UNIVERSIDAD DE ESPECIALIDADES ESPÍRITU SANTO

FACULTAD DE: ECONOMÍA Y CIENCIAS EMPRESARIALES/ICP

TITULO: THE APPLICATION OF THE FAMA AND FRENCH MODEL IN THE GUAYAQUIL STOCK EXCHANGE

TRABAJO DE TITULACIÓN QUE SE PRESENTA COMO REQUISITA PREVIO A OPTAR EL GRADO DE: INGENIERO EN CIENCIAS EMPRESARIALES.

NOMBRE DEL ESTUDIANTE: MARIO SANMIGUEL

NOMBRE DEL TUTOR: OSCAR BRIONES

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Abstract

Our main focus is to apply the Three Factor Asset Pricing Model of Fama and French in the Ecuadorian Market. The Fama and French model uses size, book to market ratio, and market risk to explain the returns of the stock. We selected fifteen years of monthly stock price data from thirty nine companies of the Guayaquil Stock Exchange we apply the model in order to verify if the three variables of the model can explain the stock returns. We used a time series regression in order to asses our data. Our results show that fourteen out of the thirty nine companies can be explained the model. Also out of the fourteen companies eight companies' stock returns can be explained only by two variables out of the three, five companies' stock returns can only be explained by one variable, and one company can be explained by the three variables of the Fama and French model.

Key Words: Fama and French, Three Asset Pricing model, size

Introduction.

Considering that the capital asset pricing model explains returns of companies, considering the excess return of the market over risk free. This investigation inquires about the expected returns of Ecuadorian companies; asking if additional independent variables such as size and book to market ratio explains the returns.

In this research we tested if the Fama and French Three Factor Model can be applied and worked in the Guayaquil Stock Exchange. Using monthly stock price data of the Guayaquil Stock Exchange.

Literature Review

Before 1969 there is a positive relationship between average stock returns and betas, found in the studies of Black, Jensen and Scholes (1972) and (Fama & MacBeth, Risk, Return and Equilibrium: Empirical Tests, 1973) but this relationship starts to disappear as years go by. Specifically in the period between 1970 and 1990, found by (Reinganum, 1981) and (Lakonishok, 1986). The tests in the research performed by these

authors are not in line with the predictions of the Sharpe-Lindtner-Black model (SLB), which is that average stocks returns are positively related to market betas.

Due to this fading relationship between the average stock returns and the betas of the SLB model the three factor model of Fama and French is built on the premise of three contradictions, which are: size effect, leverage[1], and book value. (Banz, 1980) Studied size effect, which is the first contradiction, and his results indicate that market equity (stock's price time's shares outstanding) can also explain the cross section of averages returns. The average returns on small stocks (low market equity) are too high given their betas estimates, and average returns on large stocks (high market equity) are too low. (Fama F. , The Cross-section of Expected Stock Returns, 1992)

(Bhandari, 1988) Found the second contradiction regarding leverage; there is a positive relation between the latter and average return. His results proved that it is possible that leverage is linked with risk and expected return, but in the previous model of SLB the leverage risk is supposed to be captured by market betas. The research suggest that leverage aids to the explanation of cross section of average stock returns with the inclusion of size (market equity) and beta.

The positive relation of the stock's average return with a firm's book value, and market value found in the research of (Stattman, 1980) and (Rosenberg, 1985) supports the research of Bhandari. Furthermore, the research of (Chan L. H., 1991) found that the specific quotient of book to market equity has a prominent role regarding the elucidation of cross section average returns. In the SLB model the Beta is supposed to capture all of these variables (book to market and size) to explain the returns.

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[1] For Fama and French 1992 leverage is conceived the ratio of book assets to market equity and the ratio of book assets to book equity

The research performed by (Basu, 1983) demonstrate that earning to price ratios, aid to the explanation of average returns. He conducted tests that include size and market beta that led him to that conclusion. Also (Ball, 1978) implies that earnings to price ratio is a proxy for other factors in expected returns. E/P is possibly higher for stocks with greater risks and expected returns. The conclusion of (Ball, 1978) can be applied to the other risk factors -size, leverage and book to market equity- (Fama F. , The Cross-section of Expected Stock Returns, 1992). Those variables are considered as tools to measure stock prices, to obtain relevant data about prices regarding risk and expected returns (Keim, 1983).

Fama and French goal is to evaluate the joint roles of market beta, size, leverage and book to market equity in the cross section of average returns on NYSE, AMEZ and NASDAQ stocks. The data was gathered from those sources between the years of 1962 and 1989. In order to calculate the book to market, leverage and earnings to price ratios, they used the firm's market equity at the end of December of year t_{-1}. Also to calculate the market betas, the authors used the (Fama & MacBeth, Risk, Return and Equilibrium: Empirical Tests, 1973) regression.

The first step was to create ten stock portfolios based on size (market equity) breakpoints. Then these stocks are sorted into ten BE/ME portfolios using the book to market ratios. ME are split into big and small market equity stocks. BE/ME are categorized by low, medium and high stocks. Then the following portfolios are created:

Table 1: six portfolios based on size (market equity), HML (book to market)

	Low	Medium	High
Small	Small/Low	Small/Medium	Small/High
Big	Big/Low	Big/Medium	Big/High

Then Small minus Big (SmB)= 1/3[(S/L)+(S/M)+(S/H)]-

1/3[(B/L)+(B/M)+(B/H)] and High minus Low (HmL)= ½[(S/H)+(B/H)]-

1/2[(S/L)+(B/L)]. Afterwards the calculation of the monthly returns of the portfolios is

done. The results show that the average of the monthly correlations between the cross-

sections of ln (ME) and ln (BE/ME) for individual stocks is -0.26. The negative

correlation is present in the portfolios with firms with low market equity. Suggesting that

these firms are more likely to have poor prospects, resulting in low stock prices and high

book to market equity, while the opposite happens for larger firms. They have stronger

prospects higher stock prices, lower book to market equity and lower average stock

returns. Concluding that if a stock has a positive alpha[2], the stock has a higher expected

return, and consequently a lower price. A lower price implies that the market

capitalization of the stock is lower or a high BtM ratio. Implying the stock has a higher

expected return.

(Fama F. , Common Risks Factors In The Returns of Stocks and Bonds, 1993)

Enhanced their previous study; employing time series (instead of cross sectional) on

common stocks monthly returns, these are regressed over returns of a market portfolio of

stocks, size, book to market equity. The returns analyzed were grouped in: 1) government

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[2] Alpha is any return that isn't due to common variations with the factors, it is therefore the amount by which a portfolio outperformed an index of its exact risk exposure.

bond portfolios in two maturity ranges, 2) corporate bond portfolios in five rating groups and 3) Twenty-five stock portfolios composed based on size and book to market equity. The results indicate that size and book to market factors may explain the differences in average returns across stocks.

Additionally, the Fama and French created a five factor model that utilizes the same three explanatory variables plus value profitability and investment patterns. Value profitability is the difference between the returns on diversified portfolios of stocks with robust and weak profitability, while investment patterns are the difference between the returns on diversified portfolios of the stocks of low and high investment firms (Fama F. , A Five-Factor Asset Pricing Model, 2015).

There are some authors that criticize the Fama and French model. 5According to (Kothari, Shanken, & Sloan, 1995) the Fama and French model is criticized for the use of "surviving and selection" bias, which suggests that companies employed in the research were exclusively well performing. Kothari et al. used a model that considers companies that were underperforming[3], suggesting a "selection and survivorship" bias. Furthermore, under the context of Kothari et al. the book to market value has a weak relationship with the returns. Also, (Black, 1993) research suggests that the results of Fama and French were done by p-hacking. Where the research done by Fama and French did not have any fundamentals to be based on, but rather a trial and error search that resulted in size and book to market value being the factors that were related to the returns. In order to prove the robustness of the Fama and French model, (Malin & Veeraraghavan, 2004) used monthly stocks returns from France, Germany, and the United Kingdom. They formed six portfolios which were regressed against the three factors. The results show a tendency

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[3]Data gathered from the S&P 500 from Datastream Advance 3.5 by Primark International

where growth stocks of the three before mentioned markets; generated higher returns than value stocks. The results in Germany and France show that small stock portfolios generate higher returns than the big stock portfolios. This revealed that results are consistent with the three factor asset pricing model of Fama and French. Also the research of (Sehgal & Balakrishnan, 2013) confirms the robustness of the three factor asset pricing model of Fama and French. The data gathered from the Bombay stock exchange consists of 465 firms between the periods of 1996 to 2010. They collected data for six portfolios, sorting them according to firm size and book value. The results confirm a strong effect of size and book value of the companies in the Bombay stock exchange, concluding that the three factor model of Fama and French can explain the returns on that market (Sehgal & Balakrishnan, 2013)

The three factor asset pricing model of Fama and French is tested in several countries by other authors in order to verify its feasibility outside of the United States. Some of these countries are: Spain, Brazil, Venezuela, Bangladesh, India, China, Sri Lanka, Turkey, Morocco, West Africa (Benin, Burkina Faso, Guinea Bissau, Cote d'Ivoire, Mali, Niger, Senegal, and Togo), and Australia.

(Varga, 2016) Researched the Brazilian market, using size, book-to-market, [4]leverage and [5]earnings-to-price. The information used 332 stocks of the Sao Paulo stock exchange from 1999 to 2015. These stocks were organized into equally weighted portfolios based on their market value of equity, book to market ratio, leverage ratios and earnings to price ratio; the results showed that the book-to-market of the companies explain the variation of the returns, but with a low level of significance. Also, short term

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[4] Leverage is measured as market leverage (A/ME), or book leverage (A/BE)
[5] Earnings-to-price is the relation of net earnings (after interest and taxes) attributable to stockholders divided by the market equity.

returns of stocks for months two to twelve measures the return momentum of individual stocks. Momentum[6] was added as fourth factor; this is obtained by calculating the difference between the month "t" returns on diversified portfolios of the winners and losers of the past year (Carhart, 1997). This variable proved to have some explanatory ability but it does not affect the importance of the other two variables. The correlation of momentum with ln(ME) and ln (BM) is low (Varga, 2016) concludes that the book-to-market and momentum affected the returns, but not as strong as in the research done by Fama and French. The size and market Beta had little to almost no strength affecting the returns.

(González, 2001) Researched the Caracas Stock Exchange from 1992 to 1998 adapting CAPM. (González, 2001) Constructed three portfolios for the research. The first one is a low risk portfolio with an average beta of 0.661 and a standard deviation of 0.134, the second portfolio is medium risk with an average beta of 0.995 and a standard deviation of 0.08, and the last portfolio is high risk with an average beta of 1.366 and a standard deviation of 0.12. The standard deviation of the residuals permits the study of other factors different from beta that could affect the returns of the stocks. The portfolios were built with eight stocks while the research done by (Fama & MacBeth, Risk, Return and Equilibrium: Empirical Tests, 1973) used seventeen stocks and twenty portfolios instead of three. The study of (González, 2001) concludes that risk, in this case the beta, does not have a positive relation with the returns. The CAPM model could not explain the returns in Venezuela, but author infers that there are other factors that affect the returns.

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[6] Momentum is the continuation of its short term returns. Is calculated as the cumulated returns over the past 2 to 12 months. $R.Mom._{i,t-1} = \sum_2^{12} R_{i,t-j}$
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The work of (De Peña, 2010) research in the Spanish market's main objective is to demonstrate that the risk factors used in Fama and French are present in other international markets. Their main focus was not measuring the performance of the Fama and French model, but to prove if the model captures the differences in returns; to that end they replaced size and Btm, using return on assets and return on equity[7] ratios, natural logarithm of sales, return on capital[8], earnings yield[9]. Authors used a sample of 162 non-financial stocks of the Spanish stock market from 1991 to 2004. Building six portfolios considering size and book to market value; the Spanish Treasury bill was used as risk free rate. The results of the research showed that size and book to market value have a positive relationship with the returns. Proving that the factors used in Fama and French in the United States market can be applied to the Spanish market as risk factors. The main difference was that size instead of having a negative relationship with returns had a positive one; concluding that Fama and French model is a good approach for the Spanish stock market.

(Zobaer Hasan, 2014) Tested the three factor model in the Dhaka Stock Exchange in Bangladesh. Research included seventy one companies in the period 2002 to 2011, using monthly stock return data. The three asset pricing model uses: RmT minus Rft (excess market return factor), SMB and HML. This study used the portfolio return as a dependent variable. This factor was calculated with six book to market size portfolios (see table 1), the return is the average of all the returns of the stock in the portfolios. To form the portfolios the stocks were grouped in two types, small and big market equity

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[7] Author defines the ratio as: ROE= EBIT/ Book Value. Because it does not take into account different levels of debt and differences in tax rates
[8] Author defines Return on Capital as: EBIT/ (Net working capital + Net Fixed Assets)
[9] Author defines earnings yield as: EBIT/ Enterprise Value

stocks. The portfolios of small size contains small market value equity below the median, the opposite is true for big size firms. Then the sample is grouped into three portfolios: low btm equity ratio, medium btm equity ratio and high btm equity ratio. The author regressed the excess market returns, size factor and BtM ratio as independent variables using ordinary least squares, the dependent variable is the excess return of stock. The SM and BM portfolios have positive intercepts, the market factor slopes are highly related to stock excess return with a 1% level of significance. The value of Beta is less than one in four of the six portfolios. The slope coefficients for small firms portfolios (SL, SM, SH) are positive while for big firms (BL, BM, BH) is the opposite; this confirms a *small firm effect*. The adjusted "R" square for the model goes from seventy nine percent to ninety seven percent, confirming that the model works with the stock market of Bangladesh.

Further research done by (Taneja, 2010) implementing F and F in the Indian market to predict returns; used 187 companies of the S&P CNX 500 index from 2004 to 2009. Companies were organized into six portfolios considering size and book to market value. The results show that the average returns decreased for small / low (S/L), small / medium (S/M), big / medium (B/M), and big / high (B/H). Size and the returns have a positive relationship, except in low value factor firms. Also, the book to market value has an inverse relationship with returns. Resulting in a high degree of correlation between size and book to market value. This study questions the applicability of the Fama and French model in the Indian market, due to the previously mentioned positive relationship causing negative average monthly returns.

(Xie & Qu, 2016) study the three-factor model in the Chinese using data from the Shanghai Stock Exchange from 2005 to 2012. Size becomes a paramount factor that

differentiates returns on a portfolio of small stocks from returns on a portfolio of large

stocks. The value factor (btm) is calculated using the difference of returns of portfolios of

high and low book-to-market ratios. First, the stocks are classified into five groups based

on their market value, then they are classified into five groups based on their stock

holders book to market ratio; becoming a total of twenty-five stock portfolios. The results

show the monthly returns of the three variables are positive, the monthly standard

deviations are 9.24%, 6.58% and 3.41%. Meaning that the average returns on small

stocks are higher that the big stocks returns. Concluding that the three factor model can

explain the cross-sectional variations of the returns, with an average value for R squared

of 87.36%.

Further research from twelve companies of the Colombo Stock Exchange from

2005 to 2010 in Sri Lanka on the expected return of stocks can be explained by two

factors of Fama and Macbeth (market capitalization and book to market value). This

research suggests that firm size is measured by the total market capitalization, and the

book to market value; dividing book equity by market equity (Shafana, Rimziya, &

Jariya, 2013). The two-hypothesis established in the research were if there is a positive

effect of firm size on returns, and the second hypothesis stated if there is a negative effect

of book to market equity on stock returns. The results show that book-to-market value

has an inverse relationship with returns, while firm size does not affect the expected

return (Shafana, Rimziya, & Jariya, 2013).

Further research done in Istanbul Stock Exchange by (Eraslan, 2013), using 274

stocks from the year 2003 to 2010. Indicates that the three factor model of Fama and

French can explain variations on excess portfolio returns but with a weak relationship

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(Eraslan, 2013). The stocks are placed into two groups, small and big, regarding if the stocks are above or below the median of the market equity. Then this groups are separated into three subgroups based on the bottom thirty percent, middle forty percent and top thirty percent. After diving the data into this three subgroups, six portfolios are created with their intersections. These are Small Low, Small Medium, Small High, Big Low, Big Medium, and Big High. Then the average of the returns of the stocks of the six portfolio is used to calculate the excess return[10]. The statistical evidence shows that the big size and medium size portfolios have a greater impact (in terms of earnings) than small size portfolios. High book to market stock portfolios have higher excess returns than low book to market stock portfolios. Concluding that the Fama and French model has a limited potential to explain the returns of the Istanbul Stock Exchange from 2003 to 2010. (Eraslan, 2013)

Further research of (Aguenaou, 2011) also try to examine the feasibility of the three factor model in the Moroccan stock market. The test subjects are 48 stocks of the Casablanca Stock Exchange from 2005 to 2009, which are ranked based on their market capitalization. Afterwards, they were divided into two groups, fifty percent high book to market ratio stocks and fifty percent low book to market ratio stocks. The study concludes that the findings are partially consistent with the results of Fama and French 1992 study, high book to market ratio stocks outperform low book to market ratio stocks. But size does not show any effect, small market cap stocks do not earn higher returns than big market cap stocks. Concluding that the three factor model does not fully explain the Moroccan stock market as in other countries.

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[10] the individual stock return is the difference between individual stock return of a specific month and the risk free rate of the same month

Research done in Africa by (Soumare, 2013), apply both, CAPM and Fama-French in order to ascertain the returns of the Bourse Regionale des Veleurs Mobilieres(BRVM). Twenty-eight stocks were selected from the BRVM from 2001-2008, the money market rate of the Central Bank of West African States was used as a proxy for risk free. Afterwards, the twenty-eight stocks are arranged into six portfolios, taking into account size and the book to market value. Afterwards, the author creates two groups of portfolios using the median market capitalization. The first group is small market capitalization and the other large market capitalization. Then those two groups are divided into three subgroups, based on the third and seventh deciles of the book to market ratio. This is done in order to get a value portfolio, neutral portfolio and a growth portfolio. Research tested companies using regressions for each stock. These six portfolios are used to build the small minus big factor, while the high minus low is constructed using only four. The results indicate that only eleven out of the twenty-eight stocks can be explained by CAPM, R^2 is 11.32%. While Fama-French explains ten of the twenty-eight stocks, adjusted R^2 of 20.40%. Concluding that both models failed to explain more than 60% of the stocks returns.

There is also evidence from Australia that reject the three factor model. The first research was done by (Philip Gharghori, 2009), using data from the year 1992 to 2005 from the Centre for Research in Finance and data from Aspect Huntley databases the main focus of the research was to identify if the effects of size and book to market exist in the Australian market. The authors proceeded to sort the stocks into six portfolios based on each variable, the next step was to apply the Fama and French regression to them. The results show that two of twelve portfolios have intercepts that are not

statistically significant from zero, concluding that the model fails to explain the returns in the Australian market and that is less than satisfactory in pricing assets in Australia.

Another research conducted in Australia by (Vo, 2015) seeks the strength of the model in Australia and if it can be applied to its market. Data is gathered from Bloomberg from the year 2009 to 2014. Two size portfolios were build based on their market cap and they are organized from smallest to biggest; the first half is considered small and the remaining big. The book to market value is organized by ranking the stocks from lowest to highest in order to build the three book to market portfolios. The first thirty percent are considered low book to market ratio, the next forty percent is considered as medium and the last thirty percent is considered as high. Then the author proceeds to intersect the size and book to market portfolio and create six portfolios (SL, SM, SH, BL, BM, BH), after creating the six portfolios, SMB and HML are calculated. The results show the SMB(size factor) is priced well in Australian context, the HML(value factor) shows a mixed result. The HML is statistically significant, but its estimated coefficients are negative, which does not go along with the Fama and French model. The author concludes that the value factor may be priced in the Australian context using the three factor model, but regarding the size factor is not well priced. The fundamentals expectations of the three factor model of Fama and French are not met. (Vo, 2015)

METHODOLOGY

We based our research in the works of (Fama F. , The Cross-section of Expected Stock Returns, 1992) and (Soumare, 2013). For our study we selected thirty nine companies from the Guayaquil Stock Exchange through the years of 2000 to 2015. The

book value of the companies were obtained through the Super Intendencia de Companias.

The market capitalization of each company was obtained from the Guayaquil Stock

Exchange. As a proxy for risk free we used the Treasury Certificates of Ecuador.

The research uses the model of Fama and French (1992) (equation one)

$$E(R)_i = Rf + Rm - Rf + SMB + HML \text{ (1)}$$

Where:

E(R)i= Expected Return of the company

Rf= Risk Free

Rm-Rf= Excess return of the market

SMB= Size determined by market capitalization

HML= Book value/market value of equity

The thirty nine stocks are classified in each year regarding their market

capitalization and book to market ratio. After they are classified by their market

capitalization, they are ordered from lower to higher. Fifty percent of the sample are

labeled as "Small" the other fifty percent as "Big". Regarding the book to market ratio,

the stocks are also ordered from low to high and they are divided in three parts. The first

one thirty percent, the second one forty percent and the last part thirty percent.

After the stocks are organized the six portfolios are created(table 1) in order to

calculate SMB and HML. SL represents the firms that have a small market capitalization

and a low book to market value. SM is composed of companies with small market capitalization and a medium book to market ratio. SH is formed by firms with a small market capitalization and a high book to market ratio. The other three portfolio are formed the remaining stocks. BL, which is formed by big market capitalization firms and low book to market ratio. BM is made of firms that have a big market capitalization and a medium book to market value, lastly BL are companies with big market capitalization and a large book to market ratio.

After building the six portfolios we calculate the average returns of each year in the portfolios. The following equations are performed afterwards for each year:

$$SmB = \frac{1}{3}(SL + SM + SH) - \frac{1}{3}(BL + BM + BH)$$

$$HmL = \frac{1}{2}(SH + BH) - \frac{1}{2}(SL + BL)$$

The next step is to calculate the excess return of the market is calculated by the variation of the markets returns of the Guayaquil Stock Exchange subtracted by the risk free (treasury certificate). We then proceed to regress each company with these three variables (SmB, HmL, Rm-Rf). We must add that we observed in several companies there is a very sharp increase in prices followed by a period of price stability, such as in the case of Corporacion favorita in the portfolios of BH 2000 BL 2009 BL February and April 2014, BL 2012, BL 2013, Cerveceria Nacional BL 2001, Industrias ales BL 2002, Cristaleria del Ecuador SM 2002, Banco Produbanco BM 2004, Banco Guayaquil BM 2004, continental tire SH 2004, Hotel Colon Internacional SM 2001. We treated these values as outliers and were not considered in the calculation of the regression of the model.

Results

Out of the thirty nine companies, fourteen can be explained by the three factor model of Fama and French: Agrotropical, Banco Produbanco, Banco Guayaquil, Cerro Verde Forestal, Cerveceria Nacional, Conclina, Corporacion Favorita, Holcim, Holding Tonicorp, Hotel Colon Internacional, La Reserva Forestal, La Vanguardia Forestal, Rio Congo Forestal, and San Carlos. Our results are similar to the results of (Soumare, 2013) were eleven out of the twenty eight stocks can be explained by the Fama and French model. Also out of the three variables (SMB, HML, and Rm-Rf) in most of the cases only SMB and HML are capable of explaining the stock returns.

Table #2 shows the results of the regression for each company. The stock of Agrotropical has a level of significance is 0.0026, the p value for the variable SMB is 0.0002, for the variable HML is 0.083 with an inverse relationship. Both variables with low volatility levels, but the variable Rm-Rf is not significant with a p value of 0.9512. Produbanco has a level of significance of 0.10, the SMB and HML variables can explain the returns of this stock with p values of 0.02 and 0.08 respectively. The volatility levels for both variables are low, but in this case the SMB factor has an inverse relationship. Similarly to the results of Agrotropical the Rm-Rf variable has a p value of 0.87 and cannot explain the returns of this stock. Cerro Verde Forestal has a significance level of 0.03, The SMB and HML variables can explain the returns of this company with p values of 0.04 and 0.006. Also with this company Rm-Rf is unable to explain its returns due to its 0.69 p value. The significance level for Cerveceria Nacional is 0.025, The SMB is 0.06 and the HML 0.05, both of them able to explain the returns for this company. The Rm-Rf p value is 0.54, making it again unable to explain a company from the list. Something to notice regarding Cerveceria Nacional is that both, SMB and HML, are negatively related to the stock returns. Conclina has a 0.0004 level of significance and also both of the variables, SMB and HML, can explain the returns for this company with p values of 0.00001 and 0.00009 respectively. The Rm-Rf variable in the other hand has a p value of 0.49. The results for Corporacion Favorita are similar to Cerveceria Nacional, both of the SMB and HML variables can explain the returns and have an inverse relationship. The Rm-Rf has a 0.56 p value making it unable to explain the returns for this stock. Rio Congo presents the same characteristics as the other companies. A level of significance of 0.03, Both of the SMB and HML variables can explain the stock returns.

And the Rm-Rf is unable to do it with a p value of 0.21. San Carlos SMB and HML factors can explains the stock returns but the Rm-Rf factor has a p value of 0.50.

The results for Banco Guayaquil indicate a level of significance of 0.006, the SMB has a value of 0.004. In the case of Banc Guayaquil Rm-Rf and HML have values of 0.22 and 0.44 respectively meaning this two variables cannot explain the returns for this stock. Regarding Holding Tonicorp only HML can explain the companies' stocks return with a p value of 0.029. The other two variables, SMB and Rm-Rf, have p values of 0.34 and 0.54 respectively. Also hotel Colon Internacional presents the case of the precious companies, only the HML variable can explain the returns of the stocks return with a p value of 0.003. The value for SMB is 0.97 and for Rm-Rf 0.15. La Reserva Forestal, similarly, only HML explains the stock returns with a p value of 0.0045. The SMB and Rm-Rf values are 0.52 and 0.99 respectively.

Holcim is the only company from this list that its three variables can explain the returns for this company. SMB has a p value of 0.0006, Hml a p value of 0.003 and Rm-Rf has a p value of 0.008. But we have to add that even if Rm-Rf can explain the returns for this company, its volatility is still high with a value of 0.25. While the volatility for the other variables is 0.0029 and 0.0025.

La Vaguardia Forestal is the only company that stocks returns can be explained by Rm-Rf and not with the other variables. The p value for Rm-Rf is 0.036, for SMB is 0.18 and for HML is 0.26. We must add that the volatility for Rm-Rf is high with a level of 0.17.

Table #2: Results of the regressions for each company

Stock	Intercept	F test	Adjusted R Squared	Rm-Rf	SMB	HML
Agrotropical	-0.006739 [0.007071]	**0.002629	0.066387	0.951233	0.000206	0.083884
Alicosta	-0.000433 [0.00155]	0.380123	0.007789359	0.11112	0.225848	0.73617
Banco Bolivariano	0.984915 [1.3462]	0.775218	-0.01313	0.447245	0.835574	0.677254
Banco Produbanco	-0.002063 [0.006357]	0.105099	0.022716	0.872061	0.020093	0.081625
Banco Pichincha	0.511679 [0.462089]	0.930918	-0.0177	0.55414	0.649514	0.910136

Banco Guayaquil	-0.010487 [0.007378]	*0.006931	0.061404	0.224916	0.004986	0.44774
Banco Solidario	-0.00784 [0.005618]	0.109998	0.023325	0.056044	0.75498	0.111929
Cerro Alto Forestal	0.001067 [0.003639]	0.254924	0.039964	0.919615	0.172483	0.967801
Cerro Verde Forestal	0.006666 [0.003417]	**0.034711	0.064796	0.699665	0.046185	0.006038
Cerveceria Andina	0.001035 [0.002018]	0.691526	-0.0132	0.700371	0.590714	0.567427
Cerveceria Nacional	0.008212 [0.003849]	**0.02513	0.043045	0.547799	0.068888	0.054914
Conclina	0.012037 [0.010748]	***0.000465	0.36062	0.494261	0.000198	9.33E-05
Continental Tire	-0.00021 [0.000961]	0.803701	-0.01396	0.659883	0.761169	0.384546
Corporacion Favorita	-0.02145 [0.020655]	***5.69E-25	0.542571	0.566051	2.33E-09	1.18E-16
Cristaleria del Ecuador	0.000303 [0.002138]	0.705552	-0.0113	0.692634	0.685291	0.330642
El Refugio Forestal	-0.00693 [0.014371]	0.483118	0.038552	0.336149	0.954226	0.418183
El Sendero Forestal	0.008353 [0.004931]	0.142947	0.042966	0.730214	0.268129	0.022914
El Tecal	0.007864 [0.002656]	0.204405	0.015076	0.836205	0.207939	0.043122
Holcim Ecuador	0.006298 [0.00977]	***5.39E-06	0.154229	0.008238	0.000685	0.003328
Holding Tonicorp	-0.00361 [0.003594]	0.102042	0.093619	0.549385	0.340758	0.029006
Hotel colon Internacional	-0.00086 [0.006453]	**0.014841	0.051332	0.157503	0.977321	0.003474
Industrias Ales	-0.00248 [0.00397]	0.788318	-0.01361	0.504285	0.497871	0.489191

Inversancarlos	0.004105 [0.005144]	***3.37E-05	0.142706	0.83398	2.91E-05	0.002736511
La Campiña Forestal	0.009395 [0.002795]	0.922633	-0.03475	0.792633	0.99088	0.57813
La Colina Forestal	0.004892 [0.003068]	0.189514	0.043357	0.646689	0.923039	0.070435
La Cumbre Forestal	-9E-05 [3.73E-06]	0.932304	-0.1198	0.84988	0.975544	0.697841
La Estancia Forestal	0.005625 [0.003529]	0.307248	0.013065	0.548997	0.574388	0.07423
La Reserva Forestal	0.005828 [0.002646]	**0.038874	0.055034	0.990801	0.524236	0.00457
La Sabana Forestal	0.00076 [0.001033]	0.612442	-0.03546	0.54709	0.313166	0.940872
La Vanguardia Forestal	0.002513 [0.003669]	*0.086225	0.229941	0.03625	0.189896	0.265109
Meriza	0.007833 [0.002591]	0.698626	-0.0123	0.852495	0.360969	0.414355
Retratorec	0.000221 [0.000391]	0.644194	-0.04021	0.837733	0.96415	0.305814
Rio Congo Forestal	0.007613 [0.002746]	**0.037046	0.046562	0.213014	0.038259	0.016129
Rio Grande Forestal	-9.7E-05 [1.2E-05]	0.689461	-0.25711	0.462464	0.435635	0.564802
San Carlos	0.005522 [0.005138]	***8.07E-06	0.152229	0.501233	7.17E-07	0.016528
Superdeporte	0.004371 [0.004805]	0.16318	0.043976	0.479007	0.089879	0.807082
Surpapelcorp	-8.8E-05 [4.51E-06]	0.887314	-0.13422	0.949083	0.781927	0.859564

Conclusion

The objective of our study was to test if the Three Asset Pricing Model (Fama F. , The Cross-section of Expected Stock Returns, 1992) can be applied to the Ecuadorian Market. Using the data from the Guayaquil Stock Exchange our results showed that thirty six percent of the company's stock returns could be explained by the model. This gives us a sixty four percent of companies that their stock returns cannot be explained by this model. Also out of the thirty six percent, fifty seven percent of the companies can be explained by two variables of the model, thirty six percent by one of the variable, and seven percent by the three variables of the model. Our results go in hand with the results of (Soumare, 2013) where their research found thirty five percent of the stocks returns could be explained by the model in the Bourse Regioanle des Veleurs Mobileres, the stock exchange of the West African Economic and Monetary Union. We conclude that the model cannot be applied in the Guayaquil Stock Exchange due to the lack of statistical significance in most of the stocks.

We first suggest future studies regarding the application of this model in Ecuador. Due to the lack of data and high volatility regarding the returns of some stocks in our data before 2008. Also building the portfolios differently from our study, using the average market cap in order to separate small market cap with big market cap. As (Vo, 2015) stated in his study that there is no theory regarding the construction of portfolios of the model and the results depend greatly on how the portfolios are organized. Lastly using less portfolios could alter the results, the research done by (Philip Gharghori, 2009) in Australia main difference from other studies was using less portfolios due to the large difference in size between the Australian market and the U.S. market. The main reason for this decision was that the smaller the number of portfolios the larger the number of stocks in each portfolio. If the same amount of portfolios were be applied, each portfolio would have less stocks in their research in comparison with other markets.

Bibliography

Aguenaou, A. (2011). Testing The Fama French Three Factor Model In the Moroccan Stock Market. *International Journal of Business, Accounting, and Finance*, 60-63.

Ball, R. (1978). Anomalies in relationships between securities yields and yield-surrogates. *Journal of Financial Economics*, 103-120.

Banz, R. (1980). The Relationship Between Return And Market Value Of Common Stocks. *Journal of Financial Economics*, 3-18.

Basu, S. (1983). The relationship between earnings yield, market value, and return for NYSE common stocks: Further evidence. *Journal of Financial Economics*, 130-155.

Bhandari, L. C. (1988). Debt/Equity ratio and expected common stock returns: Empirical evidence. *Journal of Finance*, 507-526.

Black. (1993). Beta and Return. *Journal of Portfolio Management*, 8-18.

Carhart, M. (1997). On Persistence in Mutual fund Performance. *Journal of Finance*, 61-63.

Chan, a.-f. C. (1988). An unconditional asset pricing test and the role of frim size as an instrumental variable for risk. *Journal of Finance*, 307-326.

Chan, L. H. (1991). Fundamentals and stock returns in Japan. *Journal of Finance*, 1739-1789.

Daniel, & Titman. (1997). Evidence on the Characteristics of Cross Sectional Variation in Stock Returns. *Journal of Finance*, 1-33.

De Peña, F. L.-E. (2010). Fundamentals and the Origin of Fama-French Factors: The Case of the Spanish Market. *Finance a uver- Czech Journal of Economics and Finance*, 430-443.

Eraslan, V. (2013). Fama and French Three Fator Model: Evidence from Istanbul Stock Exchange. *Business and Economics Research Journal*, 12-22.

Fama. (1996). Multifactor Investing. *Dimensional*, 2-18.

Fama, & MacBeth. (1973). Risk, Return and Equilibrium: Empirical Tests. *Journal of Political Economy*, 607-635.

Fama, F. (1992, June). The Cross-section of Expected Stock Returns. *The Journal Of Finance, XLVII*, 427-445.

Fama, F. (1993). Common Risks Factors In The Returns of Stocks and Bonds. *Journal of Financial Economics*, 4-42.

Fama, F. (2015). A Five-Factor Asset Pricing Model. *Journal of Financial Economics*, 1-22.

González. (2001). CAPM Performance in the Caracas Stock Exchange from 1992 to 1998. *International Review of Financial Analysis*, 334-340.

Hasan, K. (2014). Cross-Sectional Test of the Fama-French Three-Factor Model: Evidence from Bangladesh Stock Market. *Statistics and Operational Research International Conference*, 83-90.

Keim, D. (1983). Size-related anomalies and stock return seasonality. *Journal of Financial Economics*, 13-30.

Kothari, Shanken, & Sloan. (1995). Another Look at the Cross-Section of Expected Stock Returns. *Journal of Finance*, 185-224.

Lakonishok, A. S. (1986). Systematic risk, total risk and size as determinants of stock market returns. *Journal of Banking and Finance*, 114-130.

Malin, M., & Veeraraghavan, M. (2004). On the Robustness of the Fama and French Multifactir Model: Evidence from France, Germany, and the United Kingdom. *International Journal of Business and Economics*, 155-176.

Philip Gharghori, R. L. (2009). Anomalies and stock returns: Australian evidence. *Accounting and Finance*, 555-575.

Ray, B. (1978). Anomalies in relationships beteen securities yields and yield surrogates. *Journal of Financial Economics*, 102-124.

Reinganum, M. (1981). A new empirical perspective on the CAPM. *Journal of Financial and Quantitative Analysis*, 440-460.

Rosenberg, B. R. (1985). Persuasive evidence of market inefficiency. *Journal of Portfolio Management*, 10-17.

Sehgal, S., & Balakrishnan. (2013). Robustness of Fama-French Three Factor Model: Further Evidence for Indian Stock Market. *Vision*, 119-127.

Shafana, Rimziya, & Jariya. (2013). Relationship between Stock Returns and Firm sizem and Book-To-Market Equity: Empirical Evidence from Selected Companies Listed on Milanka Price Index in Colombo Stock Exchange. *Journal of Emerging Trends in Economics and Management Sciences*, 217-223.

Soumare, A. D. (2013). Applying the CAPM and the Fama–French models to the BRVM stock market. *Applied Financial Economics*, 276-284.

Stattman, D. (1980). Book values and stock returns. *The Chicago MBA: Journal of Selected Papers*, 25-45.

Taneja. (2010). Revisiting Fama French Three-Factor Model In Indian Stock Market. *The Journal of Business Perspective*, 270-272.

Varga, B. (2016). The Cross-Section of Expected Stock Returns in Brazil. *Rev. Bras. Finanças (Online)*, 152-178.

Vo, D. H. (2015). Which Factors Are Priced? An Application of the Fama French Three-Factor Model in Australia. *Economic Papers*, 290-301.

Xie, S., & Qu, Q. (2016). The Three-Factor Model and Size and Value Premiums in China's Stock Market. *Emerging Markets Finance & Trade*, 1093-1104.

Zobaer Hasan, A. A. (2014). Cross-Sectional test of the Fama-French Three-Factor Model: Evidence from Bangladesh Stock Market. *Statistic and Operational Research International Conference*, 81-91.

Annex

Table #3: Risk Free, Small minus Big, and High minus Low values.

DATE	RF	SL	SM	SH	BL	BM	BH	SMB	HML

Date								
1/31/2000	0.000540	-0.00054	-0.00054	-0.00054	-0.00054	-0.00054	-0.00054	0.00	0.00
2/29/2000	0.000476	-0.00048	-0.00048	-0.00048	-0.00048	-0.00048	-0.00048	0.00	0.00
3/31/2000	0.000471	10.0587	-0.00047	-0.00047	12.35908	-0.00047	-0.00047	-0.77	-11.21
4/28/2000	0.000453	-0.00045	-0.00045	-0.00045	-0.00045	-0.00045	-0.00045	0.00	0.00
5/31/2000	0.000440	-0.00044	-0.00044	-0.00044	-0.00044	49.99956	-23.2964	-8.90	-11.65
6/30/2000	0.000401	-0.0004	-0.0004	-0.0004	-2.77818	-0.0004	30833.63	-10276.95	15418.21
7/31/2000	0.000381	-0.00038	-0.00038	-0.00038	5.881972	-0.00038	-0.00038	-1.96	-2.94
8/31/2000	0.000399	-0.0004	-0.0004	-0.0004	-0.0004	42.6246	-0.0004	-14.21	0.00
9/29/2000	0.000337	-0.00034	-0.00034	-0.00034	15.78914	4.826202	-0.00034	-6.87	-7.89
10/31/2000	0.000345	-0.00034	-0.00034	-0.00034	-0.00034	-0.00034	-0.00034	0.00	0.00
11/30/2000	0.000359	-0.00036	-0.00036	-0.00036	-0.00036	3.956475	11.36328	-5.11	5.68
12/29/2000	0.000345	-0.00034	-0.00034	-0.00034	-0.00034	-0.00034	-0.00034	0.00	0.00
1/31/2001	0.000345	-0.00034	-0.00034	-0.00034	-2.08368	1.264961	-0.00034	0.27	1.04
2/28/2001	0.000224	-0.00022	-0.00022	-0.00022	1.738907	-0.00022	-0.00022	-0.58	-0.87
3/30/2001	0.000224	-0.00022	1661.666	-0.00022	-25.7355	-0.1362	-0.00022	562.51	12.87
4/30/2001	0.000224	-0.00022	-0.00022	-0.00022	17950	-0.09788	-0.00022	-5983.30	-8975.00
5/31/2001	0.000224	-0.00022	-0.00022	-0.00022	29.65346	-0.80415	-0.00022	-9.62	-14.83
6/29/2001	0.000224	-0.00022	-0.00022	-0.00022	22.222	0.121332	-0.00022	-7.45	-11.11
7/31/2001	0.000224	-0.00022	-0.00022	-0.00022	2.903622	5.793956	-0.00022	-2.90	-1.45
8/31/2001	0.000224	-0.00022	-0.00022	-0.00022	12.50334	-0.00022	-0.00022	-4.17	-6.25
9/28/2001	0.000224	-0.00022	-0.00022	-0.00022	-0.00022	-0.00022	-0.00022	0.00	0.00
10/31/2001	0.000224	-0.00022	-0.00022	-0.00022	31.00401	-0.00022	-20.4548	-3.52	-25.73
11/30/2001	0.000224	-0.00022	-0.00022	-0.00022	-0.00022	2.499776	-0.00022	-0.83	0.00
12/28/2001	0.000224	-0.00022	-17.8574	-0.00022	-0.00022	-0.39548	104.2855	-40.58	52.14
1/31/2002	0.000224	-0.00022	-0.00022	-0.00022	1.428348	-12.4128	2.568612	2.81	0.57
2/28/2002	0.000224	-0.00022	-0.00022	-0.00022	2.013665	-0.83356	1.782853	-0.99	-0.12
3/28/2002	0.000224	-0.00022	-0.00022	-11.5387	1447.871	25.51462	-4.40863	-493.51	-731.91
4/30/2002	0.000348	-0.00035	-0.00035	9.999652	14.42273	-0.00035	-33.6603	9.75	-19.04
5/31/2002	0.000233	-0.00023	3022.222	16.43495	-0.00023	-12.1239	0.714767	1016.69	8.58
6/27/2002	0.000252	-0.00025	-0.00025	-0.00025	-0.00025	0.861817	8.714748	-3.19	4.36
7/31/2002	0.000195	-0.0002	-0.0002	-4.44464	1.544581	-3.33353	-1.00933	-0.55	-3.50
8/30/2002	0.000271	-0.00027	-0.00027	-0.00027	0.672959	-0.00027	-1.66622	0.33	-1.17
9/30/2002	0.000252	-0.00025	-0.00025	-0.00025	6.141052	-0.96179	1.214748	-2.13	-2.46
10/31/2002	0.000289	-0.00029	-0.00029	-4.48747	0.816986	-2.25029	-0.44804	-0.87	-2.88
11/29/2002	0.000138	-0.00014	-0.00014	-0.00014	-2.27524	18.25455	0.714862	-5.56	1.50
12/30/2002	0.000345	2.082989	-0.00034	-3.59738	-2.05514	-13.884	0.299655	4.71	-1.66
1/31/2003	0.000364	-0.00036	-0.00036	4.802346	2.144819	0.567818	0.299636	0.60	1.48
2/28/2003	0.000652	19.89182	-0.00065	2.630927	-2.81811	1.666015	0.299348	7.79	-7.07
3/31/2003	0.000422	-0.00042	-0.00042	-0.00042	5.039563	-0.00042	0.299578	-1.78	-2.37
4/30/2003	0.000195	-0.0002	-0.0002	-0.0002	-8.94485	-6.08353	0.251805	4.93	4.60
5/30/2003	0.000324	1.999676	0.605737	-1.51548	3.029979	-1.13669	0.251676	-0.35	-3.15
6/30/2003	0.000271	-0.00027	-0.00027	-18.2815	0.330417	-18.4642	0.299729	-0.15	-9.16
7/31/2003	0.000249	-13.4618	-0.00025	-0.00025	-2.81149	15.4561	0.299751	-8.80	8.29
8/29/2003	0.000264	5.708238	-0.00026	-4.44166	2.390087	0.750556	0.299736	-0.72	-6.12
9/30/2003	0.000258	-0.00026	-0.00026	-1.80749	-0.86396	-2.11326	0.299742	0.29	-0.32
10/31/2003	0.000219	1.992535	-0.00022	-0.00022	1.749781	-0.07804	0.299781	0.01	-1.72
11/28/2003	0.000271	0.940496	-0.00027	2.499729	0.500171	-2.44472	0.299729	1.69	0.68
12/30/2003	0.000143	-0.00014	-0.00014	-7.143	0.235151	0.657751	0.299857	-2.78	-3.54

1/30/2004	0.000253	-0.00025	-0.00025	-0.00025	-2.56436	-2.7263	12.49975	-2.40	7.53
2/27/2004	0.000266	2.132657	-0.55582	-0.00027	4.69559	2983.529	-7.50027	-993.05	-7.16
3/31/2004	0.000253	3.278435	6.179522	-5.55581	-4.89053	-3.00025	-0.00025	3.93	-1.97
4/30/2004	0.000197	-0.0002	-6.31599	-0.0002	2.37614	-0.67994	-1.8752	-2.05	-2.13
5/31/2004	0.000247	3.845907	1.110864	-0.00025	-1.37008	2.221975	-0.42805	1.51	-1.45
6/30/2004	0.000243	-0.66691	1.351109	6.666424	7.765029	1.004324	4.347584	-1.92	1.96
7/30/2004	0.000229	-0.00023	4.347597	-5.55578	-0.57228	0.869336	3.5712	-1.69	-0.71
8/31/2004	0.000192	-0.00019	-0.00019	724.2422	8.561376	5315.833	-0.00019	-1533.38	357.84
9/30/2004	0.000224	1.190253	2.499776	0.33311	15.28436	16.31205	-1.66689	-8.64	-8.90
10/29/2004	0.000178	-0.00018	-10.5265	-0.33021	-6.14633	0.263171	-10.6946	1.91	-2.44
11/30/2004	0.000127	7.369488	6.714159	-0.00013	0.881021	3.451243	10.97548	-0.41	1.36
12/30/2004	0.000203	3.927	-0.0002	-0.0002	3.743221	0.718029	-0.0002	-0.18	-3.84
1/31/2005	0.000186	-0.00019	-0.00019	-3.57161	0.592855	-2.36382	4.545269	-2.12	0.19
2/28/2005	0.000157	-0.00016	-0.00016	-0.00016	1.084985	6.360757	-8.33349	0.30	-4.71
3/31/2005	0.000157	-0.00016	-0.00016	-0.00016	1.318144	-0.5174	-0.00016	-0.27	-0.66
4/29/2005	0.000233	-0.00023	-0.00023	-0.00023	-5.16044	-1.41616	-7.14309	4.57	-0.99
5/31/2005	0.000186	2.499814	1.666481	33.33315	-0.65257	1.082065	12.49981	8.19	21.99
6/30/2005	0.00028	1.421047	-27.554	-0.00028	0.706468	-6.03036	-0.00028	-6.94	-1.06
7/29/2005	0.000261	-0.00026	-0.00026	-16.6669	2.928231	-7.88114	-2.00026	-3.24	-10.80
8/31/2005	0.000155	-0.00015	11.11096	-0.00015	0.842929	14.69464	8.333178	-4.25	3.75
9/30/2005	0.000233	-0.00023	-0.00023	-0.00023	1.005478	-4.61562	-7.14309	3.58	-4.07
10/31/2005	0.000174	-0.00017	-0.00017	8.333159	1.016086	0.10239	2.083159	1.71	4.70
11/30/2005	0.000186	-0.00019	-0.00019	-0.00019	-0.00019	5.510018	3.333148	-2.95	1.67
12/29/2005	0.000157	12.69826	6.944288	-0.00016	-0.19547	6.999843	0.781093	4.02	-5.86
1/31/2006	0.000159	-0.00016	-0.00016	-0.00016	1.771495	-0.00016	1.025482	-0.93	-0.37
2/24/2006	0.000195	-0.0002	-0.0002	-0.0002	1.479584	2.999805	0.497317	-1.66	-0.49
3/31/2006	0.000195	-0.0002	-0.0002	-0.0002	-0.01581	-11.9507	2.450785	3.17	1.23
4/28/2006	0.000186	-0.00019	1.587116	-0.00019	0.017175	5.7141	-0.45681	-1.23	-0.24
5/31/2006	0.000149	-0.00015	-0.00015	-0.00015	0.676464	19.88874	6.65329	-9.07	2.99
6/30/2006	0.000176	1.249824	-19.3739	-0.00018	1.37229	0.085587	2.110874	-7.23	-0.26
7/31/2006	9.68E-05	-9.7E-05	1.449179	-9.7E-05	-0.79042	-1.92317	1.893843	0.76	1.34
8/31/2006	0.000186	-0.00019	-11.1113	-0.00019	-1.63496	0.38443	0.71666	-3.53	1.18
9/29/2006	0.000158	1.38873	-0.00016	-0.00016	-0.6269	1.526898	0.605902	-0.04	-0.08
10/31/2006	0.000172	-0.00017	3.845982	-0.00017	8.978003	3.182175	-0.00017	-2.77	-4.49
11/30/2006	0.000117	8.736864	-0.00012	-0.00012	2.053455	1.522571	-1.19059	2.12	-5.99
12/28/2006	0.00023	0.178182	8.333103	-0.00023	0.082278	1.782294	-0.00023	2.22	-0.13
1/31/2007	0.00023	-0.00023	-0.00023	-0.00023	1.378072	-3.54192	4.629399	-0.82	1.63
2/28/2007	8.98E-05	-9E-05	-9E-05	-9E-05	0.663749	5.925269	-0.36732	-2.07	-0.52
3/30/2007	0.000233	-0.00023	-0.00023	-0.00023	-3.66263	0.999767	-0.00023	0.89	1.83
4/30/2007	0.000252	-0.00025	1.723886	9.999748	0.448317	-1.19073	-1.19073	4.55	4.18
5/31/2007	0.000252	-0.00025	-0.00025	0.111355	-2.22355	2.352292	-0.00025	-0.01	1.17
6/29/2007	0.000252	-0.00025	-0.00025	-0.00025	-4.48278	-0.00025	-5.21976	3.23	-0.37
7/31/2007	0.000252	-0.00025	-5.00025	-0.00025	-1.11136	-1.33359	2.173661	-1.58	1.64
8/31/2007	0.000233	-0.00023	-0.00023	-0.00023	0.149692	-1.81841	-9.1669	3.61	-4.66
9/28/2007	0.000238	-0.00024	-0.00024	-0.00024	-1.40749	14.57552	2.272489	-5.15	1.84
10/31/2007	0.000238	-0.00024	-0.00024	-0.00024	-2.60858	-0.00024	-2.17415	1.59	0.22
11/30/2007	0.000238	-0.00024	-0.00024	-0.00024	-2.90246	-0.46535	2.272489	0.36	2.59
12/28/2007	0.000238	-0.00024	-0.00024	-3.57167	2.103506	4.913723	-0.00024	-3.53	-2.84

Date									
1/31/2008	0.000238	-0.00024	-0.00024	-0.00024	-0.00024	-0.00024	-0.00024	0.00	0.00
2/29/2008	0.000238	-0.00024	-0.00024	-20.0002	2.51767	0.043622	-0.44667	-7.37	-11.48
3/31/2008	0.000238	-0.00024	-2.35318	-0.00024	1.671154	0.356905	7.314686	-3.90	2.82
4/30/2008	0.000238	0.740503	-0.00024	-0.00024	-4.61672	0.093133	-1.02065	2.09	1.43
5/30/2008	0.000238	4.833096	1.922839	-0.00024	-1.4397	-0.59548	-0.00024	2.93	-1.70
6/30/2008	0.000238	1.960546	-0.00024	-0.00024	0.069531	0.212523	-1.02632	0.90	-1.53
7/31/2008	0.000238	-0.00024	2.380715	-0.00024	39.55954	0.341643	3.418566	-13.65	-18.07
8/29/2008	0.000238	0.7244	-0.00024	-0.00024	-0.52646	-0.57431	-0.08357	0.64	-0.14
9/30/2008	0.000238	0.873125	-0.00024	-0.00024	-15.3428	-3.7088	-0.00024	6.64	7.23
10/31/2008	0.000238	-0.00024	-0.00024	-0.00024	52.71497	6.435406	-2.88485	-18.76	-27.80
11/28/2008	0.000238	0.026078	-2.22246	-0.00024	-5.37727	1.428334	-7.40929	3.05	-1.03
12/30/2008	0.000238	-3.23293	4.761667	5.555318	-19.1903	-1.76559	-18.0127	15.35	4.98
1/30/2009	0.000238	-0.00024	-0.00024	-0.00024	29.72688	-1.63422	1.851614	-9.98	-13.94
2/27/2009	0.000238	-0.00024	-0.00024	-0.00024	16.67072	-3.09661	15.37439	-9.65	-0.65
3/31/2009	0.000238	-1.50024	-0.00024	-0.00024	-22.949	-2.47146	-0.1844	8.03	12.13
4/30/2009	0.000238	1.595507	3.124762	-0.00024	26.83391	3.346281	-6.6669	-6.26	-17.55
5/29/2009	0.000238	-0.26065	-0.00024	-0.00024	-19.5632	2.588339	-5.55579	7.42	7.13
6/30/2009	0.000238	0.925688	-0.00024	-0.00024	30.02987	-2.55161	-0.00024	-8.85	-15.48
7/31/2009	0.000238	-0.00024	-0.00024	-0.00024	-0.23388	-3.38485	3.333096	0.09	1.78
8/31/2009	0.000238	0.026078	1.960546	-0.00024	-4.58957	-0.26124	-10.2528	5.70	-2.84
9/30/2009	0.000238	-3.23293	-0.00024	-0.00024	-0.90136	0.275244	-0.42041	-0.73	1.86
10/30/2009	0.000238	1.785476	6.249762	-0.00024	-15.8772	-0.17808	-1.48172	8.52	6.30
11/30/2009	0.000238	-0.00024	-0.00024	-0.00024	224.2061	0.282248	3.231131	-75.91	-110.49
12/30/2009	0.000238	0.509966	-0.00024	-0.00024	-22.7577	-0.00024	0.184947	7.69	11.22
1/29/2010	0.000238	-0.00024	2.851614	-0.00024	-9.37648	-2.72751	-0.00024	4.99	4.69
2/26/2010	0.000238	-0.00024	-0.00024	-2.85738	30.69105	-0.00024	-0.00024	-11.18	-16.77
3/31/2010	0.000238	-0.00024	2.942523	-0.00024	-11.5946	2.970059	5.29388	2.09	8.44
4/30/2010	0.000238	-0.00024	0.396588	-0.00024	18.48649	-0.00024	-1.85209	-5.41	-10.17
5/31/2010	0.000238	-0.00024	4.384954	2.363399	9.334927	-4.57732	2.479044	-0.16	-2.25
6/30/2010	0.000238	-0.00024	2.417215	-0.00024	-11.1389	3.18158	4.56498	1.94	7.85
7/30/2010	0.000238	-0.00024	-0.00024	8.095	2.412842	-6.84087	-2.46056	4.99	1.61
8/31/2010	0.000238	-0.00024	5.565229	-0.00024	1.203225	4.168277	2.213242	-0.67	0.51
9/30/2010	0.000238	-0.00024	-0.20817	-0.00024	31.47072	-0.3147	-1.68532	-9.89	-16.58
10/29/2010	0.000238	-0.00024	0.1621	-0.00024	-9.11061	0.955318	-0.51748	2.94	4.30
11/30/2010	0.000238	-0.00024	-0.00024	-0.00024	43.33606	0.86494	-2.3578	-13.95	-22.85
12/30/2010	0.000238	-0.00024	-0.00024	-0.00024	-9.84845	-0.92616	1.391889	3.13	5.62
1/31/2011	0.000238	-0.00024	0.52241	-0.00024	16.80533	-1.905	2.423062	-5.60	-7.19
2/28/2011	0.000238	-0.00024	-0.00024	-0.00024	-1.17408	-0.00024	0.509966	0.22	0.84
3/31/2011	0.000238	-0.00024	-0.00024	-0.00024	-1.19966	5.816594	-2.06057	-0.85	-0.43
4/29/2011	0.000238	-0.00024	-0.00024	-5.00024	-2.3818	-7.87163	-5.02289	3.43	-3.82
5/31/2011	0.000238	-0.00024	0.300062	3.999762	-7.09562	5.973029	5.601836	-0.06	8.35
6/30/2011	0.000238	-0.00024	-0.00024	-0.00024	0.11864	7.071722	2.206637	-3.13	1.04
7/29/2011	7.68E-05	-7.7E-05	-7.7E-05	-7.7E-05	-1.8029	2.272651	2.874443	-1.11	2.34
8/31/2011	0.000105	-0.00011	2.036303	-0.00011	1.388784	-2.17402	0.015192	0.94	-0.69
9/30/2011	0.000122	-0.00012	2.2221	-0.00012	13.42954	-8.57155	1.136242	-1.26	-6.15
10/31/2011	0.000122	-0.00012	8.625986	-2.05568	8.346218	0.477934	-2.49098	0.08	-6.45
11/30/2011	0.000122	-0.00012	-0.00012	-0.00012	-7.27053	1.339164	1.562378	1.46	4.42
12/29/2011	0.000128	-0.00013	-0.00013	-1.51528	-0.33663	-0.86969	-0.61482	0.10	-0.90

1/31/2012	9.55E-05	-9.6E-05	6.617896	1.470493	17.09314	5.122672	6.464451	-6.86	-4.58
2/29/2012	0.000116	-0.00012	-4.00327	-2.53008	148.3552	-2.91387	-0.57364	-50.47	-75.73
3/30/2012	0.000123	-0.00012	1.413568	0.373012	-14.2082	-0.72437	5.572268	3.72	10.08
4/30/2012	0.000118	-0.00012	0.370252	1.150777	86.82005	-5.20393	-2.88411	-25.74	-44.28
5/31/2012	0.000124	-0.00012	-0.00012	0.499876	-2.99638	1.615639	4.986152	-1.04	4.24
6/29/2012	0.000124	-0.00012	5.7051	0.73517	8.784883	0.632796	-5.8175	0.95	-6.93
7/31/2012	8.97E-05	-9E-05	-9E-05	-9E-05	5.754212	-0.3174	-1.44024	-1.33	-3.60
8/31/2012	0.000103	-0.0001	-0.82449	-0.0001	-6.73766	-0.43239	-0.99022	2.45	2.87
9/28/2012	0.000103	-0.0001	-0.0001	-0.0001	-4.92083	-1.03761	-2.16215	2.71	1.38
10/31/2012	8.67E-05	-8.7E-05	1.067304	-8.7E-05	-2.74575	1.984439	0.724551	0.37	1.74
11/30/2012	0.000103	-0.0001	1.135467	-0.0001	18.92733	-7.58843	-4.26745	-1.98	-11.60
12/28/2012	0.000103	-0.0001	0.7888	-4.02671	6.719916	1.104605	2.17381	-4.41	-4.29
1/31/2013	0.000103	-0.0001	-0.0001	-0.0001	2.734938	-0.0001	-0.0001	-0.91	-1.37
2/28/2013	0.000129	-0.00013	-0.00013	-0.00013	-1.22737	3.999871	0.244109	-1.01	0.74
3/28/2013	7.96E-05	-8E-05	-8E-05	6.666587	28.58704	-11.5385	3.313499	-4.57	-9.30
4/30/2013	0.000121	-0.00012	-0.69942	-0.00012	-13.3511	-0.00012	-4.38783	5.68	4.48
5/31/2013	9.37E-05	-9.4E-05	-9.4E-05	-9.4E-05	-11.7611	13.04338	0.750389	-0.68	6.26
6/28/2013	0.000101	-0.0001	9.195118	6.666566	101.6235	-0.0001	-0.04976	-28.57	-47.50
7/31/2013	0.000121	-0.00012	-0.00012	-2.7779	-3.45051	-3.84628	-5.00406	3.17	-2.17
8/30/2013	8.86E-05	-8.9E-05	0.208359	9.09082	-2.10814	3.999911	-0.29972	2.57	5.45
9/30/2013	8.86E-05	-8.9E-05	-8.9E-05	-6.66676	33.22303	-8.9E-05	-3.18385	-12.24	-21.54
10/31/2013	9.37E-05	-9.4E-05	-9.4E-05	-9.4E-05	-6.90581	-9.4E-05	1.882347	1.67	4.39
11/29/2013	7.96E-05	-8E-05	-8E-05	-8E-05	-2.08831	2.307613	3.06889	-1.10	2.58
12/30/2013	6.98E-05	-7E-05	-7E-05	-21.2153	-7.85614	-9.77451	2.449855	-2.01	-5.45
1/31/2014	0.000116	4.857027	0.456399	-10.0001	29.49762	16.66655	-1.41974	-16.48	-22.89
2/28/2014	0.000112	0.650929	-0.12589	-0.00011	9.224613	-0.00011	-2.08345	-2.21	-5.98
3/31/2014	9.89E-05	-9.9E-05	0.470859	-9.9E-05	-10.1843	3.57133	2.746217	1.45	6.47
4/30/2014	0.000106	-0.64278	0.088173	-0.00011	110.4294	-0.00011	-1.55786	-36.48	-55.67
5/30/2014	0.000117	-0.00012	0.3573	-0.00012	-7.39857	-4.8277	-0.75744	4.45	3.32
6/30/2014	0.000109	-0.00011	1.203695	-0.00011	31.55063	-2.17402	0.986078	-9.72	-15.28
7/31/2014	7.57E-05	1.822841	58.94473	3.174527	-5.12512	-7.6E-05	-4.82075	24.63	0.83
8/29/2014	8.95E-05	-8.9E-05	-8.9E-05	-8.9E-05	10.89626	-8.9E-05	0.528896	-3.81	-5.18
9/30/2014	9.3E-05	-1.0205	-9.3E-05	-9.3E-05	10.12646	-3.7038	-0.1489	-2.43	-4.63
10/31/2014	9.28E-05	-9.3E-05	-9.3E-05	-9.3E-05	-3.78641	-9.3E-05	-0.78241	1.52	1.50
11/28/2014	7.98E-05	-8E-05	-8E-05	-8E-05	0.327777	-8E-05	-1.97901	0.55	-1.15
12/30/2014	9.9E-05	-9.9E-05	-9.9E-05	-9.9E-05	7.71312	6.153747	0.553916	-4.81	-3.58
1/30/2015	9.55E-05	-9.5E-05	-9.5E-05	-9.5E-05	-2.3145	-7.29054	-2.4075	4.00	-0.05
2/27/2015	7.18E-05	-7.2E-05	-0.13743	-7.2E-05	0.174867	3.703632	0.733519	-1.58	0.28
3/31/2015	9.37E-05	-9.4E-05	0.230321	-9.4E-05	16.86814	0.384522	0.255055	-5.76	-8.31
4/30/2015	6.78E-05	1.041599	0.17	-6.8E-05	-9.20771	-1.58864	0.259841	3.92	4.21
5/29/2015	0.000118	-0.00012	0.04782	-0.00012	5.721636	1.943345	-2.22234	-1.80	-3.97
6/30/2015	7.96E-05	-8E-05	-0.43703	-8E-05	-6.8208	-7.70547	-2.45018	5.51	2.19
7/31/2015	6.98E-05	-7E-05	-7E-05	-7E-05	14.76987	1.99993	-0.37581	-5.46	-7.57
8/31/2015	0.000118	-0.68039	-0.00012	-0.00012	1.779833	-0.00012	-1.05074	-0.47	-1.08
9/30/2015	6.27E-05	0.694382	0.340073	-6.3E-05	-8.41846	-3.84622	-2.56654	5.29	2.58
10/30/2015	8E-05	-8E-05	-0.16242	-8E-05	7.105836	-9.25489	-5.14253	2.38	-6.12
11/30/2015	9.12E-05	-9.1E-05	-9.1E-05	-9.1E-05	-0.74589	4.007729	1.337786	-1.53	1.04
12/30/2015	7.96E-05	-8E-05	-8E-05	-8E-05	-17.3717	-4.25733	-1.38388	7.67	7.99