on the COVID-19 are largely focused on the US economy and impact on the...
US market (e.g., Sharif et al., 2020; Goodell & Huynh, 2020), we focus on the EU countries and consider the impact of investing in human capital on funds’ coping ability and resilience to the pandemic providing novel and original contribution to the COVID-19 literature.

[Table 1 here]

The results show that funds with higher human capital efficiency depicted better risk adjusted performance and Jensen’s alpha compared to their counterparts during the outbreak. This remains consistent across different stages of the COVID-19 crisis in five countries analyzed. We report that even when the pandemic reached its peak in the EU and majority of funds demonstrated negative returns, the funds that are in the top 20% of human capital efficiency demonstrated positive (and higher) risk adjusted returns. The findings remained robust for various performance measures.

The remainder of the paper is organised as follows. Section 2 discusses data and methodology. Section 3 presents empirical results, while Section 4 concludes.

2. Data and Methodology

This paper utilizes data for 799 open-ended equity funds across five countries, Spain, Italy, France, Germany and Belgium, from 1st of January to 2nd of June 2020. The focus of this paper is to evaluate the impact of human capital efficiency on performance of equity funds during the COVID-19 pandemics. Pulic (2000), Pulic and Kolakovic(2003) suggest that Human Capital Efficiency (HCE) is a function of value added (VA) and human capital (HC) that can be expressed as:

\[ HCE = \frac{VA}{HC}, \]  

(1)
where $HC$ is investment in human capital that includes all types of compensations (i.e. payroll, commissions, allowances, training expenditures etc.). The $VA$ for fund is estimated as a product of CAPM based fund’s alpha and asset under management ($\alpha \times AUM$).

We calculate HCE for each fund as of 4Q19. The fundamental information related to compensation and AUM is available from financial disclosures of each fund and we only include funds that publicly disseminates these details. Our final sample consists of 799 equity funds across five countries.

In order to calculate the CAPM based alpha, we use daily net asset value (NAV) going back to January 2019 (pre COVID-19 period). Once HCE for each fund is estimated, we classify them in five groups (20% each) from high to low HCE. The comparative performance is assessed across these groups during the COVID-19 outbreak. We expect that funds with higher HCE should outperform their counterparts with lower HCE. Table 2 presents the country wise distribution of these funds across five rank groups.

[Insert Table 2 about here]

We analyze the impact of the COVID-19 crisis on our ranked funds’ performance in several subperiods. We begin our assessment from January 1st 2020 which is the date when COVID-19 was formally reported to WHO. Hence, our full period spans from January 1st to June 2nd 2020. Thereafter, we consider subperiods to analyze the performance during different stages of the COVID-19 pandemic. The stage A is specified from January 1st to February 20th 2020 that marks very moderate spread of virus in EU, i.e. early stage of crisis. The stage B is from February 21st to May 7th that represents the peak of the pandemics, and stage C is from May 8th to June 2nd when curve begin to flatten. In Table 3, we present the timeline of these stages with some important news corresponding to evolution of the COVID-19 crisis.

[Insert Table 3 about here]
In order to estimate and compare the risk adjusted performance, we employ multiple measures. These include adjusted Sharpe (1966), Treynor (1965), Sortino (Sortino & Price, 1994), and Information ratios. The adjusted Sharpe ratio is based on Sharpe (1966) and modified to by Pezier and White (2006) to account for non-normality of returns. Few modifications have been proposed for information ratio, however, Goodwin (1998) noted that the ratio in its simplest form is most useful for funds’ comparison. We supplement these ratios by calculating Jenson’s alpha (Jensen, 1968) using asset pricing framework of Fama and French (1992) and augmented by Carhart (1997). The fixed effect panel representation of this will be:

\[ R_i - R_f = \alpha_i + \beta_i(R_m - R_f) + s_iSMB_i + h_iHML_i + w_iMoM_i + e_{it}, \]  

(2)

where \( R_X \) is \((n \times t)\) vector of funds’ NAV based returns in group \( i \) of HCE, \( R_f \) represent the risk free rate, \( R_m - R_f \) is the market risk premium, \( SMB \) represent size premium, \( HML \) and \( MoM \) respectively reflects value and momentum factors. The \( R_f \) as well as risk premia are of the form \((1 \times t)\). Jensen’s alpha is represented by \( \alpha \) while \( \beta, s, h \) and \( w \) are risk loadings. We use Euro 5 years’ government benchmark bond yield as risk free rate, European \( SMB, HML \) and MoM factors are extracted from the data library of Kenneth R French\(^1\). For information ratio, we use S&P Europe 350\(^2\) as benchmark.

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1 The data library is open source and accessible at [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)
The factors’ daily data is available till April 30th 2020. Using Kenneth French methodology, we compute these factors for the remaining period (May 1st to June 2nd). The data is translated into equivalent of Euros.

2 The S&P Europe 350 consists of 350 leading blue-chip companies drawn from 16 developed European markets.
3. Results and Discussion

The descriptive statistics on HCE prior to the outbreak is presented in Table 4. In the full sample, the average values range from 0.86 (low) to 6.29 (high) representing a significant differential between the extreme categories. There are some interesting observations across the countries. In the low HCE category, Spanish equity funds have the minimum efficiency (0.68). Among the high HCE classification, equity funds in Belgium are at the bottom. The funds based in Germany and France represent best efficiency across all categories of HCE from low to high.

[Insert Table 4 about here]

The results on different risk adjusted measures are presented in Table 5. The funds with higher HCE outperform their counterparts with lower HCE for the complete period. The funds that are included in two lowest ranks of HCE have negative risk adjusted returns. This has been consistent when the risk is defined as total risk (Sharpe), systematic risk (Treynor), downside risk (Sortino) or tracking error (Information ratio). Our Sharpe ratio for lowest HCE funds is -0.075 (Treynor -0.04, Sortino 0.005, IR -0.0105) while for the maximum HCE category it is 0.033 (Treynor 0.017, Sortino, IR 0.002). These results are mostly significant at 1% and 5% level of significance. An interesting observation is the performance of funds across the HCE ranks. As we move from lower to higher HCE, the performance of funds improve significantly. This remain robust across all metrics and indicate the relevance of HCE towards performance of equity funds.

Table 5 also present results for the three stages of the COVID-19 crisis. During stage 1 of the pandemic, all funds demonstrated positive performance which is plausible because at that time none of the countries in our sample were significantly impacted. The contagion was mostly contained within China and some countries in Asia Pacific. In terms of HCE, the funds in the high category remained dominant during this period while for the funds with low HCE risk adjusted returns were lower albeit positive.
The stage 2 of our analysis presents the results for the most devastating period of COVID-19 in EU. This is when Europe became the new epicenter of the disease and financial systems across member states came under stress. We can observe that funds in three out of five HCE categories plunged into negative zone. These low to medium HCE categories represent 60% of our total sample. The two classifications that have funds with high HCE continued to resist and for these we observe a Sharpe ratio of 0.023 and 0.0125. These results demonstrate better coping ability of fund with higher HCE.

During the stage 3, in the final subperiod analyzed, the curve flattened with regression in growth of new and hospitalized cases. This enabled the states to revive the economic activity resulting in moderate improvement in financial market. We observe this impact with modest amelioration in funds’ risk adjusted returns. The influence of HCE remained consistent and funds that are ranked higher in terms of HCE continued to perform better on all estimates. The Sharpe and Treynor ratio for low HCE funds were -0.0255 and -0.0160 respectively that increased to 0.0006 and 0.0003 for medium HCE funds. Finally, for high HCE funds, the estimated Sharpe and Treynor ratios are 0.026 and 0.0134. These results are clear evidence of the fact that funds earn excess returns on the basis of human capital efficiency and higher HCE translates into higher risk adjusted returns.

We present results on Jensen’s alpha with four factors specification in Table 6. For the complete period we report negative alphas for low HCE funds. The excess returns are positive for funds with mid to high HCE. We observe maximum alpha of 0.0396 in the most human capital efficient funds, signifying that superior funds’ performance is associated with human capital efficiency. The stage wise results are similar to our findings on risk adjusted performance with higher HCE funds dominating across the three periods. The low HCE funds showed positive alpha...
in stage 1 but became negative in later stages. For high HCE funds, the alpha consistently remained positive (and max) across the three periods. These findings suggest that human capital efficiency is central in shaping up a fund’s performance and helps in sustaining resilience in turbulent times.

[Insert table 6 about here]

4. Conclusion

The performance of mutual funds is dependent on the investment strategies employed by the portfolio managers. These managers represent the human capital of a fund and investment in this resource contributes towards human capital efficiency. Consequently, this efficiency should translate into a performance which should vary according to the level of human capital efficiency. The COVID-19 is an unfortunate but unique opportunity to evaluate the impact of human capital efficiency (HCE) on funds’ performance during period of extreme stress. We analyze this by sorting equity funds based on their HCE and ranking them in five categories from high to low. The comparative performance is assessed across these categories. Our results suggest that during the COVID-19 outbreak, the equity funds that were ranked higher in human capital efficiency outperformed their counterparts. The analysis for different stages of the outbreak revealed some interesting findings. As the contagion peaks in EU, most funds showed negative returns and Jensen’s alpha. However, even during this stage the funds with higher HCE continued to demonstrate resilience with significant positive risk adjusted returns as well as Jensen’s alpha. We conclude that mutual funds should concentrate on investing in human capital as resulting efficiency leads to robust performance during periods marked with uncertainties and turmoil.
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Table 1: COVID-19 Statistics for Selected EU Countries

| Country | Total Cases | Total Deaths | Death Rate* |
|---------|-------------|--------------|-------------|
| World  | 6408816     | 378317       | 5.90%       |
| Spain  | 286718      | 27127        | 9.46%       |
| Italy  | 233197      | 33475        | 14.35%      |
| France | 189220      | 28833        | 15.24%      |
| Germany| 183898      | 8636         | 4.70%       |
| Belgium| 58615       | 9505         | 16.22%      |

Source: https://www.worldometers.info/
The data is as on June 2nd, 2020
*Death Rate is calculated as Total Deaths/Total Cases

Table 2: Country wise Sample Distribution (Based on HCE)

|       | Low | 2 | 3 | 4 | High | Total |
|-------|-----|---|---|---|------|-------|
| Spain | 21  | 26| 20| 25| 26   | 118   |
| Italy | 24  | 22| 19| 33| 27   | 125   |
| France| 42  | 42| 48| 42| 45   | 219   |
| Germany| 52  | 50| 54| 49| 47   | 252   |
| Belgium| 21  | 19| 18| 10| 17   | 85    |
| Total | 160 | 159|159|159|162   | 799   |

Table 3: Timeline of Evolution of COVID-19

| Stage A | Date   | Event                                                                 |
|---------|--------|----------------------------------------------------------------------|
| Dec 31  |        | Chinese Authorities alert WHO about pneumonia type cases              |
| Jan 01  |        | First death reported                                                   |
| Jan 11  |        | Human to Human transmission of virus confirmed by WHO                 |
| Jan 21  |        | Primary cases in Europe - France confirms three infections            |
| Jan 27  |        | Germany confirms its first case                                       |
| Jan 30  |        | WHO declares the outbreak a public health emergency                   |
| Feb 9   |        | The death toll surpass that of SARS epidemic in 2002-03              |
| Feb 11  |        | The official name COVID-19 is assigned to the virus                   |
| Feb 15  |        | France reports its first death                                        |
| Feb 20  |        | The virus impacts 26 countries across the globe                       |

| Stage B | Date   | Event                                                                 |
|---------|--------|----------------------------------------------------------------------|
| Feb 21  |        | Cases of COVID-19 continue to increase in Italy                      |
| Feb 28  |        | WHO raises the global risk of spread of COVID-19 from “high” to “very high.” |
| March 7 |        | The number of COVID-19 cases surpasses 100,000.                      |
| March 9 |        | COVID-19 is declared as global pandemic                             |
| March 13|        | Europe is the new epicenter of disease with more cases and deaths than the rest of the world combined |

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March 17  France imposes strict lockdown to combat COVID-19
March 24  Cases of COVID-19 crosses 400000
          Asian Development Bank estimates economic impact of COVID-19 to be between $2 - $4 trillions
April 3   The death toll in Europe crosses 50000
April 6   WHO observes the outbreak in Europe to be stabilizing
May 1     European Investment Bank and WHO announces partnership for the COVID-19 response
May 4     Italy begin to lift lockdown
May 7th   The UN increases its global response plan to $7 Billion

| Stage | Event |
|-------|-------|
| May 8 | EU agrees on emergency financial support to euro area countries |
| May 11| France lifts lockdown to ease certain restrictions |
| May 15| EU discuss priorities for recovery |
| May 19| EU adopts scheme to support workers |
| May 21| Total number of cases crosses 5 million globally |
| May 25| Relief measures were adopted for aviation and railways in EU |
| June 2| France enters second phase of post lockdown, |

Table 4: Human Capital Efficiency Year End 2019

| Country | Low   | 2     | 3     | 4     | High |
|---------|-------|-------|-------|-------|------|
| Overall | Mean  | 0.8615| 1.5044| 2.7120| 4.7970| 6.2926|
|         | Std Dev | 0.0329| 0.2093| 0.3530| 0.4229| 0.6746|
| Spain   | Mean  | 0.6853| 1.2423| 2.5708| 4.9810| 6.1528|
|         | Std Dev | 0.0317| 0.2334| 0.2591| 0.4984| 0.5202|
| Italy   | Mean  | 0.8484| 1.1827| 2.5064| 3.5690| 6.4507|
|         | Std Dev | 0.0175| 0.2417| 0.4081| 0.4145| 0.5126|
| France  | Mean  | 0.9331| 1.8127| 2.8932| 5.3750| 6.4206|
|         | Std Dev | 0.0341| 0.2096| 0.4449| 0.3718| 0.5527|
| Germany | Mean  | 0.9720| 1.9738| 2.9713| 5.5191| 6.3811|
|         | Std Dev | 0.0296| 0.1400| 0.3870| 0.5171| 0.8085|
| Belgium | Mean  | 0.8689| 1.3109| 2.6189| 4.5420| 6.0577|
|         | Std Dev | 0.0456| 0.2067| 0.2043| 0.2616| 0.8849|

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Table 5: Risk Adjusted Performance Measures

|               | Full Period |               |               |               |
|---------------|-------------|---------------|---------------|---------------|
|               | Sharpe Ratio | Treynor Ratio | Sortino Ratio | Information Ratio |
| Low           | -0.0751     | ***           | -0.0406       | ***           | -0.0202       | ***           | -0.0105       | ***           |
| 2             | -0.0320     | **            | -0.0165       | *             | -0.0076       | *             | -0.0037       | *             |
| 3             | 0.0019      | *             | 0.0009        | *             | 0.0004        | **            | 0.0002        | **            |
| 4             | 0.0284      | ***           | 0.0103        | **            | 0.0052        | **            | 0.0023        | **            |
| High          | 0.0332      | **            | 0.0175        | **            | 0.0054        | **            | 0.0022        | **            |

|               | Stage 1     |               |               |               |
|---------------|-------------|---------------|---------------|---------------|
|               | Sharpe Ratio | Treynor Ratio | Sortino Ratio | Information Ratio |
| Low           | 0.0065      | ***           | 0.0046        | *             | 0.0015        | **            | 0.0032        |               |
| 2             | 0.0089      | *             | 0.0060        | **            | 0.0018        | **            | 0.0062        | **            |
| 3             | 0.0098      | **            | 0.0063        | *             | 0.0017        |               | 0.0093        | ***           |
| 4             | 0.0192      | **            | 0.0117        | **            | 0.0029        | *             | 0.0154        | *             |
| High          | 0.0269      | ***           | 0.0197        | ***           | 0.0036        | ***           | 0.0263        | *             |

|               | Stage 2     |               |               |               |
|---------------|-------------|---------------|---------------|---------------|
|               | Sharpe Ratio | Treynor Ratio | Sortino Ratio | Information Ratio |
| Low           | -0.0689     | ***           | -0.0109       | **            | -0.0349       | **            | -0.0090       | **            |
| 2             | -0.0479     | **            | -0.0072       | **            | -0.0214       |               | -0.0056       | **            |
| 3             | -0.0255     | **            | -0.0037       | **            | -0.0100       |               | -0.0027       | *             |
| 4             | 0.0125      | *             | 0.0017        | **            | 0.0043        | **            | 0.0012        | **            |
| High          | 0.0230      | ***           | 0.0200        | **            | 0.0070        | ***           | 0.0133        | ***           |

|               | Stage 3     |               |               |               |
|---------------|-------------|---------------|---------------|---------------|
|               | Sharpe Ratio | Treynor Ratio | Sortino Ratio | Information Ratio |
| Low           | -0.0255     | **            | -0.0160       | ***           | -0.0042       | ***           | -0.0092       | *             |
| 2             | -0.0103     | *             | -0.0062       | **            | -0.0015       | **            | -0.0034       | **            |
| 3             | 0.0006      | *             | 0.0003        | *             | 0.0007        |               | 0.0002        | *             |
| 4             | 0.0174      | **            | 0.0094        | ***           | 0.0020        |               | 0.0046        | *             |
| High          | 0.0260      | **            | 0.0134        | ***           | 0.0026        | ***           | 0.0062        | ***           |

Note: *** represents significance at 1%, ** at 5% and * at 10%.
### Table 6: Jensen's Alpha based on Four Factor Model

|                | Full Period |                |                |
|----------------|-------------|----------------|----------------|
|                | Low         | 2              | 3              | 4              | High       |
| \( \alpha \)   | -0.0269     | ** -0.0148    | ** 0.0136      | ** 0.0229      | ** 0.0396  | ***         |
| \( \beta \)    | 0.7238      | ** 0.6695     | * 0.3641       | ** 0.1308      | * 0.2131   | **          |
| \( s \)        | 0.5942      | ** 0.6297     | * 0.4802       | * 0.4418       | ** 0.8938  | **          |
| \( h \)        | 0.1071      | * 0.2255      | ** 0.4510      | 0.6682         | 0.2383     | **          |
| \( w \)        | 0.6105      | ** 0.5813     | 0.2243         | 0.6049         | * 0.5456   | **          |
| Adj R\(^2\)    | 0.6260      | 0.3090         | 0.3993         | 0.4586         | 0.5437     |

|                | Stage 1     |                |                |
|----------------|-------------|----------------|----------------|
|                | Low         | 2              | 3              | 4              | High       |
| \( \alpha \)   | 0.0054      | ** 0.0061     | ** 0.0092      | * 0.0108       | ** 0.0187  | ***         |
| \( \beta \)    | 0.1190      | 0.3387         | 0.2482         | ** 0.2172      | * 0.0554   | **          |
| \( s \)        | 0.0249      | ** 0.1057     | ** -0.0857     | 0.1055         | * 0.0883   | **          |
| \( h \)        | 0.1415      | * -0.2978     | 0.5958         | ** 0.8827      | * 0.3148   | **          |
| \( w \)        | 0.5780      | ** 0.5504     | ** 0.2124      | ** 0.5727      | ** 0.5166  | *           |
| Adj R\(^2\)    | 0.3841      | 0.3995         | 0.4645         | 0.4602         | 0.5811     |

|                | Stage 2     |                |                |
|----------------|-------------|----------------|----------------|
|                | Low         | 2              | 3              | 4              | High       |
| \( A \)        | -0.0092     | ** -0.0106    | ** -0.0205     | ** 0.0020      | ** 0.0063  | ***         |
| \( B \)        | 0.1295      | * 0.3688      | * 0.2702       | * 0.2365       | ** 0.0603  | **          |
| \( s \)        | 0.0262      | * 0.1111      | -0.0901        | 0.1109         | * 0.0928   | *           |
| \( h \)        | 0.1555      | ** 0.3274     | * -0.6550      | -0.9705        | ** 0.3461  | *           |
| \( w \)        | -0.6380     | 0.6075        | * 0.2344       | * 0.6321       | * 0.5703   | *           |
| Adj R\(^2\)    | 0.4803      | 0.3032         | 0.3725         | 0.3723         | 0.4713     |

|                | Stage 3     |                |                |
|----------------|-------------|----------------|----------------|
|                | Low         | 2              | 3              | 4              | High       |
| \( \alpha \)   | -0.0109     | ** -0.0085    | ** 0.0094      | ** 0.0173      | ** 0.0202  | ***         |
| \( \beta \)    | 0.1023      | * 0.2912      | * 0.2134       | * 0.1868       | * 0.0476   | *           |
| \( s \)        | 0.0508      | ** 0.2156     | -0.1748        | 0.2152         | ** 0.1800  | **          |
| \( h \)        | 0.1869      | * -0.3934     | -0.7869        | -1.1659        | 0.4158     |
| \( w \)        | 0.8270      | ** 0.6198     | * -0.8633      | 0.2688         | * 0.3426   | *           |
| Adj R\(^2\)    | 0.4693      | 0.4938         | 0.3107         | 0.4058         | 0.5913     |

*** represents significance at 1%, ** at 5% and * at 10%