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The Effect of Optimism on the Equity Premium

ABSTRACT:

The *Equity Premium Puzzle* highlights the occurrence of historical equity premium being an order of magnitude greater than can be rationalized in the context of the standard paradigm of financial economics. Studies have shown that pessimism may explain this puzzle.

The purpose of this thesis is to examine the effect of optimism on the equity premium. By using data of optimism and equity premia from different countries the study shows a possible relationship between the two variables. This relationship is shown to be an inverse one, i.e. the equity risk premium decreases as optimism increases. However, the findings can be considered unreliable due to contradictions in the results when testing different datasets. Ultimately, there are possible ways to improve the datasets and develop the model to obtain credible results.

KEY WORDS: Behavioral Finance, Equity Risk Premium, Equity Premium Puzzle, Optimism.

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1. Introduction

The theory of rational expectations is well known among economists. As first proposed by Muth (1961) in the article "Rational Expectations and the Theory of Price Movements", the outcome of economic situations depends partly on what people expect to happen. The later on developed hypothesis states that investors have rational expectations about relevant economic variables. When using all available information, the expectations are identical to the optimal forecast of the future meaning that the forecasted outcome does not systematically differ from the equilibrium results. That is, it assumes that investors do not make systematic errors when predicting the future.

Abel (2002) conversely, takes an approach based on the assumption that the theory of rational expectations does not necessarily hold. He argues that pessimism increases the objective expected return. Pessimism leads to individuals underestimating the average return. The underestimation of the average growth in profits gives a generally lower confidence in the economy as a whole. Subsequently the individual reduces her consumption and increases her savings which forces the risk-free interest rate to decrease. Abel says that this may explain the "Equity Premium Puzzle".

According to Mehra and Prescott (2003, p.2), the Equity Premium Puzzle highlights the occurrence of "historical equity premium (the return earned by a risky security in excess of that earned by a relatively risk free Treasury-bill) being an order of magnitude greater than can be rationalized in the context of the standard paradigm of financial economics". The historical data provides evidence that stock returns have been considerably and consistently higher than those for Treasury bills. The average annual real return (i.e the inflation-adjusted return) on the US stock market over the last century has been about 7.9 per cent. Over the same period, the return on a relatively riskless security was a negligible 1 per cent. The difference between these two returns - 6.9 per cent - is called the equity premium. What puzzles the world is that stocks achieve a higher return-to-risk ratio than risk-free assets, yet investments are still made in risk-free assets.

1.1 Purpose

In contrast to Abel's (2002) work, this paper aims to examine how the antonymous concept of pessimism, in other words optimism, affects the equity premium. So far, to the best of our knowledge, no study has been made on the correlation between optimism and equity premium in conjunction with the equity premium puzzle. Optimism is characterized by the individual

subjective probability and is usually conceived as a personal trait leading to overestimate the likelihood of good outcomes and to underestimate the likelihood of bad outcomes.

1.2 Method

The relation between measures of optimism and the equity premiums in different countries is tested with regression analysis. A t-test, a Wilcoxon Rank-Sum test and a multiple linear regression are run using model including variables such as optimism, GDP/capita, stock market capitalization per capita and loss aversion in order to examine a possible affect on equity premium.

1.3 Thesis Outline

In the next section the equity premium puzzle, optimism and other important concepts will be explained. In section three the hypothesis will be presented. The data and chosen methods for testing the hypothesis will also be introduced in section three. The reliability of the data and the method will be expounded upon. In the final two sections, the empirical findings and the conclusions of the study, respectively, will be presented. These will be related to the initial hypothesis and the consequences of the results will be discussed.

2. Equity Premium Puzzle

In the following section, the main theories that this study is based on are explained and related to the purpose of this study.

2.1 History

Mehra and Prescott (1985) presents an argument that commonly used economic models are incapable of accounting for historically observed rates of return on stocks and short-term bonds. Abel (1991, p.3) emphasizes that "specifically, Mehra and Prescott found that, in the 90 years from 1889 to 1978, the average real return on stocks was 6.98 percent per year while the average real rate of return on bills was only 0.80 percent per year. The rate of return of stocks minus the rate of return on short-term bonds (bills) – the so-called equity premium – averaged an astonishing 6.18 percent per year". According to later studies of historical data (e.g by Cecchetti et al (1998)) this difference in average return between risky and risk-free assets continues and accounts for approximately 7 percent per year. Most economists would argue that the reason for this large equity premium is due to risk. Stocks are riskier than bills and investors would not want to hold stocks unless they are compensated for the higher risk by earning a higher average rate of return. However, this result is an anomaly too extensive to be explained by economic models.

According to Abel (1991) the idea that investments with higher risk should earn higher returns underlies the capital asset pricing model (CAPM). Several modifications have been made to the basic CAPM model and one of them is the consumption capital asset pricing model (CCAPM). CCAPM shows that the primary reason for holding wealth is to provide for future consumption. As a result, the equity premium should depend on the variability of consumption and its relation to stock returns. Mehra and Prescott (1985) used a standard equilibrium model in which individuals had constant relative risk aversion and additively separable utility functions, meaning that someone´s utility one year does not depend on this person´s consumption in other years. However, they found that the CCAPM accounted for an equity premium of only 0.35 percent per year, i.e. a very small fraction of the historically observed equity premium. To describe this large discrepancy, they were the first to declare the equity premium an official "puzzle".

Since the economic anomaly *Equity Premium Puzzle* was first mentioned by Mehra and Prescott in 1985 several researchers have been trying to find explanations to the puzzle that do not seem to correspond with the rational expectations theory. When disregarding the rational

expectations assumption, Abel (2002) defines a *pessimist* a "*decision maker whose subjective probabilistic belief about asset returns is stochastically dominated by the objective distribution of these returns*". Hence, a pessimistic investor underestimates the average return leading her to decrease consumption and increase savings which forces the risk-free interest rate to decrease. The result is an increase of the average equity premium and thus pessimism can be seen as a possible explanation for the equity premium puzzle discussed by Mehra and Prescott (1985).

In addition, Alfranseder and Zhang (2012) mentions that according to De Long et al (1990) irrational traders incorrectly believe that they have special information about the future price of the risky asset. They may get signals from stock brokers, economics consultants or from technical analysis which result in an irrational belief that these signals carry information which leads them to have inaccurate beliefs about the price of the risky asset. Selecting portfolios on such irrational basis affect both prices and expected returns. The interpretations of irrationality differ, but some economists argue that irrationality may affect the equity risk premium.

Myopic loss aversion has been offered as a partial explanation to the equity premium puzzle by Benartzi and Thaler (1995), showing that an investor's inclination to invest in stocks depends on loss aversion and how frequent the investor evaluates the performance of the investment. Loss aversion can be defined as 'the tendency for individuals to be more sensitive to reductions in their levels of well-being than to increases' (Benartzi and Thaler, 1995). The study suggests that a frequent evaluator will, due to the uncertain nature of short-term investments, experience more negative evaluations than an investor that doesn't check his performance as often. This fact combined with loss aversion makes an investor less likely to invest in stocks if the performance is evaluated frequently.

Another concept that has been introduced to affect an individual's evaluation of risk is narrow framing. The concept suggests that when an individual is faced with a new gamble it is evaluated in isolation from previous gambles or risks (Barberis, Huang, and Thaler, 2006). According to Barberis, Huang, and Thaler, this concept can be found to play a major role in decision making. Another study by Barberis and Huang (2006) is more directed towards applying narrow framing to the equity premium puzzle. This study argues that the proposition given by Benartzi and Thaler (1995) is in itself a case of narrow framing and suggests a model

which is based on both loss aversion and narrow framing. According to Barberis and Huang, such a model is more realistic to describe the equity premium puzzle with.

2.2 Equity Risk Premium

According to Goetzmann and Ibbotson (2006), the equity risk premium is defined as the reward that investors require to accept the uncertain outcomes associated with owning equity securities. The equity risk premium is measured as the excess return that equity holders expect to achieve over risk-free assets on average. The equity risk premium is basically the return on the market less the return on the risk-free asset. It is important to note that the equity risk premium is a forward looking concept. That is, the equity risk premium should be reflective of what investors think the risk premium will be in the future.

The equity risk premium can be calculated over any time period and in two general ways - one using historical data and one using estimates or market projections. Using historical data to develop an equity risk premium, one assumes that what has happened in the past is representative of what might be expected in the future. Using market projection, one assumes that it is possible to project the equity risk premium from projection models. The equity risk premium data used for this thesis will be further discussed in the data section below. (Bodie et al. 2011 p. 459ff)

2.3 Optimism & Pessimism

According to Abel's (1991) work pessimism leads to an increase of the average equity premium. A reasonable assumption which will be examined is therefore that optimism could lead to a decrease in the average equity premium.

A field of finance that proposes psychology-based theories to explain stock market anomalies is behavioral finance. According to Bodie et al (2011) it considers how real people make decisions and that these people make a difference in the market. A growing number of economists have come to interpret the anomalies as consistent with several "irrationalities" that seem to characterize individuals making decisions. Such irrational behavior is for example optimism and pessimism.

A common view is Scheiner and Carver´s (1985) future oriented definition of optimism and pessimism as generalized positive and negative outcome expectations. In contrast, Dember et al. (1989) have defined optimism and pessimism in a broader way as a positive and negative outlook of life.

Gallup World (2012) uses a definition of pessimism such as the expectancy that the future life will be worse than the current life. Optimism is defined as the expectancy that the future life will be better than the current life. For the purpose of this thesis Gallup's definitions of optimism and pessimism will be used in order to facilitate the analysis and interpretation of the outcomes. However Chang (1997) argues this is a simplified view, one cannot simply argue that not being optimistic means that someone is pessimistic or vice versa and that one cannot be both pessimistic and optimistic. Recently, several researchers have challenged Scheiner's and Carver's model arguing that optimism and pessimism might be better conceived as representing two partially independent dimensions.

3. Hypothesis, Data and Methodology

This section will begin by introducing the model which will be used to examine whether or not optimism has an effect on the equity premium, and explain the reason for using the chosen variables. This will be followed by an introduction to the hypothesis that will be tested, the data that this study is based upon, and the method intended to apply to test our hypothesis.

3.1 The Model

The model used to examine whether optimism has an effect on equity premium is a linear model composed of four variables, in its full scale:

$$ERP = \beta_0 + \beta_1 Optimsm + \beta_2 GDP + \beta_3 SC + \beta_4 LA + \varepsilon$$

where;

$ERP = Equity\ Risk\ Premium$
$GDP = GDP\ per\ capita$
$SC = Stock\ market\ capitalization\ per\ capita$
$LA = Loss\ aversion$
$\varepsilon = error\ term$

The different variables will be used in different tests and subsequently the model will both be used in its entirety and with certain variables excluded. Beside usage of optimism in the model, several variables that are believed to affect equity premium have been added. Both GDP per capita and stock market capitalization per capita are added to incorporate a country's economic situation. GDP per capita can reasonably be argued to have an effect on equity premium in the sense that it gives an indication on how much capital per citizen that is available to invest in a market such as the stock market. It can be argued that a larger GDP per capita would lead to more people investing money in the stock market, and can consequently have an effect on the equity premium in the country.

The effect of stock market capitalization per capita on equity premium could arguably go hand in hand with the possible effects of GDP per capita. A larger stock market capitalization per capita would mean that more capital is invested into the stock market, and would perhaps have an effect on the equity premium in the sense that there's more involvement in the stock market. Both these variables are therefore included in order to control for their effects.

The variable loss aversion is included in the model since Benartzi and Thaler (1995) have suggested that loss aversion can offer an explanation of the equity premium puzzle, through myopic loss aversion. At the same time, Barberis and Huang (2006) are using loss aversion in their model "loss aversion and narrow framing" to explain the equity premium puzzle. Along with that, there is a possibility that loss aversion and optimism are embedded in each other, and this study considers it wise to actively separate the two in an attempt to make optimism an exogenous variable and control for the effects of loss aversion on equity premium.

The reason for not including risk aversion in the model is based upon the fact that a relevant dataset for risk aversion wasn't found. The study made by Rieger, Wang, and Hens (2011) indeed has values for risk attitudes for various countries, but these are used in the study to derive loss aversion, which makes it unnecessary to include a risk aversion-variable based on the same values.

3.2 The Hypothesis

Our main hypothesis is inspired by Abel (2002) who argues that pessimistic investors underestimate the average return. As a consequence, the consumption decreases and savings increase which forces the risk-free interest rate to decrease. The result is an increase of the average equity premium and thus, according to Abel (2002), pessimism can be seen as a possible explanation to the equity premium puzzle. The main hypothesis for this study states that optimism would have the opposite effect of pessimism on the equity premium, namely *optimism has a negative impact on the equity premium*.

Stating such a hypothesis assumes segmented markets and home bias, i.e. the tendency that investors invest in a disproportionately large amount of domestic equities, despite the benefits of diversifying into foreign equities. In other words, optimistic investors in one country with low equity premiums do not invest in pessimistic countries with higher equity premiums even if it according to finance theory (Sharpe (1964)) would be beneficial for investors to diversify their portfolios internationally. (Sercu and Vanpée (2007))

3.3 The Methodology

There are different sets of data that need to be cross-examined in an attempt to investigate if optimism has an effect on the equity risk premium. The primary method to be used is to compare different nations' equity premium and their level of optimism. Using data from different countries would give an overview and show whether estimates of optimism are related to the equity premium.

In order to investigate the hypothesis, data are collected from various sources. The equity premium data will be collected from Dimson, Marsh, and Staunton (2011) and Jorion and Goetzmann (1999). Data of optimism will be collected from an international Gallup survey aiming to measure pessimism and optimism in different countries. Information about GDP in different countries will be taken from the World Bank Organization. Furthermore, data of market capitalization will be collected from La Porta et al. (1998) and loss aversion will also be collected from Rieger et al (2011). More details about the data can be found in section 3.4.

First 2-sample *t*-tests and a Wilcoxon Rank Sum tests are run to determine if optimism affects the equity premium. The reason why both of these tests are being run is due to the fact that their correctness is depending on how the data is statistically distributed. A 2-sample *t*-test is best used if the data is normally distributed, while a Wilcoxon Rank Sum is a better test if that assumption does not hold. A rank sum test can be used on a normally distributed population as well, but is then inferior to a 2-sample *t*-test. Along with those tests a simple linear regression will be performed in order to examine and graphically show the possible relationship between optimism and equity premium. These tests allow a basic view of the relationship and will serve as a good foundation before expanding the test by including more variables.

Thereafter, a multiple linear regression will be performed in order to isolate the effect of optimism on equity premium from other influential factors such as GDP per capita, market capitalization per capita and loss aversion. This regression is displayed in section 3.1.

First, all tests are run using the Dimson et al (2011) estimates of the equity premium Second, all tests are rerun using estimates of the equity premium from Jorion & Goetzmann (1999).

3.4 The Data

In this section, the various data that has been used for this research will be explained in detail in order to grant a better understanding of the study itself.

3.4.1 Datasets with equity premia

Dimson, Marsh, and Staunton (2011) gives a 19-country source of equity premia based on data from 1900-2011. Thus, it stretches over a long period of time as well as it is up to date, which makes it somewhat consistent with the data for optimism, two aspects which are good for the reliability of the dataset. On the other hand the data is relatively small with its 19 countries, which is a potential problem for its reliability. The second dataset used for equity

premia is Jorion & Goetzmann (1999). From there, 33 countries with data on average real returns, i.e. nominal return adjusted for inflation, with time periods generally being 75 years long is used. Although this dataset doesn't directly refer to equity premia, it has made the reasonable assumption that long-term real returns for an equity market are equivalent with equity premia. The major advantage of this dataset is that its size makes any analysis more relevant, but it carries disadvantages in the ways that not all time periods are as long as 75 years, along with the fact that it is only measured up to year 1996. These two datasets described above will henceforth be referred to as the "original datasets".

In an attempt to create a dataset for equity premium that is more attractive for analysis than the above mentioned ones, which both have significant drawbacks, a combination of the two datasets has been used to forge the dataset that will be the main one used in the tests. This dataset is created through three steps. First, a theoretical value of the change in equity premium for each country in Jorion & Goetzmann's dataset which is not already included in the dataset of Dimson, Marsh, and Staunton (2011) is created:

$D_X - G_X =$ Change in equity premium in country X between '96-'11
where,
$D_X =$ Dimson, Marsh, and Staunton's equity premium for given country X
$G_X =$ Jorian and Goetzmann's equity premium for given country X

Second, the data from these countries are then used to construct a hypothetical world average of the change in equity premium for the time period '96-'11:

$$\frac{\sum_{i=1}^{19} \text{Change in equity premium in country X between '96-'11}}{19} = \text{Average annual global equity premium}$$

As a final step, this value is added to the 14 countries that are not included in Dimson, Marsh, and Staunton (2011) and hence a dataset of 33 countries with equity premia has been created that has accounted for the recent economic climate, including the financial crisis, as well as historical events. This dataset will be referred to as the "main dataset".

3.4.2 Optimism

As previously mentioned, optimism has been defined to be an antonymous concept of pessimism. When choosing data for optimism, the reason for this assumption becomes clear. The data chosen for this study is the data produced by Gallup World (2012) which displays

the percentage of the population that is pessimistic, in the chosen 33 countries. In line with this study's definition, the remainder of the population is optimistic:

$$Optimism = 1 - pessimism$$

These values are the ones used directly in the model as the variable optimism. When performing the 2-sample *t*-tests and the Wilcoxon Rank Sum tests the sample is split at the median value for optimism.

3.4.3 GDP per capita and stock market capitalization per capita

The dataset used for GDP per capita is based on figures provided by The World Bank (2012), and are given in 100 000 US dollars. The stock market capitalization per capita is figures given by La Porta et al. (1998) and then divided by the population given by The World Bank (2012). The market capitalization per capita is displayed in 1 000 US dollars.

3.4.4 Loss aversion

The dataset for loss aversion is taken from a study made by Rieger, Wang, and Hens (2011). They have derived loss aversion by using their experimental results for risk attitudes to construct the parameter defined by Tversky & Kahneman (1992) 'as the ratio between a gain A and a loss B such that a fifty-fifty lottery between A and B is as attractive as an outcome of zero' (Rieger, Wang, and Hens 2011, p.6).

4. Empirical Findings

In the following section the results of the study will be displayed and analyzed. The descriptive statistics for the variables can be viewed in Table 1.

Table 1. Descriptive statistics for the variables

				---------- Quantiles ----------				
Variable	**n**	**Mean**	**S.D.**	**Min**	**.25**	**Mdn**	**.75**	**Max**
ERP_main	33	0.06	0.02	0.01	0.04	0.07	0.08	0.09
Realreturns_goetz (1921-1996)*	33	0.00	0.03	-0.05	-0.02	0.01	0.02	0.04
ERP_dimson (1900-2010)	19	0.07	0.01	0.05	0.06	0.07	0.09	0.09
Optimism	33	0.87	0.07	0.68	0.83	0.88	0.91	1.00
BNP/capita**	33	0.34	0.24	0.01	0.11	0.36	0.49	0.98
St.m.cap/capita***	33	0.17	0.24	0.00	0.02	0.10	0.23	1.21
Loss aversion	21	1.83	0.34	1.09	1.62	2.00	2.00	2.46

*Some countries have a smaller range than 75 years

**In 100 000 US dollars

*** In 1 000 US dollars

First, a test regarding the level of significance of optimism on equity premium will be made. This is done in order to get an idea of whether optimism is a factor that needs to be accounted for when discussing equity premia. The next step would then be to examine this relationship through a multiple linear regression, which is done with the model presented in the previous section. Since the dataset used in 4.1 and 4.2 is partially computed, the last step will present the testing of the original datasets by Jorion & Goetzmann (1999) and Dimson, Marsh, and Staunton (2011).

4.1 Testing the significance of optimism on equity premium

In Table 2 the results from a 2-sample *t*-test are displayed Group 0 is less optimistic than Group 1. The test suggests that optimism has a significant negative impact on the equity premium, as can be seen from the difference in the means in Table 2. Group 1 has a lower mean value for the equity premium than Group 0. An interpretation of this will be that the level of optimism in a country has an effect on the size of the equity premium in that country. As seen in Table 3, the results from the Wilcoxon rank-sum test are similar. This result can therefore be used to support and further strengthen the claim made from the t-test, i.e. that

optimism is negatively and significantly related to the equity premium. It should be noted that the reason for the uneven number between the two groups stems from the fact that there were several countries with the median value of optimism; hence all countries with 0.88 are put in the same group.

Table 2. T-test of optimism on equity premium

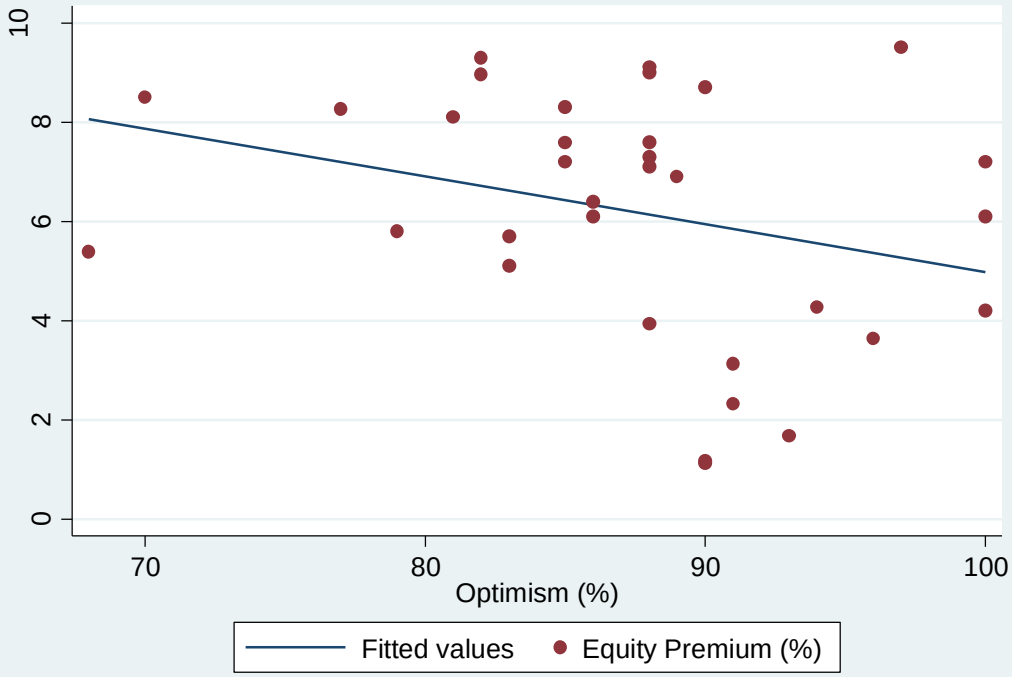
Group	Obs.	Mean
0	20	.0724
1	13	.0461
Diff		.0263
t = 3.95		
Pr(T>t) = 0.002		

Table 3. Wilcoxon rank-sum (Mann-Whitney) test of optimism on equity premium

Optimism dummy	Obs.
0	20
1	13
Median	0.88
Adjusted variance	736.42
z = 2.62	
Prob > z = 0.009	

Below Graph 1 displays the relationship between equity premium and optimism through a single linear regression. This regression has a gradient of -0.096 and even if the spread of the values is relatively large, the result is still significant on a level of 10%, through a p-value of 0.099. This regression suggests that an increase in the population's optimism by 1 percentage point, would give a decrease of 0.096 percentage points in the equity premium in that country. The coefficient reveals the inverse relationship between optimism and equity premium, which can be argued to be consistent with Abel's (2002) model. Abel argues that there is a direct relationship between pessimism and equity premium. Due to the fact that this paper is defining optimism as the opposite of pessimism, the results are in line with the idea that there should be an inverse relationship between the two variables. Lastly, R^2 is found to be 0.085, meaning that this model can explain 8.5% of the variation in equity premia.

Graph 1. The negative relationship between equity premium and optimism



4.2 The multiple linear regression

In order to isolate optimism from other influential factors, a multiple linear regression is used with the results displayed in Table 4. The p-value given for optimism, further suggests that the null hypothesis can be rejected at a 10% significance level. The coefficient of optimism, -0.1, shows the same inverse relationship as was displayed in Graph 1. The R^2 suggests that this model can explain 37.6% of the variation in equity premium, which can be argued to be a high value. If any speculation is to be made, it is most likely that GDP/capita plays a major role in this model, due to its generally big impact on a country's economic and financial situation. A higher GDP/capita is associated with a larger equity premia. Ibbotson and Chen (2002) shows that stock returns and then equity premium is consistent with the overall economic productivity. Subsequently GDP/capita has a positive impact on the equity risk premium which can be seen in the regression in Table 4.

Table 4. Regression for equity premium		
	Coefficient	**Robust Std. Err.**
Optimism	-.1000*	.0493
GDP/Capita	.0495***	.0199
Stockm.cap./Capita	.0075	.0207
Constant	.1314***	.0417

*=significant on 10% level, **=significant on 5% level, ***=significant on 1% level

R-squared = 0.375
Number of observations = 33

As a final step to extend the model, loss aversion for 21 countries is added in Table 5. It provides a smaller sample, but loss aversion could be argued to be a part of human behavior in the same way that optimism does and should therefore be tested as a separate variable to reduce any missing variable bias. . As the results show the coefficient and p-value of optimism were altered after adding loss aversion, but still significant at a level of 10%. Loss aversion proved to be insignificant. The R^2 ended up as 0.33, suggesting that 33% of the variation in equity premium can be explained by this model.

Table 5. Regression for equity premium, including loss aversion		
	Coefficient	**Robust Std. Err.**
Optimism	-.1443*	.0823
GDP/Capita	.0562*	.0276
Stockm.cap./Capita	.0045	.0152
Loss aversion	-.0023	.0140
Constant	.1725**	.0674

*=significant on 10% level, **=significant on 5% level, ***=significant on 1% level

R-squared = 0.331
Number of observations = 21

4.3 Inconsistencies

Since parts of the equity premium in the previous tests were approximated the same tests have been done separately on the real returns given by Jorion & Goetzmann (1999) as well as on the equity premia given by Dimson, Marsh, and Staunton (2011). The purpose has been to

examine if using the original data sets will generate the same result as when using the partially approximated data set

4.3.1 Dataset of Jorion & Goetzmann

When analyzing optimism with the real returns for 33 countries up to the year 1996, it can be seen in Table 6 and Table 7 that the results are consistent with the partially approximated dataset for the equity premium. The mean values in Table 6 show that the less optimistic Group 0, the mean equity premium is higher than the mean equity premium for the more optimistic group 1. Subsequently, this goes in accordance with the hypothesis that higher optimism results in a lower equity premium.

Table 6. T-test of optimism on real returns given by Jorion & Goetzmann

Group	Obs	Mean
0	20	.0117
1	13	-.0121
Diff		.0238
t = 2.79		
Pr(T > t) = 0.009		

Table 7. Wilcoxon rank-sum (Mann-Whitney) test of optimism on real returns given by Jorion & Goetzmann

Optimism dummy	Obs.
0	20
1	13
Median	0.88
Adjusted variance	736.67
z = 2.14	
Prob > z = 0.037	

To this point, optimism seems to have an impact on the equity premium. However, Table 8 doesn't show optimism as a significant variable for the equity premium, thus implicating that there might be a problem with our different datasets. As the results contradict each other, the task of determining whether a result is accurate becomes unreliable. The only significant variable according to the dataset of Jorion & Goetzmann (1999) would be the GDP per capita. However, as a whole this model would account for 33.6% of the variation in real returns according to the R^2. It may seem like a high value, but as previously discussed GDP per capita is often refered to as a good explanatory variable for economic and financial models. No matter if the R^2 is abnormally high or not, it can be concluded that this regression does not support the earlier findings that optmism have an effect on equity premium.

Table 8. Regression for real returns given by Jorion & Goetzmann, both excluding and including loss aversion

	Coefficient	Robust Std. Err.		Coefficient	Robust Std. Err.
Optimism	-.0613	.0491	**Optimism**	-.0582	.0989
GDP/Capita	.0677***	.0152	**GDP/Capita**	.0578*	.0320
Stockm.cap/Capita	.0165	.0143	**Stockm.cap./Capita**	.0181	.0159
			Loss aversion	.0012	.0159
Constant	.0302	.0450	**Constant**	.0315	.0799

*=significant on 10% level, **=significant on 5% level,
***=significant on 1% level

R-squared = 0.551	**R-squared** = 0.338
Number of observations = 33	**Number of observations** = 21

4.3.2 Dataset of Dimson, Marsh, Staunton

The dataset used in this section is a small dataset consisting of data from 19 countries. In one of the tests below, a loss aversion variable will be included which will result in a smaller data set of data from 14 countries. The instability of the dataset used in this section is apparent. The tests of significance of optimism in Table 9 and Table 10 both show that the equity premium in various countries is not affected by their level of optimism. This is inconsistent with both the partially approximated dataset as well as the dataset by Jorion & Goetzmann (1999).

Table 9. T-test of optimism on equity premia given by Dimson, Marsh, and Staunton

Group	Obs.	Mean
0	10	.0705
1	9	.0772
Diff		-.0067
t = -1.13		
Pr(T > t) = 0.27		

Table 10. Wilcoxon rank-sum (Mann-Whitney) test of optimism on equity premia given by Dimson, Marsh, and Staunton

Optimism dummy	Obs.
0	10
1	9
Median	0.86
Adjusted variance	149.74
z = -1.14	
Prob > z = 0.253	

Moving on to the multiple linear regressions in Table 11, the results show large variations depending on whether the loss aversion variable is included or not. Without including loss aversion none of the variables are considered significant. However, when loss aversion is added to the model there is a drastic change. Optimism becomes negatively significant on a 1% level of significance and both GDP per capita and loss aversion are significant on a significance level of 5%. As previously mentioned Ibbotson and Chen (2002) have shown that GDP per capita should have a positive relationship with equity premium, as should loss aversion (Benartzi and Thaler, 1995). Along with that, there are substantial changes in the coefficient before and after adding loss aversion, which reduces the dataset to 14 countries to be analyzed with regards to 4 independent variables. Changes of this magnitude can be argued to be a sign of the sensitivity of a small dataset. Any changes can alter the result drastically. On top of that, including loss aversion leads to the exclusion of 5 observations (a loss of 26.3% of all observations) and this makes the dataset even smaller and more sensitive to the changes brought upon it.

Table 11. Regression for equity premia given by Dimson, Marsh, and Staunton, both excluding and including loss aversion

	Coefficient	**Robust Std. Err.**		**Coefficient**	**Robust Std. Err.**
Optimism	.0150	.0583	**Optimism**	-.0973***	.0131
GDP/Capita	-.0124	.0177	**GDP/Capita**	.0263**	.0097
Stockm.cap/Capita	.0009	.0126	**Stockm.cap/Capita**	.0018	.0104
			Loss aversion	-.0196**	.0062
Constant	.0665**	.0455	**Constant**	.1810***	.0160

*=significant on 10% level, **=significant on 5% level,
***=significant on 1% level

R-squared = 0.025	**R-squared =** 0.5589
Number of observations = 19	**Number of observations =** 14

5. Conclusion

In this section the empirical findings will be summarized and outlined. Furthermore, closing remarks about the methodology and data will be included as well as a discussion about how this study can be extended and improved.

5.1 Final conslusion

According to Abel (1991) pessimism leads to a decrease of the equity premium and that this is a possible explanation to the equity premium puzzle. To the best of our knowledge, no study has been made to examine the effect of optimism on the equity premium. The purpose of this thesis was therefore to examine if optimism affects the equity premium.

Our hypothesis is that optimism has a negative impact on the equity premium.

The results from the study with the main dataset indeed suggested that optimism in a country has a statistically significant negative effect on that country's equity premium, i.e. a more optimistic country would have a lower equity premium than a pessimistic country. This is in line with an idea that can be derived from Abel's (1991) work on pessimism and equity premium, namely that by assuming that optimism is the antonymous concept of pessimism the relationship between optimism and equity premium would be an inverse one.

Although the main dataset has come to this conclusion, there are still doubts regarding whether the findings are reliable. By investigating the two original datasets, statistically insignificant findings emerge. None of the datasets are both large and includes data from recent years and may therefore not be considered very reliable. With datasets such as these, it is vital to have consistency in the findings throughout the different sources of data. Subsequently, the importance of any results made by any of the regressions in this study is likely to be inferior the fact that the different datasets give contradictory results. We therefore conclude that there is no robust relation between optimism and the quity premium.

5.2 Discussion

In terms of the results given from the regressions it is of importance to discuss what might have affected them and the data they are based upon. To begin with, the possible effect of the recent financial crisis on the data should be discussed. It is clear that the world economies and financial markets have changed. Data from before the crisis, starting during the fall 2008, is likely to show a prosperous and booming economy. On the other hand, data from the fall 2008

and onward possibly show a more weak state of economy. However, when discussing what effect the crisis might have had on the results in this study, one needs to be aware of that the crisis only accounts for approximately 3 years, i.e data from 2008 to 2011. These three years must be considered to be only a tiny fraction of the total amount of data used. The dataset from Jorion & Goetzmann (1999) includes data from approximately 70 years while the dataset from Dimson, Marsh, and Staunton (2011) shows data from approximately 110 years. As a result, it can be concluded that the financial crisis most likely has had none or a non-accountable effect on the long-term data of equity premium.

Furthermore, when looking at the different datasets of Jorion & Goetzmann (1999) and Dimson, Marsh, Staunton (2011) the Dimson equity premia are considerably higher than the real returns by Jorion & Goetzmann. It shall be noticed that the higher equity premia accounts for a longer and more recent time period (approx. 1900-2011). Additionally, the calculated world equity premium average used in the main dataset sum up to approximately 6 per cent during the years 1996-2011, i.e the years missing in the Jorion & Goetzmann data set. Consequently, it can be concluded that there are big discrepancies in the datasets which might originate from the difference in time periods. However, a potential reason might also be that the equity premia (or real returns) have been calculated using different methods. For example even if the assumption that real returns for equity markets can be interchangeably used with equity premia is a correct assumption, there might have different ways to obtain the figures. A future study would need to make sure that if different sources of equity premia are used the figures need to be derived in the same manner to avoid such discrepancies.

In addition to this discussion, it should be emphasized that the optimism data used as a variable in the model is from 2011. The implication is that it does not show aggregated data but data from a single period of time, namely 2011, meaning that it explains optimism in different countries around the time of the crisis. These potential effects on the data shall be taken into consideration. It could be argued that measuring optimism during a crisis would show a high number since one could not be worse off than already is the case. Although, others would say that the optimism values during a crisis would be relatively low since people see the worst aspect of things. As a third option, it might be the case that optimism in one country relative to other countries tends to stay stable over time indicating that the index used is reliable no matter of the economic situation. Consequently the dataset of optimism cannot be seen as reliable until this uncertainty has been controlled for, and therefore future studies should put more effort into finding a reliable measure of optimism. Along with this, one direct

improvement that should be considered is to be more careful when defining optimism; hence one should consider the stated assumption that optimism is an antonymous concept of pessimism. If this assumption does not hold, the measure of optimism used in this study should be rejected.

The above discussion has highlighted the issue of finding and using the correct data. The fact that the different regressions give such varying results emphasizes the importance of using reliable data. The data can to some extent be considered reliable, but far from convincingly. On the one hand, the sources of the data are all reliable sources drawn from both prominent researchers and research-based consultancies. On the other hand, the original datasets for equity premia are, as mentioned above, very different from each other. This is posing a problem since it is hard to determine which dataset is the correct one to use. The solution would be to have a larger sample with variables that historically stretches over the same period of time. In addition, any uncertainty in the formation and interpretation of the variables needs to be controlled for.

Another thought that arises from the empirical findings is the fact that loss aversion seems to be statistically insignificant. The authors find this result improbable due to the fact that it is well known that loss aversion is a trait that affects the stock market. For that reason it seems unlikely that the level of loss aversion in a country would have no impact on the equity premium in that country. Instead, it would be wise to acknowledge this result as a hint that the model and/or data require(s) improvement.

It has already been concluded that the collected data should be refined, but whether the model need improvements is also worthy consideration. The R^2 for the various regressions are consistently high, but since the significance of the different variables frequently differs there is reason to doubt whether the model's construction is sufficient. It is difficult to determine how well the current model works when it is undermined by insufficient data, but one improvement that definitely can be made is to include omitted variables that might be in the error term. One possible variable could be risk aversion which theoretically equity premium in the way that loss aversion was predicted to do. It might also be the case that risk aversion has an influence on loss aversion itself, and controlling for that relationship might prove to be wise. However this is just an example, and there might be many other variables that could be used to expand the model further.

Lastly, it would be interesting to examine the relationship between optimism and equity risk premium further through an expanded model built on more reliable data. In addition to Abel's conclusion about the effect of pessimism on the equity risk premium it would be remarkable if a relationship between optimism and equity risk premium could be found, leading to an increased understanding of the underlying factors of the equity premium puzzle.

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