Does Misery Impact Corporate Risk-Return Relationships?

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Abstract

The prior behavioral theory of the firm research documents that a firm's external environment impacts the risk-return relationship, suggesting that drivers outside the firm are part of the risk-return puzzle. This study examines whether firms' misery scores impact the return relationship. Using a sample of firm-year observations from 2002 to 2011, we investigate the relationship between the external environment related to misery and firms' risk-return relationships by regressing five factors that proxy for firms' external environments (e.g. misery levels) on risk and return. Our results suggest that both economic and non-economic external environmental factors impact firms' risk-return relationship. Specifically, low unemployment rates and taxes are associated with higher levels of risk-taking, whereas greater access to leisure amenities decreases risk-taking. A firm's return is negatively impacted by risk-taking associated with low unemployment and taxes and greater access to education and healthcare. However, a firm's return is positively impacted by risk-taking associated with better air quality and lower property crime. The results suggest that a firm's external environment impacts its performance. Therefore, future research may consider including location fixed effects to control for the unobservable external environmental factors that impact firm performance. Second, the results are of interest to practitioners as businesses can utilize the findings to develop internal programs that neutralize the external environment's effects on firm performance.

Keywords: risk-return relationship, behavioral theory of the firm, misery

1. Introduction

Misery is defined as a state of great unhappiness and emotional distress in the Merriam-Webster dictionary. Economist Arthur Okun (1962) developed an economic indicator called the Misery Index, which combined the unemployment rate and the inflation rate and provided a measure of the external environment affecting both individuals and firms. The behavioral theory of the firm suggests that external environmental factors impact risk-return relationships. However, prior research predominantly examines external environmental factors based on economic cycles (e.g. expansion periods vs. recession periods) (Fiegenbaum & Thomas, 1986; Deephouse & Wiseman, 2000). This study expands the literature by assessing the effect of misery on firms' risk-return relationships based on Okun's original notion. The misery that an individual feels may directly or indirectly impact his/her work performance and in turn the respective employer's overall performance. It is an empirical question of whether a firm's external environment (i.e., the misery of its surrounding citizenry) impacts the firm's overall performance measured by the firm's risk-return relationship.

Although a positive relationship between risk and return is well established in prior literature, Bowman (1980) documents a competing "paradoxical" result; the relationship between risk and return is negative; the phenomenon is referred to as Bowman's paradox. The paradox implies that managers engage in riskier activities while receiving lower returns. Numerous researchers have studied the Paradox; however, inconclusive results have generated a considerable controversy that continues with no consensus emerging (McNamara & Bromiley, 1999). We examine the risk-return relationship for firms headquartered in locations with lower misery scores. In this study, lower misery scores reflect the least miserable areas based on external environmental factors.

To investigate this issue, we introduce a new measure of firms' misery levels based on their environment. We incorporate environmental factors that contribute to individuals' happiness including unemployment rates, cost of living index, housing prices, taxes, air quality, healthcare, education accessibility, transportation attributes, property

crime rates, leisure availability, and arts and cultural accessibility. Assessing managerial actions and how they vary based on the surrounding environment in terms of misery adds a new dimension to the external environment that is not assessed by examining firms' environments based solely on economic cycles.

Agency theory suggests that due to the separation of ownership and control (Jensen & Meckling, 1976); one problem that may also affect the risk-return relationship may be management shirking, and therefore managers do nothing rather than engage in strategic risk-taking behavior. This study investigates whether firms' misery levels also influence firms' corporate risk-taking because managerial actions and a company's environment determine the relationship between risk and return (Oviatt & Bauerschmidt, 1991).

Using a sample of firm-year observations from 2002 to 2011, we investigate the relationship between the external environment related to misery and firms' risk-return relationships by regressing five factors that proxy for firms' external environments (e.g. misery levels) on risk and return. Our results suggest that both economic and non-economic external environmental factors impact firms' risk-return relationship. Specifically, low unemployment rates and taxes are associated with higher levels of risk-taking, whereas greater access to leisure amenities decreases risk-taking. A firm's return is negatively impacted by risk-taking associated with low unemployment and taxes and greater access to education and healthcare. However, a firm's return is positively impacted by risk-taking associated with better air quality and lower property crime.

Investigating the relationship between a firm's misery level and its risk-return relationship is important for several reasons. First, the behavioral theory of the firm establishes that the risk-return relationship is a function of a firm's environment. The misery score measure is based on an aggregation of external environmental factors and adds to the debate that any relationship between risk and return is a product of managerial actions and the firm's environment rather than any direct association between risk and return. The results suggest that a firm's external environment impacts its performance. Therefore, future research may consider including location fixed effects to control for the unobservable external environmental factors that impact firm performance. If location fixed effects are excluded from future studies, the firms' external environment may be considered a correlated omitted variable that may influence future study's findings. Second, the results are of interest to practitioners as businesses can utilize the findings to develop internal programs that neutralize the external environment's effects on firm performance. The variation in risk-taking among the different misery levels evidences a real effect on firms. Firms may also consider the misery index scores when budgeting workforce expansions and contractions in addition to workforce numbers exclusively. Third, this study is the next logical step to assessing whether a firm's external environment impacts the firm's overall performance because the study analyzes twelve external factors that proxy a firm's external environment. The results are of interest because firms can understand more specifically what factors of the external environment are associated with firms' performance.

The remainder of this paper proceeds as follows. Section 2 describes the misery components and prior literature and develops the research question and hypotheses. In Section 3, the variables are defined and the research design and sample are described. Section 4 provides descriptive statistics, the results of the main analysis, and supplemental sensitivity analyses. Section 5 provides the discussion and concluding remarks.

2. Background & Research Question Development

This section provides information on misery score inputs, risk types, slack resources, and the risk-return relationship based on the behavioral theory of the firm. First, we discuss the misery score in the context of existing literature. Next, we discuss three types of firm-level risk and explain why income stream risk applies to this study. Then, we provide background on slack resources because they are a key control in risk-return relationships based on income stream risk. Finally, we develop the research question and hypotheses based on the behavioral theory of the firm concerning external environmental factors.

2.1 Misery Components/Inputs

Forbes magazine publishes an annual listing of the most miserable cities based on the level of aggravation residents deal with in their daily lives (Badenhausen, 2013). We argue that the misery that people feel may directly or indirectly impact their work performance and in turn the employer's overall performance. This suggests that factors affecting the employers' labor supply may impact firms' overall performance.

The impact of a firm's environment on firm performance has been documented throughout accounting, economics, finance, and management literature (Oviatt & Bauerschmidt, 1991; Fiegenbaum & Thomas, 1986; Deephouse & Wiseman, 2000; Palmer & Wiseman, 1999). Oviatt and Bauerschmidt (1991) suggest that the Bowman Paradox can be partially explained by industry conditions and business strategies; however, they assert that any relationship

between risk and return is more or less determined by managerial actions and the firm's environment. Fiegenbaum and Thomas (1986) suggest that risk-return relationships differ across economic conditions and Deephouse and Wiseman (2000) find strong support that the risk-return relationship is different between turbulent and expansionary periods. Palmer and Wiseman (1999) find that risk-taking differs across industries and suggest future research attempt to capture a wider array of risky choices that are firm-specific. While we propose misery as an external environment factor; numerous studies have investigated factors that relate directly or indirectly to a misery index. One of the first studies is Okun's (1962) study based on the assumption that an increasing unemployment rate and relatively high inflation hurt economic growth and his findings support this assumption. In a more recent study, Rousseau (2009) tests the happiness-income gradient. Rousseau assumes that happiness, like utility, depends on disposable income and one would expect net income to have a larger effect on well-being. Rousseau (2009) finds that since 1975 happiness has stagnated for the rich and fallen for the poor. Lovell, Pastor, & Turner (1995) study the macroeconomic performance of 19 OECD countries over the period 1970–1990. They define performance in terms of the ability of a country's macroeconomic managers to provide four services to their citizens: a high level of real GDP per capita, a low rate of inflation, a low rate of unemployment, and a favorable trade balance. They use a best-practice macroeconomic performance frontier that includes two air pollutants (carbon and nitrogen emissions) to measure the performance of each country each year relative to the frontier. Overall, Lovell et al. (1995) find that performance rankings do change and that the relative performance declines when the air pollutants are included.

Prior literature has also documented that healthcare impacts one's level of misery. Ovaska and Takashima (2010) use cross-country data with diverse economic and socio-economic characteristics to uncover the factors that appear to be the most highly correlated with the inequality of happiness within nations. They find the inequalities in individual healthcare access are important in explaining the inequalities of happiness. Michalos (2008) finds that education impacts happiness, and his tests are robust to various meanings of both happiness and education. Transportation is not only a key factor in modern economics but also an important aspect of individual happiness. The findings from Duarte, Garcia, Giannarakis, and Limao (2010) provide evidence that transportation is a piece of the happiness equation. Tang and Lean (2009) examine the relationship between the misery index and the crime rate in the United States from 1960 to 2005, and the findings provide support that higher crime rates occur in more miserable areas. Wang and Wong (2011) study the relationship between leisure and happiness, using international survey data from 33 countries in 2007. Their results show that certain leisure activities, satisfaction from leisure, and the meaning of leisure all influence individual levels of happiness. Costello's (1998) findings provide the support that arts and culture organizations impact a local economy and may work to enhance tax incentives for business location decisions.

Overall, the prior research supports calculating a misery score measure based on an aggregation of external environmental factors. We argue that various combinations of unemployment rates, cost of living, housing prices, taxes, air quality, healthcare, education accessibility, transportation attributes, property crime rates, leisure availability, and arts and culture accessibility impact firm performance.

2.2 Firm-level Risk Types

Miller and Bromiley (1990) identify three firm-level risk types: income stream risk, stock market risk, and industry-strategic risk. Income stream risk is the ex-ante uncertainty about a firm's future income and is the risk type most relevant to managers (Libby & Fishburn, 1977; Fiegenbaum & Thomas, 1986; Deephouse & Wiseman, 2000). Stock market risk evaluates how the stock market prices expected cash flows, but it does not address the generation of cash flows. Stock market risk is most relevant to investors. Industry-strategic risk captures capital and research and development (R&D) commitments that vary systematically across industries (Miller & Bromiley, 1990); however, it is the least studied risk type. We investigate income stream risk in this study because it appears most closely related to manager discretion, which is likely impacted by the misery level of those managers.

2.3 Slack Resources

The behavioral theory of the firm suggests that slack resources impact risk-taking behavior (Cyert & March, 1963). However, evidence from the literature is mixed regarding slack's effect on risk. Some studies suggest that slack provides discretionary resources that can be used for experimentation, innovation, and risk-taking (Schumpeter, 1950; Mansfield, 1961; March, 1981). Others provide evidence that slack leads to postponing risk-taking and searching for alternatives that will resolve performance shortfalls (Cyert & March, 1963; Meyer, 1982; Sharfman, Wolf, Chase, & Tansik, 1988; March, 1989). Deephouse and Wiseman (2000) provide evidence potentially supporting both arguments. They suggest that excess slack may lead to experimentation, but deficient slack induces companies to consider new solutions. Accordingly, slack is a discretionary resource to be used in experimentation and measuring

firm viability (Hambrick & D'Aveni, 1988). Following prior research, we use three types of slack to denote different levels of accessibility to the availability of liquid assets (available slack), excess expenses (recoverable slack), and unused debt capacity (potential slack) (Bourgeois, 1981; Bourgeois & Singh, 1983; Singh, 1986; Bromiley, 1991; Wiseman & Bromiley, 1996; Deephouse & Wiseman, 2000). The theory also suggests that slack resources also impact returns (Wiseman & Bromiley, 1996); thus, we control for slack resources when examining the risk-return relationship.

2.4 Behavioral Theory of the Firm – Risk-Return Relationship

Cyert and March's (1963) behavioral theory of the firm offers one explanation of the Bowman Paradox based on the attitude towards risk by individual firms. Based on this theory, managers' risk levels depend on the difference between aspirations and expectations, which measures respective performance levels. This theory suggests when expectations for future performance are greater than aspirations; firms have little incentive to change their current behavior. However, when expectations for future performance are less than aspirations, firms have more incentive to change their current behavior. Deephouse and Wiseman (2000) show that economic cycles affect the aspirations-expectations process. We extend their work by examining whether external environmental factors (measured by the misery score) impact the aspirations-expectations process, which is a control in the risk-return relationship model. Because behavioral theory does not provide a prediction about how misery influences risk-return relationships, the effect of firms' misery levels is addressed in our research question.

2.5 Agency Theory

One theory that could render misery's impact on the risk-return relationship is agency theory. Agency theory (Jensen & Meckling, 1976) suggests that managers may shirk. Therefore, risk-seeking behavior would decrease. If managers are miserable, they could be complacent in their job roles and perform at a minimum level. The resulting return from the lack of adequate risk-taking due to shirking could be positive or negative. The preceding discussion leads to our research question.

Research Question 1: Do firms' misery scores impact the risk-return relationship?

3. Research Design

3.1 Hypotheses

Our hypotheses focus on the misery scores for the MSAs where firms' headquarters are located as those demonstrate the impact of external environmental factors. We do not predict a negative or positive relationship between the firms' misery scores and their risk-return relationships. The associated hypotheses for our research question are as follows:

H0: Firms' misery scores are not associated with firms' risk-return relationships.

H1: Firms' misery scores are associated with firms' risk-return relationships.

3.2 Model

To examine our hypotheses, we use the following seemingly unrelated equations model to test the risk-return relationship. Subscripts have been suppressed for simplicity. A seemingly unrelated equations model is used because the jointness of the risk and return equations is explained by the structure of the seemingly unrelated equations model and the covariance matrix of the associated disturbances. Such jointness introduces additional information which is over and above the information that is available when the individual risk and return equations are considered separately. Thus, it is desired to consider the separate risk and return relationships collectively to draw statistical inferences about the model parameters. One limitation of using seemingly unrelated equations is the estimates may not differ from using ordinary least squares regression if there are no cross-equation correlations between the error terms in the risk and return equations.

$$\begin{aligned} RISK = {} & \beta_0 + \beta_1 FACTOR\_COLI + \beta_2 FACTOR\_ECON + \beta_3 FACTOR\_LIESURE + \beta_4 FACTOR\_ACCESS + \\ & \beta_5 FACTOR\_DANGER + \beta_6 ATTAIN\_DISCREP + \beta_7 CURRENT\_RATIO + \beta_8 SG\&A\_RATIO + \\ & \beta_9 DEBT\_EQUITY\_RATIO + \beta_{10} INDRISK + \beta_{11} LAGPE + \beta_{12} SIZE + \varepsilon \end{aligned} \quad (1)$$

$$RETURN = \alpha_0 + \alpha_1 FACTOR\_COLI + \alpha_2 FACTOR\_ECON + \alpha_3 FACTOR\_LIESURE + \alpha_4 FACTOR\_ACCESS + \alpha_5 FACTOR\_DANGER + \alpha_6 CURRENT\_RATIO + \alpha_7 SG\&A\_RATIO + \alpha_8 DEBT\_EQUITY\_RATIO + \alpha_9 RISK + \alpha_{10} ALTMAN + \alpha_{11} RISK*FACTOR\_COLI + \alpha_{12} RISK*FACTOR\_ECON + \alpha_{13} RISK*FACTOR\_LIESURE + \alpha_{14} RISK*FACTOR\_ACCESS + \alpha_{15} RISK*FACTOR\_DANGER + \alpha_{16} INDRETURN + \alpha_{17} LAGRETURN + \alpha_{18} SIZE + \varepsilon \quad (2)$$

We use scores from a principal component factor analysis to derive the misery index. Figure 1 summarizes the misery components, empirical proxies, and the resulting factors from the analysis.

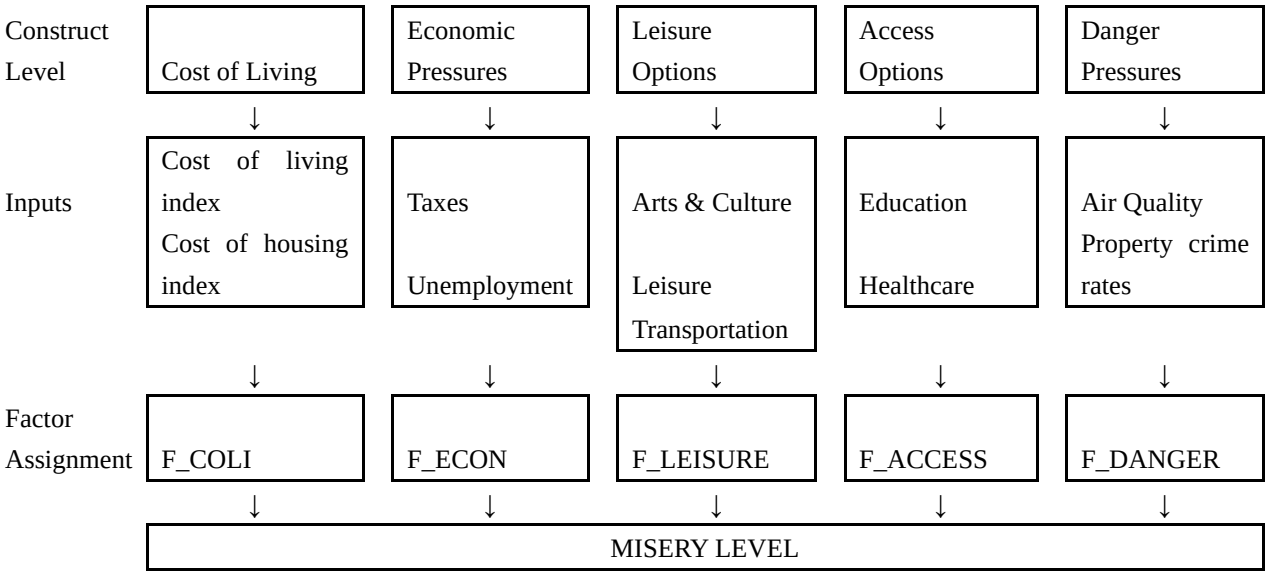

Figure 1. Summary of Misery Inputs and Factor Assignments (Variables of Interest)

See Appendix B for details on the input calculations.

The factor analysis consists of three stages. We first conducted an exploratory analysis of the misery inputs for two different years in the sample period (i.e. 2003 and 2009) and (untabulated) correlations provide the support that the misery inputs do vary in correlation across time and economic cycles. The year 2003 was chosen because this was a relatively boom year in the sample period and the year 2009 was chosen because it was a primary year in the financial crisis occurring during the sample period. We also examined the correlation of misery inputs in various Metropolitan Statistical Areas (MSAs) across the country (i.e. Indianapolis, IN; Los Angeles, CA; New York, NY), and (untabulated) correlations provide evidence that misery inputs are correlated at different levels in different MSAs. Because the misery inputs vary across time and MSA levels, we perform a factor analysis of the misery inputs by MSA and year for the sample period. Next, we break the misery components into two categories; those related to economic inputs and those related to non-economic inputs. Misery inputs classified as economic inputs are the cost of living index, the cost of housing index, unemployment rates, and taxes. Misery inputs classified as non-economic inputs are arts and culture, leisure, transportation, education, healthcare, air quality, and property crime rates. Table 1 shows the principal component factor solution with varimax rotation.

Table 1. Principal Component Factor Analysis

Panel A. Rotated factor loadings for economic inputs (2000-2011)

Input	Factor_COLI	Factor_ECON
Cost of living index	**0.524**	(0.087)
Housing index	**0.514**	0.005
Taxes	(0.066)	**0.749**
Unemployment	0.020	**0.616**

Panel B. Rotated factor loadings for non-economic inputs (2000-2011)

Input	Factor_Leisure	Factor_Access	Factor_Danger
Arts & Culture	**0.354**	0.038	(0.037)
Colleges	0.052	**0.497**	0.062
Leisure	**0.385**	(0.264)	(0.108)
Trans	**0.319**	0.158	(0.024)
Air	(0.259)	0.043	**0.373**
Property Crime Average	(0.017)	0.014	**(0.898)**
Beds	(0.100)	**0.651**	(0.036)

In the third step, the estimation of the orthogonal factor model indicates two eigenvalues greater than one on the economic input data and three eigenvalues greater than one for non-economic input data. Factors with eigenvalues greater than one were retained for rotation, and the reported variance explained is for the rotated factor pattern. The cumulative portion of the economic inputs explained by the resulting two factors is 73%. The cumulative portion of the non-economic inputs explained by the resulting three factors is 66%. The factors are determined on a MSA level by year and applied to companies based on the MSA where the company's headquarters is located for each year of the sample period. The cost of living and housing indexes have large positive loadings on the first factor, deemed F_COLI. We define large positive loadings as those with an absolute value greater than .30, which is the generally accepted threshold (Kaiser, 1958).

The second factor, consisting of total taxes and unemployment, is termed F_ECON. The third factor, which loads positively on arts and culture, leisure, and transportation, is labeled F_LEISURE. This factor reflects misery amenities that consume individuals' discretionary leisure time. The fourth factor captures access to education and healthcare. Both load positively and, the factor is labeled F_ACCESS. F_DANGER, the fifth factor, represents the misery inputs that can inflict harm on an individual, evidenced by the positive loadings on air quality and property crimes. Appendix B provides additional details on the misery input calculations used in the principal component factor analysis.

Because we are investigating the effect of misery on companies with headquarters in areas with lower misery scores; we transformed factor scores into a dichotomous variable equal to one (and zero otherwise) if the firm's respective misery factor indicated misery lower than the median for the population. Thus, for some factors, a score below the median suggests less misery and for other factors, a score above the median suggests less misery. Specifically, a

low F_COLI score is interpreted as better because lower costs of living and housing are preferred; therefore, MSAs with a FACTOR_COLI score less than the median are coded with a one (and zero otherwise). The same logic applies to F_ECON because lower taxes and unemployment levels are assumed better. MSAs with a FACTOR_ECON score less than the median are coded with a one (and zero otherwise). A higher factor score is better for all factors resulting from non-economic inputs. FACTOR_LEISURE is assigned one (and zero otherwise) for MSAs with arts and culture, leisure, and transportation amenities higher than the median of the sample. FACTOR_ACCESS is assigned one (and zero otherwise) for MSAs with greater access to education and healthcare than the median of the sample. For MSAs with better air quality and lower property crime rates than the sample median, FACTOR_DANGER is coded as a one (and zero otherwise). Therefore, negative coefficients on the five misery factors in the RISK model suggest managers approach to risk with complacency and decrease risk-taking due to shirking. The interactions of RISK and the five misery factors are the variables of interest in the RETURN model. The coefficients are expected to differ across the misery factors and respective risk interactions in the RISK and RETURN models, but we do not predict the signs of those differences.

RISK, the dependent variable in equation (1), is the five-year variance in the price-earnings ratio. We choose this measure because it captures an element of risk that is relevant to stockholders and is consistent with prior literature (Miller & Bromiley, 1990; Palmer & Wiseman, 1999) but also corresponds to income stream uncertainty, which is most relevant to managers. The ATTAIN_DISCREP variable is calculated using a method suggested by Bromiley (1991). Companies' or managers' aspirations for each year are identified by comparing each firm's performance from the previous year (ROA) with its respective industry average for that year. When performance exceeds the industry average, aspirations are determined by multiplying prior year performance by 1.05 (effectively adding a growth factor). Conversely, aspirations are coded as industry average performance from the previous year when the firm's performance was below that average. Attainment discrepancy was then calculated by taking the difference between aspirations and the firm's actual performance (ROA) (Wiseman & Bromiley, 1996). By subtracting performance from the reference, attainment discrepancy captures the nonlinear relation between the success reference predicted by March and Shapira (1992). This process was repeated for each year and then averaged across years for each firm, and the coefficient is expected to be positive. We follow the same procedures for calculating the CURRENT_RATIO, SG&A_RATIO, and DEBT_EQUITY_RATIO variables as those in Wiseman and Bromiley (1996). The current ratio measures available slack. Recoverable slack is represented by the ratio of selling, general and administrative expenses to sales. Potential slack is measured by the debt to equity ratio, which represents the inverse of potential slack such that low levels of debt represent high amounts of unused capacity. The direction of slack influence is uncertain (e.g., Cyert and March (1963) have argued that high and low levels of slack may increase risk-taking). Therefore, no expectation is specified. INDRISK is the average income stream risk of all firms in the industry (two-digit SIC code) excluding the selected firm and is expected to impact positively risk (Wiseman & Bromiley, 1996). LAGPE is the price-earnings ratio from the prior year and SIZE is the natural logarithm of sales; both are expected to impact negatively risk (Wiseman & Bromiley, 1996). Sales are selected as a control for a firm's size because of the mechanical relation between a common control for size, total assets, and RETURN, the dependent variable of the second equation.

RETURN, the dependent variable in equation (2), is measured by the firm's return on assets, (Bromiley, 1991; Palmer & Wiseman, 1999). To the extent that the misery factors combined with risk are associated with a firm's return, we expect the coefficients on RISK*FACTOR_COLI, RISK*FACTOR_ECON, RISK*FACTOR_LIESURE, RISK*FACTOR_ACCESS, and RISK*FACTOR_DANGER to be statistically different from zero. ALTMAN proxies a firm's bankruptcy risk (Altman, Avery, Eisenbeis, & Sinkey, 1981) and is multiplied by -1 so that larger numbers indicate a greater probability of bankruptcy. We expect ALTMAN to have a negative relationship with RETURN. RISK is expected to have a negative coefficient (Deephouse & Wiseman, 2000). INDRETURN is the average RETURN of all firms in the industry (two-digit SIC code) excluding the selected firm. LAGRETURN is the prior year return and is expected to impact positively return. All variables are summarized in Appendix A.

3.3 Sample

We obtain a sample of firm-year observations from 2002 to 2011 with data in the Compustat database. We begin with a sample period in 2002 because the hand-collected data covers the period from 2000 to 2011, and some of the variables require data from two years prior. We also require that all firms have data for each variable included in equations (1) and (2). Also, we remove firms that are in the financial services industry due to differences in accounting requirements for those firms. Our final sample consists of 29,954 firm-year observations (5,355 unique firms). The sample includes 262 unique MSAs. Figure 2 lists the least and most miserable MSAs for each misery factor (e.g. variables of interest).

Five least miserable resulting from F_Coli

1. Pine Bluff, AR
2. Fort Smith, AR-OK
3. Corpus Christi, TX
4. Little Rock-North Little Rock-Conway, AR
5. Kokomo, IN

Five most miserable resulting from F_Coli

1. New York-Northern New Jersey-Long Island, NY-NJ-PA
2. San Francisco-Oakland-Fremont, CA
3. Santa Cruz-Watsonville, CA
4. Honolulu, HI
5. Santa Rosa-Petaluma, CA

Five least miserable resulting from F_Econ

1. Gainesville, FL
2. Sioux Falls, SD
3. Reno-Sparks, NV
4. Chattanooga, TN-GA
5. Tampa-St. Petersburg-Clearwater, FL

Five most miserable resulting from F_Econ

1. Bakersfield- Delano, CA
2. Beaumont-Port Arthur, TX
3. Utica-Rome, NY
4. Fresno, CA
5. Winston-Salem, NC

Five least miserable resulting from F_Leisure

1. Sheboygan, WI
2. Great Falls, MT
3. Napa, CA
4. Rochester, MN
5. Elmira, NY

Five most miserable resulting from F_Leisure

1. Washington-Arlington-Alexandria, DC-VA-MD-WV
2. Detroit-Warren-Livonia, MI
3. New York-Northern New Jersey-Long Island, NY-NJ-PA
4. Chicago-Joliet-Naperville, IL-IN-WI
5. Pittsburg, PA

Five least miserable resulting from F_Access

1. Bismarck, ND
2. Rapid City, SD
3. Sioux Falls, SD
4. Fargo, ND-MN
5. Washington-Arlington-Alexandria, DC-VA-MD-WV

Five most miserable resulting from F_Access

1. Bremerton-Silverdale, WA
2. Madera-Chowchilla, CA
3. Greeley, CO
4. Grand Junction, CO
5. San Luis Obispo-Paso Robles, CA

Five least miserable resulting from F_Danger

1. Portland-Vancouver-Hillsboro, OR-WA
2. Longview, WA
3. Myrtle Beach-North Myrtle Beach-Conway, SC
4. Florence, SC
5. Salem, OR

Five most miserable resulting from F_Danger

1. Chicago-Joliet-Naperville, IL-IN-WI
2. Richmond, VA
3. Wheeling, WV-OH
4. Detroit-Warren-Livonia, MI
5. Harrisonburg, VA

Figure 2. Least & Most Desirable MSAs

Untabulated analyses were conducted to provide a reasonableness check regarding the least and most miserable areas based on the factor analysis. For example, the factor analysis capturing the cost of living inputs (e.g. F_COLI) supports (untabulated) statistics from the National Association of Realtors and Bureau of Labor Statistics that New York, NY, San Francisco, CA, Santa Cruz, CA, Honolulu, HI, and Santa Rosa, CA are more expensive and, therefore, more miserable, than Pine Bluff, AR, Fort Smith, AR, Corpus Christi, TX, Little Rock, AR, and Kokomo, IN. Additionally, the least and most miserable MSAs based on unemployment rates and taxes (e.g. F_ECON) primarily align with (untabulated) Bureau of Labor Statistics and tax rate data. The least and most miserable areas for the non-economic factors (e.g. F_Leisure, F_Access, and F_Danger) are generally in line with (untabulated) statistics from the American Medical Association, U.S. Department of Health and Services, U.S. Department of Justice Federal Bureau of Investigation, and U.S. Census.

Table 2 Panel A shows the distribution of firms by industry. Industry classifications are based on those presented in Barth, Beaver, and Landsman (1998). The top five industries represented comprise approximately 79 percent of the sample tested and is representative of the Compustat population for the same period because the same five industries comprise approximately 78 percent of the Compustat population. We also show the distribution of firms across the fiscal years from 2002 to 2011 in Panel B of Table 2.

Table 2. Sample Composition

Panel A: Classification by industry

Industry	Observations	Sample Percentage	Compustat Percentage
Agriculture	106	0.35	0.35
Chemicals	995	3.33	2.09
Computers	8,134	27.25	17.58
Durable Manufacturers	8,850	29.65	41.56
Extractive	1,509	5.06	4.60
Food	761	2.55	1.78
Mining and Construction	511	1.71	4.71
Pharmaceuticals	1,544	5.17	6.15
Retail	3,482	11.67	6.89
Services	682	2.28	1.79
Textiles and Printing	1,335	4.47	2.86
Transportation	1,707	5.72	5.64
Utilities	338	1.13	4.00

Panel B: Classification by year

Year	Observations	Sample Percentage	Compustat Percentage
2002	628	2.10	10.88
2003	3,884	12.97	10.82
2004	3,791	12.66	10.58
2005	3,663	12.23	10.38
2006	3,539	11.81	10.17
2007	3,293	10.99	9.90
2008	3,145	10.50	9.58
2009	2,874	9.59	9.37
2010	2,781	9.28	9.20
2011	2,356	7.87	9.12

4. Results

4.1 Descriptive statistics

Table 3 presents descriptive statistics for model variables in the sample. To eliminate the effect of outliers, all continuous variables are winsorized at the 1% and 99% levels after all data was merged, lag values were calculated, and variables were scaled and ranked.

Table 3. Descriptive Statistics

Panel A: Full Sample Descriptive Statistics (2002 – 2011)

Variable	N	Mean	Median	Std Dev	Min	Q1	Q3	Max
Variables of interest								
FACTOR_COLI	29,954	0.500	0.000	0.500	0.000	0.000	1.000	1.000
FACTOR_ECON	29,954	0.497	0.000	0.500	0.000	0.000	1.000	1.000
FACTOR_LEISURE	29,954	0.503	1.000	0.500	0.000	0.000	1.000	1.000
FACTOR_ACCESS	29,954	0.496	0.000	0.500	0.000	0.000	1.000	1.000
FACTOR_DANGER	29,954	0.503	1.000	0.500	0.000	0.000	1.000	1.000
Dependent variables								
RISK	29,954	22.50	0.03	148.91	0.00	0.00	0.26	1,442.56
RETURN	29,954	(0.20)	0.03	1.31	(14.63)	(0.08)	0.08	0.64
Independent variables								
ATTAIN_DISCREP	29,954	0.20	(0.22)	4.11	(4.67)	(0.42)	(0.15)	46.51
CURRENT_RATIO	29,954	2.70	1.93	2.94	0.00	1.23	3.13	31.34
SG&A_RATIO	29,954	0.81	0.28	2.65	0.02	0.15	0.50	23.11
DEBT_EQUITY_RATIO	29,954	0.43	0.12	2.32	(10.94)	0.00	0.59	16.99
INDRISK	29,954	22.51	19.02	14.83	0.00	17.26	26.09	103.79
INDRETURN	29,954	(2.95)	(2.27)	2.53	(11.50)	(4.64)	(1.76)	2.32
LAGPE	29,954	(0.25)	0.07	110.28	(17,808.00)	(0.10)	0.18	4,724.00
LAGRETURN	29,954	(0.21)	0.03	1.29	(13.16)	(0.09)	0.08	0.63
ALTMAN	29,954	1.55	(1.93)	22.34	(16.80)	(3.05)	(0.63)	279.44
SIZE	29,954	5.20	5.41	2.60	(6.91)	3.63	6.97	12.98

Panel B. Descriptive Statistics for Misery Factors (2002 – 2011)

Variable	N	Mean	Median	Std Dev	Min	Q1	Q3	Max
Factor Score (continuous)								
F_COLI	29,954	1.735	0.711	2.657	(1.176)	(0.282)	2.841	8.384
F_ECON	29,954	(0.177)	(0.182)	0.706	(2.321)	(0.668)	0.196	7.885
F_LEISURE	29,954	(1.101)	(1.269)	0.670	(2.201)	(1.545)	(0.806)	5.117
F_ACCESS	29,954	(0.209)	(0.359)	0.767	(2.569)	(0.692)	0.161	4.182
F_DANGER	29,954	(0.405)	(0.330)	0.881	(2.914)	(0.937)	0.121	9.263

Collectively, the descriptive statistics for control variables appear reasonable. Following Belsley, Kuh, and Welch (1980), we conduct a test of multicollinearity (untabulated) by regressing the dependent variables (RISK and RETURN) on all the respective independent variables. We find that the maximum condition index is 11.82 for the dependent variable RISK, and the maximum condition index is 11.68 for the dependent variable RETURN. Both are below the generally excepted threshold of 30. This suggests that multicollinearity is not a problem in the model. For many variables, the mean value appears to be skewed compared to the median value. Therefore, we use median values to test for differences in the misery factors based on whether a firm's misery factor score is above or below the median of the sample.

We perform a Wilcoxon rank-sum test for differences in medians for each misery factor, the two dependent variables, and the size control variable. Table 4 presents the difference in medians for F_COLI (Panel A), F_ECON (Panel B), F_LEISURE (Panel C), F_ACCESS (Panel D), and F_DANGER (Panel E) between the least and most miserable, measured as those firms above or below the median for each factor, firms.

Table 4. Wilcoxon rank-sum test for differences in medians

Panel A: Least Miserable vs. Most Miserable based on F_COLI

Variable	Median - Overall	Median -Least Miserable (a)	Median -Most Miserable (b)	Absolute Difference - (a) - (b)	Z-stat	P-value
N	29,954	14,976	14,978			
F_COLI	0.711	(0.282)	2.841	3.123	(149.885)	<.0001
RISK	0.03	0.02	0.04	0.018	(14.136)	<.0001
RETURN	0.03	0.04	0.02	0.018	16.110	<.0001
SIZE	5.41	5.77	5.08	0.689	19.994	<.0001

Panel B: Least Miserable vs. Most Miserable based on F_ECON

Variable	Median - Overall	Median -Least Miserable (a)	Median -Most Miserable (b)	Absolute Difference - (a) - (b)	Z-stat	P-value
N	29,954	14,886	15,068			
F_ECON	(0.182)	(0.671)	0.191	0.861	(149.882)	<.0001
RISK	0.03	0.03	0.03	0.002	3.455	0.001
RETURN	0.03	0.03	0.03	0.001	0.222	0.825
SIZE	5.41	5.34	5.48	0.139	(5.218)	<.0001

Panel C: Least Miserable vs. Most Miserable based on F_LEISURE

Variable	Median - Overall	Median -Least Miserable (a)	Median -Most Miserable (b)	Absolute Difference - (a) - (b)	Z-stat	P-value
N	29,954	15,072	14,882			
F_LEISURE	(1.269)	(0.808)	(1.549)	0.741	(149.882)	<.0001
RISK	0.03	0.03	0.03	0.004	4.506	<.0001
RETURN	0.03	0.03	0.03	0.002	1.834	0.067
SIZE	5.41	5.34	5.50	0.154	4.091	<.0001

Panel D: Least Miserable vs. Most Miserable based on F_ACCESS

Variable	Median - Overall	Median -Least Miserable (a)	Median -Most Miserable (b)	Absolute Difference - (a) - (b)	Z-stat	P-value
N	29,954	14,864	15,090			
F_ACCESS	(0.359)	0.173	(0.684)	0.857	149.880	<.0001
RISK	0.03	0.02	0.04	0.015	(14.885)	<.0001
RETURN	0.03	0.04	0.02	0.015	11.765	<.0001
SIZE	5.41	5.67	5.19	0.476	14.670	<.0001

Panel E: Least Miserable vs. Most Miserable based on F_DANGER

Variable	Median - Overall	Median -Least Miserable (a)	Median -Most Miserable (b)	Absolute Difference - (a) - (b)	Z-stat	P-value
N	29,954	15,071	14,883			
F_DANGER	(0.330)	0.116	(0.946)	1.062	(149.882)	<.0001
RISK	0.03	0.03	0.03	0.003	2.507	0.012
RETURN	0.03	0.03	0.03	0.002	(2.941)	0.003
SIZE	5.41	5.44	5.38	0.064	(2.762)	0.006

The least miserable firms are those with F_COLI and F_ECON scores below the median value and those firms with scores above the median value for F_LEISURE, F_ACCESS, and F_DANGER. Most miserable firms correspond to those firms with F_COLI and F_ECON scores above the median value and those firms with scores below the median value for F_LEISURE, F_ACCESS, and F_DANGER. Table 4 shows significant differences, those values of an absolute difference with a corresponding p-value of .10 or less, for all variables except RETURN in Panel B. Therefore, the results in Table 4 support our research design choice to use dichotomous variables for F_COLI, F_ECON, F_LEISURE, F_ACCESS, and F_DANGER that represent the least and most miserable firms based on the respective sample median.

Table 5 presents the results of equation (1) in the seemingly unrelated regression estimation.

Table 5. Seemingly Unrelated Regression of Risk-Return Relationship and Misery Factors

$$RISK = \beta_0 + \beta_1 FACTOR\_COLI + \beta_2 FACTOR\_ECON + \beta_3 FACTOR\_LEISURE + \beta_4 FACTOR\_ACCESS + \beta_5 FACTOR\_DANGER + \beta_6 ATTAIN\_DISCREP + \beta_7 CURRENT\_RATIO + \beta_8 SG\&A\_RATIO + \beta_9 DEBT\_EQUITY\_RATIO + \beta_{10} INDRISK + \beta_{11} LAGPE + \beta_{12} SIZE + \varepsilon$$

	Prediction	Estimate	t-stat
FACTOR_COLI	?	-1.3598	(-0.72)
FACTOR_ECON	?	3.2769	(1.91)*
FACTOR_LEISURE	?	-3.4911	(-1.90)*
FACTOR_ACCESS	?	2.7641	(1.53)
FACTOR_DANGER	?	2.0818	(1.06)
ATTAIN_DISCREP	+	2.4353	(11.26)***
CURRENT_RATIO	?	-3.6573	(-12.49)***
SG&A_RATIO	?	3.2890	(8.81)***
DEBT_EQUITY_RATIO	?	-1.8959	(-5.21)***
INDRISK	+	0.5298	(9.20)***
LAGPE	-	-0.0312	(-4.10)***
SIZE	-	-6.8057	(-17.59)***
INTERCEPT	?	51.9158	(14.91)***
Pseudo R-squared		0.05	
N		29,951	

The results in Table 5 suggest that misery levels impact firms' risk-taking.

Table 6 presents the results of equation (2) in the seemingly unrelated regression estimation.

Table 6. Seemingly Unrelated Regression of Risk-Return Relationship and Misery Factors

$RISK = \beta_0 + \beta_1 FACTOR\_COLI + \beta_2 FACTOR\_ECON + \beta_3 FACTOR\_LEISURE + \beta_4 FACTOR\_ACCESS + \beta_5 FACTOR\_DANGER + \beta_6 CURRENT\_RATIO + \beta_7 SG\&A\_RATIO + \beta_8 DEBT\_EQUITY\_RATIO + \beta_9 INDRETURN + \beta_{10} LAGRETURN + \beta_{11} ALTMAN + \beta_{12} RISK + \beta_{13} RISK*FACTOR\_COLI + \beta_{14} RISK*FACTOR\_ECON + \beta_{15} RISK*FACTOR\_LEISURE + \beta_{16} RISK*FACTOR\_ACCESS + \beta_{17} RISK*FACTOR\_DANGER + \beta_{18} SIZE + \varepsilon$

	Prediction	Estimate	t-stat
FACTOR_COLI	?	-0.0073	(-0.63)
FACTOR_ECON	?	0.0056	(0.53)
FACTOR_LEISURE	?	0.0102	(0.89)
FACTOR_ACCESS	?	-0.0061	(-0.55)
FACTOR_DANGER	?	-0.0050	(-0.41)
CURRENT_RATIO	+	0.0113	(6.07)***
SG&A_RATIO	-	-0.0856	(-35.50)***
DEBT_EQUITY_RATIO	+	0.0012	(0.52)
INDRETURN	+	0.0020	(0.97)
LAGRETURN	+	0.4395	(92.40)***
ALTMAN	-	-0.0160	(-57.73)***
RISK	-	-0.0001	(-1.52)
RISK* FACTOR_COLI	?	-0.0000	(-0.39)
RISK* FACTOR_ECON	?	-0.0003	(-4.06)***
RISK* FACTOR_LEISURE	?	0.0000	(0.37)
RISK* FACTOR_ACCESS	?	-0.0002	(-2.02)**
RISK* FACTOR_DANGER	?	0.0002	(1.90)*
SIZE	?	0.0176	(7.15)***
INTERCEPT	?	-0.1240	(-5.85)***
Pseudo R-squared		0.54	
N		29,951	

The results in Table 6 indicate that misery levels interacted with firms' risk-taking behaviors impact firms' return on assets. Overall, our results suggest that assessing the variation in managerial actions based on the surrounding environment in terms of misery adds an additional dimension to the external environment that is not assessed by examining firms' environments based solely on economic cycles. Thus, our study helps close the literature gap regarding the relationship between firms' external environments and their overall performance.

4.2 Sensitivity Analyses

In addition to the main analysis, we perform two (untabulated) sensitivity analyses. For our first robustness test, we estimate separate OLS regressions with year fixed effects for both equations (1) and (2) and the standard errors associated with the seemingly unrelated regression are lower than the separate OLS regressions with year fixed effects. Therefore, the coefficient estimates in the seemingly unrelated regression model are more efficient (Zellner, 1962). In our second (untabulated) robustness test, we estimate a seemingly unrelated regression on equations (1) and (2) in which we combined all the factor scores into a single factor. The F_COLI and F_ECON scores are reverse coded (e.g. multiplied by negative one) to ensure that higher factor scores for each of the five factors correlate to less miserable areas. We then bifurcate the sample around the median of the single factor score and those

firms with a single factor score greater than the median are classified as the least miserable. The single factor results provide evidence that misery does not impact a firm's risk-taking behavior; however, the interaction of RISK and the single factor score in the RETURN regression is negative and significant. This result provides evidence that a firm's external environment does impact performance and highlights it is important to analyze the misery level by five separate factors to understand what external environmental factors are most important to a firm's risk-return relationship.

5. Discussion

5.1 Discussion and Interpretation of Results

The results obtained in this study show that firms headquartered in the least miserable areas for economic conditions tend to increase risk-taking. The result extends both Okun's (1962) and Rousseau's (2009) collective findings to a firm performance level and suggests that the lower misery levels related to unemployment and taxes impact firms' performance by increasing risk-taking behavior. Firms headquartered in the least miserable areas for leisure activities tend to decrease risk-taking, suggesting these firms tend to shirk when approaching risk. Intuitively, this result is consistent with the notion that if employees have more opportunities and access to leisure options outside of the firm, then the employees may perform their job responsibilities at a minimum level to maximize their time on leisure activities. This finding is consistent with agency theory suggesting the notion that managers shirk when their external environments offer greater access to leisure activies.

Our results suggest that the increased risk-taking that resulted from being in low tax and unemployment areas impacts firms' performance and is not associated with higher returns; therefore, the increased risk-taking results in negative outcomes. Our results are consistent with Tsang, Ruberger, and Levin (1991) who found that an education surplus results in lower job satisfaction and worker productivity. It is common that areas with greater access to secondary education typically have greater access to healthcare providers; therefore, the Tsang et al. (1991) finding is confirmed by our study's results. Thus, a negative return related to risk-taking in the best areas based on education and health care access is the risk-taking may result because of fierce competition, which leads to negative outcomes. Positive returns are found for firms in the least miserable areas based on air quality and property crime rates and these results extend the Lovell et al. (1995) finding to the firm performance level. Our results suggest better air quality leads to positive firm performance. Additionally, our results contradict the Tang and Lean (2009) findings. Tang and Lean (2009) find higher crime rates are correlated with higher misery index scores on a macroeconomic level. The increased risk-taking that resulted from fewer danger pressures suggests firms located in MSAs with lower crime rates have a positive return on assets, which is analogous to the opposite result presented by Tang and Lean (2009).

5.2 Concluding Remarks and Recommendations for Further Research

The purpose of this study is to investigate whether firms' external environments provide information about their risk-return relationships. We introduce a new measure of firms' misery levels based on the environment in its headquarters' MSA. The misery measure consists of five factors that capture both economic and non-economic factors that proxy for firms' external environments. The first factor captures the cost of living and the cost of housing for each MSA. The second factor represents a MSA's unemployment and taxes (state, sales, and property). The third factor is comprised of arts and culture, leisure, and transportation amenities. The fourth factor represents access to healthcare and education. The final factor captures air quality and property crime rates.

Using a sample from 2002 to 2011, we find that firms' external environments are associated with firms' risk-return relationships. Specifically, low unemployment rates and taxes increase risk-taking within a firm, whereas greater access to leisure amenities decreases risk-taking. Firms' returns are negatively impacted by those risks taken in conjunction with low unemployment and taxes and those risks taken in conjunction with greater access to education and healthcare. However, firms' returns are positively impacted when risks are taken in conjunction with better air quality and lower property crime.

This study contributes to the line of research that investigates firms' risk-return relationships with respect to the behavioral theory of the firm. Prior research (Oviatt & Bauerschmidt, 1991; Deephouse & Wiseman, 2000) documents a firm's external environment impacts the risk-return relationship, suggesting drivers outside the firm are part of the risk-return puzzle. Fiegenbaum and Thomas (1986) suggest that the risk-return relationship differs across economic conditions, such as recessions and expansions. We extend these studies by examining another dimension of firms' external environment by providing evidence that firms' everyday external environments do appear to impact their risk-return relationships.

The results suggest that a firm's external environment is associated with its performance. Therefore, future research may consider including location fixed effects to control for the unobservable external environmental factors that impact firm performance. Our sample period examined the years preceding and proceeding the great recession period of 2008-2009. This allowed us to make inferences in times of varying levels of misery. Future research may consider another form of misery caused by the COVID-19 pandemic to determine whether variations in misery levels and corporate performances are observable.

Although this study provides evidence that the external environment impacts firms' performance, it is not free from limitations. The analysis is based on the MSA where firms' headquarters are located. Thus, the results imply that all risk decisions occur at the firms' headquarters level. However, risk-taking decisions may occur in locations other than the firms' headquartered location. Additionally, prior literature has not established a correct measure of risk. We use an external measure of risk, the five-year variance of the price-earnings ratio, to imply the variation of external investors' valuations for the sample firms. However, earnings management can influence the denominator of the price-earnings ratio and present a distorted picture of firm risk-taking. Furthermore, other control variables might be introduced because the results may be confounded by correlated omitted variables.

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Appendix A

Variable Definitions and Data Sources

Dependent Variables		
RISK	Five-year variance in price earnings ratio (stock price/earnings per share) $[(IB_t\text{-}DVP_t)/ ((CEQ_{t-1} + CEQ_t) / 2)]$	Compustat
RETURN	Return on assets $[IB_t/AT_{t-1}]$	Compustat
Variables of Interest		
F_COLI	Principal component factor score with positive loadings related to the cost of living and housing indexes.	Hand collected
F_ECON	Principal component factor score with positive loadings related to taxes and unemployment.	Hand collected
F_LEISURE	Principal component factor score with positive loadings related to arts and culture, leisure, and transportation amenities.	Hand collected
F_ACCESS	Principal component factor score with positive loadings related to education and healthcare access.	Hand collected
F_DANGER	Principal component factor score with positive loadings related to air quality and property crime rates.	Hand collected
FACTOR_COLI	Dichotomous variable equal to 1 (and 0 otherwise) if the F_Coli score (based on the rotated factor pattern) is less than the sample median.	
FACTOR_ECON	Dichotomous variable equal to 1 (and 0 otherwise) if the F_Econ score (based on the rotated factor pattern) is less than the sample median.	
FACTOR_LEISURE	Dichotomous variable equal to 1 (and 0 otherwise) if the F_Leisure score (based on the rotated factor pattern) is greater than the sample median.	
FACTOR_ACCESS	Dichotomous variable equal to 1 (and 0 otherwise) if the F_Access score (based on the rotated factor pattern) is greater than the sample median.	
FACTOR_DANGER	Dichotomous variable equal to 1 (and 0 otherwise) if the F_Danger score (based on the rotated factor pattern) is greater than the sample median.	
*RISK*FACTOR_COLI*	Interaction of RISK and *FACTOR_COLI*	
*RISK*FACTOR_ECON*	Interaction of RISK and *FACTOR_ECON*	
*RISK*FACTOR_LEISURE*	Interaction of RISK and *FACTOR_LEISURE*	
*RISK*FACTOR_ACCESS*	Interaction of RISK and *FACTOR_ACCESS*	
*RISK*FACTOR_DANGER*	Interaction of RISK and *FACTOR_DANGER*	
Independent Variables		
ATTAIN_DISCREP	Aspirations for each year were identified by comparing each firm's performance from the previous year (ROA) with its respective industry average for that year. When performance exceeded the industry average, aspirations are determined by multiplying prior year performance by 1.05 (effectively adding a growth factor). Conversely, aspirations are coded as industry average performance from the previous year when a firm's performance was below that average. Attainment discrepancy was then calculated by taking the difference between aspirations and the firm's actual performance (ROA) (Wiseman and Bromiley, 1996). By subtracting	Compustat

	performance from the reference, attainment discrepancy captures the nonlinear relation between the success reference predicted by March and Shapira (1992). This process was repeated for each year and then averaged across years for each firm.	
CURRENT_RATIO	Current ratio [ACT_t /LCT_t]	Compustat
SG&A_RATIO	SG&A ratio [$XSGA_t$ / $SALE_t$]	Compustat
DEBT_EQUITY_RATIO	Debt to equity ratio [DT_t / CEQ_t]	Compustat
INDRISK	Average RISK of all firms in the industry (two-digit SIC code) excluding the selected firm	Compustat
LAGPE	Price earnings ratio in prior year	Compustat
SIZE	Natural logarithm of total sales [$SALE_t$]	Compustat
ALTMAN	Altman's [1983] scores multiplied by negative 1.	Compustat
INDRETURN	Average RETURN of all firms in the industry (two-digit SIC code) excluding the selected firm	Compustat
LAGRETURN	RETURN in prior year	Compustat

Appendix B – Misery Input Calculations

Taxes – obtained for years 2000-2011

Sales tax

- Obtained respective sales tax rates and applied them to respective MSAs. If MSA data was not available, applied the state sales tax rate for the respective year.
- Applied to per capita income (along with other tax rates) to determine how much of one's income goes to taxes and scaled calculation by per capita income for the respective MSA
- Source (year 2003) – Sander, Peter; Sperling, Bert. Cities Ranked and Rated: More than 400 Metropolitan Areas Evaluated in the U.S. and Canada. 1st Edition. New York: Wiley, 2004. Print.
- Source (year 2006) – Sander, Peter; Sperling, Bert. Cities Ranked and Rated: More than 400 Metropolitan Areas Evaluated in the U.S. and Canada. 2nd Edition. New York: Wiley, 2007. Print.
- Source (years 2000-2002 and 2004-2005) – same source as 2003 and verified the rate was reasonable based on state sales tax rates published by the Federation of Tax Administrators.
- Source (years 2007-2011) – same source as 2006 and verified the rate was reasonable based on state sales tax rates published by the Federation of Tax Administrators.
- Source (MSAs without data in the Cities Ranked and Rated 1st Edition: years 2000-2005) - Taxfoundation.org. Federation of Tax Administrators. 2000-2005. Web. 12 August 2013.
- MSAs without data in the Cities Ranked and Rated 1st Edition are available upon request.

State income tax

- Obtained respective state income tax rates and applied them to respective MSAs. If MSA data was not available, applied the state income tax rate for the respective year.
- Applied to per capita income (along with other tax rates) to determine how much of one's income goes to taxes and scaled calculation by per capita income for the respective MSA
- Source (year 2003) – Sander, Peter; Sperling, Bert. Cities Ranked and Rated: More than 400 Metropolitan Areas Evaluated in the U.S. and Canada. 1st Edition. New York: Wiley, 2004. Print.
- Source (year 2006) – Sander, Peter; Sperling, Bert. Cities Ranked and Rated: More than 400 Metropolitan Areas Evaluated in the U.S. and Canada. 2nd Edition. New York: Wiley, 2007. Print.
- Source (years 2000-2002 and 2004-2005) – same source as 2003 and verified the rate was reasonable based on state income tax rates published by the Federation of Tax Administrators.
- Source (years 2007-2011) – same source as 2006 and verified the rate was reasonable based on state income tax rates published by the Federation of Tax Administrators.
- Source (MSAs without data in the Cities Ranked and Rated 1st Edition: years 2000-2005) - Taxfoundation.org. Federation of Tax Administrators. 2000-2005. Web. 12 August 2013.

Property tax (% of Personal Income)

- Calculated the percentage of per capita income that was spent on property taxes
- Applied to per capita income (along with other tax rates) to determine how much of one's income goes to taxes and scaled calculation by per capita income for the respective MSA
- Source (year 2003) – Sander, Peter; Sperling, Bert. Cities Ranked and Rated: More than 400 Metropolitan Areas Evaluated in the U.S. and Canada. 1st Edition. New York: Wiley, 2004. Print.
- Source (year 2006) – Sander, Peter; Sperling, Bert. Cities Ranked and Rated: More than 400 Metropolitan Areas Evaluated in the U.S. and Canada. 2nd Edition. New York: Wiley, 2007. Print.
- Source (MSAs without data in the Cities Ranked and Rated 1st Edition: years 2000-2002 and 2005) - Taxfoundation.org. Federation of Tax Administrators. 2000-2005. Web. 12 August 2013.
- Source (2007-2011) - Taxfoundation.org. Federation of Tax Administrators. 2007-2011. Web. 12 August 2013.

Cost of Living Index – obtained for years 2000-2011

- Obtained the average cost of living index (COLI) score for each MSA in each respective year.
- For MSAs not reported in the COLI data from sources below (for periods ranging from 1 to 10 years), we applied the average COLI score for the respective state in that year based on obtained data. These MSAs are available upon request.
- For MSAs not reported in the COLI data from the sources below and did not have state average data for the base period (year 2000), we calculated the year 2000 COLI score by taking the next available period and backing into the year 2000 score by reducing the first reported score by the National COLI average for the respective period(s). These MSAs are available upon request.
- Source (2000-2011) – Cost of Living Index. The Council for Community and Economic Research. Arlington, VA. 2013.
- Source (year 2003) – Sander, Peter; Sperling, Bert. Cities Ranked and Rated: More than 400 Metropolitan Areas Evaluated in the U.S. and Canada. 1st Edition. New York: Wiley, 2004. Print.
- Source (year 2006) – Sander, Peter; Sperling, Bert. Cities Ranked and Rated: More than 400 Metropolitan Areas Evaluated in the U.S. and Canada. 2nd Edition. New York: Wiley, 2007. Print.

Housing Index – obtained for years 2000-2011

- Obtained the average housing index score for each MSA in each respective year.
- For MSAs not reported in the housing index data from sources below (for periods ranging from 1 to 10 years), we applied the average housing index score for the respective state in that year based on obtained data. These MSAs are available upon request.
- For MSAs not reported in the housing index data from the sources below and did not have state average data for the base period (year 2000), we calculated the year 2000 housing index score by taking the next available period and backing into the year 2000 score by reducing the first reported score by the national housing index average for the respective period(s). These MSAs are available upon request.
- Source (2000-2011) – Cost of Living Index. The Council for Community and Economic Research. Arlington, VA. 2013.
- Source (year 2003) – Sander, Peter; Sperling, Bert. Cities Ranked and Rated: More than 400 Metropolitan Areas Evaluated in the U.S. and Canada. 1st Edition. New York: Wiley, 2004. Print.
- Note: The Cities Ranked and Rated 2nd Edition did not include housing index data.

Arts & Culture – obtained for years 2000-2011

- For years 2003 and 2004, we used the overall arts & culture score from the sources below. For periods other than 2003 and 2004, we took the average score for 2003 and 2004 and applied it to the remaining years. If an MSA score was not listed in the sources below for either 2003 or 2004, we used the average score obtained for the MSA. All arts & culture scores are scaled by population.
- The overall arts & culture rating is based on the following attributes: number of libraries, library volumes per capita, arts radio rating, classical music rating, ballet/dance rating, professional theater rating, university arts program rating, overall museum rating, art museum rating, science museum rating, and children's museum rating.
- Source (year 2003) – Sander, Peter; Sperling, Bert. Cities Ranked and Rated: More than 400 Metropolitan Areas Evaluated in the U.S. and Canada. 1st Edition. New York: Wiley, 2004. Print.
- Source (year 2004) – Sander, Peter; Sperling, Bert. Cities Ranked and Rated: More than 400 Metropolitan Areas Evaluated in the U.S. and Canada. 2nd Edition. New York: Wiley, 2007. Print.

Leisure – obtained for years 2000-2011

- For years 2003 and 2005, we used the overall leisure score from the sources below. For periods other than 2003 and 2005, we took the average score for 2003 and 2005 and applied it to the remaining years. If an MSA score was not listed in the sources below for either 2003 or 2005, we used the average score obtained for the MSA. All leisure scores are scaled by population.
- The overall leisure rating is based on the following attributes: restaurant rating, outlet mall rating, number of Starbucks, number of Costco, Sam's Club, and BJ's stores, professional sports rating, college sports rating, zoo/aquarium rating, amusement park rating, botanical garden/arboretum rating, golf course rating, ski area rating, square miles of inland water, miles of coastline, and National Park rating.
- Source (year 2003) – Sander, Peter; Sperling, Bert. Cities Ranked and Rated: More than 400 Metropolitan Areas Evaluated in the U.S. and Canada. 1st Edition. New York: Wiley, 2004. Print.
- Source (year 2005) – Sander, Peter; Sperling, Bert. Cities Ranked and Rated: More than 400 Metropolitan Areas Evaluated in the U.S. and Canada. 2nd Edition. New York: Wiley, 2007. Print.

Transportation – obtained for years 2000-2011

- For years 2003 and 2005, we used the overall transportation score from the sources below. For periods other than 2003 and 2005, we took the average score for 2003 and 2005 and applied it to the remaining years. If an MSA score was not listed in the sources below for either 2003 or 2005, we used the average score obtained for the MSA. All transportation scores are scaled by population.
- The overall transportation rating is based on the following attributes: average commute time, percentage of commutes greater than 60 minutes, percentage who commute by auto, percentage who commute by mass transit, percentage who work from home, mass transit miles per capita, major airports within 60 miles, size of regional airport, daily airline service activity, Amtrak service, average annual insurance premium, average cost of gas per gallon, and average daily road miles traveled.
- Source (year 2003) – Sander, Peter; Sperling, Bert. Cities Ranked and Rated: More than 400 Metropolitan Areas Evaluated in the U.S. and Canada. 1st Edition. New York: Wiley, 2004. Print.
- Source (year 2005) – Sander, Peter; Sperling, Bert. Cities Ranked and Rated: More than 400 Metropolitan Areas Evaluated in the U.S. and Canada. 2nd Edition. New York: Wiley, 2007. Print.

Education – obtained for years 2000-2011

- For years 2002 and 2005, we summed the number of 4 year and 2 year universities/colleges and the number of highly rated universities from the sources below. For the periods 2000 and 2001, we used the total number of 4 year and 2 year universities/colleges and the number of highly rated universities from 2002. For 2003 and 2004, We used the average number of 4 year and 2 year universities/colleges and the number of highly rated universities reported in 2005 and 2002. For the periods 2006 - 2011, we used the total number of 4 year and 2 year universities/colleges and the number of highly rated universities from 2005. If an MSA score was not listed in the sources below for either 2002 or 2005, we used the average scores obtained for the MSA. All total universities/colleges are scaled by population.
- To assess the number of highly rated universities per MSA, we used two indicator variables. An indicator variable equal to 1 if the number of highly ranked universities for the respective MSA is greater than the national average number of highly rated universities, and 0 otherwise. An indicator variable equal to 1 if the number of highly ranked universities for the respective MSA is equal to the national average number of highly rated universities, and 0 otherwise.
- Source (year 2002) – Sander, Peter; Sperling, Bert. Cities Ranked and Rated: More than 400 Metropolitan Areas Evaluated in the U.S. and Canada. 1st Edition. New York: Wiley, 2004. Print.
- Source (year 2005) – Sander, Peter; Sperling, Bert. Cities Ranked and Rated: More than 400 Metropolitan Areas Evaluated in the U.S. and Canada. 2nd Edition. New York: Wiley, 2007. Print.

Unemployment – obtained for years 2000-2011

- Obtained monthly unemployment rates by MSA and calculated the annual average unemployment rate for each respective year. Obtained the national average unemployment rate for each respective year. Scaled the MSA average annual unemployment rate by the national annual average unemployment rate.
- Source - http://www.bls.gov/lau/metrossa.htm Bureau of Labor Statistics 2000-2011. Web. 29 June 2013.

Crime – obtained for years 2000-2011

- Obtained property crime rates for each MSA and scaled each by the respective MSA population. The average property crime rate scaled by MSA population was then calculated. The MSA average property crime rate was then scaled by the national average property crime rate scaled by population.
- Property crimes include burglary, larceny, theft, and motor vehicle theft. Total crime is the sum of violent and property crime totals.
- For MSAs not reported in the crime rate data from source below (for periods ranging from 1 to 11 years), we applied the average violent, property, and total crime rates for the respective MSA based on obtained data. These MSAs are available upon request.

- Chicago-Joliet-Naperville, IL-IN-WI had crime data for 2011 only. Since this is a MSA with many companies headquartered within it and one of the highest crime rates, the remaining years crime rates (violent and property) were calculated by averaging the five highest crime rate MSAs. The values were then scaled by the Chicago-Joliet-Naperville, IL-IN-WI population for each respective year.
- Source - http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s Federal Bureau of Investigation Environmental Protection Agency 2000-2011. Web. 2 September 2013.

Health & Healthcare – obtained for years 2000-2011

- Air quality is measured by particulates and other chemicals in the air for each MSA. The subtotals for each are scaled by the median particulates and other chemicals.
- For MSAs not reported in the air quality data from source below (for periods ranging from 1 to 12 years), we applied the average particulates and other chemical values for the two nearest MSAs in that year based on obtained data. These MSAs are available upon request.
- Number of hospital beds were obtained by state and year and were assigned to MSAs based on the state it is located.
- Source (air quality) - http://www.epa.gov/airtrends/factbook.html Environmental Protection Agency 2000-2011. Web. 25 September 2013.
- Source (hospital beds) – http://kff.org/other/state-indicator/beds/ The Henry J. Kaiser Family Foundation 2000-2011. Web. 5 August 2013.

Population, Personal Income, per capital income – obtained for years 2000-2011

- Source - http://www.bea.gov/ Bureau of Economic Analysis 2000-2011. Web. 25 June 2021.

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