VOLATILITY MISPRCING IN US EQUITY OPTION MARKETS

by

Max Minwei Lu
B.Comm. in Finance, University of Ottawa, 2008

and

Mehrdad Y. Rastan
B.Sc. in Physics, Simon Fraser University, 1994

PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF FINANCIAL RISK MANAGEMENT

In the
Faculty
of
Business Administration

Financial Risk Management Program

Approval

Name: **Max Minwei Lu and Mehrdad Y. Rastan**

Degree: **Master of Financial Risk Management**

Title of Project: **Volatility Mispricing in US Equity Option Markets.**

Supervisory Committee:

_____

Dr. George Blazenko

Associate Professor
Senior Supervisor

_____

Dr. Andrey Pavlov

Associate Professor
Academic Chair, Master of Financial Risk Management

Second Reader

Date Approved: August 6th, 2009_____

Abstract

Recent research shows that volatility measurement errors are a prime source of mispricing in options markets. This allows investors to engage in trading strategies that earn abnormal rates of return. We conduct empirical research on US non-dividend paying American call options and perform a cross-sectional study of these stock option returns. We find that a zero-cost trading strategy that is long (short) in 2-month-to-expiry calls with relatively large positive (negative) difference between historical realized volatility and option implied volatility produces significant positive returns, but the same strategy applied to 1-month-to-expiry calls and delta-hedged calls does not.

Acknowledgements

Table of Contents

List of Figures

List of Tables

1: Introduction

Empirical evidence of mispricing in equity option markets leads us to believe there are ways to take advantage of these possible market inefficiencies and execute profitable trading strategies. Since the only uncertain variable in option pricing is volatility, and investors have to make an estimate of this parameter based on the market's expectation about future volatility, it is natural to assume that volatility is a prime source of option mispricing.

Goyal and Saretto (2007) show how profitable trading strategies can be formed by identifying errors in volatility measurement which reveal errors in option prices. There are various methods used to measure volatility, but we will focus only on historical realized volatility and implied volatility which is derived from an option's market price.

Historical realized volatility is the ex-post measure but implied volatility is the market's ex-ante expectation about future volatility with respect to the time the option is purchased. Goyal and Saretto, who will be referred to as G&S from here on, propose a way to identify the mispricing of an option is to compare the historical realized volatility of the option's underlying stock to the option's implied volatility. If the difference[1] between the historical realized volatility (HV) and the implied volatility (IV) of an option is relatively[2] highly positive (negative), then this is an indication of an underpriced or cheap (overpriced or expensive) option.

Goyal and Saretto test their hypothesis that large deviations between HV and IV signal mispricing by grouping US equity calls, puts, delta-hedged calls, delta-hedged puts, and straddles into decile portfolios based on this measure of mispricing. Then they form a zero-cost trading strategy which is long (short) the portfolio with relatively large positive (negative) difference between historical realized volatility and option implied volatility. This process is repeated for each of the call, put, delta-hedged call, delta-hedged put, and straddle portfolios every month for the period January 1996 to December 2005. This trading strategy results in statistically significant positive returns for each of the 5 groups.

---

[1] At times in this paper, this difference will be referred to as HV-IV.
[2] "Relatively" refers to a comparison of an option's HV-IV measure with the average of all options' HV-IVs.

The purpose of our research, presented in this paper, is to investigate the relationship between the cross-section of option returns and volatility. We attempt to recreate some of the tests performed by Goyal and Saretto but use data that differs in time range, sample size, and number of firms (underlying stocks). Our option selection criteria and screening processes differ somewhat but this will be discussed in detail in section 3 of this paper.

What is the logic behind the trading strategy we execute? We believe that extreme levels of implied volatility and historical realized volatility will revert back to long run averages, therefore grouping options into deciles by the HV-IV measure will identify mispriced options. Extremely positive HV-IV identifies cheap options and extremely negative HV-IV identifies expensive options, therefore we create a trading strategy by going long positive HV-IV portfolios (decile 10) and short negative HV-IV portfolios (decile 1). We are not concerned with why options are mispriced[3], we just want to verify this method of identifying mispriced options and determine if it is profitable.

The results we obtain for 1-month-to-expiry options differ from G&S's results, hence we expand our investigations to 2-month-to-expiry calls.[4] The rationale for expanding the data set after preliminary results lies in the conjecture that our 1-month-to-expiry options do not experience the expected mean reversion process in this short time period but given a longer time to expiry, this effect might be observable for the longer expiry options.

The remainder of our paper is organized as follows. Section 2 is a literature review. Section 3 discusses the data and methodology. Section 4 presents the main results and provides a discussion of these results. Section 5 discusses possible future research and section 6 concludes.

---

[3] There literature concerning this subject is too vast to cite therefore we list only some examples here. Karpoff (1987) and Long and Officer (2007) investigate the relationship between option mispricing and trading volume. Rubinstein (1985), and Geske and Roll (1984) discuss biases inherent to the B-S OPM as relating to exercise price, time to expiry and volatility. Hamilton and Lin (1996) show that volatility is higher during recessions. Glosten et al. (1993) found a positive relationship between interest rates and volatility. Bollerslev and Jubinski (1999) found a positive relationship between trading volume and volatility.

[4] G&S employ only 1-month-to-expiry options.

2: Literature Review

Although there is vast literature on volatility mispricing and trading of index options such as Figlewski (1989), Coval and Shumway (2001), Emmons and Schmid (2002), Ammann and Herriger (2002), and Jones (2006), the literature on volatility mispricing related to trading individual equity options is very sparse. Goyal and Saretto (2007) and Barry and Taggart (2007) are in a rare group who provide trading strategies that take advantage of individual option mispricings. What does it mean for an option to be mispriced, and how are these mispricings detected? To answer these questions, we must look to option pricing models and the parameters they have in common.

Granger and Poon (2003, 2005) conduct a survey of 93 studies of volatility forecasting methods and categorize these methods (or models) into four types: Historical (realized) volatility, autoregressive conditional heteroscedasticity (ARCH), stochastic volatility and option implied volatility. A common factor that most studies report is that volatility tends to revert back to its long run historical mean. This would imply that volatility forecasts must take this mean-reversion into account if they are to have any predictive power. Granger and Poon conclude that option implied volatility provides more accurate forecasts of future volatility than the other three time series methods. But to which implied volatility are they referring? The Black and Scholes implied volatility (B-S IV)?

A call option's payoff is contingent on unknown future events such as the difference between the underlying stock's price at expiry and the option's strike price. The Black and Scholes (1973) option pricing model (B-S OPM) which uses risk-neutral valuation implies that the average return on the stock is irrelevant and the primary factor in determining an option's price is volatility. Under certain assumptions such as lognormal stock price distribution, normal stock return distribution and constant volatility, a European call option's price, C_E, is given by the following closed form solution:

$$C_E = e^{-\delta\tau}SN(d_1) - Xe^{-r\tau}N(d_2) \qquad\qquad \textbf{(1)}$$

where:
$$d_1 = \frac{\ln\left(\frac{S}{X}\right) + (r - \delta + \left(\frac{1}{2}\right)\sigma^2)\tau}{\sigma\sqrt{\tau}},$$ (1.1)

$$d_2 = d_1 - \sigma\sqrt{\tau},$$ (1.2)

S is the underlying stock price, N is the cumulative standard normal distribution function, δ is the stock's continuously compounded annualized dividend rate, τ is the time to expiry of the option in years, X is the option's exercise price, r is the continuously compounded annualized risk-free interest rate, and σ is the volatility (standard deviation) of the continuously compounded annualized rate of return of the underlying stock. If the dividend rate δ is zero, then equation (1) can also be used to price an American call option and the equation simplifies to:

$$C_A = SN(d_1) - Xe^{-r\tau}N(d_2)$$ **(2)**

and   Call Option Payoff = max $[(S_T - X), 0]$, (2.1)

where S_T is the stock price at the option's expiry.

With the exception of volatility, given that all the above parameters are observable, we can solve for σ. This value, the implied volatility, represents the market's forecast of future volatility of the underlying stock's return over the life of the option. When making a volatility trade, an investor believes that the market's estimate of future volatility is not correct, and σ should be scaled up for an option that is cheap or down for an option that is expensive. Therefore investors can speculate on the option's future price based on their belief of future volatility.

Various trading strategies like buying or shorting calls, puts, delta-hedged calls, delta-gamma-hedged calls, or straddles[5] can be used to speculate on the change of volatility. For example, if an investor believes a call option is overpriced (underpriced), he could sell (buy) the option and simultaneously buy (sell) the underlying stock. For each option sold (purchased), a number of shares of the stock equal to Δ, the first partial derivative of the call's price with

---

[5] A straddle portfolio is composed of a long (short) call and a long (short) put with the same strike price.

respect to the underlying stock price should be purchased (sold). Differentiating equation (1) or (2) with respect to S gives:

$$\Delta = N(d_1) \qquad \textbf{(3)}$$

$N(d_1)$ is also referred to as the hedge ratio. For relatively small changes, this strategy protects the investor against movements in the underlying stock price. If the stock price changes quickly or drastically, the investor might be left inadequately protected because the hedge ratio changes as the stock price changes. For far out-of-the-money (OTM) call options, Δ approaches 0 and for far in–the-money (ITM) call options, Δ approaches 1, but for at-the-money (ATM) options, Δ is close to ½, is very sensitive to small changes in stock price, and can change significantly and quickly. Because a call option's payoff is non-linear, a more conservative and possibly better approach is to create a portfolio that is also gamma-hedged.[6]

Gamma, Γ, is the second partial derivative of the call's price with respect to the underlying stock price and it is given by:

$$\Gamma = \frac{N'(d_1)e^{-\delta\tau}}{S\sigma\sqrt{\tau}}, \qquad \textbf{(4)}$$

where:
$$N'(d_1) \;=\; \frac{e^{-(d_1)^2/2}}{2\pi} \qquad (4.1)$$

If the B-S IV is used to forecast future volatility, and this method is correct, then it should render the same volatility measure for different strike prices, same time to expiry and same underlying. But this is usually not true and IV tends to change as strike price changes causing volatility skews, or non-linearities in volatility curves which are sometimes referred to as volatility smirks, sneers or smiles. The most popular approach to modeling this volatility skew is by using stochastic volatility models that allow for negative correlation between stock return and the return's variance. Hull and White (1988) produce a numerical solution for pricing a European call option with stochastic volatility. Heston (1993) derives a similar model but with a closed form solution. Christofferson et al. (2009) present a multifactor stochastic volatility model that outperforms the previous two models but it is difficult to implement. So why is the B-S OPM

---

[6] For more information on how to create delta-gamma-hedged portfolios see Barry and Taggart (2007).

still prevalent in the markets as a benchmark for implied volatility? The bulk of options trades involves ATM[7] options due to high liquidity, therefore implied volatility based on ATM options contains the greatest information about future volatility as evidenced by Christensen and Prabhala (1998) and Ederington and Guan (2005). As Heston (1993) states, the B-S OPM produces results that are virtually identical to the stochastic volatility models for ATM options. So if certain criteria are chosen carefully, there is no need to use a more sophisticated model than the robust, tractable and easy to use B-S OPM. What if the option is not European? Can the BS-OPM still be used to price and option and derive the implied volatility or the hedge ratio?

An American option may be exercised early if optimality conditions are met therefore the B-S OPM is not appropriate for pricing. Cox et al. (1979) develop a numerical method which not only solves the pricing problem, but it can generate values for implied volatility and delta as well. For a non-dividend paying American call option though, it is never optimal to exercise early hence the B-S OPM and equation (2) can be used to price the option or evaluate the implied volatility given the market's call price.

---

[7] In this report, a call option is recognized as at-the-money when stock price is 5% above or below the present value of the strike price of the option.

3: Data and Methodology

From Bloomberg, we obtain a list of all non-dividend paying firms[8] that were listed on the NYSE or NASDAQ from January 1998 to June 2008 and the resulting set contains 573 firms. We sort the companies by market capitalization and reduce the data set to the largest 220 firms whose market caps are above $990M. This list is imported to Excel and also saved as a text file.

We obtain data for options from the OptionMetrics Ivy DB database using the "Option Prices" menu.[9] The text file containing only 220 company tickers is uploaded to OptionMetrics, the "Days to Expiration"[10] fields are set to = 26 AND = 54, and data for equity American calls is downloaded. Data includes Option Symbol, First Day Traded, Last Day Traded, Best Bid, Best Ask, Security ID, CUSIP, Ticker, Implied Volatility, and Delta.[11] Initially we only downloaded 1-month-to-expiry options (26-day options). Options expire the Saturday immediately after the third Friday of each month, therefore we chose 26 day options which start trading the Monday following expiration Saturday. If Monday is a non-trading day, our data set will be missing the option for that month. We later expand our data set by adding 2-month-to-expiry options (54-day options).

We obtain data for stock returns from the OptionMetrics Ivy DB database using the "Security Prices" menu. We follow a similar procedure as above and obtain the daily price history for our 220 firms. Data includes CUSIP, Ticker, Bid/Low, Ask/High, Close Price, Return, Cum. Adjustment Factor (for stock splits and consolidations).

We obtain data for historical volatility from the OptionMetrics Ivy DB database using the "Historical Volatility" menu. Once again the list of 220 firms' tickers is uploaded and the "Days

---

[8] The Bloomberg screening tool used was set to Dividend Yield = 0
[9] Access to OptionMetrics was obtained through the WRDS web site: http://wrds.wharton.upenn.edu/
[10] For explanations of these fields, refer to Ivy DB's OptionMetrics Manual located at the web site: http://wrds.wharton.upenn.edu/ds/optionm/manuals/IvyDBReference.pdf
[11] Deltas and implied volatilities for American options are calculated using a proprietary algorithm that is based on the Cox-Ross-Rubinstein (1979) binomial tree model.

of this Realized Volatility" fields are set to = 365 OR = 730.[12] 365 and 730 correspond to 1-year and 2-year historical realized volatilities respectively.

We obtain data for the risk-free rate from Bloomberg using the "IND1" function and "G0B1" option. We download the 0-3-month T-bill daily annualized yields for the period Jan 3, 2000 to June 30, 2008. When compared to the CRSP Daily Treasuries data that contain two significant digits for each data point, we find Bloomberg data to be more precise, as each daily data point contains 4 significant digits.

Although OptionMetrics is the best option prices database that is publicly available, as Battalio and Schultz (2006) point out, "closing option quotes and closing stock prices obtained from the OptionMetrics database do not represent contemporaneous prices at which investors could have simultaneously traded", therefore Battalio and Schultz use NYSE's TAQ database to get more accurate data. We detect certain errors when checking the data provided by OptionMetrics. We take great care in discarding misleading, incorrect or incomplete data and information. If data match any of the following criteria, we delete the entire company data set from our final raw data set: The stock did not trade continuously between Jan 1, 1998 to June 30, 2008, continuous historical volatility data does not exists for the stock from Jan 1, 1998 to June 30, 2008, and different options whose Security IDs don't match, but their underlying stock is the same. After this screening process, we are left with data for 139 firms.

We then load the data into MATLAB by executing the file "Data_Gen.m" which converts data from various Excel files to one .mat MATLAB file. Each column of each Excel sheet is imported into MATLAB as an independent column vector. We then apply a series of data filters using the MATLAB file "Data_Process.m" to organize the data, eliminate errors and incomplete data sets, and convert some data into more useful formats.

The first data screening process includes the following procedures. The closing stock price is converted to the absolute value of stock price since some data has been erroneously recorded by OptionMetrics with negative values. All dates are converted from string to serial number format. One month options (time-to-expiry = 26 days) are separated from 2 month

---

[12] Historical volatility is calculated using a standard deviation (SD) calculation on the logarithm of the close-to-close daily total return and then annualized by multiplying the SD value by the square root of 252 (trading days in a year).

options (time-to-expiry = 26 + 28 = 54 days) and treated as independent vectors. If the best bid = 0, then the option is deleted. If the quoted date is not equal to the last day traded, then the option is deleted to eliminate stale quotes. If the best bid is greater than the best ask, the option is deleted. If the spread is less than .05 for best asks less than $3, or when the spread is less than .10 for best asks greater than $3, delete option because bid-ask spreads are mis-quoted.

Option data is then matched to its underlying stock price for each date by Security ID. If a match cannot be found, the option is deleted. This process is executed independently for 1-month-to-expiry and 2-month-to-expiry options. The same process is repeated to match options to the corresponding risk-free rate. The process is repeated again but option data is matched with 1-yr and 2-yr historical volatility. If either the 1-yr or 2-yr volatilities are not matched,[13] the option is deleted.

Before executing the next screen, the following calculations are performed. Call option price = (Best Bid + Best Ask)/2, therefore the midpoint of the bid-ask spread is set to be the call price.[14] In the risk-neutral environment, the forward price of the stock is $F = Se^{r\tau}$, where S is the stock price, r is the risk-free interest rate, and τ is the time to expiry. The strike price, X, of each option is rescaled by dividing by 1000 because OptionMetrics provides the value of 1000X for each option.

The second data screening process is then executed and it includes the following procedures. If the call option price falls outside the no-arbitrage interval $(S - Xe^{-r\tau}, S)$, the option is deleted. Only ATM options are desired, therefore if the following condition is not met, .95 < X/F < 1.05, the option is deleted.[15]

Returns are calculated for all options and underlying stocks then matched by option issue date, expiry date and Security ID. All returns are reported as a holding period rate of return (HPRR). The payoff for the call is calculated as in equation (2.1) by using the closing price of the stock on the corresponding Friday before the option's Saturday expiry, but if that Friday is

---

[13] For some options, the 1-yr, the 2-yr or both historical volatility values are missing from the OptionMetrics data set despite the stock trading continuously for at least 2 years before the date the option is issued.

[14] It might not be possible to buy or sell an option at this bid-ask average value and this would affect the option's final return, but for now we assume that this is the price of the option.

[15] The options that fall within the boundary conditions could be considered near-the-money but we assume this interval is small enough to consider these options ATM.

not a trading day, the Thursday (day before) closing price of the stock is used instead. The call's return is calculated using the following formula:

$$HPRR_C = \max[(S - X), 0]/C - 1 \qquad \textbf{(5)}$$

For some options, the delta or implied volatility values are missing. Also B-S OPM gives more accurate values for these measures than the method OptionMetrics uses. Therefore, we calculate the delta and implied volatility values for all options using equations (2) and (3). We perform these calculations by using MATLAB functions "blsdelta" and "blsimpv".

Initially, we started with 266,887 call options but after all sorting and filtering of data, we are left with 9280 1-month call options and 7386 2-month call options. We construct portfolios of call options, stocks and delta-hedged calls by ranking them, then placing them in deciles for each of the 102 months of the investment horizon, Jan 2000 to June 2008. The ranking is done by evaluating the log difference[16] between historical realized volatility and implied volatility for all options in each month. Deciles, over the aggregate period of 102 months, have equal number of options but in each month, the deciles do not necessarily have the same number of options. Options with the lowest (negative) HV-IV difference are placed in decile one, while the options with the highest (positive) HV-IV difference are placed in decile ten. This ranking is done four times, once each for 1-month-to-expiry options with 1-yr HV, 1-month-to-expiry options with 2-yr HV, 2-month-to-expiry options with 1-yr HV, and 2-month-to-expiry options with 2-yr HV. To report the results, we compute the time series averages of HV, IV, C/S, and delta, over 102 months for each decile. The results are reported in tables in the appendix. The HV-IV values reported in the tables are not average values, but they are the difference between average HV and average IV for each decile. Returns for calls, stocks, and delta-hedged calls are calculated using the same time series averaging as above. The results of mean returns, t-stats, standard deviation of return, minimum return, maximum return, and Sharpe Ratio for each decile are reported in the tables.

Delta hedged call portfolios are formed by purchasing one call and shorting ΔS stocks for each call option in each decile. This process creates value weighted (value of call option) portfolios in each decile. The return of each delta-hedged-call portfolio is calculated as:

---

[16] Log difference is computed as lnHV– lnIV or ln(HV/IV).

$$\text{HPRR}_{\Delta HC} = [\max[(X-S_T), 0] - C + \Delta S_0 - \Delta S_T] / (C - \Delta S_0) \qquad \textbf{(6)}$$

Sharpe Ratios (for the holding period) are calculated using the following formula:

$$\text{Sharpe Ratio} = \frac{\text{Return} - R_f}{\sqrt{\text{var}(\text{Return} - R_f)}} \qquad \textbf{(7)}$$

where Return is the HPRR for the asset, R_f is the risk-free interest rate for the holding period, and var is the variance.

Results are reported for the long-short strategy in Table 4, 5, 6, and 7 in columns labeled 10-1. The strategy involves purchasing the 10th decile portfolio and shorting the 1st decile portfolio each month. Reported results are the time series average returns for the 102 month investment horizon. The investment is "zero-investment" because only the proceeds received from shorting the decile 1 portfolio are used to purchase the decile 10 portfolio.

For delta-hedged-call portfolios the strategy is a little more complex, as shorting the decile 1 portfolio results in receiving C_{D1} from the short calls and paying ΔS_{D1} for the long stocks. The strategy is still zero-investment because purchasing the decile 10 portfolio results in paying C_{D10} for the long calls and receiving ΔS_{D10} for the short stocks, hence:

$$\text{proceeds received, } \Delta S_{D10} + C_{D1} = \Delta S_{D1} + C_{D10} \text{ , proceeds paid} \qquad \textbf{(8)}$$

$$C_{D1} = \sum_{i=1}^{n} C_i \ , \qquad C_{D10} = \sum_{j=1}^{m} C_j \ , \qquad (8.1)$$

$$S_{D1} = \sum_{i=1}^{n} S_i \ , \qquad S_{D10} = \sum_{j=1}^{n} S_j \ , \qquad (8.2)$$

where n is the number of call options in decile 1 and m is the number of call options in decile 10 for one month. Each month, n and m values are not necessarily the same. There are months when $n = 0$ or $m = 0$. For months when this condition is true, no trades are executed. This condition applies to all trading strategies including call options and stocks.

4: Results and Discussion

Since the only uncertain variable in option pricing is volatility, and investors have to make an estimate of this parameter based on the market's expectation about future volatility, it is natural to assume that volatility is a prime source of option mispricing. We construct portfolios of call options, stocks and delta-hedged calls by ranking them, then placing them in deciles for each of the 102 months of the investment horizon, Jan 2000 to June 2008. The ranking is done by evaluating the log difference between historical realized volatility and implied volatility for all options in each month. Decile 10 contains options with the highest HV-IV difference (positive) therefore they are considered cheap, and decile 1 contains the options with the lowest HV-IV difference (negative) therefore they are considered expensive.

Summary statistics are given for IV and HV in Table 2. To obtain values for average HV and IV, we compute the time-series average for each decile, then calculate the cross-sectional average of these averages. The mean value of IV for 1-month-to-expiry call options is .450 and for 2-month-to-expiry call options is .462. 1-yr and 2-yr HV values vary between .463 to .494. All the volatility values are very close to each other but their distributions differ as displayed in Figures 2 to 7. HV standard deviations are greater than IV standard deviations.

Table 3 shows HV, IV, C/S (call prices scaled by stock price) and delta statistics for each decile and each option type.[17] HV is monotonically increasing from decile 1 to decile 10 and IV is generally decreasing from decile 1 to decile 10 with the exception of 1-month-to-expiry with 1-yr HV. Even though there is no distinct trend in this specific case, the IV values remain in a tight band between .435 to .490. Another indication that decile 1 contains expensive options and decile 10 contains cheap options, is the scaled call price, C/S, which is generally decreasing from decile 1 to decile 10.

Holding period rates of return on equally weighted portfolios of call options, stocks, and delta-hedged calls are computed for each decile and each month. The time series average for

---

[17] The option types are: 1-month-to-expiry options with 1-yr HV, 1-month-to-expiry options with 2-yr HV, 2-month-to-expiry options with 1-yr HV, and 2-month-to-expiry options with 2-yr HV.

each decile is reported in Table 4, 5, 6, and 7. For 1-month-to-expiry call options, Table 4 and 5, call returns are opposite to what we expect and opposite to the results obtained by Goyal and Saretto. Returns are generally decreasing from decile 1 to decile 10. We cannot form a logical long-short trading strategy based on our results. Stock returns also exhibit the same general pattern of decreasing from decile 1 to 10. This is in violation of the Black-Scholes model as cross-sectional stock returns should be constant. G&S identify the same pattern but offer no explanation for their results. We propose a possible explanation for these results.

A Firm's equity and debt have option-like features and with certain assumptions, Merton (1973) shows how a firm's equity can be regarded as a call option on the firm's assets. Under these assumptions, Galai and Masulis (1975) show as a result of leverage reduction, as volatility increases, expected return on a call option decreases. This could explain why our 1-month-to-expiry option and stock returns decrease as our volatility measure, HV, increases. We need more evidence to lend validity to our conjecture. For future research we would develop an objective volatility measure and a benchmark long-run average against which option volatility would be compared. We would track these volatility changes and empirically test the Galai and Masulis theory to determine if there is an inverse non-linear relationship between option return and volatility. Based on current results, we can form a profitable trading strategy for stocks by longing decile 1 portfolios and shorting decile 10 portfolios. As shown in Table 4 and 5, this strategy renders 2.4% and 2.1% 26-day average returns for 1-month-to-expiry with 1-yr HV, and 1-month-to-expiry with 2-yr HV respectively.

The results for delta-hedged-call returns are opposite to G&S results. The 26-day average return on a long-short strategy (long decile 10 and short decile 1) is -1.7%, whereas G&S report an average monthly return of 2.3%. This could be due to the differences between data sets. We use option data from January 2000 to June 2008, but G&S use data from January 1996 to December 2005. We use call options of non-dividend paying, large cap, US firms listed on NYSE and NASDAQ, but G&S use options of all US firms. There are 139 firms (stocks) in our sample but 3885 firms in G&S's. Our data filters are not identical to the ones used by G&S and we suspect our screening process is more conservative. We place more screening criteria on our initial data set than what G&S disclose in their paper. As shown in Table 1, a disproportionate number, 51 firms or 37% of total, of our sample firms are Technology firms. We create an

equally weighted index of our 139 US large-cap, non-dividend paying firms, and plot the daily return of this index for the period January 2000 to June 2008 (see Figure 1). The annualized return of the index is -14.4% with an annualized volatility of 32.6%. For the same period, the annualized return of the S&P 500 index is -1.6% with an annualized volatility of 17.9%. Technology sector stock returns are lower than other sector stock returns for the period January 2000 to December 2002 due to the Dot-com Bubble decline. For future research, we would remove Technology firms from our data set and run the tests again to determine if our strategy produces the same results. We would also split the time horizon into two sub-periods, 2000 to 2002 (down market) and 2003 to 2008 (up market) to determine if results are significantly different.

For 2-month stock returns and delta-hedged-call returns we obtain similar results as 1-month-to-expiry options. As shown in Table 6 and 7, returns decline from decile 1 to 10. For 2-month-to-expiry call option returns we get the same results as G&S but opposite to our results for 1-month-to-expiry options. Call returns increase from deciles 1 to 10. How do we explain these results that seem to conflict? We investigate by dividing the 2-month-to-expiry period into two 1-month sub-periods. Results are displayed in Table 8 and 9. Comparing the initial HV-IV difference of Table 8, Panel A, to the interim HV-IV difference of Table 8, Panel B, we observe that decile 1 increases from -.158 to -.112 and decile 10 decreases from .221 to .178. Panel C and D show similar results as decile 1 increases from -.162 to -.137 and decile 10 decreases from .259 to .222. This could be due to mean reversion. Results in Table 9 and 10 show a reversal of trend from decile 1 to 10 as mean call returns go from decreasing in the first month (Panel A and D) to increasing in the second month (Panel B and E). Table 9, Panel A and D results are consistent with Table 4, Panel A results, where the long-short strategy produces negative results. The strategy results in significant and highly positive returns for 2-month-to-expiry call options though. Table 6 and 7 show 54-day holding period mean returns of 13.6% and 23.6% respectively. Using 2-yr historical volatility is more profitable than 1-yr historical which may signal that this is a better measure of long-run mean volatility.[18]

Stein (1989) discusses how with respect to longer term options, investors overreact relative to shorter term options because they place too much emphasis on short-term option

---

[18] For a discussion on measuring historical volatility see Ederington (2007).

implied volatilities and too little emphasis on historical volatility. Short-term option volatilities are influenced by current information, but will not persist in the long run. This leads to investors forming volatility expectations for longer term options irrationally. To confirm this claim that the long-short strategy is not suitable for short expiry options (1-month expiry or less) and show that our strategy is valid for long-term options (2-month-to-expiry and greater) we need to perform additional test on options with longer time to expiry, such as 3-month-to-expiry and 6-month-to-expiry options.

5: Future Research

Due to OptionMetric's lack of user interface database filters and sorting criteria, it is difficult to obtain desired data. Hence we initially reduced our data set to allow for timely completion of our investigations. Regardless of these constraints, after investigating the relationship between US equity options returns and volatility, we believe markets underestimate the underlying stock's mean reversion stochastic volatility parameter which leads to profitable investment opportunities. Given the opportunity to conduct further research on this subject to provide evidence for our conjectures, we would expand our data set and perform additional tests.

We would like to obtain data for longer expiry options (i.e. 3-month-to-expiry, 6-month-to-expiry) to investigate if HV-IV spreads continue to narrow for extreme decile portfolios. Also by obtaining historical and future (with respect to option trade date) HV and IV values, we could track HV and IV month-by-month trends to confirm mean-reversion of volatility measures.

We would like to determine if there are significant differences in our results if we look at data for periods when market returns are increasing and positive on average, or decreasing and negative on average. This would also be done for periods of increasing VIX or decreasing VIX to determine if there is a relationship between our trading strategy returns and market volatility.

In addition to the long-short delta-hedged-call trading strategy, we would like to further expand our research into strategies involving delta-gamma-hedged portfolios and straddle portfolio by taking advantage of the relationship between HV-IV on both call and put options. We suspect these strategies will be less risky, yet more profitable.

Since our selection of zero-dividend yield companies places disproportionate emphasis on large market-cap technology companies, we would like to investigate options of small cap, mid-cap or all firms including dividend paying firms, to test whether the strategy would still generate positive returns. If firm characteristics contribute to discrepancies between our research and Goyal and Saretto's, this might be evidence that G&S's results are not as robust as stated in their 2007 paper.

Lastly, we would like to account for transaction costs, bid-ask spreads and cost of holding margin in the portfolio return calculations. We are interested in identifying profitable trading strategies based on volatility mispricing, but if these trading strategies cannot be executed in practice with real profits, then our exercise is just theoretical and of no use to the investment world. Trading strategies that remain significantly profitable despite trading costs and other frictions could possibly provide evidence for the inefficiency of capital markets and that itself would warrant further research.

6: Conclusion

The objective of our paper is to investigate and verify the existence of a significant spread in the cross-section of U.S. non-dividend paying equity call options based on their HV-IV difference and to form a profitable trading strategy to take advantage of this mispricing signal. We have shown that this spread exists for 2-month-to-expiry call options but what causes this spread? How do we explain why the same pattern is not observed for 1-month-to-expiry call options? We believe that investors underestimate the underlying stock's mean reversion stochastic volatility parameter. They ignore the long run mean reversion of historical realized volatility and of option implied volatility and place greater emphasis on the current estimation of implied volatility. Stein (1989) provides evidence that investors form volatility expectations for longer term options irrationally, hence one month might be too short for mean reversion to take effect but after two months, these effects are observed in the form of a narrowing of the HV-IV spread.

To lend credence to these claims, we need to perform additional rigorous tests but this is left to future research. We would like to extend this research by performing tests on longer expiry options to see if the HV-IV spread continues to narrow for extreme decile portfolios. We would like to perform the same tests but for different time periods, for example times of high or low market volatility and positive (increasing) or negative (decreasing) market returns. We would also like to obtain results for various sectors or industry groups to establish if the difference in data constituents may be a cause of discrepancies between Goyal and Saretto's results and ours.

Regardless of some discrepancies between G&S and our results, under certain conditions, we observe results consistent with Whaley (1992) that volatility changes may be predictable and find evidence to support that on average, significant positive returns can be obtained by executing trades based on mis-estimation of US equity options volatility.

Reference List

Ammann, Manuel and Herriger, Silvan, 2002, Relative Implied-Volatility Arbitrage with Index Options, *Financial Analysts Journal* 58, issue 6, 42-55.

Barry, Michael J. and Taggart, Robert A., 2007, Hedging Strategies for Exploiting Mispriced Options Using the Black-Scholes Model with Excel, *Journal of Applied Finance* 17, issue 2, 5-12.

Battalio, Robert and Schultz, Paul, 2006, Options and the Bubble, *Journal of Finance* 61, issue 5, 2071-2102.

Black, Fischer and Scholes, Myron, 1973, The Pricing of Options and Corporate Liabilities, *Journal of Political Economy* 81, issue 3, 637.

Bollerslev, Tim, and Jubinski, D., 1999, Equity Trading Volume and Volatility: Latent Information Arrivals and Common Long-Run Dependencies, *Journal of Business and Economic Statistics* 17, no. 1, 9-21.

Canina, L and Figlewski, 1993, The Informational Content of Implied Volatility, *S. Review of Financial Studies* 6, issue 3, 659.

Christensen, B.J. and Prabhala, N.R., 1998, The Relation Between Implied and Realized Volatility, *Journal of Financial Economics* 50, issue 2, 125-150.

Christoffersen, P., Heston, S. and Jacobs, K., 2009, The Shape and Term Structure of the Index Option Smirk: Why Multifactor Stochastic Volatility Models Work so Well, Working Papers - Financial Institutions Center at The Wharton School, special section, 1-7.

Cox, John C., Ross, Stephen A. and Rubinstein, Mark, 1979, Option Pricing: A Simplified Approach, *Journal of Financial Economics* 7, issue 3, 229-263.

Ederington, Louis and Guan, Wei, 2005, The information Frown in Option Prices, *Journal of Banking & Finance* 29, issue 6, 1429-1457.

Ederington, Louis and Guan, Wei, 2007, Measuring Historical Volatility, *CFA Digest* 37, issue 1, 30-31.

Emmons, William R. and Schmid, Frank, 2002, Asset Mispricing, Arbitrage, and Volatility, Federal Reserve Bank of St Louis, Review 84, issue 6, 19.

Figlewski, Stephen, 1989, Options Arbitrage in Imperfect Markets, *Journal of Finance* 44, issue 5, 1289-1311.

Galai, Dan and Masulis, Ronald W., 1975, The Option Pricing Model and the Risk Factor of Stock, *Journal of Financial Economics* 3, issue 1/2, 53-81.

Geske, Robert and Roll, Richard, 1984, On Valuing American Call Options with the Black-Scholes European Formula, *Journal of Finance* 39, issue 2, 443-455.

Glosten, Lawrence, Jagannathan, Ravi and Runkle, David E., 1993, On the Relation Between the Expected Value and the Volatility of the Nominal Excess Return on Stocks, *Journal of Finance* 48, issue 5, 1779-1801.

Goyal, Amit and Saretto, Alessio, 2007, Option Returns and Volatility Mispricing, Ciber Working Paper Series - Center for International Business Education and Research.

Granger, Clive and Poon, Ser-Huang, 2003, Forecasting Volatility in Financial Markets: A Review, *Journal of Economic Literature* 41, issue 2, 478.

Granger, Clive and Poon, Ser-Huang, 2005, Practical Issues in Forecasting Volatility, *Financial Analysts Journal* 61, issue 1, 45-56.

Hamilton, J. and Lin, G., 1996, Stock Market Volatility and the Business Cycle, *Journal of Applied Econometrics* 11, no. 5, 573-593.

Harvey, Campbell R. and Whaley, Robert E., 1992, Market Volatility Prediction and the Efficiency of the S& P 100 Index Option Market, *Journal of Financial Economics* 31, issue 1, 43-73.

Heston, Steven, 1993, A Closed-form Solution for Options with Stochastic Volatility with Applications to Bond and Currency Options, *Review of Financial Studies* 6, issue 2, 327.

Hull, John and White, Alan, 1988, The Use of the Control Variate Technique in Option Pricing, *Journal of Financial & Quantitative Analysis* 23, issue 3, 237-251.

Karpoff, Jonathan M., 1987, The Relation Between Price Changes and Trading Volume: A Survey, *Journal of Financial & Quantitative Analysis* 22, issue 1, 109-126.

Long, D. Michael and Officer, Dennis T, 1997, The Relations Between Option Mispricing and Volume in the Black-Scholes Option Model, *Journal of Financial Research* 20, issue 1,1.

Merton, Robert C., 1973, Theory of Rational Option Pricing, *Bell Journal of Economics & Management Science* 4, issue 1, 141.

Rubinstein, Mark, 1985, Nonparametric Tests of Alternative Option Pricing Models Using All Reported Trades and Quotes on the 30 Most Active CBOE Option Classes from August 23, 1976 through August 31, 1978, *Journal of Finance* 40, issue 2, 455-480.

Stein, Jeremy, 1989, Overreactions in the Options Market, *Journal of Finance* 44, issue 4, 1011-1023.

Appendix A: Tables and Figures

Table 1: Sector Composition of Custom Index

Among the top 139 non-dividend paying companies that were listed on the NYSE or NASDAQ from January 1998 to June 2008 by market capitalization, a disproportionate number, 51 firms or 37% of total, of our sample firms are Technology firms.

Name	Count	Weight
Custom Equity Index	**139**	**100.00%**
Energy	8	5.72%
Industrials	18	13.02%
Consumer Staples	8	5.76%
Health Care	28	19.88%
Consumer Discretionary	20	14.34%
Telecommunications	1	0.76%
Utilities	1	0.69%
Financials	4	2.88%
Technology	**51**	**36.95%**

Figure 1: Price Index of 139 Equal-Weighted US Large-Cap Non-Dividend Companies

We create an equally weighted index of our 139 US large-cap, non-dividend paying firms, and plot the daily return of this index for the period January 2000 to June 2008. The annualized return of the index is negative 14.4% with an annualized volatility of 32.6%.
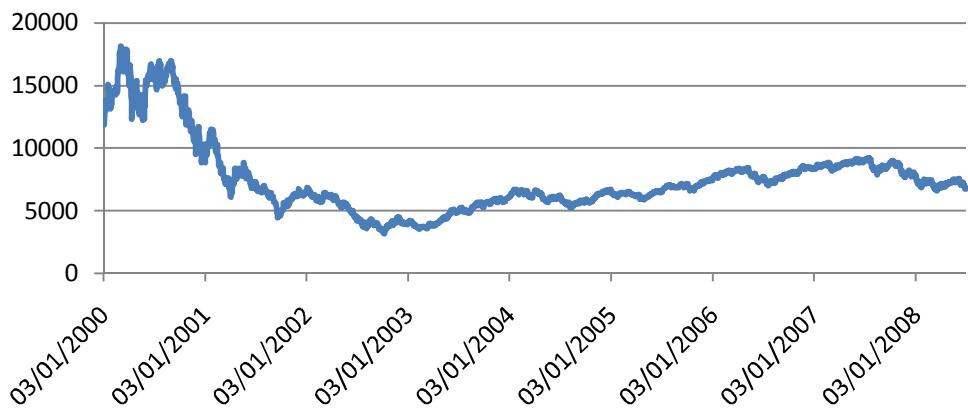
Table 2: Summary Statistics of Volatility

To obtain values for average historical realized volatility (HV) and implied volatility (IV), we compute the time-series average for each decile, then calculate the cross-sectional average of these averages. Implied volatility is calculated by using the Black-Scholes Option Pricing Model. Historical volatility is calculated using a standard deviation (SD) calculation on the logarithm of the close-to-close daily total return on the underlying stock and then annualized by multiplying the SD value by square root of 252. 1-yr HV and 2-yr HV are calculated by using the underlying stock return over the most recent 1 year and 2 years respectively.

	Mean	Median	StDev	Min	Max	Skewness	Kurtosis
Panel A: 1mth-To-Expiry Options							
IV	0.450	0.393	0.205	0.111	1.912	1.540	6.203
1YR HV	0.471	0.404	0.232	0.136	3.448	1.555	7.493
2YR HV	0.494	0.429	0.226	0.151	2.479	1.268	5.827
Panel B: 2mth-To-Expiry Options							
IV	0.462	0.408	0.190	0.161	1.745	1.406	5.251
1YR HV	0.463	0.398	0.222	0.137	1.546	1.390	4.823
2YR HV	0.488	0.423	0.219	0.151	2.479	1.199	5.203

Figure 2: B-S Implied Volatility Distribution of 1mth-To-Expiry Options

Histogram of Implied Volatilities of 1mth-to-expiry Options Using Black-Schole Formula
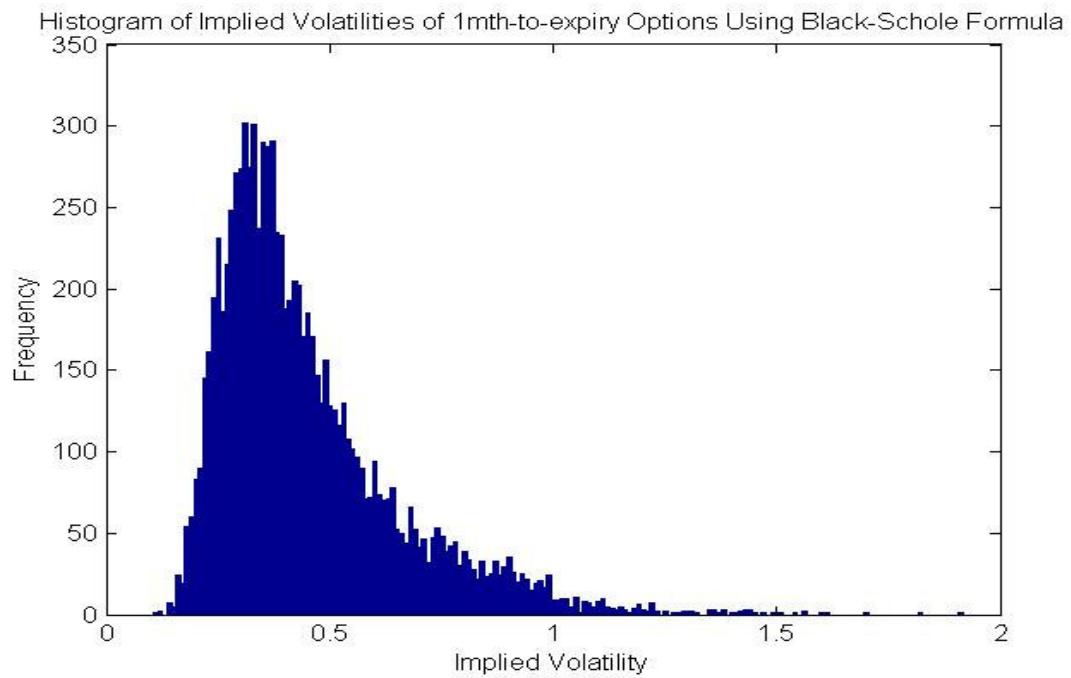
Figure 3: B-S Implied Volatility Distribution of 2mth-To-Expiry Options

Histogram of Implied Volatilities of 2mth-to-expiry Options Using Black-Schole Formula
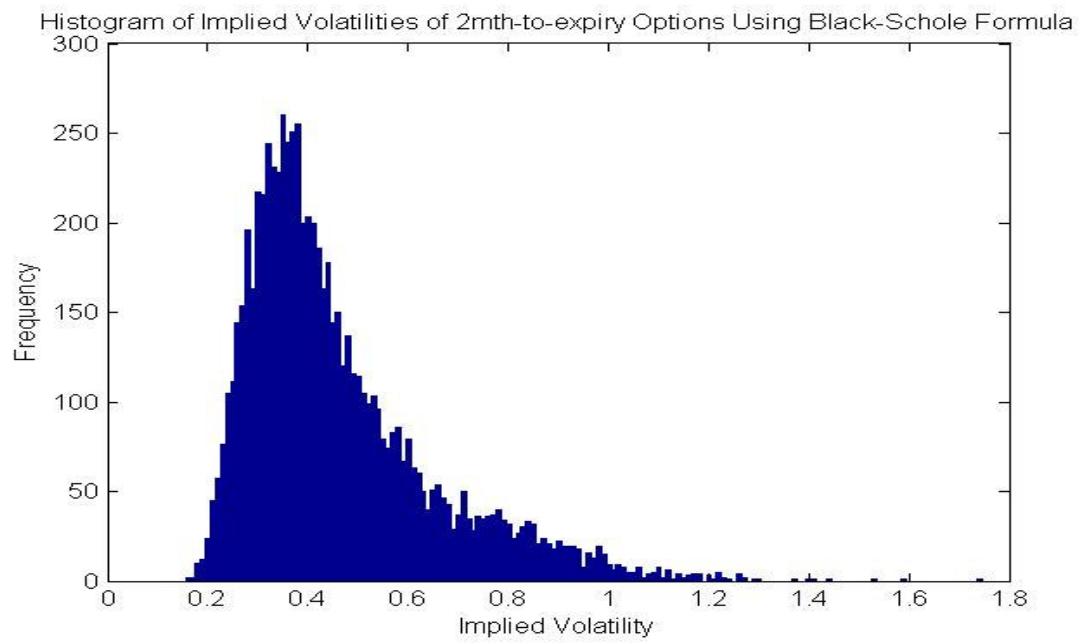
Figure 4: One-Year Historical Volatility Distribution of 1mth-To-Expiry Options

Histogram of One-year Historical Volatilities of 1mth-to-expiry Options
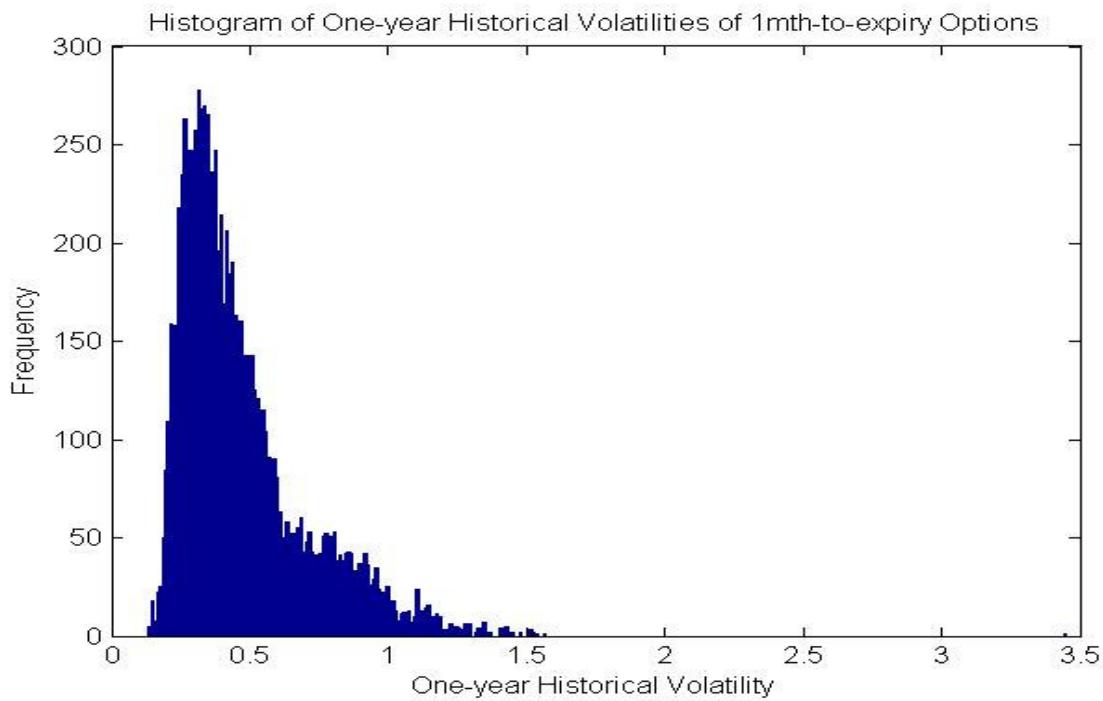
Figure 5: Two-Year Historical Volatility Distribution of 1mth-To-Expiry Options

Histogram of Two-year Historical Volatilities of 1mth-to-expiry Options
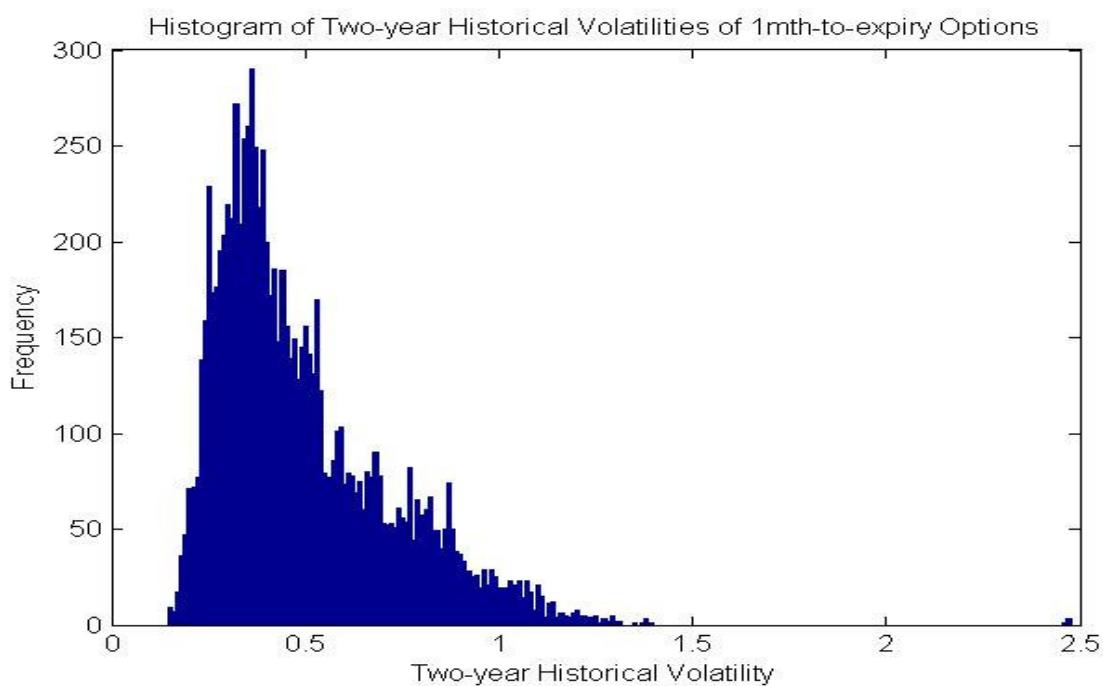
Figure 6: One-Year Historical Volatility Distribution of 2mth-To-Expiry Options

Histogram of One-year Historical Volatilities of 2mth-to-expiry Options
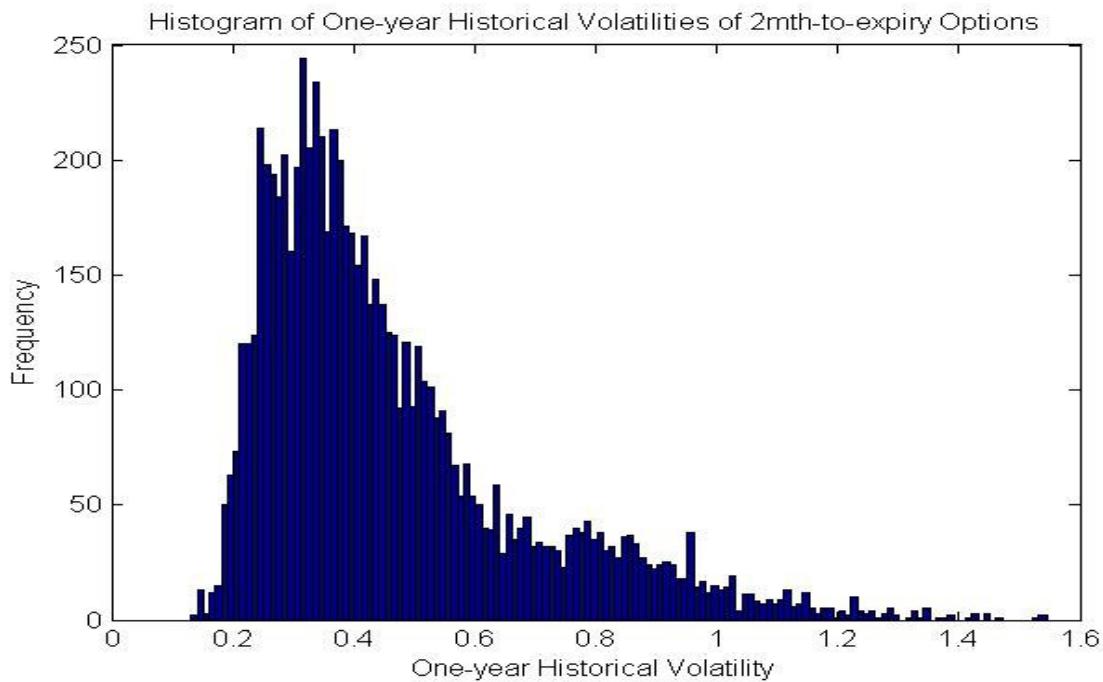
Figure 7: Two-Year Historical Volatility Distribution of 2mth-To-Expiry Options
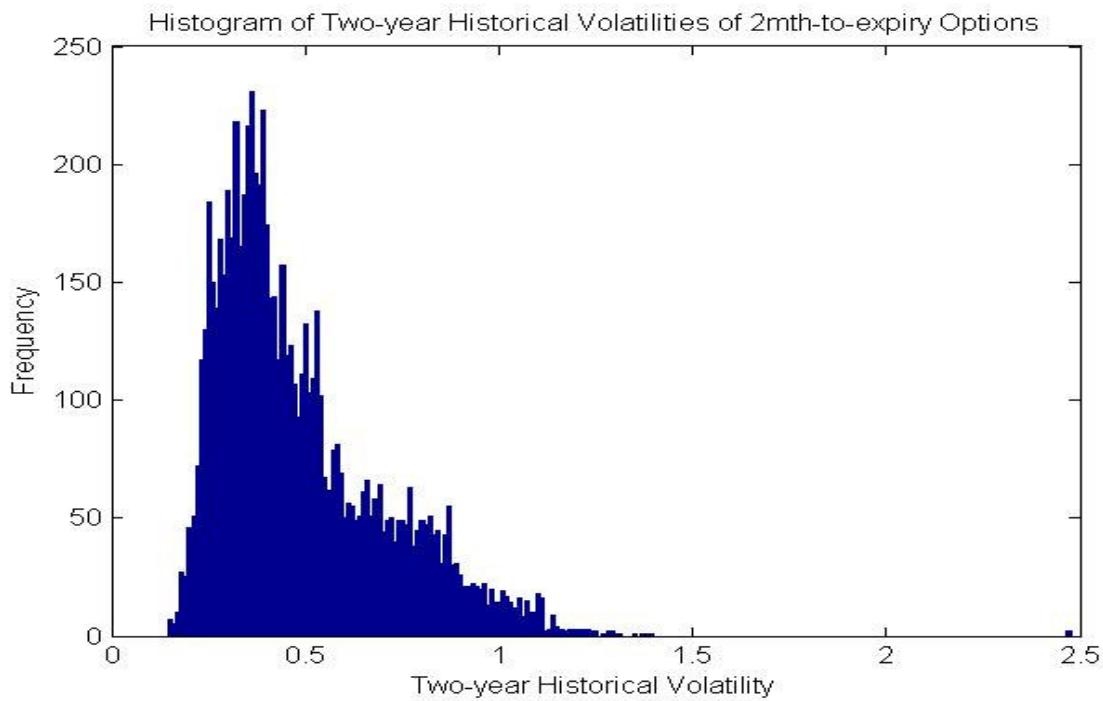
Histogram of Two-year Historical Volatilities of 2mth-to-expiry Options

Table 3: Statistics of Portfolios Sorted on the Difference Between HV and IV

We construct portfolios of at-the-money call options by ranking them, then placing them in deciles for each of the 102 months of the investment horizon, Jan 2000 to June 2008. The ranking is done by evaluating the log difference between historical realized volatility (HV) and implied volatility (IV) for all options in each month. C/S is the call price scaled by the underlying stock price. Delta is calculated using the Black-Scholes Option Pricing Model. All reported values are time-series averages of each decile.

| Decile	1	2	3	4	5	6	7	8	9	10
Panel A: 1mth-To-Expiry Options Using One-Year Historical Volatility										
1YR HV - IV	-0.177	-0.089	-0.052	-0.023	0.002	0.027	0.052	0.083	0.129	0.254
1YR HV	0.356	0.392	0.405	0.418	0.423	0.466	0.482	0.510	0.560	0.693
IV	0.533	0.481	0.456	0.441	0.421	0.439	0.430	0.427	0.431	0.440
C/S	0.059	0.054	0.050	0.048	0.046	0.048	0.046	0.045	0.045	0.046
Delta	0.536	0.533	0.522	0.521	0.518	0.520	0.514	0.514	0.516	0.524
Panel B: 1mth-To-Expiry Options Using Two-Year Historical Volatility										
2YR HV - IV	-0.179	-0.083	-0.039	-0.008	0.022	0.053	0.087	0.125	0.178	0.288
2YR HV	0.386	0.424	0.426	0.453	0.460	0.484	0.506	0.536	0.587	0.678
IV	0.565	0.508	0.465	0.461	0.438	0.431	0.419	0.411	0.410	0.390
C/S	0.062	0.057	0.051	0.051	0.047	0.047	0.045	0.045	0.043	0.041
Delta	0.531	0.535	0.523	0.527	0.517	0.518	0.518	0.521	0.518	0.525
Panel C: 2mth-To-Expiry Options Using One-Year Historical Volatility										
1YR HV - IV	-0.158	-0.095	-0.065	-0.043	-0.023	0.000	0.024	0.056	0.100	0.221
1YR HV	0.330	0.361	0.371	0.395	0.423	0.449	0.484	0.536	0.574	0.710
IV	0.489	0.456	0.435	0.438	0.445	0.449	0.459	0.480	0.475	0.490
C/S	0.077	0.072	0.068	0.066	0.067	0.068	0.069	0.072	0.070	0.073
Delta	0.540	0.536	0.532	0.516	0.520	0.522	0.524	0.528	0.525	0.541
Panel D: 2mth-To-Expiry Options Using Two-Year Historical Volatility										
2YR HV - IV	-0.163	-0.089	-0.055	-0.031	-0.004	0.026	0.061	0.105	0.161	0.259
2YR HV	0.354	0.383	0.398	0.440	0.461	0.481	0.523	0.561	0.609	0.675
IV	0.517	0.472	0.453	0.471	0.465	0.456	0.462	0.456	0.448	0.416
C/S	0.082	0.074	0.071	0.073	0.070	0.069	0.069	0.068	0.067	0.061
Delta	0.540	0.533	0.530	0.530	0.522	0.525	0.526	0.528	0.534	0.539

Table 4: 1mth HPRR of 1mth-To-Expiry Portfolios Sorted on the Difference Between 1YR HV and IV

We construct portfolios of call options, stocks and delta-hedged calls by ranking them, then placing them in deciles for each of the 102 months of the investment horizon, Jan 2000 to June 2008. The ranking is done by evaluating the log difference between historical realized volatility (HV) and implied volatility (IV) for all options in each month. Holding period rates of return on equally weighted portfolios of call options, stocks, and delta-hedged calls are computed for each decile and each month, and the time series average of each decile is reported.

Decile	1	2	3	4	5	6	7	8	9	10	**10 - 1**
					Panel A: Call Returns						
Mean	-0.009	0.143	0.136	-0.015	-0.002	-0.018	0.011	-0.068	0.010	-0.049	**-0.040**
T-Stats	-0.196	2.676	2.412	-0.304	-0.033	-0.372	0.214	-1.346	0.176	-0.949	-0.550
StDev	1.465	1.625	1.715	1.525	1.593	1.475	1.540	1.532	1.791	1.576	2.199
Min	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	
Max	12.255	12.650	10.700	10.000	16.787	7.800	14.625	10.318	18.714	9.121	
SR	-0.008	0.086	0.078	-0.011	-0.002	-0.014	0.006	-0.046	0.005	-0.032	-0.018

P value of F-test: 0.0574

Decile	1	2	3	4	5	6	7	8	9	10	**10 - 1**
					Panel B: Stock Returns						
Mean	0.005	0.013	0.012	-0.007	0.005	-0.001	0.000	-0.007	0.002	-0.019	**-0.024**
T-Stats	0.933	2.753	2.403	-1.596	1.175	-0.235	-0.109	-1.678	0.443	-3.988	-3.276
StDev	0.156	0.145	0.147	0.137	0.128	0.139	0.139	0.127	0.128	0.146	0.222
Min	-0.717	-0.509	-0.685	-0.591	-0.629	-0.912	-0.691	-0.530	-0.583	-0.552	
Max	0.904	1.007	0.998	0.390	0.733	0.813	0.689	0.643	0.837	0.708	
SR	0.015	0.074	0.063	-0.069	0.021	-0.024	-0.018	-0.071	0.000	-0.144	-0.105

P value of F-test: 1.05719e-005

Decile	1	2	3	4	5	6	7	8	9	10	**10 - 1**
					Panel C: Delta-Hedged Call Returns						
Mean	0.010	0.001	-0.001	-0.003	0.007	0.000	0.000	0.003	0.006	-0.012	**-0.022**
T-Stats	2.335	0.251	-0.423	-1.001	2.143	0.071	-0.100	1.020	1.882	-3.498	-3.960
StDev	0.126	0.102	0.108	0.098	0.095	0.102	0.102	0.093	0.095	0.103	0.166
Min	-0.749	-0.985	-0.643	-0.559	-0.546	-0.902	-0.640	-0.502	-0.622	-0.468	
Max	0.421	0.291	0.280	0.345	0.332	0.232	0.216	0.233	0.219	0.197	
SR	0.057	-0.015	-0.036	-0.056	0.047	-0.020	-0.024	0.012	0.042	-0.134	-0.156

P value of F-test: 0.0007

Table 5: 1mth HPRR of 1mth-To-Expiry Portfolios Sorted on the Difference Between 2YR HV and IV

We construct portfolios of call options, stocks and delta-hedged calls by ranking them, then placing them in deciles for each of the 102 months of the investment horizon, Jan 2000 to June 2008. The ranking is done by evaluating the log difference between historical realized volatility (HV) and implied volatility (IV) for all options in each month. Holding period rates of return on equally weighted portfolios of call options, stocks, and delta-hedged calls are computed for each decile and each month, and the time series average of each decile is reported.

Decile	1	2	3	4	5	6	7	8	9	10	**10 - 1**
					Panel A: Call Returns						
Mean	-0.044	0.118	0.003	0.070	0.074	-0.010	0.052	0.046	-0.116	-0.054	**-0.010**
T-Stats	-0.904	2.400	0.048	1.324	1.418	-0.192	1.008	0.801	-2.465	-0.938	-0.132
StDev	1.468	1.497	1.609	1.602	1.591	1.592	1.570	1.737	1.433	1.739	2.307
Min	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	
Max	12.255	7.291	10.700	9.103	12.650	16.787	9.525	18.714	10.318	14.018	
SR	-0.031	0.077	0.000	0.042	0.045	-0.008	0.032	0.025	-0.082	-0.032	-0.004

P value of F-test: 0.0531

Decile	1	2	3	4	5	6	7	8	9	10	**10 - 1**
					Panel B: Stock Returns						
Mean	0.001	0.012	-0.006	0.007	0.008	0.002	0.004	0.003	-0.009	-0.020	**-0.021**
T-Stats	0.224	2.361	-1.207	1.467	1.835	0.387	0.869	0.789	-2.295	-4.605	-2.930
StDev	0.170	0.148	0.151	0.145	0.132	0.139	0.125	0.123	0.123	0.130	0.217
Min	-0.717	-0.555	-0.749	-0.592	-0.524	-0.912	-0.594	-0.552	-0.552	-0.594	
Max	0.904	0.813	1.007	0.998	0.733	0.837	0.469	0.708	0.708	0.473	
SR	-0.007	0.060	-0.057	0.030	0.041	-0.004	0.012	0.011	-0.088	-0.161	-0.091

P value of F-test: 2.55801e-005

Decile	1	2	3	4	5	6	7	8	9	10	**10 - 1**
					Panel C: Delta-Hedged Call Returns						
Mean	0.007	0.001	-0.001	-0.001	0.003	0.002	0.005	0.004	0.001	-0.010	**-0.017**
T-Stats	1.638	0.384	-0.291	-0.344	1.066	0.521	1.583	1.213	0.352	-3.303	-3.194
StDev	0.134	0.100	0.118	0.100	0.091	0.107	0.095	0.090	0.085	0.095	0.167
Min	-0.712	-0.513	-0.937	-0.649	-0.513	-0.902	-0.572	-0.524	-0.481	-0.555	
Max	0.417	0.336	0.279	0.245	0.237	0.252	0.204	0.177	0.190	0.189	
SR	0.035	-0.013	-0.032	-0.037	0.008	-0.005	0.030	0.020	-0.007	-0.122	-0.128

P value of F-test: 0.0364

Table 6: 2mth HPRR of 2mth-To-Expiry Portfolios Sorted on the Difference Between 1YR HV and IV

We construct portfolios of call options, stocks and delta-hedged calls by ranking them, then placing them in deciles for each of the 102 months of the investment horizon, Jan 2000 to June 2008. The ranking is done by evaluating the log difference between historical realized volatility (HV) and implied volatility (IV) for all options in each month. Holding period rates of return on equally weighted portfolios of call options, stocks, and delta-hedged calls are computed for each decile and each month, and the time series average of each decile is reported.

Decile	1	2	3	4	5	6	7	8	9	10	**10 - 1**
Panel A: Call Returns											
Mean	-0.099	-0.049	0.097	-0.007	-0.110	-0.059	-0.049	-0.033	-0.130	0.037	**0.136**
T-Stats	-1.958	-0.952	1.726	-0.134	-2.131	-1.049	-0.907	-0.600	-2.581	0.608	1.697
StDev	1.370	1.401	1.524	1.512	1.405	1.523	1.480	1.510	1.365	1.641	2.176
Min	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	
Max	6.903	8.029	7.419	8.295	8.572	11.015	11.595	10.660	7.780	12.108	
SR	-0.072	-0.035	0.063	-0.005	-0.079	-0.039	-0.034	-0.022	-0.095	0.022	0.063

P value of F-test: 0.1068

Decile	1	2	3	4	5	6	7	8	9	10	**10 - 1**
Panel B: Stock Returns											
Mean	-0.002	-0.008	0.013	0.001	-0.014	-0.010	-0.003	-0.002	-0.024	-0.011	**-0.009**
T-Stats	-0.229	-1.215	1.906	0.116	-2.033	-1.550	-0.522	-0.228	-3.318	-1.423	-0.827
StDev	0.196	0.189	0.182	0.179	0.184	0.181	0.182	0.188	0.193	0.208	0.298
Min	-0.677	-0.690	-0.663	-0.638	-0.721	-0.711	-0.752	-0.620	-0.708	-0.602	
Max	1.049	1.153	0.875	0.552	0.854	0.669	0.629	1.046	0.660	0.730	
SR	-0.010	-0.046	0.069	0.003	-0.076	-0.058	-0.021	-0.010	-0.123	-0.054	-0.031

P value of F-test: 0.0381

Decile	1	2	3	4	5	6	7	8	9	10	**10 - 1**
Panel C: Delta-Hedged Call Returns											
Mean	0.015	0.005	0.003	0.005	0.006	0.006	0.009	0.013	0.002	-0.009	**-0.023**
T-Stats	2.665	0.950	0.686	1.151	1.235	1.241	1.889	2.693	0.322	-1.702	-3.074
StDev	0.149	0.133	0.131	0.126	0.139	0.134	0.135	0.134	0.149	0.143	0.207
Min	-0.915	-0.772	-0.624	-0.576	-0.652	-0.720	-0.699	-0.553	-0.675	-0.540	
Max	0.484	0.378	0.359	0.293	0.318	0.388	0.344	0.376	0.372	0.280	
SR	0.096	0.033	0.023	0.040	0.044	0.044	0.068	0.097	0.010	-0.064	-0.116

P value of F-test: 0.0855

Table 7: 2mth HPRR of 2mth-To-Expiry Portfolios Sorted on the Difference Between 2YR HV and IV

We construct portfolios of call options, stocks and delta-hedged calls by ranking them, then placing them in deciles for each of the 102 months of the investment horizon, Jan 2000 to June 2008. The ranking is done by evaluating the log difference between historical realized volatility (HV) and implied volatility (IV) for all options in each month. Holding period rates of return on equally weighted portfolios of call options, stocks, and delta-hedged calls are computed for each decile and each month, and the time series average of each decile is reported.

Decile	1	2	3	4	5	6	7	8	9	10	**10 - 1**
Panel A: Call Returns											
Mean	-0.195	-0.003	0.059	-0.008	-0.096	-0.049	-0.033	-0.029	-0.088	0.039	**0.236**
T-Stats	-4.173	-0.063	1.018	-0.153	-1.789	-0.896	-0.643	-0.501	-1.686	0.610	3.102
StDev	1.268	1.375	1.580	1.418	1.453	1.485	1.383	1.593	1.427	1.721	2.067
Min	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	
Max	6.837	8.029	7.419	6.115	11.595	10.660	7.646	10.889	8.107	12.108	
SR	-0.154	-0.002	0.037	-0.006	-0.066	-0.033	-0.024	-0.019	-0.062	0.022	0.114

P value of F-test: 0.0476

Decile	1	2	3	4	5	6	7	8	9	10	**10 - 1**
Panel B: Stock Returns											
Mean	-0.009	-0.007	0.003	-0.008	-0.007	-0.004	0.002	-0.009	-0.008	-0.012	**-0.003**
T-Stats	-1.255	-0.990	0.433	-1.202	-0.993	-0.663	0.247	-1.341	-1.248	-1.736	-0.247
StDev	0.201	0.194	0.201	0.189	0.184	0.184	0.183	0.181	0.177	0.191	0.275
Min	-0.677	-0.663	-0.711	-0.752	-0.744	-0.744	-0.708	-0.634	-0.702	-0.600	
Max	1.049	0.647	1.153	0.627	0.875	1.046	0.791	0.681	0.668	0.730	
SR	-0.047	-0.038	0.015	-0.046	-0.038	-0.026	0.008	-0.051	-0.047	-0.065	-0.009

P value of F-test: 0.8777

Decile	1	2	3	4	5	6	7	8	9	10	**10 - 1**
Panel C: Delta-Hedged Call Returns											
Mean	0.019	0.002	-0.003	0.007	0.012	0.008	0.013	0.006	0.007	-0.015	**-0.034**
T-Stats	3.406	0.446	-0.565	1.329	2.486	1.687	2.634	1.253	1.523	-3.155	-4.621
StDev	0.150	0.142	0.144	0.138	0.135	0.137	0.130	0.133	0.125	0.132	0.201
Min	-1.086	-0.575	-0.764	-0.679	-0.691	-0.698	-0.630	-0.569	-0.675	-0.564	
Max	0.466	0.369	0.362	0.396	0.391	0.332	0.345	0.299	0.294	0.283	
SR	0.124	0.015	-0.022	0.047	0.090	0.060	0.095	0.044	0.054	-0.118	-0.173

P value of F-test: 0.0002

Table 8: Volatility Statistics of 2mth-To-Expiry Portfolios Sort on the Difference Between HV and IV

We construct portfolios of at-the-money 2-month call options by ranking them, then placing them in deciles for each of the 102 months of the investment horizon, Jan 2000 to June 2008. The ranking is done by evaluating the log difference between historical realized volatility (HV) and implied volatility (IV) for all options in each month. We report the results for at the time of portfolio formation in Panel A and C. The results for the same options but after 1 month (interim) are reported in Panel B and D.

Decile	**1**	2	3	4	5	6	7	8	9	**10**
Panel A: Initial Volatility Measurements of 2mth-To-Expiry Options										
Using One Year Historical Volatility										
1YR HV - IV	**-0.158**	-0.094	-0.065	-0.043	-0.022	0.000	0.024	0.055	0.099	**0.221**
1YR HV	0.329	0.357	0.371	0.395	0.420	0.437	0.486	0.526	0.570	0.718
IV	0.487	0.451	0.436	0.437	0.442	0.438	0.461	0.470	0.470	0.497
Panel B: Interim Volatility Measurements of 2mth-To-Expiry Options										
Using One Year Historical Volatility										
1YR HV - IV	**-0.112**	-0.107	-0.061	-0.043	-0.023	0.000	-0.004	0.040	0.078	**0.178**
1YR HV	0.346	0.365	0.376	0.396	0.421	0.435	0.481	0.519	0.559	0.698
IV	0.458	0.472	0.436	0.439	0.444	0.436	0.485	0.479	0.481	0.520
Panel C: Initial Volatility Measurements of 2mth-To-Expiry Options										
Using Two Year Historical Volatility										
2YR HV - IV	**-0.162**	-0.089	-0.054	-0.031	-0.004	0.026	0.062	0.105	0.159	**0.259**
2YR HV	0.350	0.380	0.391	0.441	0.460	0.479	0.533	0.561	0.602	0.675
IV	0.512	0.469	0.446	0.472	0.464	0.453	0.471	0.456	0.443	0.416
Panel D: Interim Volatility Measurement of 2mth-To-Expiry Options										
Using Two Year Historical Volatility										
2YR HV - IV	**-0.137**	-0.093	-0.058	-0.048	-0.004	0.017	0.047	0.096	0.144	**0.222**
2YR HV	0.358	0.384	0.394	0.441	0.459	0.476	0.529	0.553	0.593	0.660
IV	0.495	0.477	0.451	0.489	0.463	0.458	0.482	0.458	0.449	0.438

Table 9: Call Returns of 2mth-To-Expiry Sorted on the Difference Between HV and IV

We construct portfolios of at-the-money 2-month call options by ranking them, then placing them in deciles for each of the 102 months of the investment horizon, Jan 2000 to June 2008. The ranking is done by evaluating the log difference between historical realized volatility (HV) and implied volatility (IV) for all options in each month. We report the mean returns on call option for at 1 month (interim) of 2mth-to-expiry in Panel A and D. The results for the same options but in the second month are reported in Panel B and E. The results for the same options but during the entire two-month holding period are reported in Panel C and F.

Decile	1	2	3	4	5	6	7	8	9	10
Panel A: One-month Interim Call Returns of 2mth-To-Expiry Options Using One-Year Historical Volatility										
Mean	0.003	0.001	0.116	0.017	-0.035	-0.054	0.008	-0.025	-0.028	-0.097
T-Stats	0.076	0.016	2.665	0.412	-0.862	-1.399	0.196	-0.634	-0.715	-2.668
Panel B: Second month Call Returns of 2mth-To-Expiry options Using One-Year Historical Volatility										
Mean	-0.162	-0.035	-0.070	-0.010	0.036	-0.077	-0.063	-0.058	-0.122	-0.021
T-Stats	-2.699	-0.512	-1.103	-0.115	0.206	-1.026	-0.890	-0.728	-1.793	-0.273
Panel C: Holding Period Call Returns of 2mth-To-Expiry options Using One-Year Historical Volatility										
Mean	-0.103	-0.025	0.078	-0.014	-0.148	-0.028	-0.021	-0.051	-0.119	-0.071
T-Stats	-1.887	-0.424	1.271	-0.222	-2.631	-0.431	-0.356	-0.909	-2.216	-1.214
Panel D: One-month Interim Call Returns of 2mth-To-Expiry Options Using Two-Year Historical Volatility										
Mean	-0.050	0.099	0.038	-0.011	-0.041	0.030	0.046	0.013	-0.120	-0.077
T-Stats	-1.340	2.171	0.910	-0.285	-1.066	0.726	1.133	0.325	-3.409	-1.942
Panel E: Second month Call Returns of 2mth-To-Expiry options Using Two-Year Historical Volatility										
Mean	-0.238	-0.016	0.005	0.190	-0.119	-0.144	-0.165	-0.002	-0.065	-0.020
T-Stats	-3.895	-0.232	0.059	1.048	-1.743	-2.401	-3.099	-0.029	-0.876	-0.278
Panel F: Holding Period Call Returns of 2mth-To-Expiry options Using Two-Year Historical Volatility										
Mean	-0.227	0.064	0.044	-0.011	-0.081	-0.048	-0.035	-0.019	-0.134	-0.038
T-Stats	-4.482	1.051	0.662	-0.178	-1.371	-0.837	-0.634	-0.310	-2.500	-0.607

Appendix B: MATLAB Programming Code

Script 1: Data_Gen.m

```matlab
1  %-----Program Description-----
2  %This program translates orginal MS Excel 20003/2007 (.xls/.xlsx) data file
3  %into Matlab .mat data file with the same file name and renames each colume
4  %vector with the header name of that vector in the orginal data set.
5
6  %Thanks to Shawn Guanghuan Hou for contributing this program.
7
8  %Read original date file and distinguish data between text and numbers.
9  filename='Data Input\FILENAME.xls';
10 [Data,Txt]=xlsread(filename);
11
12 %Save first colume header names as "VarName"
13 VarName=Txt(1,:);
14 StringVariable=find(isnan(Data(1,:)));
15
16 %Store data under each colume header into a colume vector, and name it by
17 %its header
18 for m=1:length(VarName)
19     if(~ismember(m,StringVariable))
20         data_assign_code=strcat(strvcat(VarName(m)),'=','Data(:,m);');
21         eval(strvcat(data_assign_code));
22     else
23         data_assign_code=strcat(strvcat(VarName(m)),'=','Txt(2:end,m);');
24         eval(strvcat(data_assign_code));
25     end
26
27 end
28
29 clear  Txt  Data  m  StringVariable  VarName
30
31 %Save translated data into Matlab .mat data file with the same file name
32 save FILENAME
33
34
```

Script 2: Data_Process.m

```matlab
 1  %-----Program Description-----
 2  %This program processes raw option data downloaded from OptionMetrics and
 3  %filters them through several layers of screening criteria while
 4  %associating underlying share price, risk-free rate and one-year/two-year
 5  %historical volatility to each option. Implied volatility and delta based
 6  %on Black-Schole formula are calculated for each option. Base on the log
 7  %differences of historical volatility and implied volatility, options are
 8  %assigned into 10 deciles. Summarized statistic and average of returns are
 9  %calculated for each deciles.
10
11  %Author: Max Minwei Lu & Merhdad Y. Rastan
12  %Last Modified: June 30, 2009
13
14  clc
15  clear all
16
17  tic
18
19  %-----Loading raw data sets into Matlab--------
20
21  disp('Stage 1 - Status: Loading Raw Data...')
22  %0-3mth T-bill yields downloaded from Bloomberg; data set designated for
23  %1mth-to-expiry options
24  load yield_27;
25  %0-3mth T-bill yields downloaded from Bloomberg; data set designated for
26  %2mth-to-expiry options
27  load yield_55;
28  %Daily underlying share prices of selected options downloaded from CRSP
29  %accessed through WRDS
30  load stockprice;
31  %Option quotes of all selected companies from Jan. 2000 to Jun. 2008
32  %downloaded from OptionMetrics accessed through WRDS
33  load optdata;
34
35  %Save all loaded data as "rawdata"
36  save rawdata;
37
38  toc
39
40  disp('Stage 2 - Status: Options Screening 1...')
41
42  %Remove of all unnecessary vectors
43  clear root suffix cp_flag optionid index_flag cfadj shrout crspid_27...
44      crspid_55
45
46  %Fix negative share price to positive in the 'stockprice' data set
47  close_stock1 = abs(close_stock);
48
49  %Translate all dates into serial number format
50  D_op_ex = datenum(exdate_op);
51  D_op = datenum(date_op);
52  D_stock = datenum(date_stock);
53  D_op_last = datenum(last_date);
54  D_qdate27 = datenum(qdate_27);
```

```matlab
55  D_qdate55 = datenum(qdate_55);
56
57  %Calculate time-to-maturity of each option
58  TTM = D_op_ex - D_op;
59
60  %Logical statement to distinguish 1mth-to-expiry options and 2mth-to-expiry
61  %options
62  one_month = (TTM~=26);
63  two_month = (TTM~=54);
64
65  %Transfer original data set array in to a new array, then apply above
66  %logical statement to distinguish 1mth-to-expiry option data and
67  %2mth-to-expiry data. For example all original "best_bid" price array will
68  %be transferred to a newly created "best_bid_1mth" array
69  best_bid_1mth = best_bid;
70  %If the previous logical test returns a value of 1(when above logical
71  %statements are true), delete that row in the array
72  best_bid_1mth(one_month) = [];
73  %Repeat above procedures for all arrays to create 1mth-to-expiry option
74  %data
75  best_offer_1mth=best_offer;
76  best_offer_1mth(one_month) = [];
77  secid_op_1mth=secid_op;
78  secid_op_1mth(one_month) = [];
79  D_op_1mth=D_op;
80  D_op_1mth(one_month) = [];
81  D_op_ex_1mth=D_op_ex;
82  D_op_ex_1mth(one_month) = [];
83  D_op_last_1mth=D_op_last;
84  D_op_last_1mth(one_month) = [];
85  strike_price_1mth=strike_price;
86  strike_price_1mth(one_month) = [];
87  impl_volatility_1mth=impl_volatility;
88  impl_volatility_1mth(one_month) = [];
89  delta_1mth=delta;
90  delta_1mth(one_month) = [];
91  ticker_op_1mth=ticker_op;
92  ticker_op_1mth(one_month) = [];
93  cusip_op_1mth=cusip_op;
94  cusip_op_1mth(one_month) = [];
95
96  %Repeat same procedures as above for all arrays to create 2mth-to-expiry
97  %option data
98  best_bid_2mth = best_bid;
99  best_bid_2mth(two_month) = [];
100 best_offer_2mth=best_offer;
101 best_offer_2mth(two_month) = [];
102 secid_op_2mth=secid_op;
103 secid_op_2mth(two_month) = [];
104 D_op_2mth=D_op;
105 D_op_2mth(two_month) = [];
106 D_op_ex_2mth=D_op_ex;
107 D_op_ex_2mth(two_month) = [];
108 D_op_last_2mth=D_op_last;
```

```
109  D_op_last_2mth(two_month) = [];
110  strike_price_2mth=strike_price;
111  strike_price_2mth(two_month) = [];
112  impl_volatility_2mth=impl_volatility;
113  impl_volatility_2mth(two_month) = [];
114  delta_2mth=delta;
115  delta_2mth(two_month) = [];
116  ticker_op_2mth=ticker_op;
117  ticker_op_2mth(two_month) = [];
118  cusip_op_2mth=cusip_op;
119  cusip_op_2mth(two_month) = [];
120
121  %------First Option Screening------
122
123  %Applying Logical test to detect following types of mis-quoted or illiquid
124  %traded options: 1. Best bid price equals zero 2. Last day the option was
125  %trade is not the quoted date 3. Best bid price is larger than best ask
126  %price.
127  %The logical test returns value 0 if one or more of the above test
128  %statements are true. For example, if the best bid price is equal to 0,
129  %the logical test returns value 1.
130  screen1_one_month = ((best_bid_1mth == 0) |...
131      (D_op_1mth ~= D_op_last_1mth) | (best_offer_1mth<best_bid_1mth));
132
133  %Applying logical test to identify mis-quoted spread between bid and ask
134  %prices. Bid and ask quotes are mis-quoted when their spreads are less than
135  %.05 when best ask price is less than $3 or when their spreads are less
136  %than .10 if the best ask price is larger than $3
137  spread_logic_1mth = (((best_offer_1mth <= 3) & ...
138      ((best_offer_1mth - best_bid_1mth) < 0.049))) |...
139      (((best_offer_1mth > 3) & ((best_offer_1mth - best_bid_1mth) < 0.09)));
140
141  %Combine the results of the above two logical tests
142  logic_1mth = screen1_one_month | spread_logic_1mth;
143
144  %Transfer all original arrays to a new arrays and rename them with "_1"
145  %tails
146  best_bid_1mth_1 = best_bid_1mth;
147  %If the above logical test are true and returns a value of 1, delete that
148  %option
149  best_bid_1mth_1(logic_1mth) = [];
150  best_offer_1mth_1=best_offer_1mth;
151  best_offer_1mth_1(logic_1mth) = [];
152  secid_op_1mth_1=secid_op_1mth;
153  secid_op_1mth_1(logic_1mth) = [];
154  D_op_1mth_1=D_op_1mth;
155  D_op_1mth_1(logic_1mth) = [];
156  D_op_ex_1mth_1=D_op_ex_1mth;
157  D_op_ex_1mth_1(logic_1mth) = [];
158  D_op_last_1mth_1=D_op_last_1mth;
159  D_op_last_1mth_1(logic_1mth) = [];
160  strike_price_1mth_1=strike_price_1mth;
161  strike_price_1mth_1(logic_1mth) = [];
162  impl_volatility_1mth_1=impl_volatility_1mth;
```

```matlab
163 impl_volatility_1mth_1(logic_1mth) = [];
164 delta_1mth_1=delta_1mth;
165 delta_1mth_1(logic_1mth) = [];
166 ticker_op_1mth_1=ticker_op_1mth;
167 ticker_op_1mth_1(logic_1mth) = [];
168 cusip_op_1mth_1=cusip_op_1mth;
169 cusip_op_1mth_1(logic_1mth) = [];
170
171
172 %Repeat the same procedures as above for 2mth-to-exiry options
173  screen1_two_month = ((best_bid_2mth == 0) |...
174      (D_op_2mth ~= D_op_last_2mth) | (best_offer_2mth<best_bid_2mth) |...
175      (isnan(0./impl_volatility_2mth)) | (isnan(0./delta_2mth)));
176 spread_logic_2mth = (((best_offer_2mth <= 3) &...
177     ((best_offer_2mth - best_bid_2mth) < 0.049))) |...
178     (((best_offer_2mth > 3) & ((best_offer_2mth - best_bid_2mth) < 0.09)));
179
180 logic_2mth = screen1_two_month | spread_logic_2mth;
181
182 best_bid_2mth_1 = best_bid_2mth;
183 best_bid_2mth_1(logic_2mth) = [];
184 best_offer_2mth_1=best_offer_2mth;
185 best_offer_2mth_1(logic_2mth) = [];
186 secid_op_2mth_1=secid_op_2mth;
187 secid_op_2mth_1(logic_2mth) = [];
188 D_op_2mth_1=D_op_2mth;
189 D_op_2mth_1(logic_2mth) = [];
190 D_op_ex_2mth_1=D_op_ex_2mth;
191 D_op_ex_2mth_1(logic_2mth) = [];
192 D_op_last_2mth_1=D_op_last_2mth;
193 D_op_last_2mth_1(logic_2mth) = [];
194 strike_price_2mth_1=strike_price_2mth;
195 strike_price_2mth_1(logic_2mth) = [];
196 impl_volatility_2mth_1=impl_volatility_2mth;
197 impl_volatility_2mth_1(logic_2mth) = [];
198 delta_2mth_1=delta_2mth;
199 delta_2mth_1(logic_2mth) = [];
200 ticker_op_2mth_1=ticker_op_2mth;
201 ticker_op_2mth_1(logic_2mth) = [];
202 cusip_op_2mth_1=cusip_op_2mth;
203 cusip_op_2mth_1(logic_2mth) = [];
204
205 save 1_screened_options
206
207 toc
208 %-----Matching Underlying Share Prices to Each Option-----
209 disp('Stage 3 - Status: Matching Underlying Share Prices to Each Option...')
210
211
212 %Define the size for a new underlying share price array
213 underlying_1mth = nan(length(secid_op_1mth_1),1);
214 %When tickers and trading dates of options and stocks match, then transfer
215 %the stock price to an array called "underlying_Xmth" for each option
216 %according to the original order of that option in the option data set
```

```matlab
217 for n = 1:length(secid_op_1mth_1);
218     for m = 1:length(secid_stock);
219         if (secid_stock(m) == secid_op_1mth_1(n)) && ...
220             (D_stock(m) == D_op_1mth_1(n));
221             underlying_1mth(n) = close_stock1(m);
222         end
223     end
224 end
225
226 %Remove options that do not have a matched underlying share price
227 logic_underlying_1mth_zero = (isnan(underlying_1mth));
228
229 best_bid_1mth_2 = best_bid_1mth_1;
230 best_bid_1mth_2(logic_underlying_1mth_zero) = [];
231 best_offer_1mth_2=best_offer_1mth_1;
232 best_offer_1mth_2(logic_underlying_1mth_zero) = [];
233 secid_op_1mth_2=secid_op_1mth_1;
234 secid_op_1mth_2(logic_underlying_1mth_zero) = [];
235 D_op_1mth_2=D_op_1mth_1;
236 D_op_1mth_2(logic_underlying_1mth_zero) = [];
237 D_op_ex_1mth_2=D_op_ex_1mth_1;
238 D_op_ex_1mth_2(logic_underlying_1mth_zero) = [];
239 D_op_last_1mth_2=D_op_last_1mth_1;
240 D_op_last_1mth_2(logic_underlying_1mth_zero) = [];
241 strike_price_1mth_2=strike_price_1mth_1;
242 strike_price_1mth_2(logic_underlying_1mth_zero) = [];
243 impl_volatility_1mth_2=impl_volatility_1mth_1;
244 impl_volatility_1mth_2(logic_underlying_1mth_zero) = [];
245 delta_1mth_2=delta_1mth_1;
246 delta_1mth_2(logic_underlying_1mth_zero) = [];
247 ticker_op_1mth_2=ticker_op_1mth_1;
248 ticker_op_1mth_2(logic_underlying_1mth_zero) = [];
249 cusip_op_1mth_2=cusip_op_1mth_1;
250 cusip_op_1mth_2(logic_underlying_1mth_zero) = [];
251 underlying_1mth_1=underlying_1mth;
252 underlying_1mth_1(logic_underlying_1mth_zero) = [];
253
254
255 %Matching underlying share prices for 2mth-to-expiry options using the same
256 %methodology as above
257 underlying_2mth = nan(length(secid_op_2mth_1),1);
258 for n = 1:length(secid_op_2mth_1);
259     for m = 1:length(secid_stock);
260         if (secid_stock(m) == secid_op_2mth_1(n)) &&...
261             (D_stock(m) == D_op_2mth_1(n));
262             underlying_2mth(n) = close_stock1(m);
263         end
264     end
265 end
266
267 logic_underlying_2mth_zero = (isnan(underlying_2mth));
268
269 best_bid_2mth_2 = best_bid_2mth_1;
270 best_bid_2mth_2(logic_underlying_2mth_zero) = [];
```

```matlab
271 best_offer_2mth_2=best_offer_2mth_1;
272 best_offer_2mth_2(logic_underlying_2mth_zero) = [];
273 secid_op_2mth_2=secid_op_2mth_1;
274 secid_op_2mth_2(logic_underlying_2mth_zero) = [];
275 D_op_2mth_2=D_op_2mth_1;
276 D_op_2mth_2(logic_underlying_2mth_zero) = [];
277 D_op_ex_2mth_2=D_op_ex_2mth_1;
278 D_op_ex_2mth_2(logic_underlying_2mth_zero) = [];
279 D_op_last_2mth_2=D_op_last_2mth_1;
280 D_op_last_2mth_2(logic_underlying_2mth_zero) = [];
281 strike_price_2mth_2=strike_price_2mth_1;
282 strike_price_2mth_2(logic_underlying_2mth_zero) = [];
283 impl_volatility_2mth_2=impl_volatility_2mth_1;
284 impl_volatility_2mth_2(logic_underlying_2mth_zero) = [];
285 delta_2mth_2=delta_2mth_1;
286 delta_2mth_2(logic_underlying_2mth_zero) = [];
287 ticker_op_2mth_2=ticker_op_2mth_1;
288 ticker_op_2mth_2(logic_underlying_2mth_zero) = [];
289 cusip_op_2mth_2=cusip_op_2mth_1;
290 cusip_op_2mth_2(logic_underlying_2mth_zero) = [];
291 underlying_2mth_1=underlying_2mth;
292 underlying_2mth_1(logic_underlying_2mth_zero) = [];
293
294
295 save 2_underlying_matched
296 toc
297 % -----Matching Risk-Free Rates to Each Options-----
298
299 disp('Stage 4 - Status: Matching Risk-Free Rates to Each Option...')
300
301 %Define the size for risk-free rates array
302 rates_1mth = nan(length(best_bid_1mth_2),1);
303
304 %Matching option trading day to the nearest quoted date of risk-free rate to
305 %an option. Note: The original rates from Blommberg are quoted as annual
306 %yield. So here, they were converted to daily yield first then to holding
307 %period yield. The matched rate will be saved as the risk-free rates for
308 %the holding period (1 month or 2 month risk-free rate of returns).
309 for p = 1:length(D_op_1mth_2);
310     for q = 1:length(D_qdate27);
311         if D_op_1mth_2(p) == D_qdate27(q);
312             rates_1mth(p) = exp(26*(log(yield_27(q)/100+1)/365))-1;
313         elseif D_op_1mth_2(p)-1 == D_qdate27(q);
314             rates_1mth(p) = exp(26*(log(yield_27(q)/100+1)/365))-1;
315         elseif D_op_1mth_2(p)-2 == D_qdate27(q);
316             rates_1mth(p) = exp(26*(log(yield_27(q)/100+1)/365))-1;
317         end
318     end
319 end
320
321 %Rescale strike price to dollar value
322 strike_p_1mth = strike_price_1mth_2/1000;
323
324 %Calculate forward prices for each option (F=S*e^(r*t))
```

```matlab
325 forwards_1mth = underlying_1mth_1 .* exp(rates_1mth);
326
327 %Calculate call price by taking the mid-point to bid and ask prices
328 call_price_1mth = 0.5*(best_offer_1mth_2+best_bid_1mth_2);
329
330 toc
331 %------Second Option Screening------
332 disp('Stage 5 - Status: Options Screening 2...')
333
334 %Second option screening to detect following types of theoretically
335 %mis-priced options: 1. Logical test to identify not at-the-money options
336 %for which moneyness is <.95 or >1.05
337 ATM_logic_1mth = ((strike_p_1mth./forwards_1mth) < 0.95) |...
338     ((strike_p_1mth./forwards_1mth) > 1.05);
339 %2.Logical test to identify call option prices fall outside the
340 %non-arbitrage interval (S-K*e^(-rt),S)
341 call_price_logic_1mth = (call_price_1mth <= ...
342     (underlying_1mth_1 - strike_p_1mth.*exp(-rates_1mth))) |...
343     (call_price_1mth >= underlying_1mth_1);
344
345
346 %Combine the result of the above two logical tests
347 final_logic_1mth = (ATM_logic_1mth | call_price_logic_1mth);
348
349
350 %Remove rows that have been identified in the last two logical tests
351 best_bid_1mth_3 = best_bid_1mth_2;
352 best_bid_1mth_3(final_logic_1mth) = [];
353 best_offer_1mth_3=best_offer_1mth_2;
354 best_offer_1mth_3(final_logic_1mth) = [];
355 secid_op_1mth_3=secid_op_1mth_2;
356 secid_op_1mth_3(final_logic_1mth) = [];
357 D_op_1mth_3=D_op_1mth_2;
358 D_op_1mth_3(final_logic_1mth) = [];
359 D_op_ex_1mth_3=D_op_ex_1mth_2;
360 D_op_ex_1mth_3(final_logic_1mth) = [];
361 D_op_last_1mth_3=D_op_last_1mth_2;
362 D_op_last_1mth_3(final_logic_1mth) = [];
363 strike_price_1mth_3=strike_p_1mth;
364 strike_price_1mth_3(final_logic_1mth) = [];
365 impl_volatility_1mth_3=impl_volatility_1mth_2;
366 impl_volatility_1mth_3(final_logic_1mth) = [];
367 delta_1mth_3=delta_1mth_2;
368 delta_1mth_3(final_logic_1mth) = [];
369 ticker_op_1mth_3=ticker_op_1mth_2;
370 ticker_op_1mth_3(final_logic_1mth) = [];
371 cusip_op_1mth_3=cusip_op_1mth_2;
372 cusip_op_1mth_3(final_logic_1mth) = [];
373 underlying_1mth_2=underlying_1mth_1;
374 underlying_1mth_2(final_logic_1mth) = [];
375 rates_1mth_1=rates_1mth;
376 rates_1mth_1(final_logic_1mth) = [];
377 call_price_1mth_1=call_price_1mth;
378 call_price_1mth_1(final_logic_1mth) = [];
```

```matlab
379
380
381 % Annualized risk-free rate of each option
382 rates_annual_1mth = exp((log(rates_1mth_1 + 1)/26)*365) -1;
383
384
385 %Repeat above steps for 2mth-to-expiry options
386
387 rates_2mth = nan(length(best_bid_2mth_2),1);
388
389 for pp = 1:length(D_op_2mth_2);
390     for qq = 1:length(D_qdate55);
391         if D_op_2mth_2(pp) == D_qdate55(qq);
392             rates_2mth(pp) = exp(54*(log(yield_55(q)/100+1)/365))-1;
393         elseif D_op_2mth_2(pp)-1 == D_qdate55(qq);
394             rates_2mth(pp) = exp(54*(log(yield_55(q)/100+1)/365))-1;
395         elseif D_op_2mth_2(pp)-2 == D_qdate55(qq);
396             rates_2mth(pp) = exp(54*(log(yield_55(q)/100+1)/365))-1;
397         end
398     end
399 end
400
401 strike_p_2mth = strike_price_2mth_2/1000;
402
403 forwards_2mth = underlying_2mth_1 .* exp(rates_2mth);
404
405 call_price_2mth = 0.5*(best_offer_2mth_2+best_bid_2mth_2);
406
407
408 ATM_logic_2mth = ((strike_p_2mth./forwards_2mth) < 0.95) |...
409     ((strike_p_2mth./forwards_2mth) > 1.05);
410
411 call_price_logic_2mth = (call_price_2mth <= ...
412     (underlying_2mth_1 - strike_p_2mth.*exp(-rates_2mth))) | ...
413     (call_price_2mth >= underlying_2mth_1);
414
415 final_logic_2mth = (ATM_logic_2mth | call_price_logic_2mth);
416
417 best_bid_2mth_3 = best_bid_2mth_2;
418 best_bid_2mth_3(final_logic_2mth) = [];
419 best_offer_2mth_3=best_offer_2mth_2;
420 best_offer_2mth_3(final_logic_2mth) = [];
421 secid_op_2mth_3=secid_op_2mth_2;
422 secid_op_2mth_3(final_logic_2mth) = [];
423 D_op_2mth_3=D_op_2mth_2;
424 D_op_2mth_3(final_logic_2mth) = [];
425 D_op_ex_2mth_3=D_op_ex_2mth_2;
426 D_op_ex_2mth_3(final_logic_2mth) = [];
427 D_op_last_2mth_3=D_op_last_2mth_2;
428 D_op_last_2mth_3(final_logic_2mth) = [];
429 strike_price_2mth_3=strike_p_2mth;
430 strike_price_2mth_3(final_logic_2mth) = [];
431 impl_volatility_2mth_3=impl_volatility_2mth_2;
432 impl_volatility_2mth_3(final_logic_2mth) = [];
```

```matlab
433 delta_2mth_3=delta_2mth_2;
434 delta_2mth_3(final_logic_2mth) = [];
435 ticker_op_2mth_3=ticker_op_2mth_2;
436 ticker_op_2mth_3(final_logic_2mth) = [];
437 cusip_op_2mth_3=cusip_op_2mth_2;
438 cusip_op_2mth_3(final_logic_2mth) = [];
439 underlying_2mth_2=underlying_2mth_1;
440 underlying_2mth_2(final_logic_2mth) = [];
441 rates_2mth_1=rates_2mth;
442 rates_2mth_1(final_logic_2mth) = [];
443 call_price_2mth_1=call_price_2mth;
444 call_price_2mth_1(final_logic_2mth) = [];
445
446 rates_annual_2mth = exp((log(rates_2mth_1 + 1)/54)*365) -1;
447
448 save 3_riskfree_matched
449
450 toc
451
452 %------Matching Historical Volatility to Each Option------
453 disp('Stage 6 - Status: Matching Historical Volatility to Each Option...')
454
455 load RV
456
457 clear cusip_RV
458
459 %Translate historical volatility (or realized volatility (RV)) dates into
460 %serial number format
461 D_RV = datenum(date_RV);
462
463 %Applying logical test to distinguish one-year and two-year historical
464 %volatility
465 one_yr_RV = (days_RV~=365);
466 two_yr_RV = (days_RV~=730);
467
468 secid_RV_1yr = secid_RV;
469 secid_RV_1yr(one_yr_RV) = [];
470 D_RV_1yr = D_RV;
471 D_RV_1yr(one_yr_RV) = [];
472 volatility_1yr = volatility;
473 volatility_1yr(one_yr_RV) = [];
474
475 secid_RV_2yr = secid_RV;
476 secid_RV_2yr(two_yr_RV) = [];
477 D_RV_2yr = D_RV;
478 D_RV_2yr(two_yr_RV) = [];
479 volatility_2yr = volatility;
480 volatility_2yr(two_yr_RV) = [];
481
482 clear secid_RV D_RV volatility
483
484 %Define the length of historical volatility array
485 Hist_Vol_1yr_1mth = nan(length(secid_op_1mth_3),1);
486
```

```matlab
487 %When SECID and trading dates of option and historical volatility are the
488 %same, then assign the historical volatility to that specific option.
489 for x = 1:length(secid_op_1mth_3);
490     for y = 1:length(secid_RV_1yr);
491         if (secid_RV_1yr(y) == secid_op_1mth_3(x)) &&...
492                 (D_RV_1yr(y) == D_op_1mth_3(x));
493             Hist_Vol_1yr_1mth(x) = volatility_1yr(y-1);
494         end
495     end
496 end
497
498 %Repeat above procedures to match two-year historical volatility to each
499 %option
500 Hist_Vol_2yr_1mth = nan(length(secid_op_1mth_3),1);
501
502 for xx = 1:length(secid_op_1mth_3);
503     for yy = 1:length(secid_RV_2yr);
504         if (secid_RV_2yr(yy) == secid_op_1mth_3(xx)) &&...
505                 (D_RV_2yr(yy) == D_op_1mth_3(xx));
506             Hist_Vol_2yr_1mth(xx) = volatility_2yr(yy-1);
507         end
508     end
509 end
510
511 % Repeat above procedures again for 2mth-to-expiry options
512 Hist_Vol_1yr_2mth = nan(length(secid_op_2mth_3),1);
513
514 for xy = 1:length(secid_op_2mth_3);
515     for yx = 1:length(secid_RV_1yr);
516         if (secid_RV_1yr(yx) == secid_op_2mth_3(xy)) &&...
517                 (D_RV_1yr(yx) == D_op_2mth_3(xy));
518             Hist_Vol_1yr_2mth(xy) = volatility_1yr(yx-1);
519         end
520     end
521 end
522
523 Hist_Vol_2yr_2mth = nan(length(secid_op_2mth_3),1);
524
525 for xxx = 1:length(secid_op_2mth_3);
526     for yyy = 1:length(secid_RV_2yr);
527         if (secid_RV_2yr(yyy) == secid_op_2mth_3(xxx)) &&...
528                 (D_RV_2yr(yyy) == D_op_2mth_3(xxx));
529             Hist_Vol_2yr_2mth(xxx) = volatility_2yr(yyy-1);
530         end
531     end
532 end
533
534 toc
535 %------Calculating Returns on Options and Underlying Shares------
536 disp('Stage 7 - Status: Calculating Returns on Options and Underlying Shares...')
537
538 %Define the length of returns on underlying stocks and options arrays
539 opt_ex_payoff_1mth = nan(length(secid_op_1mth_3),1);
540 stock_close_1mth = nan(length(secid_op_1mth_3),1);
```

```matlab
541 stock_percentage_return_1mth = nan(length(secid_op_1mth_3),1);
542
543 %Finding returns on underlying stocks and options during the holding period
544 %by matching SECIDs and expiry dates of options. Note: If the underlying
545 %stock was not traded on the last day Friday before the option expiry day,
546 %then find the latest available stock price as the closing price.
547
548 for a = 1:length(secid_op_1mth_3);
549     for b = 1:length(close_stock1);
550         if (secid_stock(b) == secid_op_1mth_3(a)) &&...
551             ((D_stock(b)) == (D_op_ex_1mth_3(a)-1));
552             stock_close_1mth(a) = close_stock1(b);
553             opt_ex_payoff_1mth(a) = ...
554                 max((close_stock1(b) - strike_price_1mth_3(a)),0);
555         elseif (secid_stock(b) == secid_op_1mth_3(a)) &&...
556             ((D_stock(b)) == (D_op_ex_1mth_3(a)-2));
557             stock_close_1mth(a) = close_stock1(b);
558             opt_ex_payoff_1mth(a) = ...
559                 max((close_stock1(b) - strike_price_1mth_3(a)),0);
560         elseif (secid_stock(b) == secid_op_1mth_3(a)) &&...
561             ((D_stock(b)) == D_op_ex_1mth_3(a) -3);
562             stock_close_1mth(a) = close_stock1(b);
563             opt_ex_payoff_1mth(a) = ...
564                 max((close_stock1(b) - strike_price_1mth_3(a)),0);
565         elseif (secid_stock(b) == secid_op_1mth_3(a)) &&...
566             ((D_stock(b)) == D_op_ex_1mth_3(a) -4);
567             stock_close_1mth(a) = close_stock1(b);
568             opt_ex_payoff_1mth(a) = ...
569                 max((close_stock1(b) - strike_price_1mth_3(a)),0);
570         end
571     end
572 end
573
574 %Calculating the returns on options and underlying stocks
575 stock_percentage_return_1mth = (stock_close_1mth./underlying_1mth_2)-1;
576
577 opt_percentage_return_1mth = (opt_ex_payoff_1mth ./ call_price_1mth_1) - 1;
578
579
580 %Repeating the same procedures for 2mth-to-expiry options
581 opt_ex_payoff_2mth = nan(length(secid_op_2mth_3),1);
582 stock_close_2mth = nan(length(secid_op_2mth_3),1);
583 stock_percentage_return_2mth = nan(length(secid_op_2mth_3),1);
584
585 for aa = 1:length(secid_op_2mth_3);
586     for bb = 1:length(close_stock1);
587         if (secid_stock(bb) == secid_op_2mth_3(aa)) &&...
588             ((D_stock(bb)) == (D_op_ex_2mth_3(aa)-1));
589             stock_close_2mth(aa) = close_stock1(bb);
590             opt_ex_payoff_2mth(aa) = ...
591                 max((close_stock1(bb) - strike_price_2mth_3(aa)),0);
592         elseif (secid_stock(bb) == secid_op_2mth_3(aa)) &&...
593             ((D_stock(bb)) == (D_op_ex_2mth_3(aa)-2));
594             stock_close_2mth(aa) = close_stock1(bb);
```

```matlab
595             opt_ex_payoff_2mth(aa) = ...
596                 max((close_stock1(bb) - strike_price_2mth_3(aa)),0);
597         elseif (secid_stock(bb) == secid_op_2mth_3(aa)) && ...
598                 ((D_stock(bb)) == D_op_ex_2mth_3(aa) -3);
599             stock_close_2mth(aa) = close_stock1(bb);
600             opt_ex_payoff_2mth(aa) = ...
601                 max((close_stock1(bb) - strike_price_2mth_3(aa)),0);
602         elseif (secid_stock(bb) == secid_op_2mth_3(aa)) && ...
603                 ((D_stock(bb)) == D_op_ex_2mth_3(aa) -4);
604             stock_close_2mth(aa) = close_stock1(bb);
605             opt_ex_payoff_2mth(aa) = ...
606                 max((close_stock1(bb) - strike_price_2mth_3(aa)),0);
607         end
608     end
609 end
610
611 stock_percentage_return_2mth = (stock_close_2mth./underlying_2mth_2)-1;
612
613 opt_percentage_return_2mth = (opt_ex_payoff_2mth ./ call_price_2mth_1) - 1;
614
615
616 save 4_volatility_matched
617 toc
618
619 %-------Applying Black-Schole Formula to obtain deltas and BS implied
620 %volatilities of each option------
621 disp('Stage 8 - Status: Calculating Black-Schole delta and implied volatility of↵
each option ...')
622
623 %Using following Matlab financial package function to calculate
624 %Black-Schole deltas: [CallDelta, PutDelta] =
625 %blsdelta(Price, Strike, Rate, Time, Volatility, Yield)
626
627 [callDelta_1mth_1yr, putdelta_1mth_1yr] = blsdelta(underlying_1mth_2,...
628     strike_price_1mth_3, rates_annual_1mth, 26/365, Hist_Vol_1yr_1mth);
629
630 [callDelta_1mth_2yr, putdelta_1mth_2yr] = blsdelta(underlying_1mth_2,...
631     strike_price_1mth_3, rates_annual_1mth, 26/365, Hist_Vol_2yr_1mth);
632
633 [callDelta_2mth_1yr, putdelta_2mth_1yr] = blsdelta(underlying_2mth_2,...
634     strike_price_2mth_3, rates_annual_2mth, 54/365, Hist_Vol_1yr_2mth);
635
636 [callDelta_2mth_2yr, putdelta_2mth_2yr] = blsdelta(underlying_2mth_2,...
637     strike_price_2mth_3, rates_annual_2mth, 54/365, Hist_Vol_2yr_2mth);
638
639 %Using following Matlab financial package function to calculate
640 %Black-Schole implied volatilites: Volatility =
641 %blsimpv(Price, Strike, Rate, Time, Value, Limit, Yield, Tolerance, Class)
642
643 bsvolatility_1mth = blsimpv(underlying_1mth_2, strike_price_1mth_3,...
644     rates_annual_1mth, 26/365, call_price_1mth_1);
645
646 bsvolatility_2mth = blsimpv(underlying_2mth_2, strike_price_2mth_3,...
647     rates_annual_2mth, 54/365, call_price_2mth_1);
```

```matlab
648
649 save 5_black_schole_imp_delta
650
651 toc
652
653 %------Third Option Screening------
654 disp('Stage 9 - Status: Options Screening 3...')
655
656 %Using logical test to identify options that are before Jan. 2000 or
657 %have no matched historical volatilities or have unrealistic Black-Schole
658 %implied volatility (implied volatility>4), and then remove them
659
660 logic_opt_1mth = ((D_op_1mth_3 < datenum('01.01.2000', 'dd.mm.yyyy')) |...
661     (isnan(Hist_Vol_2yr_1mth)) | (bsvolatility_1mth>4));
662
663 best_bid_1mth_4 = best_bid_1mth_3;
664 best_bid_1mth_4(logic_opt_1mth) = [];
665 best_offer_1mth_4=best_offer_1mth_3;
666 best_offer_1mth_4(logic_opt_1mth) = [];
667 secid_op_1mth_4=secid_op_1mth_3;
668 secid_op_1mth_4(logic_opt_1mth) = [];
669 D_op_1mth_4=D_op_1mth_3;
670 D_op_1mth_4(logic_opt_1mth) = [];
671 D_op_ex_1mth_4=D_op_ex_1mth_3;
672 D_op_ex_1mth_4(logic_opt_1mth) = [];
673 D_op_last_1mth_4=D_op_last_1mth_3;
674 D_op_last_1mth_4(logic_opt_1mth) = [];
675 strike_price_1mth_4=strike_price_1mth_3;
676 strike_price_1mth_4(logic_opt_1mth) = [];
677 impl_volatility_1mth_4=impl_volatility_1mth_3;
678 impl_volatility_1mth_4(logic_opt_1mth) = [];
679 delta_1mth_4=delta_1mth_3;
680 delta_1mth_4(logic_opt_1mth) = [];
681 ticker_op_1mth_4=ticker_op_1mth_3;
682 ticker_op_1mth_4(logic_opt_1mth) = [];
683 cusip_op_1mth_4=cusip_op_1mth_3;
684 cusip_op_1mth_4(logic_opt_1mth) = [];
685 underlying_1mth_3=underlying_1mth_2;
686 underlying_1mth_3(logic_opt_1mth) = [];
687 rates_1mth_2=rates_1mth_1;
688 rates_1mth_2(logic_opt_1mth) = [];
689 call_price_1mth_2=call_price_1mth_1;
690 call_price_1mth_2(logic_opt_1mth) = [];
691 rates_annual_1mth_1=rates_annual_1mth;
692 rates_annual_1mth_1(logic_opt_1mth) = [];
693 Hist_Vol_1yr_1mth_1=Hist_Vol_1yr_1mth;
694 Hist_Vol_1yr_1mth_1(logic_opt_1mth) = [];
695 Hist_Vol_2yr_1mth_1=Hist_Vol_2yr_1mth;
696 Hist_Vol_2yr_1mth_1(logic_opt_1mth) = [];
697 callDelta_1mth_1yr_1=callDelta_1mth_1yr;
698 callDelta_1mth_1yr_1(logic_opt_1mth) = [];
699 callDelta_1mth_2yr_1=callDelta_1mth_2yr;
700 callDelta_1mth_2yr_1(logic_opt_1mth) = [];
701 bsvolatility_1mth_1=bsvolatility_1mth;
```

```matlab
702 bsvolatility_1mth_1(logic_opt_1mth) = [];
703 opt_percentage_return_1mth_1=opt_percentage_return_1mth;
704 opt_percentage_return_1mth_1(logic_opt_1mth) = [];
705 opt_ex_payoff_1mth_1=opt_ex_payoff_1mth;
706 opt_ex_payoff_1mth_1(logic_opt_1mth) = [];
707 stock_percentage_return_1mth_1=stock_percentage_return_1mth;
708 stock_percentage_return_1mth_1(logic_opt_1mth) = [];
709 stock_close_1mth_1=stock_close_1mth;
710 stock_close_1mth_1(logic_opt_1mth) = [];
711
712 %Repeat the same processes above for 2mth-to-expiry options
713
714 logic_opt_2mth = ((D_op_2mth_3 < datenum('01.01.2000', 'dd.mm.yyyy')) |...
715     (isnan(Hist_Vol_2yr_2mth)) | (bsvolatility_2mth>4));
716
717 best_bid_2mth_4 = best_bid_2mth_3;
718 best_bid_2mth_4(logic_opt_2mth) = [];
719 best_offer_2mth_4=best_offer_2mth_3;
720 best_offer_2mth_4(logic_opt_2mth) = [];
721 secid_op_2mth_4=secid_op_2mth_3;
722 secid_op_2mth_4(logic_opt_2mth) = [];
723 D_op_2mth_4=D_op_2mth_3;
724 D_op_2mth_4(logic_opt_2mth) = [];
725 D_op_ex_2mth_4=D_op_ex_2mth_3;
726 D_op_ex_2mth_4(logic_opt_2mth) = [];
727 D_op_last_2mth_4=D_op_last_2mth_3;
728 D_op_last_2mth_4(logic_opt_2mth) = [];
729 strike_price_2mth_4=strike_price_2mth_3;
730 strike_price_2mth_4(logic_opt_2mth) = [];
731 impl_volatility_2mth_4=impl_volatility_2mth_3;
732 impl_volatility_2mth_4(logic_opt_2mth) = [];
733 delta_2mth_4=delta_2mth_3;
734 delta_2mth_4(logic_opt_2mth) = [];
735 ticker_op_2mth_4=ticker_op_2mth_3;
736 ticker_op_2mth_4(logic_opt_2mth) = [];
737 cusip_op_2mth_4=cusip_op_2mth_3;
738 cusip_op_2mth_4(logic_opt_2mth) = [];
739 underlying_2mth_3=underlying_2mth_2;
740 underlying_2mth_3(logic_opt_2mth) = [];
741 rates_2mth_2=rates_2mth_1;
742 rates_2mth_2(logic_opt_2mth) = [];
743 call_price_2mth_2=call_price_2mth_1;
744 call_price_2mth_2(logic_opt_2mth) = [];
745 rates_annual_2mth_1=rates_annual_2mth;
746 rates_annual_2mth_1(logic_opt_2mth) = [];
747 Hist_Vol_1yr_2mth_1=Hist_Vol_1yr_2mth;
748 Hist_Vol_1yr_2mth_1(logic_opt_2mth) = [];
749 Hist_Vol_2yr_2mth_1=Hist_Vol_2yr_2mth;
750 Hist_Vol_2yr_2mth_1(logic_opt_2mth) = [];
751 callDelta_2mth_1yr_1=callDelta_2mth_1yr;
752 callDelta_2mth_1yr_1(logic_opt_2mth) = [];
753 callDelta_2mth_2yr_1=callDelta_2mth_2yr;
754 callDelta_2mth_2yr_1(logic_opt_2mth) = [];
755 bsvolatility_2mth_1=bsvolatility_2mth;
```

```matlab
756 bsvolatility_2mth_1(logic_opt_2mth) = [];
757 opt_percentage_return_2mth_1=opt_percentage_return_2mth;
758 opt_percentage_return_2mth_1(logic_opt_2mth) = [];
759 opt_ex_payoff_2mth_1=opt_ex_payoff_2mth;
760 opt_ex_payoff_2mth_1(logic_opt_2mth) = [];
761 stock_percentage_return_2mth_1=stock_percentage_return_2mth;
762 stock_percentage_return_2mth_1(logic_opt_2mth) = [];
763 stock_close_2mth_1=stock_close_2mth;
764 stock_close_2mth_1(logic_opt_2mth) = [];
765
766
767 save 6_data_for_calculation
768 toc
769 %------Setting Up Deciles------
770 disp('Stage 10 - Status: Setting Up Deciles...')
771
772 % Calculating the log difference between RV and IV for options
773 logdiff_1yrRV_1mth = log(Hist_Vol_1yr_1mth_1./bsvolatility_1mth_1);
774 logdiff_1yrRV_2mth = log(Hist_Vol_1yr_2mth_1./bsvolatility_2mth_1);
775 logdiff_2yrRV_1mth = log(Hist_Vol_2yr_1mth_1./bsvolatility_1mth_1);
776 logdiff_2yrRV_2mth = log(Hist_Vol_2yr_2mth_1./bsvolatility_2mth_1);
777
778 % Calculating the value difference between RV and IV
779 diff_1yrRV_1mth = Hist_Vol_1yr_1mth_1-bsvolatility_1mth_1;
780 diff_1yrRV_2mth = Hist_Vol_1yr_2mth_1-bsvolatility_2mth_1;
781 diff_2yrRV_1mth = Hist_Vol_2yr_1mth_1-bsvolatility_1mth_1;
782 diff_2yrRV_2mth = Hist_Vol_2yr_2mth_1-bsvolatility_2mth_1;
783
784 % Calculating Call/Stock price (C/S) ratio
785 CallDivStock_1mth = call_price_1mth_2./underlying_1mth_3;
786 CallDivStock_2mth = call_price_2mth_2./underlying_2mth_3;
787
788 % Sorting the log difference between RV and IV of options from smallest to
789 %largest
790 sort_logdiff_1yrRV_1mth = sort(logdiff_1yrRV_1mth);
791
792 % Defining the numbering of options in deciles 1-9
793 ff1 = round(length(logdiff_1yrRV_1mth)/10);
794
795 % Indexing the options that falls into 1st deciles
796 decile_1yr_1mth_1=find(logdiff_1yrRV_1mth <= sort_logdiff_1yrRV_1mth(ff1,1));
797
798 %Summarizing the statistic of this deciles by applying the index above onto
799 %all options
800 decile_1yr_1mth_1_mean = mean(diff_1yrRV_1mth(decile_1yr_1mth_1));
801 decile_1yr_1mth_1_RV = mean(Hist_Vol_1yr_1mth_1(decile_1yr_1mth_1));
802 decile_1yr_1mth_1_IV = mean(bsvolatility_1mth_1(decile_1yr_1mth_1));
803 decile_1yr_1mth_1_CS = mean(CallDivStock_1mth(decile_1yr_1mth_1));
804 decile_1yr_1mth_1_delta = mean(callDelta_1mth_1yr_1(decile_1yr_1mth_1));
805 decile_1yr_1mth_1_rates = rates_1mth_2(decile_1yr_1mth_1);
806 decile_1yr_1mth_1_call_return = mean(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_1));
807 [h,p,ci,decile_1yr_1mth_1_call_return_ttest] = ttest(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_1),0);
```

```
808 decile_1yr_1mth_1_call_return_std = std(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_1));
809 decile_1yr_1mth_1_call_return_min = min(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_1));
810 decile_1yr_1mth_1_call_return_max = max(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_1));
811 decile_1yr_1mth_1_call_SR = mean(opt_percentage_return_1mth_1(decile_1yr_1mth_1)-↵
decile_1yr_1mth_1_rates)/(sqrt(var(opt_percentage_return_1mth_1(decile_1yr_1mth_1)-↵
decile_1yr_1mth_1_rates)));
812 decile_1yr_1mth_1_stock_return = mean(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_1));
813 [h,p,ci,decile_1yr_1mth_1_stock_return_ttest] = ttest↵
(stock_percentage_return_1mth_1(decile_1yr_1mth_1),0);
814 decile_1yr_1mth_1_stock_return_std = std(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_1));
815 decile_1yr_1mth_1_stock_return_min = min(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_1));
816 decile_1yr_1mth_1_stock_return_max = max(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_1));
817 decile_1yr_1mth_1_stock_SR = mean(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_1)-decile_1yr_1mth_1_rates)/(sqrt(var(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_1)-decile_1yr_1mth_1_rates)));
818 decile_1yr_1mth_1_date = D_op_1mth_4(decile_1yr_1mth_1);
819 decile_1yr_1mth_1_call_price = call_price_1mth_2(decile_1yr_1mth_1);
820 decile_1yr_1mth_1_stock_price = underlying_1mth_3(decile_1yr_1mth_1);
821 decile_1yr_1mth_1_opt_ex_price = opt_ex_payoff_1mth_1(decile_1yr_1mth_1);
822 decile_1yr_1mth_1_strike_price = strike_price_1mth_4(decile_1yr_1mth_1);
823 decile_1yr_1mth_1_D_op = D_op_1mth_4(decile_1yr_1mth_1);
824 decile_1yr_1mth_1_ticker_op = ticker_op_1mth_4(decile_1yr_1mth_1);
825 decile_1yr_1mth_1_calldelta = callDelta_1mth_1yr_1(decile_1yr_1mth_1);
826 decile_1yr_1mth_1_stock_close = stock_close_1mth_1(decile_1yr_1mth_1);
827 decile_1yr_1mth_1_delta_return = mean((decile_1yr_1mth_1_opt_ex_price-↵
decile_1yr_1mth_1_call_price+(decile_1yr_1mth_1_stock_price.↵
*decile_1yr_1mth_1_calldelta)-(decile_1yr_1mth_1_stock_close.↵
*decile_1yr_1mth_1_calldelta))./((-decile_1yr_1mth_1_stock_price.↵
*decile_1yr_1mth_1_calldelta)+decile_1yr_1mth_1_call_price));
828 [h,p,ci,decile_1yr_1mth_1_delta_return_ttest] = ttest↵
((decile_1yr_1mth_1_opt_ex_price-decile_1yr_1mth_1_call_price+↵
(decile_1yr_1mth_1_stock_price.*decile_1yr_1mth_1_calldelta)-↵
(decile_1yr_1mth_1_stock_close.*decile_1yr_1mth_1_calldelta))./((-↵
decile_1yr_1mth_1_stock_price.*decile_1yr_1mth_1_calldelta)↵
+decile_1yr_1mth_1_call_price),0);
829 decile_1yr_1mth_1_delta_std = std((decile_1yr_1mth_1_opt_ex_price-↵
decile_1yr_1mth_1_call_price+(decile_1yr_1mth_1_stock_price.↵
*decile_1yr_1mth_1_calldelta)-(decile_1yr_1mth_1_stock_close.↵
*decile_1yr_1mth_1_calldelta))./((-decile_1yr_1mth_1_stock_price.↵
*decile_1yr_1mth_1_calldelta)+decile_1yr_1mth_1_call_price));
830 decile_1yr_1mth_1_delta_min = min((decile_1yr_1mth_1_opt_ex_price-↵
decile_1yr_1mth_1_call_price+(decile_1yr_1mth_1_stock_price.↵
*decile_1yr_1mth_1_calldelta)-(decile_1yr_1mth_1_stock_close.↵
*decile_1yr_1mth_1_calldelta))./((-decile_1yr_1mth_1_stock_price.↵
*decile_1yr_1mth_1_calldelta)+decile_1yr_1mth_1_call_price));
831 decile_1yr_1mth_1_delta_max = max((decile_1yr_1mth_1_opt_ex_price-↵
decile_1yr_1mth_1_call_price+(decile_1yr_1mth_1_stock_price.↵
```

```
     *decile_1yr_1mth_1_calldelta)-(decile_1yr_1mth_1_stock_close.↵
     *decile_1yr_1mth_1_calldelta))./((-decile_1yr_1mth_1_stock_price.↵
     *decile_1yr_1mth_1_calldelta)+decile_1yr_1mth_1_call_price));
 832 decile_1yr_1mth_1_delta_SR = mean((((decile_1yr_1mth_1_opt_ex_price-↵
     decile_1yr_1mth_1_call_price+(decile_1yr_1mth_1_stock_price.↵
     *decile_1yr_1mth_1_calldelta)-(decile_1yr_1mth_1_stock_close.↵
     *decile_1yr_1mth_1_calldelta))./((-decile_1yr_1mth_1_stock_price.↵
     *decile_1yr_1mth_1_calldelta)+decile_1yr_1mth_1_call_price)-decile_1yr_1mth_1_rates)↵
     /...
 833     (sqrt(var((decile_1yr_1mth_1_opt_ex_price-decile_1yr_1mth_1_call_price+↵
     (decile_1yr_1mth_1_stock_price.*decile_1yr_1mth_1_calldelta)-↵
     (decile_1yr_1mth_1_stock_close.*decile_1yr_1mth_1_calldelta))./(-↵
     decile_1yr_1mth_1_stock_price.↵
     *decile_1yr_1mth_1_calldelta+decile_1yr_1mth_1_call_price)-↵
     decile_1yr_1mth_1_rates))));
 834
 835  % Repeat the same procedures as 1st deciles for the rest deciles
 836 decile_1yr_1mth_2=find((logdiff_1yrRV_1mth > sort_logdiff_1yrRV_1mth(ff1,1)) &↵
     (logdiff_1yrRV_1mth <= sort_logdiff_1yrRV_1mth(ff1*2,1)));
 837
 838 decile_1yr_1mth_2_mean = mean(diff_1yrRV_1mth(decile_1yr_1mth_2));
 839 decile_1yr_1mth_2_RV = mean(Hist_Vol_1yr_1mth_1(decile_1yr_1mth_2));
 840 decile_1yr_1mth_2_IV = mean(bsvolatility_1mth_1(decile_1yr_1mth_2));
 841 decile_1yr_1mth_2_CS = mean(CallDivStock_1mth(decile_1yr_1mth_2));
 842 decile_1yr_1mth_2_delta = mean(callDelta_1mth_1yr_1(decile_1yr_1mth_2));
 843 decile_1yr_1mth_2_rates = rates_1mth_2(decile_1yr_1mth_2);
 844 decile_1yr_1mth_2_call_return = mean(opt_percentage_return_1mth_1↵
     (decile_1yr_1mth_2));
 845 [h,p,ci,decile_1yr_1mth_2_call_return_ttest] = ttest(opt_percentage_return_1mth_1↵
     (decile_1yr_1mth_2),0);
 846 decile_1yr_1mth_2_call_return_std = std(opt_percentage_return_1mth_1↵
     (decile_1yr_1mth_2));
 847 decile_1yr_1mth_2_call_return_min = min(opt_percentage_return_1mth_1↵
     (decile_1yr_1mth_2));
 848 decile_1yr_1mth_2_call_return_max = max(opt_percentage_return_1mth_1↵
     (decile_1yr_1mth_2));
 849 decile_1yr_1mth_2_call_SR = mean(opt_percentage_return_1mth_1(decile_1yr_1mth_2)-↵
     decile_1yr_1mth_2_rates)/(sqrt(var(opt_percentage_return_1mth_1(decile_1yr_1mth_2)-↵
     decile_1yr_1mth_2_rates)));
 850 decile_1yr_1mth_2_stock_return = mean(stock_percentage_return_1mth_1↵
     (decile_1yr_1mth_2));
 851 [h,p,ci,decile_1yr_1mth_2_stock_return_ttest] = ttest↵
     (stock_percentage_return_1mth_1(decile_1yr_1mth_2),0);
 852 decile_1yr_1mth_2_stock_return_std = std(stock_percentage_return_1mth_1↵
     (decile_1yr_1mth_2));
 853 decile_1yr_1mth_2_stock_return_min = min(stock_percentage_return_1mth_1↵
     (decile_1yr_1mth_2));
 854 decile_1yr_1mth_2_stock_return_max = max(stock_percentage_return_1mth_1↵
     (decile_1yr_1mth_2));
 855 decile_1yr_1mth_2_stock_SR = mean(stock_percentage_return_1mth_1↵
     (decile_1yr_1mth_2)-decile_1yr_1mth_2_rates)/(sqrt(var(stock_percentage_return_1mth_1↵
     (decile_1yr_1mth_2)-decile_1yr_1mth_2_rates)));
 856 decile_1yr_1mth_2_date = D_op_1mth_4(decile_1yr_1mth_2);
 857 decile_1yr_1mth_2_call_price = call_price_1mth_2(decile_1yr_1mth_2);
```

```
858 decile_1yr_1mth_2_stock_price = underlying_1mth_3(decile_1yr_1mth_2);
859 decile_1yr_1mth_2_opt_ex_price = opt_ex_payoff_1mth_1(decile_1yr_1mth_2);
860 decile_1yr_1mth_2_strike_price = strike_price_1mth_4(decile_1yr_1mth_2);
861 decile_1yr_1mth_2_D_op = D_op_1mth_4(decile_1yr_1mth_2);
862 decile_1yr_1mth_2_ticker_op = ticker_op_1mth_4(decile_1yr_1mth_2);
863 decile_1yr_1mth_2_calldelta = callDelta_1mth_1yr_1(decile_1yr_1mth_2);
864 decile_1yr_1mth_2_stock_close = stock_close_1mth_1(decile_1yr_1mth_2);
865 decile_1yr_1mth_2_delta_return = mean((decile_1yr_1mth_2_opt_ex_price-↲
decile_1yr_1mth_2_call_price+(decile_1yr_1mth_2_stock_price.↲
*decile_1yr_1mth_2_calldelta)-(decile_1yr_1mth_2_stock_close.↲
*decile_1yr_1mth_2_calldelta))./((-decile_1yr_1mth_2_stock_price.↲
*decile_1yr_1mth_2_calldelta)+decile_1yr_1mth_2_call_price));
866 [h,p,ci,decile_1yr_1mth_2_delta_return_ttest] = ttest↲
((decile_1yr_1mth_2_opt_ex_price-decile_1yr_1mth_2_call_price+↲
(decile_1yr_1mth_2_stock_price.*decile_1yr_1mth_2_calldelta)-↲
(decile_1yr_1mth_2_stock_close.*decile_1yr_1mth_2_calldelta))./((-↲
decile_1yr_1mth_2_stock_price.*decile_1yr_1mth_2_calldelta)↲
+decile_1yr_1mth_2_call_price),0);
867 decile_1yr_1mth_2_delta_std = std((decile_1yr_1mth_2_opt_ex_price-↲
decile_1yr_1mth_2_call_price+(decile_1yr_1mth_2_stock_price.↲
*decile_1yr_1mth_2_calldelta)-(decile_1yr_1mth_2_stock_close.↲
*decile_1yr_1mth_2_calldelta))./((-decile_1yr_1mth_2_stock_price.↲
*decile_1yr_1mth_2_calldelta)+decile_1yr_1mth_2_call_price));
868 decile_1yr_1mth_2_delta_min = min((decile_1yr_1mth_2_opt_ex_price-↲
decile_1yr_1mth_2_call_price+(decile_1yr_1mth_2_stock_price.↲
*decile_1yr_1mth_2_calldelta)-(decile_1yr_1mth_2_stock_close.↲
*decile_1yr_1mth_2_calldelta))./((-decile_1yr_1mth_2_stock_price.↲
*decile_1yr_1mth_2_calldelta)+decile_1yr_1mth_2_call_price));
869 decile_1yr_1mth_2_delta_max = max((decile_1yr_1mth_2_opt_ex_price-↲
decile_1yr_1mth_2_call_price+(decile_1yr_1mth_2_stock_price.↲
*decile_1yr_1mth_2_calldelta)-(decile_1yr_1mth_2_stock_close.↲
*decile_1yr_1mth_2_calldelta))./((-decile_1yr_1mth_2_stock_price.↲
*decile_1yr_1mth_2_calldelta)+decile_1yr_1mth_2_call_price));
870 decile_1yr_1mth_2_delta_SR = mean((((decile_1yr_1mth_2_opt_ex_price-↲
decile_1yr_1mth_2_call_price+(decile_1yr_1mth_2_stock_price.↲
*decile_1yr_1mth_2_calldelta)-(decile_1yr_1mth_2_stock_close.↲
*decile_1yr_1mth_2_calldelta))./((-decile_1yr_1mth_2_stock_price.↲
*decile_1yr_1mth_2_calldelta)+decile_1yr_1mth_2_call_price))-decile_1yr_1mth_2_rates)↲
/...
871     (sqrt(var((decile_1yr_1mth_2_opt_ex_price-decile_1yr_1mth_2_call_price+↲
(decile_1yr_1mth_2_stock_price.*decile_1yr_1mth_2_calldelta)-↲
(decile_1yr_1mth_2_stock_close.*decile_1yr_1mth_2_calldelta))./(-↲
decile_1yr_1mth_2_stock_price.↲
*decile_1yr_1mth_2_calldelta+decile_1yr_1mth_2_call_price)-↲
decile_1yr_1mth_2_rates)))));
872
873
874 decile_1yr_1mth_3=find((logdiff_1yrRV_1mth > sort_logdiff_1yrRV_1mth(ff1*2,1)) &↲
(logdiff_1yrRV_1mth <= sort_logdiff_1yrRV_1mth(ff1*3,1)));
875
876 decile_1yr_1mth_3_mean = mean(diff_1yrRV_1mth(decile_1yr_1mth_3));
877 decile_1yr_1mth_3_RV = mean(Hist_Vol_1yr_1mth_1(decile_1yr_1mth_3));
878 decile_1yr_1mth_3_IV = mean(bsvolatility_1mth_1(decile_1yr_1mth_3));
879 decile_1yr_1mth_3_CS = mean(CallDivStock_1mth(decile_1yr_1mth_3));
```

```matlab
880 decile_1yr_1mth_3_delta = mean(callDelta_1mth_1yr_1(decile_1yr_1mth_3));
881 decile_1yr_1mth_3_rates = rates_1mth_2(decile_1yr_1mth_3);
882 decile_1yr_1mth_3_call_return = mean(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_3));
883 [h,p,ci,decile_1yr_1mth_3_call_return_ttest] = ttest(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_3),0);
884 decile_1yr_1mth_3_call_return_std = std(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_3));
885 decile_1yr_1mth_3_call_return_min = min(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_3));
886 decile_1yr_1mth_3_call_return_max = max(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_3));
887 decile_1yr_1mth_3_call_SR = mean(opt_percentage_return_1mth_1(decile_1yr_1mth_3)-↵
decile_1yr_1mth_3_rates)/(sqrt(var(opt_percentage_return_1mth_1(decile_1yr_1mth_3)-↵
decile_1yr_1mth_3_rates)));
888 decile_1yr_1mth_3_stock_return = mean(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_3));
889 [h,p,ci,decile_1yr_1mth_3_stock_return_ttest] = ttest↵
(stock_percentage_return_1mth_1(decile_1yr_1mth_3),0);
890 decile_1yr_1mth_3_stock_return_std = std(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_3));
891 decile_1yr_1mth_3_stock_return_min = min(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_3));
892 decile_1yr_1mth_3_stock_return_max = max(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_3));
893 decile_1yr_1mth_3_stock_SR = mean(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_3)-decile_1yr_1mth_3_rates)/(sqrt(var(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_3)-decile_1yr_1mth_3_rates)));
894 decile_1yr_1mth_3_date = D_op_1mth_4(decile_1yr_1mth_3);
895 decile_1yr_1mth_3_call_price = call_price_1mth_2(decile_1yr_1mth_3);
896 decile_1yr_1mth_3_stock_price = underlying_1mth_3(decile_1yr_1mth_3);
897 decile_1yr_1mth_3_opt_ex_price = opt_ex_payoff_1mth_1(decile_1yr_1mth_3);
898 decile_1yr_1mth_3_strike_price = strike_price_1mth_4(decile_1yr_1mth_3);
899 decile_1yr_1mth_3_D_op = D_op_1mth_4(decile_1yr_1mth_3);
900 decile_1yr_1mth_3_ticker_op = ticker_op_1mth_4(decile_1yr_1mth_3);
901 decile_1yr_1mth_3_calldelta = callDelta_1mth_1yr_1(decile_1yr_1mth_3);
902 decile_1yr_1mth_3_stock_close = stock_close_1mth_1(decile_1yr_1mth_3);
903 decile_1yr_1mth_3_delta_return = mean((decile_1yr_1mth_3_opt_ex_price-↵
decile_1yr_1mth_3_call_price+(decile_1yr_1mth_3_stock_price.↵
*decile_1yr_1mth_3_calldelta)-(decile_1yr_1mth_3_stock_close.↵
*decile_1yr_1mth_3_calldelta))./((-decile_1yr_1mth_3_stock_price.↵
*decile_1yr_1mth_3_calldelta)+decile_1yr_1mth_3_call_price));
904 [h,p,ci,decile_1yr_1mth_3_delta_return_ttest] = ttest↵
((decile_1yr_1mth_3_opt_ex_price-decile_1yr_1mth_3_call_price+↵
(decile_1yr_1mth_3_stock_price.*decile_1yr_1mth_3_calldelta)-↵
(decile_1yr_1mth_3_stock_close.*decile_1yr_1mth_3_calldelta))./((-↵
decile_1yr_1mth_3_stock_price.*decile_1yr_1mth_3_calldelta)↵
+decile_1yr_1mth_3_call_price),0);
905 decile_1yr_1mth_3_delta_std = std((decile_1yr_1mth_3_opt_ex_price-↵
decile_1yr_1mth_3_call_price+(decile_1yr_1mth_3_stock_price.↵
*decile_1yr_1mth_3_calldelta)-(decile_1yr_1mth_3_stock_close.↵
*decile_1yr_1mth_3_calldelta))./((-decile_1yr_1mth_3_stock_price.↵
*decile_1yr_1mth_3_calldelta)+decile_1yr_1mth_3_call_price));
906 decile_1yr_1mth_3_delta_min = min((decile_1yr_1mth_3_opt_ex_price-↵
```

```
decile_1yr_1mth_3_call_price+(decile_1yr_1mth_3_stock_price.↵
*decile_1yr_1mth_3_calldelta)-(decile_1yr_1mth_3_stock_close.↵
*decile_1yr_1mth_3_calldelta))./((-decile_1yr_1mth_3_stock_price.↵
*decile_1yr_1mth_3_calldelta)+decile_1yr_1mth_3_call_price));
 907 decile_1yr_1mth_3_delta_max = max((decile_1yr_1mth_3_opt_ex_price-↵
decile_1yr_1mth_3_call_price+(decile_1yr_1mth_3_stock_price.↵
*decile_1yr_1mth_3_calldelta)-(decile_1yr_1mth_3_stock_close.↵
*decile_1yr_1mth_3_calldelta))./((-decile_1yr_1mth_3_stock_price.↵
*decile_1yr_1mth_3_calldelta)+decile_1yr_1mth_3_call_price));
 908 decile_1yr_1mth_3_delta_SR = mean((((decile_1yr_1mth_3_opt_ex_price-↵
decile_1yr_1mth_3_call_price+(decile_1yr_1mth_3_stock_price.↵
*decile_1yr_1mth_3_calldelta)-(decile_1yr_1mth_3_stock_close.↵
*decile_1yr_1mth_3_calldelta))./((-decile_1yr_1mth_3_stock_price.↵
*decile_1yr_1mth_3_calldelta)+decile_1yr_1mth_3_call_price))-decile_1yr_1mth_3_rates)↵
/...
 909     (sqrt(var((decile_1yr_1mth_3_opt_ex_price-decile_1yr_1mth_3_call_price+↵
(decile_1yr_1mth_3_stock_price.*decile_1yr_1mth_3_calldelta)-↵
(decile_1yr_1mth_3_stock_close.*decile_1yr_1mth_3_calldelta))./(-↵
decile_1yr_1mth_3_stock_price.↵
*decile_1yr_1mth_3_calldelta+decile_1yr_1mth_3_call_price)-↵
decile_1yr_1mth_3_rates)))));
 910
 911
 912 decile_1yr_1mth_4=find((logdiff_1yrRV_1mth > sort_logdiff_1yrRV_1mth(ff1*3,1)) &↵
(logdiff_1yrRV_1mth <= sort_logdiff_1yrRV_1mth(ff1*4,1)));
 913
 914 decile_1yr_1mth_4_mean = mean(diff_1yrRV_1mth(decile_1yr_1mth_4));
 915 decile_1yr_1mth_4_RV = mean(Hist_Vol_1yr_1mth_1(decile_1yr_1mth_4));
 916 decile_1yr_1mth_4_IV = mean(bsvolatility_1mth_1(decile_1yr_1mth_4));
 917 decile_1yr_1mth_4_CS = mean(CallDivStock_1mth(decile_1yr_1mth_4));
 918 decile_1yr_1mth_4_delta = mean(callDelta_1mth_1yr_1(decile_1yr_1mth_4));
 919 decile_1yr_1mth_4_rates = rates_1mth_2(decile_1yr_1mth_4);
 920 decile_1yr_1mth_4_call_return = mean(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_4));
 921 [h,p,ci,decile_1yr_1mth_4_call_return_ttest] = ttest(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_4),0);
 922 decile_1yr_1mth_4_call_return_std = std(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_4));
 923 decile_1yr_1mth_4_call_return_min = min(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_4));
 924 decile_1yr_1mth_4_call_return_max = max(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_4));
 925 decile_1yr_1mth_4_call_SR = mean(opt_percentage_return_1mth_1(decile_1yr_1mth_4)-↵
decile_1yr_1mth_4_rates)/(sqrt(var(opt_percentage_return_1mth_1(decile_1yr_1mth_4)-↵
decile_1yr_1mth_4_rates)));
 926 decile_1yr_1mth_4_stock_return = mean(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_4));
 927 [h,p,ci,decile_1yr_1mth_4_stock_return_ttest] = ttest↵
(stock_percentage_return_1mth_1(decile_1yr_1mth_4),0);
 928 decile_1yr_1mth_4_stock_return_std = std(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_4));
 929 decile_1yr_1mth_4_stock_return_min = min(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_4));
 930 decile_1yr_1mth_4_stock_return_max = max(stock_percentage_return_1mth_1↵
```

```
     (decile_1yr_1mth_4));
 931 decile_1yr_1mth_4_stock_SR = mean(stock_percentage_return_1mth_1↙
     (decile_1yr_1mth_4)-decile_1yr_1mth_4_rates)/(sqrt(var(stock_percentage_return_1mth_1↙
     (decile_1yr_1mth_4)-decile_1yr_1mth_4_rates)));
 932 decile_1yr_1mth_4_date = D_op_1mth_4(decile_1yr_1mth_4);
 933 decile_1yr_1mth_4_call_price = call_price_1mth_2(decile_1yr_1mth_4);
 934 decile_1yr_1mth_4_stock_price = underlying_1mth_3(decile_1yr_1mth_4);
 935 decile_1yr_1mth_4_opt_ex_price = opt_ex_payoff_1mth_1(decile_1yr_1mth_4);
 936 decile_1yr_1mth_4_strike_price = strike_price_1mth_4(decile_1yr_1mth_4);
 937 decile_1yr_1mth_4_D_op = D_op_1mth_4(decile_1yr_1mth_4);
 938 decile_1yr_1mth_4_ticker_op = ticker_op_1mth_4(decile_1yr_1mth_4);
 939 decile_1yr_1mth_4_calldelta = callDelta_1mth_1yr_1(decile_1yr_1mth_4);
 940 decile_1yr_1mth_4_stock_close = stock_close_1mth_1(decile_1yr_1mth_4);
 941 decile_1yr_1mth_4_delta_return = mean((decile_1yr_1mth_4_opt_ex_price-↙
     decile_1yr_1mth_4_call_price+(decile_1yr_1mth_4_stock_price.↙
     *decile_1yr_1mth_4_calldelta)-(decile_1yr_1mth_4_stock_close.↙
     *decile_1yr_1mth_4_calldelta))./((-decile_1yr_1mth_4_stock_price.↙
     *decile_1yr_1mth_4_calldelta)+decile_1yr_1mth_4_call_price));
 942 [h,p,ci,decile_1yr_1mth_4_delta_return_ttest] = ttest↙
     ((decile_1yr_1mth_4_opt_ex_price-decile_1yr_1mth_4_call_price+↙
     (decile_1yr_1mth_4_stock_price.*decile_1yr_1mth_4_calldelta)-↙
     (decile_1yr_1mth_4_stock_close.*decile_1yr_1mth_4_calldelta))./((-↙
     decile_1yr_1mth_4_stock_price.*decile_1yr_1mth_4_calldelta)↙
     +decile_1yr_1mth_4_call_price),0);
 943 decile_1yr_1mth_4_delta_std = std((decile_1yr_1mth_4_opt_ex_price-↙
     decile_1yr_1mth_4_call_price+(decile_1yr_1mth_4_stock_price.↙
     *decile_1yr_1mth_4_calldelta)-(decile_1yr_1mth_4_stock_close.↙
     *decile_1yr_1mth_4_calldelta))./((-decile_1yr_1mth_4_stock_price.↙
     *decile_1yr_1mth_4_calldelta)+decile_1yr_1mth_4_call_price));
 944 decile_1yr_1mth_4_delta_min = min((decile_1yr_1mth_4_opt_ex_price-↙
     decile_1yr_1mth_4_call_price+(decile_1yr_1mth_4_stock_price.↙
     *decile_1yr_1mth_4_calldelta)-(decile_1yr_1mth_4_stock_close.↙
     *decile_1yr_1mth_4_calldelta))./((-decile_1yr_1mth_4_stock_price.↙
     *decile_1yr_1mth_4_calldelta)+decile_1yr_1mth_4_call_price));
 945 decile_1yr_1mth_4_delta_max = max((decile_1yr_1mth_4_opt_ex_price-↙
     decile_1yr_1mth_4_call_price+(decile_1yr_1mth_4_stock_price.↙
     *decile_1yr_1mth_4_calldelta)-(decile_1yr_1mth_4_stock_close.↙
     *decile_1yr_1mth_4_calldelta))./((-decile_1yr_1mth_4_stock_price.↙
     *decile_1yr_1mth_4_calldelta)+decile_1yr_1mth_4_call_price));
 946 decile_1yr_1mth_4_delta_SR = mean((((decile_1yr_1mth_4_opt_ex_price-↙
     decile_1yr_1mth_4_call_price+(decile_1yr_1mth_4_stock_price.↙
     *decile_1yr_1mth_4_calldelta)-(decile_1yr_1mth_4_stock_close.↙
     *decile_1yr_1mth_4_calldelta))./((-decile_1yr_1mth_4_stock_price.↙
     *decile_1yr_1mth_4_calldelta)+decile_1yr_1mth_4_call_price))-decile_1yr_1mth_4_rates)↙
     /...
 947     (sqrt(var((decile_1yr_1mth_4_opt_ex_price-decile_1yr_1mth_4_call_price+↙
     (decile_1yr_1mth_4_stock_price.*decile_1yr_1mth_4_calldelta)-↙
     (decile_1yr_1mth_4_stock_close.*decile_1yr_1mth_4_calldelta))./(-↙
     decile_1yr_1mth_4_stock_price.↙
     *decile_1yr_1mth_4_calldelta+decile_1yr_1mth_4_call_price)-↙
     decile_1yr_1mth_4_rates))));
 948
 949
 950 decile_1yr_1mth_5=find((logdiff_1yrRV_1mth > sort_logdiff_1yrRV_1mth(ff1*4,1)) &↙
```

```
     (logdiff_1yrRV_1mth <= sort_logdiff_1yrRV_1mth(ff1*5,1)));
951
952 decile_1yr_1mth_5_mean = mean(diff_1yrRV_1mth(decile_1yr_1mth_5));
953 decile_1yr_1mth_5_RV = mean(Hist_Vol_1yr_1mth_1(decile_1yr_1mth_5));
954 decile_1yr_1mth_5_IV = mean(bsvolatility_1mth_1(decile_1yr_1mth_5));
955 decile_1yr_1mth_5_CS = mean(CallDivStock_1mth(decile_1yr_1mth_5));
956 decile_1yr_1mth_5_delta = mean(callDelta_1mth_1yr_1(decile_1yr_1mth_5));
957 decile_1yr_1mth_5_rates = rates_1mth_2(decile_1yr_1mth_5);
958 decile_1yr_1mth_5_call_return = mean(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_5));
959 [h,p,ci,decile_1yr_1mth_5_call_return_ttest] = ttest(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_5),0);
960 decile_1yr_1mth_5_call_return_std = std(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_5));
961 decile_1yr_1mth_5_call_return_min = min(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_5));
962 decile_1yr_1mth_5_call_return_max = max(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_5));
963 decile_1yr_1mth_5_call_SR = mean(opt_percentage_return_1mth_1(decile_1yr_1mth_5)-↵
decile_1yr_1mth_5_rates)/(sqrt(var(opt_percentage_return_1mth_1(decile_1yr_1mth_5)-↵
decile_1yr_1mth_5_rates)));
964 decile_1yr_1mth_5_stock_return = mean(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_5));
965 [h,p,ci,decile_1yr_1mth_5_stock_return_ttest] = ttest↵
(stock_percentage_return_1mth_1(decile_1yr_1mth_5),0);
966 decile_1yr_1mth_5_stock_return_std = std(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_5));
967 decile_1yr_1mth_5_stock_return_min = min(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_5));
968 decile_1yr_1mth_5_stock_return_max = max(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_5));
969 decile_1yr_1mth_5_stock_SR = mean(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_5)-decile_1yr_1mth_5_rates)/(sqrt(var(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_5)-decile_1yr_1mth_5_rates)));
970 decile_1yr_1mth_5_date = D_op_1mth_4(decile_1yr_1mth_5);
971 decile_1yr_1mth_5_call_price = call_price_1mth_2(decile_1yr_1mth_5);
972 decile_1yr_1mth_5_stock_price = underlying_1mth_3(decile_1yr_1mth_5);
973 decile_1yr_1mth_5_opt_ex_price = opt_ex_payoff_1mth_1(decile_1yr_1mth_5);
974 decile_1yr_1mth_5_strike_price = strike_price_1mth_4(decile_1yr_1mth_5);
975 decile_1yr_1mth_5_D_op = D_op_1mth_4(decile_1yr_1mth_5);
976 decile_1yr_1mth_5_ticker_op = ticker_op_1mth_4(decile_1yr_1mth_5);
977 decile_1yr_1mth_5_calldelta = callDelta_1mth_1yr_1(decile_1yr_1mth_5);
978 decile_1yr_1mth_5_stock_close = stock_close_1mth_1(decile_1yr_1mth_5);
979 decile_1yr_1mth_5_delta_return = mean((decile_1yr_1mth_5_opt_ex_price-↵
decile_1yr_1mth_5_call_price+(decile_1yr_1mth_5_stock_price.↵
*decile_1yr_1mth_5_calldelta)-(decile_1yr_1mth_5_stock_close.↵
*decile_1yr_1mth_5_calldelta))./((-decile_1yr_1mth_5_stock_price.↵
*decile_1yr_1mth_5_calldelta)+decile_1yr_1mth_5_call_price));
980 [h,p,ci,decile_1yr_1mth_5_delta_return_ttest] = ttest↵
((decile_1yr_1mth_5_opt_ex_price-decile_1yr_1mth_5_call_price+↵
(decile_1yr_1mth_5_stock_price.*decile_1yr_1mth_5_calldelta)-↵
(decile_1yr_1mth_5_stock_close.*decile_1yr_1mth_5_calldelta))./((-↵
decile_1yr_1mth_5_stock_price.*decile_1yr_1mth_5_calldelta)↵
+decile_1yr_1mth_5_call_price),0);
```

```
 981 decile_1yr_1mth_5_delta_std = std((decile_1yr_1mth_5_opt_ex_price-↵
decile_1yr_1mth_5_call_price+(decile_1yr_1mth_5_stock_price.↵
*decile_1yr_1mth_5_calldelta)-(decile_1yr_1mth_5_stock_close.↵
*decile_1yr_1mth_5_calldelta))./((-decile_1yr_1mth_5_stock_price.↵
*decile_1yr_1mth_5_calldelta)+decile_1yr_1mth_5_call_price));
 982 decile_1yr_1mth_5_delta_min = min((decile_1yr_1mth_5_opt_ex_price-↵
decile_1yr_1mth_5_call_price+(decile_1yr_1mth_5_stock_price.↵
*decile_1yr_1mth_5_calldelta)-(decile_1yr_1mth_5_stock_close.↵
*decile_1yr_1mth_5_calldelta))./((-decile_1yr_1mth_5_stock_price.↵
*decile_1yr_1mth_5_calldelta)+decile_1yr_1mth_5_call_price));
 983 decile_1yr_1mth_5_delta_max = max((decile_1yr_1mth_5_opt_ex_price-↵
decile_1yr_1mth_5_call_price+(decile_1yr_1mth_5_stock_price.↵
*decile_1yr_1mth_5_calldelta)-(decile_1yr_1mth_5_stock_close.↵
*decile_1yr_1mth_5_calldelta))./((-decile_1yr_1mth_5_stock_price.↵
*decile_1yr_1mth_5_calldelta)+decile_1yr_1mth_5_call_price));
 984 decile_1yr_1mth_5_delta_SR = mean((((decile_1yr_1mth_5_opt_ex_price-↵
decile_1yr_1mth_5_call_price+(decile_1yr_1mth_5_stock_price.↵
*decile_1yr_1mth_5_calldelta)-(decile_1yr_1mth_5_stock_close.↵
*decile_1yr_1mth_5_calldelta))./((-decile_1yr_1mth_5_stock_price.↵
*decile_1yr_1mth_5_calldelta)+decile_1yr_1mth_5_call_price))-decile_1yr_1mth_5_rates)↵
/...
 985     (sqrt(var((decile_1yr_1mth_5_opt_ex_price-decile_1yr_1mth_5_call_price+↵
(decile_1yr_1mth_5_stock_price.*decile_1yr_1mth_5_calldelta)-↵
(decile_1yr_1mth_5_stock_close.*decile_1yr_1mth_5_calldelta))./(-↵
decile_1yr_1mth_5_stock_price.↵
*decile_1yr_1mth_5_calldelta+decile_1yr_1mth_5_call_price)-↵
decile_1yr_1mth_5_rates))));
 986
 987
 988 decile_1yr_1mth_6=find((logdiff_1yrRV_1mth > sort_logdiff_1yrRV_1mth(ff1*5,1)) &↵
(logdiff_1yrRV_1mth <= sort_logdiff_1yrRV_1mth(ff1*6,1)));
 989
 990 decile_1yr_1mth_6_mean = mean(diff_1yrRV_1mth(decile_1yr_1mth_6));
 991 decile_1yr_1mth_6_RV = mean(Hist_Vol_1yr_1mth_1(decile_1yr_1mth_6));
 992 decile_1yr_1mth_6_IV = mean(bsvolatility_1mth_1(decile_1yr_1mth_6));
 993 decile_1yr_1mth_6_CS = mean(CallDivStock_1mth(decile_1yr_1mth_6));
 994 decile_1yr_1mth_6_delta = mean(callDelta_1mth_1yr_1(decile_1yr_1mth_6));
 995 decile_1yr_1mth_6_rates = rates_1mth_2(decile_1yr_1mth_6);
 996 decile_1yr_1mth_6_call_return = mean(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_6));
 997 [h,p,ci,decile_1yr_1mth_6_call_return_ttest] = ttest(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_6),0);
 998 decile_1yr_1mth_6_call_return_std = std(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_6));
 999 decile_1yr_1mth_6_call_return_min = min(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_6));
1000 decile_1yr_1mth_6_call_return_max = max(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_6));
1001 decile_1yr_1mth_6_call_SR = mean(opt_percentage_return_1mth_1(decile_1yr_1mth_6)-↵
decile_1yr_1mth_6_rates)/(sqrt(var(opt_percentage_return_1mth_1(decile_1yr_1mth_6)-↵
decile_1yr_1mth_6_rates)));
1002 decile_1yr_1mth_6_stock_return = mean(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_6));
1003 [h,p,ci,decile_1yr_1mth_6_stock_return_ttest] = ttest↵
```

```
(stock_percentage_return_1mth_1(decile_1yr_1mth_6),0);
1004 decile_1yr_1mth_6_stock_return_std = std(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_6));
1005 decile_1yr_1mth_6_stock_return_min = min(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_6));
1006 decile_1yr_1mth_6_stock_return_max = max(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_6));
1007 decile_1yr_1mth_6_stock_SR = mean(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_6)-decile_1yr_1mth_6_rates)/(sqrt(var(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_6)-decile_1yr_1mth_6_rates)));
1008 decile_1yr_1mth_6_date = D_op_1mth_4(decile_1yr_1mth_6);
1009 decile_1yr_1mth_6_call_price = call_price_1mth_2(decile_1yr_1mth_6);
1010 decile_1yr_1mth_6_stock_price = underlying_1mth_3(decile_1yr_1mth_6);
1011 decile_1yr_1mth_6_opt_ex_price = opt_ex_payoff_1mth_1(decile_1yr_1mth_6);
1012 decile_1yr_1mth_6_strike_price = strike_price_1mth_4(decile_1yr_1mth_6);
1013 decile_1yr_1mth_6_D_op = D_op_1mth_4(decile_1yr_1mth_6);
1014 decile_1yr_1mth_6_ticker_op = ticker_op_1mth_4(decile_1yr_1mth_6);
1015 decile_1yr_1mth_6_calldelta = callDelta_1mth_1yr_1(decile_1yr_1mth_6);
1016 decile_1yr_1mth_6_stock_close = stock_close_1mth_1(decile_1yr_1mth_6);
1017 decile_1yr_1mth_6_delta_return = mean((decile_1yr_1mth_6_opt_ex_price-↵
decile_1yr_1mth_6_call_price+(decile_1yr_1mth_6_stock_price.↵
*decile_1yr_1mth_6_calldelta)-(decile_1yr_1mth_6_stock_close.↵
*decile_1yr_1mth_6_calldelta))./((-decile_1yr_1mth_6_stock_price.↵
*decile_1yr_1mth_6_calldelta)+decile_1yr_1mth_6_call_price));
1018 [h,p,ci,decile_1yr_1mth_6_delta_return_ttest] = ttest↵
((decile_1yr_1mth_6_opt_ex_price-decile_1yr_1mth_6_call_price+↵
(decile_1yr_1mth_6_stock_price.*decile_1yr_1mth_6_calldelta)-↵
(decile_1yr_1mth_6_stock_close.*decile_1yr_1mth_6_calldelta))./((-↵
decile_1yr_1mth_6_stock_price.*decile_1yr_1mth_6_calldelta)↵
+decile_1yr_1mth_6_call_price),0);
1019 decile_1yr_1mth_6_delta_std = std((decile_1yr_1mth_6_opt_ex_price-↵
decile_1yr_1mth_6_call_price+(decile_1yr_1mth_6_stock_price.↵
*decile_1yr_1mth_6_calldelta)-(decile_1yr_1mth_6_stock_close.↵
*decile_1yr_1mth_6_calldelta))./((-decile_1yr_1mth_6_stock_price.↵
*decile_1yr_1mth_6_calldelta)+decile_1yr_1mth_6_call_price));
1020 decile_1yr_1mth_6_delta_min = min((decile_1yr_1mth_6_opt_ex_price-↵
decile_1yr_1mth_6_call_price+(decile_1yr_1mth_6_stock_price.↵
*decile_1yr_1mth_6_calldelta)-(decile_1yr_1mth_6_stock_close.↵
*decile_1yr_1mth_6_calldelta))./((-decile_1yr_1mth_6_stock_price.↵
*decile_1yr_1mth_6_calldelta)+decile_1yr_1mth_6_call_price));
1021 decile_1yr_1mth_6_delta_max = max((decile_1yr_1mth_6_opt_ex_price-↵
decile_1yr_1mth_6_call_price+(decile_1yr_1mth_6_stock_price.↵
*decile_1yr_1mth_6_calldelta)-(decile_1yr_1mth_6_stock_close.↵
*decile_1yr_1mth_6_calldelta))./((-decile_1yr_1mth_6_stock_price.↵
*decile_1yr_1mth_6_calldelta)+decile_1yr_1mth_6_call_price));
1022 decile_1yr_1mth_6_delta_SR = mean((((decile_1yr_1mth_6_opt_ex_price-↵
decile_1yr_1mth_6_call_price+(decile_1yr_1mth_6_stock_price.↵
*decile_1yr_1mth_6_calldelta)-(decile_1yr_1mth_6_stock_close.↵
*decile_1yr_1mth_6_calldelta))./((-decile_1yr_1mth_6_stock_price.↵
*decile_1yr_1mth_6_calldelta)+decile_1yr_1mth_6_call_price))-decile_1yr_1mth_6_rates)↵
/...
1023    (sqrt(var((decile_1yr_1mth_6_opt_ex_price-decile_1yr_1mth_6_call_price+↵
(decile_1yr_1mth_6_stock_price.*decile_1yr_1mth_6_calldelta)-↵
(decile_1yr_1mth_6_stock_close.*decile_1yr_1mth_6_calldelta))./(-↵
```

```
decile_1yr_1mth_6_stock_price.↵
*decile_1yr_1mth_6_calldelta+decile_1yr_1mth_6_call_price)-↵
decile_1yr_1mth_6_rates))));
1024
1025
1026 decile_1yr_1mth_7=find((logdiff_1yrRV_1mth > sort_logdiff_1yrRV_1mth(ff1*6,1)) &↵
(logdiff_1yrRV_1mth <= sort_logdiff_1yrRV_1mth(ff1*7,1)));
1027
1028 decile_1yr_1mth_7_mean = mean(diff_1yrRV_1mth(decile_1yr_1mth_7));
1029 decile_1yr_1mth_7_RV = mean(Hist_Vol_1yr_1mth_1(decile_1yr_1mth_7));
1030 decile_1yr_1mth_7_IV = mean(bsvolatility_1mth_1(decile_1yr_1mth_7));
1031 decile_1yr_1mth_7_CS = mean(CallDivStock_1mth(decile_1yr_1mth_7));
1032 decile_1yr_1mth_7_delta = mean(callDelta_1mth_1yr_1(decile_1yr_1mth_7));
1033 decile_1yr_1mth_7_rates = rates_1mth_2(decile_1yr_1mth_7);
1034 decile_1yr_1mth_7_call_return = mean(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_7));
1035 [h,p,ci,decile_1yr_1mth_7_call_return_ttest] = ttest(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_7),0);
1036 decile_1yr_1mth_7_call_return_std = std(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_7));
1037 decile_1yr_1mth_7_call_return_min = min(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_7));
1038 decile_1yr_1mth_7_call_return_max = max(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_7));
1039 decile_1yr_1mth_7_call_SR = mean(opt_percentage_return_1mth_1(decile_1yr_1mth_7)-↵
decile_1yr_1mth_7_rates)/(sqrt(var(opt_percentage_return_1mth_1(decile_1yr_1mth_7)-↵
decile_1yr_1mth_7_rates)));
1040 decile_1yr_1mth_7_stock_return = mean(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_7));
1041 [h,p,ci,decile_1yr_1mth_7_stock_return_ttest] = ttest↵
(stock_percentage_return_1mth_1(decile_1yr_1mth_7),0);
1042 decile_1yr_1mth_7_stock_return_std = std(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_7));
1043 decile_1yr_1mth_7_stock_return_min = min(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_7));
1044 decile_1yr_1mth_7_stock_return_max = max(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_7));
1045 decile_1yr_1mth_7_stock_SR = mean(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_7)-decile_1yr_1mth_7_rates)/(sqrt(var(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_7)-decile_1yr_1mth_7_rates)));
1046 decile_1yr_1mth_7_date = D_op_1mth_4(decile_1yr_1mth_7);
1047 decile_1yr_1mth_7_call_price = call_price_1mth_2(decile_1yr_1mth_7);
1048 decile_1yr_1mth_7_stock_price = underlying_1mth_3(decile_1yr_1mth_7);
1049 decile_1yr_1mth_7_opt_ex_price = opt_ex_payoff_1mth_1(decile_1yr_1mth_7);
1050 decile_1yr_1mth_7_strike_price = strike_price_1mth_4(decile_1yr_1mth_7);
1051 decile_1yr_1mth_7_D_op = D_op_1mth_4(decile_1yr_1mth_7);
1052 decile_1yr_1mth_7_ticker_op = ticker_op_1mth_4(decile_1yr_1mth_7);
1053 decile_1yr_1mth_7_calldelta = callDelta_1mth_1yr_1(decile_1yr_1mth_7);
1054 decile_1yr_1mth_7_stock_close = stock_close_1mth_1(decile_1yr_1mth_7);
1055 decile_1yr_1mth_7_delta_return = mean((decile_1yr_1mth_7_opt_ex_price-↵
decile_1yr_1mth_7_call_price+(decile_1yr_1mth_7_stock_price.↵
*decile_1yr_1mth_7_calldelta)-(decile_1yr_1mth_7_stock_close.↵
*decile_1yr_1mth_7_calldelta))./((-decile_1yr_1mth_7_stock_price.↵
*decile_1yr_1mth_7_calldelta)+decile_1yr_1mth_7_call_price));
```

```
1056 [h,p,ci,decile_1yr_1mth_7_delta_return_ttest] = ttest↵
((decile_1yr_1mth_7_opt_ex_price-decile_1yr_1mth_7_call_price+↵
(decile_1yr_1mth_7_stock_price.*decile_1yr_1mth_7_calldelta)-↵
(decile_1yr_1mth_7_stock_close.*decile_1yr_1mth_7_calldelta))./((-↵
decile_1yr_1mth_7_stock_price.*decile_1yr_1mth_7_calldelta)↵
+decile_1yr_1mth_7_call_price),0);
1057 decile_1yr_1mth_7_delta_std = std((decile_1yr_1mth_7_opt_ex_price-↵
decile_1yr_1mth_7_call_price+(decile_1yr_1mth_7_stock_price.↵
*decile_1yr_1mth_7_calldelta)-(decile_1yr_1mth_7_stock_close.↵
*decile_1yr_1mth_7_calldelta))./((-decile_1yr_1mth_7_stock_price.↵
*decile_1yr_1mth_7_calldelta)+decile_1yr_1mth_7_call_price));
1058 decile_1yr_1mth_7_delta_min = min((decile_1yr_1mth_7_opt_ex_price-↵
decile_1yr_1mth_7_call_price+(decile_1yr_1mth_7_stock_price.↵
*decile_1yr_1mth_7_calldelta)-(decile_1yr_1mth_7_stock_close.↵
*decile_1yr_1mth_7_calldelta))./((-decile_1yr_1mth_7_stock_price.↵
*decile_1yr_1mth_7_calldelta)+decile_1yr_1mth_7_call_price));
1059 decile_1yr_1mth_7_delta_max = max((decile_1yr_1mth_7_opt_ex_price-↵
decile_1yr_1mth_7_call_price+(decile_1yr_1mth_7_stock_price.↵
*decile_1yr_1mth_7_calldelta)-(decile_1yr_1mth_7_stock_close.↵
*decile_1yr_1mth_7_calldelta))./((-decile_1yr_1mth_7_stock_price.↵
*decile_1yr_1mth_7_calldelta)+decile_1yr_1mth_7_call_price));
1060 decile_1yr_1mth_7_delta_SR = mean((((decile_1yr_1mth_7_opt_ex_price-↵
decile_1yr_1mth_7_call_price+(decile_1yr_1mth_7_stock_price.↵
*decile_1yr_1mth_7_calldelta)-(decile_1yr_1mth_7_stock_close.↵
*decile_1yr_1mth_7_calldelta))./((-decile_1yr_1mth_7_stock_price.↵
*decile_1yr_1mth_7_calldelta)+decile_1yr_1mth_7_call_price))-decile_1yr_1mth_7_rates)↵
/...
1061     (sqrt(var((decile_1yr_1mth_7_opt_ex_price-decile_1yr_1mth_7_call_price+↵
(decile_1yr_1mth_7_stock_price.*decile_1yr_1mth_7_calldelta)-↵
(decile_1yr_1mth_7_stock_close.*decile_1yr_1mth_7_calldelta))./(-↵
decile_1yr_1mth_7_stock_price.↵
*decile_1yr_1mth_7_calldelta+decile_1yr_1mth_7_call_price)-↵
decile_1yr_1mth_7_rates))));
1062
1063
1064 decile_1yr_1mth_8=find((logdiff_1yrRV_1mth > sort_logdiff_1yrRV_1mth(ff1*7,1)) &↵
(logdiff_1yrRV_1mth <= sort_logdiff_1yrRV_1mth(ff1*8,1)));
1065
1066 decile_1yr_1mth_8_mean = mean(diff_1yrRV_1mth(decile_1yr_1mth_8));
1067 decile_1yr_1mth_8_RV = mean(Hist_Vol_1yr_1mth_1(decile_1yr_1mth_8));
1068 decile_1yr_1mth_8_IV = mean(bsvolatility_1mth_1(decile_1yr_1mth_8));
1069 decile_1yr_1mth_8_CS = mean(CallDivStock_1mth(decile_1yr_1mth_8));
1070 decile_1yr_1mth_8_delta = mean(callDelta_1mth_1yr_1(decile_1yr_1mth_8));
1071 decile_1yr_1mth_8_rates = rates_1mth_2(decile_1yr_1mth_8);
1072 decile_1yr_1mth_8_call_return = mean(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_8));
1073 [h,p,ci,decile_1yr_1mth_8_call_return_ttest] = ttest(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_8),0);
1074 decile_1yr_1mth_8_call_return_std = std(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_8));
1075 decile_1yr_1mth_8_call_return_min = min(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_8));
1076 decile_1yr_1mth_8_call_return_max = max(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_8));
```

```
1077 decile_1yr_1mth_8_call_SR = mean(opt_percentage_return_1mth_1(decile_1yr_1mth_8)-↵
decile_1yr_1mth_8_rates)/(sqrt(var(opt_percentage_return_1mth_1(decile_1yr_1mth_8)-↵
decile_1yr_1mth_8_rates)));
1078 decile_1yr_1mth_8_stock_return = mean(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_8));
1079 [h,p,ci,decile_1yr_1mth_8_stock_return_ttest] = ttest↵
(stock_percentage_return_1mth_1(decile_1yr_1mth_8),0);
1080 decile_1yr_1mth_8_stock_return_std = std(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_8));
1081 decile_1yr_1mth_8_stock_return_min = min(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_8));
1082 decile_1yr_1mth_8_stock_return_max = max(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_8));
1083 decile_1yr_1mth_8_stock_SR = mean(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_8)-decile_1yr_1mth_8_rates)/(sqrt(var(stock_percentage_return_1mth_1↵
(decile_1yr_1mth_8)-decile_1yr_1mth_8_rates)));
1084 decile_1yr_1mth_8_date = D_op_1mth_4(decile_1yr_1mth_8);
1085 decile_1yr_1mth_8_call_price = call_price_1mth_2(decile_1yr_1mth_8);
1086 decile_1yr_1mth_8_stock_price = underlying_1mth_3(decile_1yr_1mth_8);
1087 decile_1yr_1mth_8_opt_ex_price = opt_ex_payoff_1mth_1(decile_1yr_1mth_8);
1088 decile_1yr_1mth_8_strike_price = strike_price_1mth_4(decile_1yr_1mth_8);
1089 decile_1yr_1mth_8_D_op = D_op_1mth_4(decile_1yr_1mth_8);
1090 decile_1yr_1mth_8_ticker_op = ticker_op_1mth_4(decile_1yr_1mth_8);
1091 decile_1yr_1mth_8_calldelta = callDelta_1mth_1yr_1(decile_1yr_1mth_8);
1092 decile_1yr_1mth_8_stock_close = stock_close_1mth_1(decile_1yr_1mth_8);
1093 decile_1yr_1mth_8_delta_return = mean((decile_1yr_1mth_8_opt_ex_price-↵
decile_1yr_1mth_8_call_price+(decile_1yr_1mth_8_stock_price.↵
*decile_1yr_1mth_8_calldelta)-(decile_1yr_1mth_8_stock_close.↵
*decile_1yr_1mth_8_calldelta))./((-decile_1yr_1mth_8_stock_price.↵
*decile_1yr_1mth_8_calldelta)+decile_1yr_1mth_8_call_price));
1094 [h,p,ci,decile_1yr_1mth_8_delta_return_ttest] = ttest↵
((decile_1yr_1mth_8_opt_ex_price-decile_1yr_1mth_8_call_price+↵
(decile_1yr_1mth_8_stock_price.*decile_1yr_1mth_8_calldelta)-↵
(decile_1yr_1mth_8_stock_close.*decile_1yr_1mth_8_calldelta))./((-↵
decile_1yr_1mth_8_stock_price.*decile_1yr_1mth_8_calldelta)↵
+decile_1yr_1mth_8_call_price),0);
1095 decile_1yr_1mth_8_delta_std = std((decile_1yr_1mth_8_opt_ex_price-↵
decile_1yr_1mth_8_call_price+(decile_1yr_1mth_8_stock_price.↵
*decile_1yr_1mth_8_calldelta)-(decile_1yr_1mth_8_stock_close.↵
*decile_1yr_1mth_8_calldelta))./((-decile_1yr_1mth_8_stock_price.↵
*decile_1yr_1mth_8_calldelta)+decile_1yr_1mth_8_call_price));
1096 decile_1yr_1mth_8_delta_min = min((decile_1yr_1mth_8_opt_ex_price-↵
decile_1yr_1mth_8_call_price+(decile_1yr_1mth_8_stock_price.↵
*decile_1yr_1mth_8_calldelta)-(decile_1yr_1mth_8_stock_close.↵
*decile_1yr_1mth_8_calldelta))./((-decile_1yr_1mth_8_stock_price.↵
*decile_1yr_1mth_8_calldelta)+decile_1yr_1mth_8_call_price));
1097 decile_1yr_1mth_8_delta_max = max((decile_1yr_1mth_8_opt_ex_price-↵
decile_1yr_1mth_8_call_price+(decile_1yr_1mth_8_stock_price.↵
*decile_1yr_1mth_8_calldelta)-(decile_1yr_1mth_8_stock_close.↵
*decile_1yr_1mth_8_calldelta))./((-decile_1yr_1mth_8_stock_price.↵
*decile_1yr_1mth_8_calldelta)+decile_1yr_1mth_8_call_price));
1098 decile_1yr_1mth_8_delta_SR = mean((((decile_1yr_1mth_8_opt_ex_price-↵
decile_1yr_1mth_8_call_price+(decile_1yr_1mth_8_stock_price.↵
*decile_1yr_1mth_8_calldelta)-(decile_1yr_1mth_8_stock_close.↵
```

```
     *decile_1yr_1mth_8_calldelta))./((-decile_1yr_1mth_8_stock_price.↙
     *decile_1yr_1mth_8_calldelta)+decile_1yr_1mth_8_call_price))-decile_1yr_1mth_8_rates)↙
     /...
1099      (sqrt(var((decile_1yr_1mth_8_opt_ex_price-decile_1yr_1mth_8_call_price+↙
     (decile_1yr_1mth_8_stock_price.*decile_1yr_1mth_8_calldelta)-↙
     (decile_1yr_1mth_8_stock_close.*decile_1yr_1mth_8_calldelta))./(-↙
     decile_1yr_1mth_8_stock_price.↙
     *decile_1yr_1mth_8_calldelta+decile_1yr_1mth_8_call_price)-↙
     decile_1yr_1mth_8_rates)))));
1100
1101
1102 decile_1yr_1mth_9=find((logdiff_1yrRV_1mth > sort_logdiff_1yrRV_1mth(ff1*8,1)) &↙
     (logdiff_1yrRV_1mth <= sort_logdiff_1yrRV_1mth(ff1*9,1)));
1103
1104 decile_1yr_1mth_9_mean = mean(diff_1yrRV_1mth(decile_1yr_1mth_9));
1105 decile_1yr_1mth_9_RV = mean(Hist_Vol_1yr_1mth_1(decile_1yr_1mth_9));
1106 decile_1yr_1mth_9_IV = mean(bsvolatility_1mth_1(decile_1yr_1mth_9));
1107 decile_1yr_1mth_9_CS = mean(CallDivStock_1mth(decile_1yr_1mth_9));
1108 decile_1yr_1mth_9_delta = mean(callDelta_1mth_1yr_1(decile_1yr_1mth_9));
1109 decile_1yr_1mth_9_rates = rates_1mth_2(decile_1yr_1mth_9);
1110 decile_1yr_1mth_9_call_return = mean(opt_percentage_return_1mth_1↙
     (decile_1yr_1mth_9));
1111 [h,p,ci,decile_1yr_1mth_9_call_return_ttest] = ttest(opt_percentage_return_1mth_1↙
     (decile_1yr_1mth_9),0);
1112 decile_1yr_1mth_9_call_return_std = std(opt_percentage_return_1mth_1↙
     (decile_1yr_1mth_9));
1113 decile_1yr_1mth_9_call_return_min = min(opt_percentage_return_1mth_1↙
     (decile_1yr_1mth_9));
1114 decile_1yr_1mth_9_call_return_max = max(opt_percentage_return_1mth_1↙
     (decile_1yr_1mth_9));
1115 decile_1yr_1mth_9_call_SR = mean(opt_percentage_return_1mth_1(decile_1yr_1mth_9)-↙
     decile_1yr_1mth_9_rates)/(sqrt(var(opt_percentage_return_1mth_1(decile_1yr_1mth_9)-↙
     decile_1yr_1mth_9_rates)));
1116 decile_1yr_1mth_9_stock_return = mean(stock_percentage_return_1mth_1↙
     (decile_1yr_1mth_9));
1117 [h,p,ci,decile_1yr_1mth_9_stock_return_ttest] = ttest↙
     (stock_percentage_return_1mth_1(decile_1yr_1mth_9),0);
1118 decile_1yr_1mth_9_stock_return_std = std(stock_percentage_return_1mth_1↙
     (decile_1yr_1mth_9));
1119 decile_1yr_1mth_9_stock_return_min = min(stock_percentage_return_1mth_1↙
     (decile_1yr_1mth_9));
1120 decile_1yr_1mth_9_stock_return_max = max(stock_percentage_return_1mth_1↙
     (decile_1yr_1mth_9));
1121 decile_1yr_1mth_9_stock_SR = mean(stock_percentage_return_1mth_1↙
     (decile_1yr_1mth_9)-decile_1yr_1mth_9_rates)/(sqrt(var(stock_percentage_return_1mth_1↙
     (decile_1yr_1mth_9)-decile_1yr_1mth_9_rates)));
1122 decile_1yr_1mth_9_date = D_op_1mth_4(decile_1yr_1mth_9);
1123 decile_1yr_1mth_9_call_price = call_price_1mth_2(decile_1yr_1mth_9);
1124 decile_1yr_1mth_9_stock_price = underlying_1mth_3(decile_1yr_1mth_9);
1125 decile_1yr_1mth_9_opt_ex_price = opt_ex_payoff_1mth_1(decile_1yr_1mth_9);
1126 decile_1yr_1mth_9_strike_price = strike_price_1mth_4(decile_1yr_1mth_9);
1127 decile_1yr_1mth_9_D_op = D_op_1mth_4(decile_1yr_1mth_9);
1128 decile_1yr_1mth_9_ticker_op = ticker_op_1mth_4(decile_1yr_1mth_9);
1129 decile_1yr_1mth_9_calldelta = callDelta_1mth_1yr_1(decile_1yr_1mth_9);
```

```
1130 decile_1yr_1mth_9_stock_close = stock_close_1mth_1(decile_1yr_1mth_9);
1131 decile_1yr_1mth_9_delta_return = mean((decile_1yr_1mth_9_opt_ex_price-↵
decile_1yr_1mth_9_call_price+(decile_1yr_1mth_9_stock_price.↵
*decile_1yr_1mth_9_calldelta)-(decile_1yr_1mth_9_stock_close.↵
*decile_1yr_1mth_9_calldelta))./((-decile_1yr_1mth_9_stock_price.↵
*decile_1yr_1mth_9_calldelta)+decile_1yr_1mth_9_call_price));
1132 [h,p,ci,decile_1yr_1mth_9_delta_return_ttest] = ttest↵
((decile_1yr_1mth_9_opt_ex_price-decile_1yr_1mth_9_call_price+↵
(decile_1yr_1mth_9_stock_price.*decile_1yr_1mth_9_calldelta)-↵
(decile_1yr_1mth_9_stock_close.*decile_1yr_1mth_9_calldelta))./((-↵
decile_1yr_1mth_9_stock_price.*decile_1yr_1mth_9_calldelta)↵
+decile_1yr_1mth_9_call_price),0);
1133 decile_1yr_1mth_9_delta_std = std((decile_1yr_1mth_9_opt_ex_price-↵
decile_1yr_1mth_9_call_price+(decile_1yr_1mth_9_stock_price.↵
*decile_1yr_1mth_9_calldelta)-(decile_1yr_1mth_9_stock_close.↵
*decile_1yr_1mth_9_calldelta))./((-decile_1yr_1mth_9_stock_price.↵
*decile_1yr_1mth_9_calldelta)+decile_1yr_1mth_9_call_price));
1134 decile_1yr_1mth_9_delta_min = min((decile_1yr_1mth_9_opt_ex_price-↵
decile_1yr_1mth_9_call_price+(decile_1yr_1mth_9_stock_price.↵
*decile_1yr_1mth_9_calldelta)-(decile_1yr_1mth_9_stock_close.↵
*decile_1yr_1mth_9_calldelta))./((-decile_1yr_1mth_9_stock_price.↵
*decile_1yr_1mth_9_calldelta)+decile_1yr_1mth_9_call_price));
1135 decile_1yr_1mth_9_delta_max = max((decile_1yr_1mth_9_opt_ex_price-↵
decile_1yr_1mth_9_call_price+(decile_1yr_1mth_9_stock_price.↵
*decile_1yr_1mth_9_calldelta)-(decile_1yr_1mth_9_stock_close.↵
*decile_1yr_1mth_9_calldelta))./((-decile_1yr_1mth_9_stock_price.↵
*decile_1yr_1mth_9_calldelta)+decile_1yr_1mth_9_call_price));
1136 decile_1yr_1mth_9_delta_SR = mean((((decile_1yr_1mth_9_opt_ex_price-↵
decile_1yr_1mth_9_call_price+(decile_1yr_1mth_9_stock_price.↵
*decile_1yr_1mth_9_calldelta)-(decile_1yr_1mth_9_stock_close.↵
*decile_1yr_1mth_9_calldelta))./((-decile_1yr_1mth_9_stock_price.↵
*decile_1yr_1mth_9_calldelta)+decile_1yr_1mth_9_call_price))-decile_1yr_1mth_9_rates)↵
/...
1137     (sqrt(var((decile_1yr_1mth_9_opt_ex_price-decile_1yr_1mth_9_call_price+↵
(decile_1yr_1mth_9_stock_price.*decile_1yr_1mth_9_calldelta)-↵
(decile_1yr_1mth_9_stock_close.*decile_1yr_1mth_9_calldelta))./(-↵
decile_1yr_1mth_9_stock_price.↵
*decile_1yr_1mth_9_calldelta+decile_1yr_1mth_9_call_price)-↵
decile_1yr_1mth_9_rates)))));
1138
1139
1140 decile_1yr_1mth_10=find((logdiff_1yrRV_1mth > sort_logdiff_1yrRV_1mth(ff1*9,1)));
1141
1142 decile_1yr_1mth_10_mean = mean(diff_1yrRV_1mth(decile_1yr_1mth_10));
1143 decile_1yr_1mth_10_RV = mean(Hist_Vol_1yr_1mth_1(decile_1yr_1mth_10));
1144 decile_1yr_1mth_10_IV = mean(bsvolatility_1mth_1(decile_1yr_1mth_10));
1145 decile_1yr_1mth_10_CS = mean(CallDivStock_1mth(decile_1yr_1mth_10));
1146 decile_1yr_1mth_10_delta = mean(callDelta_1mth_1yr_1(decile_1yr_1mth_10));
1147 decile_1yr_1mth_10_rates = rates_1mth_2(decile_1yr_1mth_10);
1148 decile_1yr_1mth_10_call_return = mean(opt_percentage_return_1mth_1↵
(decile_1yr_1mth_10));
1149 [h,p,ci,decile_1yr_1mth_10_call_return_ttest] = ttest↵
(opt_percentage_return_1mth_1(decile_1yr_1mth_10),0);
1150 decile_1yr_1mth_10_call_return_std = std(opt_percentage_return_1mth_1↵
```

```
    (decile_1yr_1mth_10));
1151 decile_1yr_1mth_10_call_return_min = min(opt_percentage_return_1mth_1↙
    (decile_1yr_1mth_10));
1152 decile_1yr_1mth_10_call_return_max = max(opt_percentage_return_1mth_1↙
    (decile_1yr_1mth_10));
1153 decile_1yr_1mth_10_call_SR = mean(opt_percentage_return_1mth_1↙
    (decile_1yr_1mth_10)-decile_1yr_1mth_10_rates)/(sqrt(var(opt_percentage_return_1mth_1↙
    (decile_1yr_1mth_10)-decile_1yr_1mth_10_rates)));
1154 decile_1yr_1mth_10_stock_return = mean(stock_percentage_return_1mth_1↙
    (decile_1yr_1mth_10));
1155 [h,p,ci,decile_1yr_1mth_10_stock_return_ttest] = ttest↙
    (stock_percentage_return_1mth_1(decile_1yr_1mth_10),0);
1156 decile_1yr_1mth_10_stock_return_std = std(stock_percentage_return_1mth_1↙
    (decile_1yr_1mth_10));
1157 decile_1yr_1mth_10_stock_return_min = min(stock_percentage_return_1mth_1↙
    (decile_1yr_1mth_10));
1158 decile_1yr_1mth_10_stock_return_max = max(stock_percentage_return_1mth_1↙
    (decile_1yr_1mth_10));
1159 decile_1yr_1mth_10_stock_SR = mean(stock_percentage_return_1mth_1↙
    (decile_1yr_1mth_10)-decile_1yr_1mth_10_rates)/(sqrt(var↙
    (stock_percentage_return_1mth_1(decile_1yr_1mth_10)-decile_1yr_1mth_10_rates)));
1160 decile_1yr_1mth_10_date = D_op_1mth_4(decile_1yr_1mth_10);
1161 decile_1yr_1mth_10_call_price = call_price_1mth_2(decile_1yr_1mth_10);
1162 decile_1yr_1mth_10_stock_price = underlying_1mth_3(decile_1yr_1mth_10);
1163 decile_1yr_1mth_10_opt_ex_price = opt_ex_payoff_1mth_1(decile_1yr_1mth_10);
1164 decile_1yr_1mth_10_strike_price = strike_price_1mth_4(decile_1yr_1mth_10);
1165 decile_1yr_1mth_10_D_op = D_op_1mth_4(decile_1yr_1mth_10);
1166 decile_1yr_1mth_10_ticker_op = ticker_op_1mth_4(decile_1yr_1mth_10);
1167 decile_1yr_1mth_10_calldelta = callDelta_1mth_1yr_1(decile_1yr_1mth_10);
1168 decile_1yr_1mth_10_stock_close = stock_close_1mth_1(decile_1yr_1mth_10);
1169 decile_1yr_1mth_10_delta_return = mean((decile_1yr_1mth_10_opt_ex_price-↙
    decile_1yr_1mth_10_call_price+(decile_1yr_1mth_10_stock_price.↙
    *decile_1yr_1mth_10_calldelta)-(decile_1yr_1mth_10_stock_close.↙
    *decile_1yr_1mth_10_calldelta))./((-decile_1yr_1mth_10_stock_price.↙
    *decile_1yr_1mth_10_calldelta)+decile_1yr_1mth_10_call_price));
1170 [h,p,ci,decile_1yr_1mth_10_delta_return_ttest] = ttest↙
    ((decile_1yr_1mth_10_opt_ex_price-decile_1yr_1mth_10_call_price+↙
    (decile_1yr_1mth_10_stock_price.*decile_1yr_1mth_10_calldelta)-↙
    (decile_1yr_1mth_10_stock_close.*decile_1yr_1mth_10_calldelta))./((-↙
    decile_1yr_1mth_10_stock_price.*decile_1yr_1mth_10_calldelta)↙
    +decile_1yr_1mth_10_call_price),0);
1171 decile_1yr_1mth_10_delta_std = std((decile_1yr_1mth_10_opt_ex_price-↙
    decile_1yr_1mth_10_call_price+(decile_1yr_1mth_10_stock_price.↙
    *decile_1yr_1mth_10_calldelta)-(decile_1yr_1mth_10_stock_close.↙
    *decile_1yr_1mth_10_calldelta))./((-decile_1yr_1mth_10_stock_price.↙
    *decile_1yr_1mth_10_calldelta)+decile_1yr_1mth_10_call_price));
1172 decile_1yr_1mth_10_delta_min = min((decile_1yr_1mth_10_opt_ex_price-↙
    decile_1yr_1mth_10_call_price+(decile_1yr_1mth_10_stock_price.↙
    *decile_1yr_1mth_10_calldelta)-(decile_1yr_1mth_10_stock_close.↙
    *decile_1yr_1mth_10_calldelta))./((-decile_1yr_1mth_10_stock_price.↙
    *decile_1yr_1mth_10_calldelta)+decile_1yr_1mth_10_call_price));
1173 decile_1yr_1mth_10_delta_max = max((decile_1yr_1mth_10_opt_ex_price-↙
    decile_1yr_1mth_10_call_price+(decile_1yr_1mth_10_stock_price.↙
    *decile_1yr_1mth_10_calldelta)-(decile_1yr_1mth_10_stock_close.↙
```

```matlab
*decile_1yr_1mth_10_calldelta))./((-decile_1yr_1mth_10_stock_price.↙
*decile_1yr_1mth_10_calldelta)+decile_1yr_1mth_10_call_price));
1174 decile_1yr_1mth_10_delta_SR = mean(((((decile_1yr_1mth_10_opt_ex_price-↙
decile_1yr_1mth_10_call_price+(decile_1yr_1mth_10_stock_price.↙
*decile_1yr_1mth_10_calldelta)-(decile_1yr_1mth_10_stock_close.↙
*decile_1yr_1mth_10_calldelta))./((-decile_1yr_1mth_10_stock_price.↙
*decile_1yr_1mth_10_calldelta)+decile_1yr_1mth_10_call_price))-↙
decile_1yr_1mth_10_rates)/...
1175     (sqrt(var((decile_1yr_1mth_10_opt_ex_price-decile_1yr_1mth_10_call_price+↙
(decile_1yr_1mth_10_stock_price.*decile_1yr_1mth_10_calldelta)-↙
(decile_1yr_1mth_10_stock_close.*decile_1yr_1mth_10_calldelta))./(-↙
decile_1yr_1mth_10_stock_price.↙
*decile_1yr_1mth_10_calldelta+decile_1yr_1mth_10_call_price)-↙
decile_1yr_1mth_10_rates))));
1176
1177 %Caculating the stats for deciles 10 minues deciles 1
1178 decile101_1yr_1mth_call_return = mean(opt_percentage_return_1mth_1↙
(decile_1yr_1mth_10)-opt_percentage_return_1mth_1(decile_1yr_1mth_1));
1179 [h,p,ci,decile101_1yr_1mth_call_return_ttest] = ttest↙
(opt_percentage_return_1mth_1(decile_1yr_1mth_10)-opt_percentage_return_1mth_1↙
(decile_1yr_1mth_1),0);
1180 decile101_1yr_1mth_call_return_std = std(opt_percentage_return_1mth_1↙
(decile_1yr_1mth_10)-opt_percentage_return_1mth_1(decile_1yr_1mth_1));
1181 decile101_1yr_1mth_call_return_min = min(opt_percentage_return_1mth_1↙
(decile_1yr_1mth_10)-opt_percentage_return_1mth_1(decile_1yr_1mth_1));
1182 decile101_1yr_1mth_call_return_max = max(opt_percentage_return_1mth_1↙
(decile_1yr_1mth_10)-opt_percentage_return_1mth_1(decile_1yr_1mth_1));
1183 decile101_1yr_1mth_call_SR = mean((opt_percentage_return_1mth_1↙
(decile_1yr_1mth_10)-decile_1yr_1mth_10_rates)-(opt_percentage_return_1mth_1↙
(decile_1yr_1mth_1)-decile_1yr_1mth_1_rates))/(sqrt(var(opt_percentage_return_1mth_1↙
(decile_1yr_1mth_10)-decile_1yr_1mth_10_rates-(opt_percentage_return_1mth_1↙
(decile_1yr_1mth_1)-decile_1yr_1mth_1_rates))));
1184 decile101_1yr_1mth_stock_return = mean(stock_percentage_return_1mth_1↙
(decile_1yr_1mth_10)-stock_percentage_return_1mth_1(decile_1yr_1mth_1));
1185 [h,p,ci,decile101_1yr_1mth_stock_return_ttest] = ttest↙
(stock_percentage_return_1mth_1(decile_1yr_1mth_10)-stock_percentage_return_1mth_1↙
(decile_1yr_1mth_1),0);
1186 decile101_1yr_1mth_stock_return_std = std(stock_percentage_return_1mth_1↙
(decile_1yr_1mth_10)-stock_percentage_return_1mth_1(decile_1yr_1mth_1));
1187 decile101_1yr_1mth_stock_return_min = min(stock_percentage_return_1mth_1↙
(decile_1yr_1mth_10)-stock_percentage_return_1mth_1(decile_1yr_1mth_1));
1188 decile101_1yr_1mth_stock_return_max = max(stock_percentage_return_1mth_1↙
(decile_1yr_1mth_10)-stock_percentage_return_1mth_1(decile_1yr_1mth_1));
1189 decile101_1yr_1mth_stock_SR = mean(stock_percentage_return_1mth_1↙
(decile_1yr_1mth_10)-decile_1yr_1mth_10_rates-(stock_percentage_return_1mth_1↙
(decile_1yr_1mth_1)-decile_1yr_1mth_1_rates))/(sqrt(var(stock_percentage_return_1mth_1↙
(decile_1yr_1mth_10)-decile_1yr_1mth_10_rates-(stock_percentage_return_1mth_1↙
(decile_1yr_1mth_1)-decile_1yr_1mth_1_rates))));
1190 decile101_1yr_1mth_delta_return = mean((decile_1yr_1mth_10_opt_ex_price-↙
decile_1yr_1mth_10_call_price+(decile_1yr_1mth_10_stock_price.↙
*decile_1yr_1mth_10_calldelta)-(decile_1yr_1mth_10_stock_close.↙
*decile_1yr_1mth_10_calldelta))./((-decile_1yr_1mth_10_stock_price.↙
*decile_1yr_1mth_10_calldelta)+decile_1yr_1mth_10_call_price)-↙
(decile_1yr_1mth_1_opt_ex_price-decile_1yr_1mth_1_call_price+↙
```

```
(decile_1yr_1mth_1_stock_price.*decile_1yr_1mth_1_calldelta)-
(decile_1yr_1mth_1_stock_close.*decile_1yr_1mth_1_calldelta))./((-
decile_1yr_1mth_1_stock_price.*decile_1yr_1mth_1_calldelta)
+decile_1yr_1mth_1_call_price));
1191 [h,p,ci,decile101_1yr_1mth_delta_return_ttest] = ttest
((decile_1yr_1mth_10_opt_ex_price-decile_1yr_1mth_10_call_price+
(decile_1yr_1mth_10_stock_price.*decile_1yr_1mth_10_calldelta)-
(decile_1yr_1mth_10_stock_close.*decile_1yr_1mth_10_calldelta))./((-
decile_1yr_1mth_10_stock_price.*decile_1yr_1mth_10_calldelta)
+decile_1yr_1mth_10_call_price)-(decile_1yr_1mth_1_opt_ex_price-
decile_1yr_1mth_1_call_price+(decile_1yr_1mth_1_stock_price.
*decile_1yr_1mth_1_calldelta)-(decile_1yr_1mth_1_stock_close.
*decile_1yr_1mth_1_calldelta))./((-decile_1yr_1mth_1_stock_price.
*decile_1yr_1mth_1_calldelta)+decile_1yr_1mth_1_call_price),0);
1192 decile101_1yr_1mth_delta_std = std((decile_1yr_1mth_10_opt_ex_price-
decile_1yr_1mth_10_call_price+(decile_1yr_1mth_10_stock_price.
*decile_1yr_1mth_10_calldelta)-(decile_1yr_1mth_10_stock_close.
*decile_1yr_1mth_10_calldelta))./((-decile_1yr_1mth_10_stock_price.
*decile_1yr_1mth_10_calldelta)+decile_1yr_1mth_10_call_price)-
(decile_1yr_1mth_1_opt_ex_price-decile_1yr_1mth_1_call_price+
(decile_1yr_1mth_1_stock_price.*decile_1yr_1mth_1_calldelta)-
(decile_1yr_1mth_1_stock_close.*decile_1yr_1mth_1_calldelta))./((-
decile_1yr_1mth_1_stock_price.*decile_1yr_1mth_1_calldelta)
+decile_1yr_1mth_1_call_price));
1193 decile101_1yr_1mth_delta_min = min((decile_1yr_1mth_10_opt_ex_price-
decile_1yr_1mth_10_call_price+(decile_1yr_1mth_10_stock_price.
*decile_1yr_1mth_10_calldelta)-(decile_1yr_1mth_10_stock_close.
*decile_1yr_1mth_10_calldelta))./((-decile_1yr_1mth_10_stock_price.
*decile_1yr_1mth_10_calldelta)+decile_1yr_1mth_10_call_price)-
(decile_1yr_1mth_1_opt_ex_price-decile_1yr_1mth_1_call_price+
(decile_1yr_1mth_1_stock_price.*decile_1yr_1mth_1_calldelta)-
(decile_1yr_1mth_1_stock_close.*decile_1yr_1mth_1_calldelta))./((-
decile_1yr_1mth_1_stock_price.*decile_1yr_1mth_1_calldelta)
+decile_1yr_1mth_1_call_price));
1194 decile101_1yr_1mth_delta_max = max((decile_1yr_1mth_10_opt_ex_price-
decile_1yr_1mth_10_call_price+(decile_1yr_1mth_10_stock_price.
*decile_1yr_1mth_10_calldelta)-(decile_1yr_1mth_10_stock_close.
*decile_1yr_1mth_10_calldelta))./((-decile_1yr_1mth_10_stock_price.
*decile_1yr_1mth_10_calldelta)+decile_1yr_1mth_10_call_price)-
(decile_1yr_1mth_1_opt_ex_price-decile_1yr_1mth_1_call_price+
(decile_1yr_1mth_1_stock_price.*decile_1yr_1mth_1_calldelta)-
(decile_1yr_1mth_1_stock_close.*decile_1yr_1mth_1_calldelta))./((-
decile_1yr_1mth_1_stock_price.*decile_1yr_1mth_1_calldelta)
+decile_1yr_1mth_1_call_price));
1195 decile101_1yr_1mth_delta_SR = mean((((decile_1yr_1mth_10_opt_ex_price-
decile_1yr_1mth_10_call_price+(decile_1yr_1mth_10_stock_price.
*decile_1yr_1mth_10_calldelta)-(decile_1yr_1mth_10_stock_close.
*decile_1yr_1mth_10_calldelta))./((-decile_1yr_1mth_10_stock_price.
*decile_1yr_1mth_10_calldelta)+decile_1yr_1mth_10_call_price))-
decile_1yr_1mth_10_rates-((decile_1yr_1mth_1_opt_ex_price-
decile_1yr_1mth_1_call_price+(decile_1yr_1mth_1_stock_price.
*decile_1yr_1mth_1_calldelta)-(decile_1yr_1mth_1_stock_close.
*decile_1yr_1mth_1_calldelta))./((-decile_1yr_1mth_1_stock_price.
*decile_1yr_1mth_1_calldelta)+decile_1yr_1mth_1_call_price))-decile_1yr_1mth_1_rates)
```

```
/...
1196     (sqrt(var((((decile_1yr_1mth_10_opt_ex_price-decile_1yr_1mth_10_call_price+↵
(decile_1yr_1mth_10_stock_price.*decile_1yr_1mth_10_calldelta)-↵
(decile_1yr_1mth_10_stock_close.*decile_1yr_1mth_10_calldelta))./((-↵
decile_1yr_1mth_10_stock_price.*decile_1yr_1mth_10_calldelta)↵
+decile_1yr_1mth_10_call_price))-decile_1yr_1mth_10_rates)-↵
(((decile_1yr_1mth_1_opt_ex_price-decile_1yr_1mth_1_call_price+↵
(decile_1yr_1mth_1_stock_price.*decile_1yr_1mth_1_calldelta)-↵
(decile_1yr_1mth_1_stock_close.*decile_1yr_1mth_1_calldelta))./((-↵
decile_1yr_1mth_1_stock_price.*decile_1yr_1mth_1_calldelta)↵
+decile_1yr_1mth_1_call_price))-decile_1yr_1mth_1_rates)))));
1197
1198
1199
1200 % Repeat the same procedures as above for 1mth-to-expiry options based on 2-yr RV
1201 sort_logdiff_2yrRV_1mth = sort(logdiff_2yrRV_1mth);
1202 ff2 = round(length(logdiff_2yrRV_1mth)/10);
1203
1204 decile_2yr_1mth_1=find(logdiff_2yrRV_1mth <= sort_logdiff_2yrRV_1mth(ff2,1));
1205
1206 decile_2yr_1mth_1_mean = mean(diff_2yrRV_1mth(decile_2yr_1mth_1));
1207 decile_2yr_1mth_1_RV = mean(Hist_Vol_2yr_1mth_1(decile_2yr_1mth_1));
1208 decile_2yr_1mth_1_IV = mean(bsvolatility_1mth_1(decile_2yr_1mth_1));
1209 decile_2yr_1mth_1_CS = mean(CallDivStock_1mth(decile_2yr_1mth_1));
1210 decile_2yr_1mth_1_delta = mean(callDelta_1mth_2yr_1(decile_2yr_1mth_1));
1211 decile_2yr_1mth_1_rates = rates_1mth_2(decile_2yr_1mth_1);
1212 decile_2yr_1mth_1_call_return = mean(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_1));
1213 [h,p,ci,decile_2yr_1mth_1_call_return_ttest] = ttest(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_1),0);
1214 decile_2yr_1mth_1_call_return_std = std(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_1));
1215 decile_2yr_1mth_1_call_return_min = min(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_1));
1216 decile_2yr_1mth_1_call_return_max = max(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_1));
1217 decile_2yr_1mth_1_call_SR = mean(opt_percentage_return_1mth_1(decile_2yr_1mth_1)-↵
decile_2yr_1mth_1_rates)/(sqrt(var(opt_percentage_return_1mth_1(decile_2yr_1mth_1)-↵
decile_2yr_1mth_1_rates)));
1218 decile_2yr_1mth_1_stock_return = mean(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_1));
1219 [h,p,ci,decile_2yr_1mth_1_stock_return_ttest] = ttest↵
(stock_percentage_return_1mth_1(decile_2yr_1mth_1),0);
1220 decile_2yr_1mth_1_stock_return_std = std(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_1));
1221 decile_2yr_1mth_1_stock_return_min = min(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_1));
1222 decile_2yr_1mth_1_stock_return_max = max(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_1));
1223 decile_2yr_1mth_1_stock_SR = mean(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_1)-decile_2yr_1mth_1_rates)/(sqrt(var(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_1)-decile_2yr_1mth_1_rates)));
1224 decile_2yr_1mth_1_date = D_op_1mth_4(decile_2yr_1mth_1);
1225 decile_2yr_1mth_1_call_price = call_price_1mth_2(decile_2yr_1mth_1);
```

```
1226 decile_2yr_1mth_1_stock_price = underlying_1mth_3(decile_2yr_1mth_1);
1227 decile_2yr_1mth_1_opt_ex_price = opt_ex_payoff_1mth_1(decile_2yr_1mth_1);
1228 decile_2yr_1mth_1_strike_price = strike_price_1mth_4(decile_2yr_1mth_1);
1229 decile_2yr_1mth_1_D_op = D_op_1mth_4(decile_2yr_1mth_1);
1230 decile_2yr_1mth_1_ticker_op = ticker_op_1mth_4(decile_2yr_1mth_1);
1231 decile_2yr_1mth_1_calldelta = callDelta_1mth_2yr_1(decile_2yr_1mth_1);
1232 decile_2yr_1mth_1_stock_close = stock_close_1mth_1(decile_2yr_1mth_1);
1233 decile_2yr_1mth_1_delta_return = mean((decile_2yr_1mth_1_opt_ex_price-↵
decile_2yr_1mth_1_call_price+(decile_2yr_1mth_1_stock_price.↵
*decile_2yr_1mth_1_calldelta)-(decile_2yr_1mth_1_stock_close.↵
*decile_2yr_1mth_1_calldelta))./((-decile_2yr_1mth_1_stock_price.↵
*decile_2yr_1mth_1_calldelta)+decile_2yr_1mth_1_call_price));
1234 [h,p,ci,decile_2yr_1mth_1_delta_return_ttest] = ttest↵
((decile_2yr_1mth_1_opt_ex_price-decile_2yr_1mth_1_call_price+↵
(decile_2yr_1mth_1_stock_price.*decile_2yr_1mth_1_calldelta)-↵
(decile_2yr_1mth_1_stock_close.*decile_2yr_1mth_1_calldelta))./((-↵
decile_2yr_1mth_1_stock_price.*decile_2yr_1mth_1_calldelta)↵
+decile_2yr_1mth_1_call_price),0);
1235 decile_2yr_1mth_1_delta_std = std((decile_2yr_1mth_1_opt_ex_price-↵
decile_2yr_1mth_1_call_price+(decile_2yr_1mth_1_stock_price.↵
*decile_2yr_1mth_1_calldelta)-(decile_2yr_1mth_1_stock_close.↵
*decile_2yr_1mth_1_calldelta))./((-decile_2yr_1mth_1_stock_price.↵
*decile_2yr_1mth_1_calldelta)+decile_2yr_1mth_1_call_price));
1236 decile_2yr_1mth_1_delta_min = min((decile_2yr_1mth_1_opt_ex_price-↵
decile_2yr_1mth_1_call_price+(decile_2yr_1mth_1_stock_price.↵
*decile_2yr_1mth_1_calldelta)-(decile_2yr_1mth_1_stock_close.↵
*decile_2yr_1mth_1_calldelta))./((-decile_2yr_1mth_1_stock_price.↵
*decile_2yr_1mth_1_calldelta)+decile_2yr_1mth_1_call_price));
1237 decile_2yr_1mth_1_delta_max = max((decile_2yr_1mth_1_opt_ex_price-↵
decile_2yr_1mth_1_call_price+(decile_2yr_1mth_1_stock_price.↵
*decile_2yr_1mth_1_calldelta)-(decile_2yr_1mth_1_stock_close.↵
*decile_2yr_1mth_1_calldelta))./((-decile_2yr_1mth_1_stock_price.↵
*decile_2yr_1mth_1_calldelta)+decile_2yr_1mth_1_call_price));
1238 decile_2yr_1mth_1_delta_SR = mean((((decile_2yr_1mth_1_opt_ex_price-↵
decile_2yr_1mth_1_call_price+(decile_2yr_1mth_1_stock_price.↵
*decile_2yr_1mth_1_calldelta)-(decile_2yr_1mth_1_stock_close.↵
*decile_2yr_1mth_1_calldelta))./((-decile_2yr_1mth_1_stock_price.↵
*decile_2yr_1mth_1_calldelta)+decile_2yr_1mth_1_call_price))-decile_2yr_1mth_1_rates)↵
/...
1239     (sqrt(var((decile_2yr_1mth_1_opt_ex_price-decile_2yr_1mth_1_call_price+↵
(decile_2yr_1mth_1_stock_price.*decile_2yr_1mth_1_calldelta)-↵
(decile_2yr_1mth_1_stock_close.*decile_2yr_1mth_1_calldelta))./(-↵
decile_2yr_1mth_1_stock_price.↵
*decile_2yr_1mth_1_calldelta+decile_2yr_1mth_1_call_price)-↵
decile_2yr_1mth_1_rates))));
1240
1241
1242 decile_2yr_1mth_2=find((logdiff_2yrRV_1mth > sort_logdiff_2yrRV_1mth(ff2,1)) &↵
(logdiff_2yrRV_1mth <= sort_logdiff_2yrRV_1mth(ff2*2,1)));
1243
1244 decile_2yr_1mth_2_mean = mean(diff_2yrRV_1mth(decile_2yr_1mth_2));
1245 decile_2yr_1mth_2_RV = mean(Hist_Vol_2yr_1mth_1(decile_2yr_1mth_2));
1246 decile_2yr_1mth_2_IV = mean(bsvolatility_1mth_1(decile_2yr_1mth_2));
1247 decile_2yr_1mth_2_CS = mean(CallDivStock_1mth(decile_2yr_1mth_2));
```

```
1248 decile_2yr_1mth_2_delta = mean(callDelta_1mth_2yr_1(decile_2yr_1mth_2));
1249 decile_2yr_1mth_2_rates = rates_1mth_2(decile_2yr_1mth_2);
1250 decile_2yr_1mth_2_call_return = mean(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_2));
1251 [h,p,ci,decile_2yr_1mth_2_call_return_ttest] = ttest(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_2),0);
1252 decile_2yr_1mth_2_call_return_std = std(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_2));
1253 decile_2yr_1mth_2_call_return_min = min(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_2));
1254 decile_2yr_1mth_2_call_return_max = max(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_2));
1255 decile_2yr_1mth_2_call_SR = mean(opt_percentage_return_1mth_1(decile_2yr_1mth_2)-↵
decile_2yr_1mth_2_rates)/(sqrt(var(opt_percentage_return_1mth_1(decile_2yr_1mth_2)-↵
decile_2yr_1mth_2_rates)));
1256 decile_2yr_1mth_2_stock_return = mean(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_2));
1257 [h,p,ci,decile_2yr_1mth_2_stock_return_ttest] = ttest↵
(stock_percentage_return_1mth_1(decile_2yr_1mth_2),0);
1258 decile_2yr_1mth_2_stock_return_std = std(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_2));
1259 decile_2yr_1mth_2_stock_return_min = min(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_2));
1260 decile_2yr_1mth_2_stock_return_max = max(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_2));
1261 decile_2yr_1mth_2_stock_SR = mean(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_2)-decile_2yr_1mth_2_rates)/(sqrt(var(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_2)-decile_2yr_1mth_2_rates)));
1262 decile_2yr_1mth_2_date = D_op_1mth_4(decile_2yr_1mth_2);
1263 decile_2yr_1mth_2_call_price = call_price_1mth_2(decile_2yr_1mth_2);
1264 decile_2yr_1mth_2_stock_price = underlying_1mth_3(decile_2yr_1mth_2);
1265 decile_2yr_1mth_2_opt_ex_price = opt_ex_payoff_1mth_1(decile_2yr_1mth_2);
1266 decile_2yr_1mth_2_strike_price = strike_price_1mth_4(decile_2yr_1mth_2);
1267 decile_2yr_1mth_2_D_op = D_op_1mth_4(decile_2yr_1mth_2);
1268 decile_2yr_1mth_2_ticker_op = ticker_op_1mth_4(decile_2yr_1mth_2);
1269 decile_2yr_1mth_2_calldelta = callDelta_1mth_2yr_1(decile_2yr_1mth_2);
1270 decile_2yr_1mth_2_stock_close = stock_close_1mth_1(decile_2yr_1mth_2);
1271 decile_2yr_1mth_2_delta_return = mean((decile_2yr_1mth_2_opt_ex_price-↵
decile_2yr_1mth_2_call_price+(decile_2yr_1mth_2_stock_price.↵
*decile_2yr_1mth_2_calldelta)-(decile_2yr_1mth_2_stock_close.↵
*decile_2yr_1mth_2_calldelta))./((-decile_2yr_1mth_2_stock_price.↵
*decile_2yr_1mth_2_calldelta)+decile_2yr_1mth_2_call_price));
1272 [h,p,ci,decile_2yr_1mth_2_delta_return_ttest] = ttest↵
((decile_2yr_1mth_2_opt_ex_price-decile_2yr_1mth_2_call_price+↵
(decile_2yr_1mth_2_stock_price.*decile_2yr_1mth_2_calldelta)-↵
(decile_2yr_1mth_2_stock_close.*decile_2yr_1mth_2_calldelta))./((-↵
decile_2yr_1mth_2_stock_price.*decile_2yr_1mth_2_calldelta)↵
+decile_2yr_1mth_2_call_price),0);
1273 decile_2yr_1mth_2_delta_std = std((decile_2yr_1mth_2_opt_ex_price-↵
decile_2yr_1mth_2_call_price+(decile_2yr_1mth_2_stock_price.↵
*decile_2yr_1mth_2_calldelta)-(decile_2yr_1mth_2_stock_close.↵
*decile_2yr_1mth_2_calldelta))./((-decile_2yr_1mth_2_stock_price.↵
*decile_2yr_1mth_2_calldelta)+decile_2yr_1mth_2_call_price));
1274 decile_2yr_1mth_2_delta_min = min((decile_2yr_1mth_2_opt_ex_price-↵
```

```
decile_2yr_1mth_2_call_price+(decile_2yr_1mth_2_stock_price.↙
*decile_2yr_1mth_2_calldelta)-(decile_2yr_1mth_2_stock_close.↙
*decile_2yr_1mth_2_calldelta))./((-decile_2yr_1mth_2_stock_price.↙
*decile_2yr_1mth_2_calldelta)+decile_2yr_1mth_2_call_price));
1275 decile_2yr_1mth_2_delta_max = max((decile_2yr_1mth_2_opt_ex_price-↙
decile_2yr_1mth_2_call_price+(decile_2yr_1mth_2_stock_price.↙
*decile_2yr_1mth_2_calldelta)-(decile_2yr_1mth_2_stock_close.↙
*decile_2yr_1mth_2_calldelta))./((-decile_2yr_1mth_2_stock_price.↙
*decile_2yr_1mth_2_calldelta)+decile_2yr_1mth_2_call_price));
1276 decile_2yr_1mth_2_delta_SR = mean((((decile_2yr_1mth_2_opt_ex_price-↙
decile_2yr_1mth_2_call_price+(decile_2yr_1mth_2_stock_price.↙
*decile_2yr_1mth_2_calldelta)-(decile_2yr_1mth_2_stock_close.↙
*decile_2yr_1mth_2_calldelta))./((-decile_2yr_1mth_2_stock_price.↙
*decile_2yr_1mth_2_calldelta)+decile_2yr_1mth_2_call_price))-decile_2yr_1mth_2_rates)↙
/...
1277      (sqrt(var((decile_2yr_1mth_2_opt_ex_price-decile_2yr_1mth_2_call_price+↙
(decile_2yr_1mth_2_stock_price.*decile_2yr_1mth_2_calldelta)-↙
(decile_2yr_1mth_2_stock_close.*decile_2yr_1mth_2_calldelta))./(-↙
decile_2yr_1mth_2_stock_price.↙
*decile_2yr_1mth_2_calldelta+decile_2yr_1mth_2_call_price)-↙
decile_2yr_1mth_2_rates))));
1278
1279
1280 decile_2yr_1mth_3=find((logdiff_2yrRV_1mth > sort_logdiff_2yrRV_1mth(ff2*2,1)) &↙
(logdiff_2yrRV_1mth <= sort_logdiff_2yrRV_1mth(ff2*3,1)));
1281
1282 decile_2yr_1mth_3_mean = mean(diff_2yrRV_1mth(decile_2yr_1mth_3));
1283 decile_2yr_1mth_3_RV = mean(Hist_Vol_2yr_1mth_1(decile_2yr_1mth_3));
1284 decile_2yr_1mth_3_IV = mean(bsvolatility_1mth_1(decile_2yr_1mth_3));
1285 decile_2yr_1mth_3_CS = mean(CallDivStock_1mth(decile_2yr_1mth_3));
1286 decile_2yr_1mth_3_delta = mean(callDelta_1mth_2yr_1(decile_2yr_1mth_3));
1287 decile_2yr_1mth_3_rates = rates_1mth_2(decile_2yr_1mth_3);
1288 decile_2yr_1mth_3_call_return = mean(opt_percentage_return_1mth_1↙
(decile_2yr_1mth_3));
1289 [h,p,ci,decile_2yr_1mth_3_call_return_ttest] = ttest(opt_percentage_return_1mth_1↙
(decile_2yr_1mth_3),0);
1290 decile_2yr_1mth_3_call_return_std = std(opt_percentage_return_1mth_1↙
(decile_2yr_1mth_3));
1291 decile_2yr_1mth_3_call_return_min = min(opt_percentage_return_1mth_1↙
(decile_2yr_1mth_3));
1292 decile_2yr_1mth_3_call_return_max = max(opt_percentage_return_1mth_1↙
(decile_2yr_1mth_3));
1293 decile_2yr_1mth_3_call_SR = mean(opt_percentage_return_1mth_1(decile_2yr_1mth_3)-↙
decile_2yr_1mth_3_rates)/(sqrt(var(opt_percentage_return_1mth_1(decile_2yr_1mth_3)-↙
decile_2yr_1mth_3_rates)));
1294 decile_2yr_1mth_3_stock_return = mean(stock_percentage_return_1mth_1↙
(decile_2yr_1mth_3));
1295 [h,p,ci,decile_2yr_1mth_3_stock_return_ttest] = ttest↙
(stock_percentage_return_1mth_1(decile_2yr_1mth_3),0);
1296 decile_2yr_1mth_3_stock_return_std = std(stock_percentage_return_1mth_1↙
(decile_2yr_1mth_3));
1297 decile_2yr_1mth_3_stock_return_min = min(stock_percentage_return_1mth_1↙
(decile_2yr_1mth_3));
1298 decile_2yr_1mth_3_stock_return_max = max(stock_percentage_return_1mth_1↙
```

```
     (decile_2yr_1mth_3));
1299 decile_2yr_1mth_3_stock_SR = mean(stock_percentage_return_1mth_1↙
(decile_2yr_1mth_3)-decile_2yr_1mth_3_rates)/(sqrt(var(stock_percentage_return_1mth_1↙
(decile_2yr_1mth_3)-decile_2yr_1mth_3_rates)));
1300 decile_2yr_1mth_3_date = D_op_1mth_4(decile_2yr_1mth_3);
1301 decile_2yr_1mth_3_call_price = call_price_1mth_2(decile_2yr_1mth_3);
1302 decile_2yr_1mth_3_stock_price = underlying_1mth_3(decile_2yr_1mth_3);
1303 decile_2yr_1mth_3_opt_ex_price = opt_ex_payoff_1mth_1(decile_2yr_1mth_3);
1304 decile_2yr_1mth_3_strike_price = strike_price_1mth_4(decile_2yr_1mth_3);
1305 decile_2yr_1mth_3_D_op = D_op_1mth_4(decile_2yr_1mth_3);
1306 decile_2yr_1mth_3_ticker_op = ticker_op_1mth_4(decile_2yr_1mth_3);
1307 decile_2yr_1mth_3_calldelta = callDelta_1mth_2yr_1(decile_2yr_1mth_3);
1308 decile_2yr_1mth_3_stock_close = stock_close_1mth_1(decile_2yr_1mth_3);
1309 decile_2yr_1mth_3_delta_return = mean((decile_2yr_1mth_3_opt_ex_price-↙
decile_2yr_1mth_3_call_price+(decile_2yr_1mth_3_stock_price.↙
*decile_2yr_1mth_3_calldelta)-(decile_2yr_1mth_3_stock_close.↙
*decile_2yr_1mth_3_calldelta))./((-decile_2yr_1mth_3_stock_price.↙
*decile_2yr_1mth_3_calldelta)+decile_2yr_1mth_3_call_price));
1310 [h,p,ci,decile_2yr_1mth_3_delta_return_ttest] = ttest↙
((decile_2yr_1mth_3_opt_ex_price-decile_2yr_1mth_3_call_price+↙
(decile_2yr_1mth_3_stock_price.*decile_2yr_1mth_3_calldelta)-↙
(decile_2yr_1mth_3_stock_close.*decile_2yr_1mth_3_calldelta))./((-↙
decile_2yr_1mth_3_stock_price.*decile_2yr_1mth_3_calldelta)↙
+decile_2yr_1mth_3_call_price),0);
1311 decile_2yr_1mth_3_delta_std = std((decile_2yr_1mth_3_opt_ex_price-↙
decile_2yr_1mth_3_call_price+(decile_2yr_1mth_3_stock_price.↙
*decile_2yr_1mth_3_calldelta)-(decile_2yr_1mth_3_stock_close.↙
*decile_2yr_1mth_3_calldelta))./((-decile_2yr_1mth_3_stock_price.↙
*decile_2yr_1mth_3_calldelta)+decile_2yr_1mth_3_call_price));
1312 decile_2yr_1mth_3_delta_min = min((decile_2yr_1mth_3_opt_ex_price-↙
decile_2yr_1mth_3_call_price+(decile_2yr_1mth_3_stock_price.↙
*decile_2yr_1mth_3_calldelta)-(decile_2yr_1mth_3_stock_close.↙
*decile_2yr_1mth_3_calldelta))./((-decile_2yr_1mth_3_stock_price.↙
*decile_2yr_1mth_3_calldelta)+decile_2yr_1mth_3_call_price));
1313 decile_2yr_1mth_3_delta_max = max((decile_2yr_1mth_3_opt_ex_price-↙
decile_2yr_1mth_3_call_price+(decile_2yr_1mth_3_stock_price.↙
*decile_2yr_1mth_3_calldelta)-(decile_2yr_1mth_3_stock_close.↙
*decile_2yr_1mth_3_calldelta))./((-decile_2yr_1mth_3_stock_price.↙
*decile_2yr_1mth_3_calldelta)+decile_2yr_1mth_3_call_price));
1314 decile_2yr_1mth_3_delta_SR = mean((((decile_2yr_1mth_3_opt_ex_price-↙
decile_2yr_1mth_3_call_price+(decile_2yr_1mth_3_stock_price.↙
*decile_2yr_1mth_3_calldelta)-(decile_2yr_1mth_3_stock_close.↙
*decile_2yr_1mth_3_calldelta))./((-decile_2yr_1mth_3_stock_price.↙
*decile_2yr_1mth_3_calldelta)+decile_2yr_1mth_3_call_price))-decile_2yr_1mth_3_rates)↙
/...
1315     (sqrt(var((decile_2yr_1mth_3_opt_ex_price-decile_2yr_1mth_3_call_price+↙
(decile_2yr_1mth_3_stock_price.*decile_2yr_1mth_3_calldelta)-↙
(decile_2yr_1mth_3_stock_close.*decile_2yr_1mth_3_calldelta))./(-↙
decile_2yr_1mth_3_stock_price.↙
*decile_2yr_1mth_3_calldelta+decile_2yr_1mth_3_call_price)-↙
decile_2yr_1mth_3_rates))));
1316
1317
1318 decile_2yr_1mth_4=find((logdiff_2yrRV_1mth > sort_logdiff_2yrRV_1mth(ff2*3,1)) &↙
```

```
(logdiff_2yrRV_1mth <= sort_logdiff_2yrRV_1mth(ff2*4,1)));
1319
1320 decile_2yr_1mth_4_mean = mean(diff_2yrRV_1mth(decile_2yr_1mth_4));
1321 decile_2yr_1mth_4_RV = mean(Hist_Vol_2yr_1mth_1(decile_2yr_1mth_4));
1322 decile_2yr_1mth_4_IV = mean(bsvolatility_1mth_1(decile_2yr_1mth_4));
1323 decile_2yr_1mth_4_CS = mean(CallDivStock_1mth(decile_2yr_1mth_4));
1324 decile_2yr_1mth_4_delta = mean(callDelta_1mth_2yr_1(decile_2yr_1mth_4));
1325 decile_2yr_1mth_4_rates = rates_1mth_2(decile_2yr_1mth_4);
1326 decile_2yr_1mth_4_call_return = mean(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_4));
1327 [h,p,ci,decile_2yr_1mth_4_call_return_ttest] = ttest(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_4),0);
1328 decile_2yr_1mth_4_call_return_std = std(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_4));
1329 decile_2yr_1mth_4_call_return_min = min(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_4));
1330 decile_2yr_1mth_4_call_return_max = max(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_4));
1331 decile_2yr_1mth_4_call_SR = mean(opt_percentage_return_1mth_1(decile_2yr_1mth_4)-↵
decile_2yr_1mth_4_rates)/(sqrt(var(opt_percentage_return_1mth_1(decile_2yr_1mth_4)-↵
decile_2yr_1mth_4_rates)));
1332 decile_2yr_1mth_4_stock_return = mean(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_4));
1333 [h,p,ci,decile_2yr_1mth_4_stock_return_ttest] = ttest↵
(stock_percentage_return_1mth_1(decile_2yr_1mth_4),0);
1334 decile_2yr_1mth_4_stock_return_std = std(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_4));
1335 decile_2yr_1mth_4_stock_return_min = min(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_4));
1336 decile_2yr_1mth_4_stock_return_max = max(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_4));
1337 decile_2yr_1mth_4_stock_SR = mean(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_4)-decile_2yr_1mth_4_rates)/(sqrt(var(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_4)-decile_2yr_1mth_4_rates)));
1338 decile_2yr_1mth_4_date = D_op_1mth_4(decile_2yr_1mth_4);
1339 decile_2yr_1mth_4_call_price = call_price_1mth_2(decile_2yr_1mth_4);
1340 decile_2yr_1mth_4_stock_price = underlying_1mth_3(decile_2yr_1mth_4);
1341 decile_2yr_1mth_4_opt_ex_price = opt_ex_payoff_1mth_1(decile_2yr_1mth_4);
1342 decile_2yr_1mth_4_strike_price = strike_price_1mth_4(decile_2yr_1mth_4);
1343 decile_2yr_1mth_4_D_op = D_op_1mth_4(decile_2yr_1mth_4);
1344 decile_2yr_1mth_4_ticker_op = ticker_op_1mth_4(decile_2yr_1mth_4);
1345 decile_2yr_1mth_4_calldelta = callDelta_1mth_2yr_1(decile_2yr_1mth_4);
1346 decile_2yr_1mth_4_stock_close = stock_close_1mth_1(decile_2yr_1mth_4);
1347 decile_2yr_1mth_4_delta_return = mean((decile_2yr_1mth_4_opt_ex_price-↵
decile_2yr_1mth_4_call_price+(decile_2yr_1mth_4_stock_price.↵
*decile_2yr_1mth_4_calldelta)-(decile_2yr_1mth_4_stock_close.↵
*decile_2yr_1mth_4_calldelta))./((-decile_2yr_1mth_4_stock_price.↵
*decile_2yr_1mth_4_calldelta)+decile_2yr_1mth_4_call_price));
1348 [h,p,ci,decile_2yr_1mth_4_delta_return_ttest] = ttest↵
((decile_2yr_1mth_4_opt_ex_price-decile_2yr_1mth_4_call_price+↵
(decile_2yr_1mth_4_stock_price.*decile_2yr_1mth_4_calldelta)-↵
(decile_2yr_1mth_4_stock_close.*decile_2yr_1mth_4_calldelta))./((-↵
decile_2yr_1mth_4_stock_price.*decile_2yr_1mth_4_calldelta)↵
+decile_2yr_1mth_4_call_price),0);
```

```
1349 decile_2yr_1mth_4_delta_std = std((decile_2yr_1mth_4_opt_ex_price-↵
decile_2yr_1mth_4_call_price+(decile_2yr_1mth_4_stock_price.↵
*decile_2yr_1mth_4_calldelta)-(decile_2yr_1mth_4_stock_close.↵
*decile_2yr_1mth_4_calldelta))./((-decile_2yr_1mth_4_stock_price.↵
*decile_2yr_1mth_4_calldelta)+decile_2yr_1mth_4_call_price));
1350 decile_2yr_1mth_4_delta_min = min((decile_2yr_1mth_4_opt_ex_price-↵
decile_2yr_1mth_4_call_price+(decile_2yr_1mth_4_stock_price.↵
*decile_2yr_1mth_4_calldelta)-(decile_2yr_1mth_4_stock_close.↵
*decile_2yr_1mth_4_calldelta))./((-decile_2yr_1mth_4_stock_price.↵
*decile_2yr_1mth_4_calldelta)+decile_2yr_1mth_4_call_price));
1351 decile_2yr_1mth_4_delta_max = max((decile_2yr_1mth_4_opt_ex_price-↵
decile_2yr_1mth_4_call_price+(decile_2yr_1mth_4_stock_price.↵
*decile_2yr_1mth_4_calldelta)-(decile_2yr_1mth_4_stock_close.↵
*decile_2yr_1mth_4_calldelta))./((-decile_2yr_1mth_4_stock_price.↵
*decile_2yr_1mth_4_calldelta)+decile_2yr_1mth_4_call_price));
1352 decile_2yr_1mth_4_delta_SR = mean((((decile_2yr_1mth_4_opt_ex_price-↵
decile_2yr_1mth_4_call_price+(decile_2yr_1mth_4_stock_price.↵
*decile_2yr_1mth_4_calldelta)-(decile_2yr_1mth_4_stock_close.↵
*decile_2yr_1mth_4_calldelta))./((-decile_2yr_1mth_4_stock_price.↵
*decile_2yr_1mth_4_calldelta)+decile_2yr_1mth_4_call_price))-decile_2yr_1mth_4_rates)↵
/...
1353     (sqrt(var((decile_2yr_1mth_4_opt_ex_price-decile_2yr_1mth_4_call_price+↵
(decile_2yr_1mth_4_stock_price.*decile_2yr_1mth_4_calldelta)-↵
(decile_2yr_1mth_4_stock_close.*decile_2yr_1mth_4_calldelta))./(-↵
decile_2yr_1mth_4_stock_price.↵
*decile_2yr_1mth_4_calldelta+decile_2yr_1mth_4_call_price)-↵
decile_2yr_1mth_4_rates)))));
1354
1355
1356 decile_2yr_1mth_5=find((logdiff_2yrRV_1mth > sort_logdiff_2yrRV_1mth(ff2*4,1)) &↵
(logdiff_2yrRV_1mth <= sort_logdiff_2yrRV_1mth(ff2*5,1)));
1357
1358 decile_2yr_1mth_5_mean = mean(diff_2yrRV_1mth(decile_2yr_1mth_5));
1359 decile_2yr_1mth_5_RV = mean(Hist_Vol_2yr_1mth_1(decile_2yr_1mth_5));
1360 decile_2yr_1mth_5_IV = mean(bsvolatility_1mth_1(decile_2yr_1mth_5));
1361 decile_2yr_1mth_5_CS = mean(CallDivStock_1mth(decile_2yr_1mth_5));
1362 decile_2yr_1mth_5_delta = mean(callDelta_1mth_2yr_1(decile_2yr_1mth_5));
1363 decile_2yr_1mth_5_rates = rates_1mth_2(decile_2yr_1mth_5);
1364 decile_2yr_1mth_5_call_return = mean(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_5));
1365 [h,p,ci,decile_2yr_1mth_5_call_return_ttest] = ttest(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_5),0);
1366 decile_2yr_1mth_5_call_return_std = std(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_5));
1367 decile_2yr_1mth_5_call_return_min = min(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_5));
1368 decile_2yr_1mth_5_call_return_max = max(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_5));
1369 decile_2yr_1mth_5_call_SR = mean(opt_percentage_return_1mth_1(decile_2yr_1mth_5)-↵
decile_2yr_1mth_5_rates)/(sqrt(var(opt_percentage_return_1mth_1(decile_2yr_1mth_5)-↵
decile_2yr_1mth_5_rates)));
1370 decile_2yr_1mth_5_stock_return = mean(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_5));
1371 [h,p,ci,decile_2yr_1mth_5_stock_return_ttest] = ttest↵
```

```
     (stock_percentage_return_1mth_1(decile_2yr_1mth_5),0);
1372 decile_2yr_1mth_5_stock_return_std = std(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_5));
1373 decile_2yr_1mth_5_stock_return_min = min(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_5));
1374 decile_2yr_1mth_5_stock_return_max = max(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_5));
1375 decile_2yr_1mth_5_stock_SR = mean(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_5)-decile_2yr_1mth_5_rates)/(sqrt(var(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_5)-decile_2yr_1mth_5_rates)));
1376 decile_2yr_1mth_5_date = D_op_1mth_4(decile_2yr_1mth_5);
1377 decile_2yr_1mth_5_call_price = call_price_1mth_2(decile_2yr_1mth_5);
1378 decile_2yr_1mth_5_stock_price = underlying_1mth_3(decile_2yr_1mth_5);
1379 decile_2yr_1mth_5_opt_ex_price = opt_ex_payoff_1mth_1(decile_2yr_1mth_5);
1380 decile_2yr_1mth_5_strike_price = strike_price_1mth_4(decile_2yr_1mth_5);
1381 decile_2yr_1mth_5_D_op = D_op_1mth_4(decile_2yr_1mth_5);
1382 decile_2yr_1mth_5_ticker_op = ticker_op_1mth_4(decile_2yr_1mth_5);
1383 decile_2yr_1mth_5_calldelta = callDelta_1mth_2yr_1(decile_2yr_1mth_5);
1384 decile_2yr_1mth_5_stock_close = stock_close_1mth_1(decile_2yr_1mth_5);
1385 decile_2yr_1mth_5_delta_return = mean((decile_2yr_1mth_5_opt_ex_price-↵
decile_2yr_1mth_5_call_price+(decile_2yr_1mth_5_stock_price.↵
*decile_2yr_1mth_5_calldelta)-(decile_2yr_1mth_5_stock_close.↵
*decile_2yr_1mth_5_calldelta))./((-decile_2yr_1mth_5_stock_price.↵
*decile_2yr_1mth_5_calldelta)+decile_2yr_1mth_5_call_price));
1386 [h,p,ci,decile_2yr_1mth_5_delta_return_ttest] = ttest↵
((decile_2yr_1mth_5_opt_ex_price-decile_2yr_1mth_5_call_price+↵
(decile_2yr_1mth_5_stock_price.*decile_2yr_1mth_5_calldelta)-↵
(decile_2yr_1mth_5_stock_close.*decile_2yr_1mth_5_calldelta))./((-↵
decile_2yr_1mth_5_stock_price.*decile_2yr_1mth_5_calldelta)↵
+decile_2yr_1mth_5_call_price),0);
1387 decile_2yr_1mth_5_delta_std = std((decile_2yr_1mth_5_opt_ex_price-↵
decile_2yr_1mth_5_call_price+(decile_2yr_1mth_5_stock_price.↵
*decile_2yr_1mth_5_calldelta)-(decile_2yr_1mth_5_stock_close.↵
*decile_2yr_1mth_5_calldelta))./((-decile_2yr_1mth_5_stock_price.↵
*decile_2yr_1mth_5_calldelta)+decile_2yr_1mth_5_call_price));
1388 decile_2yr_1mth_5_delta_min = min((decile_2yr_1mth_5_opt_ex_price-↵
decile_2yr_1mth_5_call_price+(decile_2yr_1mth_5_stock_price.↵
*decile_2yr_1mth_5_calldelta)-(decile_2yr_1mth_5_stock_close.↵
*decile_2yr_1mth_5_calldelta))./((-decile_2yr_1mth_5_stock_price.↵
*decile_2yr_1mth_5_calldelta)+decile_2yr_1mth_5_call_price));
1389 decile_2yr_1mth_5_delta_max = max((decile_2yr_1mth_5_opt_ex_price-↵
decile_2yr_1mth_5_call_price+(decile_2yr_1mth_5_stock_price.↵
*decile_2yr_1mth_5_calldelta)-(decile_2yr_1mth_5_stock_close.↵
*decile_2yr_1mth_5_calldelta))./((-decile_2yr_1mth_5_stock_price.↵
*decile_2yr_1mth_5_calldelta)+decile_2yr_1mth_5_call_price));
1390 decile_2yr_1mth_5_delta_SR = mean((((decile_2yr_1mth_5_opt_ex_price-↵
decile_2yr_1mth_5_call_price+(decile_2yr_1mth_5_stock_price.↵
*decile_2yr_1mth_5_calldelta)-(decile_2yr_1mth_5_stock_close.↵
*decile_2yr_1mth_5_calldelta))./((-decile_2yr_1mth_5_stock_price.↵
*decile_2yr_1mth_5_calldelta)+decile_2yr_1mth_5_call_price))-decile_2yr_1mth_5_rates)↵
/...
1391     (sqrt(var((decile_2yr_1mth_5_opt_ex_price-decile_2yr_1mth_5_call_price+↵
(decile_2yr_1mth_5_stock_price.*decile_2yr_1mth_5_calldelta)-↵
(decile_2yr_1mth_5_stock_close.*decile_2yr_1mth_5_calldelta))./(-↵
```

```
decile_2yr_1mth_5_stock_price.↵
*decile_2yr_1mth_5_calldelta+decile_2yr_1mth_5_call_price)-↵
decile_2yr_1mth_5_rates))));
1392
1393
1394 decile_2yr_1mth_6=find((logdiff_2yrRV_1mth > sort_logdiff_2yrRV_1mth(ff2*5,1)) &↵
(logdiff_2yrRV_1mth <= sort_logdiff_2yrRV_1mth(ff2*6,1)));
1395
1396 decile_2yr_1mth_6_mean = mean(diff_2yrRV_1mth(decile_2yr_1mth_6));
1397 decile_2yr_1mth_6_RV = mean(Hist_Vol_2yr_1mth_1(decile_2yr_1mth_6));
1398 decile_2yr_1mth_6_IV = mean(bsvolatility_1mth_1(decile_2yr_1mth_6));
1399 decile_2yr_1mth_6_CS = mean(CallDivStock_1mth(decile_2yr_1mth_6));
1400 decile_2yr_1mth_6_delta = mean(callDelta_1mth_2yr_1(decile_2yr_1mth_6));
1401 decile_2yr_1mth_6_rates = rates_1mth_2(decile_2yr_1mth_6);
1402 decile_2yr_1mth_6_call_return = mean(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_6));
1403 [h,p,ci,decile_2yr_1mth_6_call_return_ttest] = ttest(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_6),0);
1404 decile_2yr_1mth_6_call_return_std = std(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_6));
1405 decile_2yr_1mth_6_call_return_min = min(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_6));
1406 decile_2yr_1mth_6_call_return_max = max(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_6));
1407 decile_2yr_1mth_6_call_SR = mean(opt_percentage_return_1mth_1(decile_2yr_1mth_6)-↵
decile_2yr_1mth_6_rates)/(sqrt(var(opt_percentage_return_1mth_1(decile_2yr_1mth_6)-↵
decile_2yr_1mth_6_rates)));
1408 decile_2yr_1mth_6_stock_return = mean(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_6));
1409 [h,p,ci,decile_2yr_1mth_6_stock_return_ttest] = ttest↵
(stock_percentage_return_1mth_1(decile_2yr_1mth_6),0);
1410 decile_2yr_1mth_6_stock_return_std = std(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_6));
1411 decile_2yr_1mth_6_stock_return_min = min(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_6));
1412 decile_2yr_1mth_6_stock_return_max = max(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_6));
1413 decile_2yr_1mth_6_stock_SR = mean(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_6)-decile_2yr_1mth_6_rates)/(sqrt(var(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_6)-decile_2yr_1mth_6_rates)));
1414 decile_2yr_1mth_6_date = D_op_1mth_4(decile_2yr_1mth_6);
1415 decile_2yr_1mth_6_call_price = call_price_1mth_2(decile_2yr_1mth_6);
1416 decile_2yr_1mth_6_stock_price = underlying_1mth_3(decile_2yr_1mth_6);
1417 decile_2yr_1mth_6_opt_ex_price = opt_ex_payoff_1mth_1(decile_2yr_1mth_6);
1418 decile_2yr_1mth_6_strike_price = strike_price_1mth_4(decile_2yr_1mth_6);
1419 decile_2yr_1mth_6_D_op = D_op_1mth_4(decile_2yr_1mth_6);
1420 decile_2yr_1mth_6_ticker_op = ticker_op_1mth_4(decile_2yr_1mth_6);
1421 decile_2yr_1mth_6_calldelta = callDelta_1mth_2yr_1(decile_2yr_1mth_6);
1422 decile_2yr_1mth_6_stock_close = stock_close_1mth_1(decile_2yr_1mth_6);
1423 decile_2yr_1mth_6_delta_return = mean((decile_2yr_1mth_6_opt_ex_price-↵
decile_2yr_1mth_6_call_price+(decile_2yr_1mth_6_stock_price.↵
*decile_2yr_1mth_6_calldelta)-(decile_2yr_1mth_6_stock_close.↵
*decile_2yr_1mth_6_calldelta))./((-decile_2yr_1mth_6_stock_price.↵
*decile_2yr_1mth_6_calldelta)+decile_2yr_1mth_6_call_price));
```

```
1424 [h,p,ci,decile_2yr_1mth_6_delta_return_ttest] = ttest↵
((decile_2yr_1mth_6_opt_ex_price-decile_2yr_1mth_6_call_price+↵
(decile_2yr_1mth_6_stock_price.*decile_2yr_1mth_6_calldelta)-↵
(decile_2yr_1mth_6_stock_close.*decile_2yr_1mth_6_calldelta))./((-↵
decile_2yr_1mth_6_stock_price.*decile_2yr_1mth_6_calldelta)↵
+decile_2yr_1mth_6_call_price),0);
1425 decile_2yr_1mth_6_delta_std = std((decile_2yr_1mth_6_opt_ex_price-↵
decile_2yr_1mth_6_call_price+(decile_2yr_1mth_6_stock_price.↵
*decile_2yr_1mth_6_calldelta)-(decile_2yr_1mth_6_stock_close.↵
*decile_2yr_1mth_6_calldelta))./((-decile_2yr_1mth_6_stock_price.↵
*decile_2yr_1mth_6_calldelta)+decile_2yr_1mth_6_call_price));
1426 decile_2yr_1mth_6_delta_min = min((decile_2yr_1mth_6_opt_ex_price-↵
decile_2yr_1mth_6_call_price+(decile_2yr_1mth_6_stock_price.↵
*decile_2yr_1mth_6_calldelta)-(decile_2yr_1mth_6_stock_close.↵
*decile_2yr_1mth_6_calldelta))./((-decile_2yr_1mth_6_stock_price.↵
*decile_2yr_1mth_6_calldelta)+decile_2yr_1mth_6_call_price));
1427 decile_2yr_1mth_6_delta_max = max((decile_2yr_1mth_6_opt_ex_price-↵
decile_2yr_1mth_6_call_price+(decile_2yr_1mth_6_stock_price.↵
*decile_2yr_1mth_6_calldelta)-(decile_2yr_1mth_6_stock_close.↵
*decile_2yr_1mth_6_calldelta))./((-decile_2yr_1mth_6_stock_price.↵
*decile_2yr_1mth_6_calldelta)+decile_2yr_1mth_6_call_price));
1428 decile_2yr_1mth_6_delta_SR = mean((((decile_2yr_1mth_6_opt_ex_price-↵
decile_2yr_1mth_6_call_price+(decile_2yr_1mth_6_stock_price.↵
*decile_2yr_1mth_6_calldelta)-(decile_2yr_1mth_6_stock_close.↵
*decile_2yr_1mth_6_calldelta))./((-decile_2yr_1mth_6_stock_price.↵
*decile_2yr_1mth_6_calldelta)+decile_2yr_1mth_6_call_price))-decile_2yr_1mth_6_rates)↵
/...
1429     (sqrt(var((decile_2yr_1mth_6_opt_ex_price-decile_2yr_1mth_6_call_price+↵
(decile_2yr_1mth_6_stock_price.*decile_2yr_1mth_6_calldelta)-↵
(decile_2yr_1mth_6_stock_close.*decile_2yr_1mth_6_calldelta))./(-↵
decile_2yr_1mth_6_stock_price.↵
*decile_2yr_1mth_6_calldelta+decile_2yr_1mth_6_call_price)-↵
decile_2yr_1mth_6_rates))));
1430
1431
1432 decile_2yr_1mth_7=find((logdiff_2yrRV_1mth > sort_logdiff_2yrRV_1mth(ff2*6,1)) &↵
(logdiff_2yrRV_1mth <= sort_logdiff_2yrRV_1mth(ff2*7,1)));
1433
1434 decile_2yr_1mth_7_mean = mean(diff_2yrRV_1mth(decile_2yr_1mth_7));
1435 decile_2yr_1mth_7_RV = mean(Hist_Vol_2yr_1mth_1(decile_2yr_1mth_7));
1436 decile_2yr_1mth_7_IV = mean(bsvolatility_1mth_1(decile_2yr_1mth_7));
1437 decile_2yr_1mth_7_CS = mean(CallDivStock_1mth(decile_2yr_1mth_7));
1438 decile_2yr_1mth_7_delta = mean(callDelta_1mth_2yr_1(decile_2yr_1mth_7));
1439 decile_2yr_1mth_7_rates = rates_1mth_2(decile_2yr_1mth_7);
1440 decile_2yr_1mth_7_call_return = mean(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_7));
1441 [h,p,ci,decile_2yr_1mth_7_call_return_ttest] = ttest(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_7),0);
1442 decile_2yr_1mth_7_call_return_std = std(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_7));
1443 decile_2yr_1mth_7_call_return_min = min(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_7));
1444 decile_2yr_1mth_7_call_return_max = max(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_7));
```

```
1445 decile_2yr_1mth_7_call_SR = mean(opt_percentage_return_1mth_1(decile_2yr_1mth_7)-↵
decile_2yr_1mth_7_rates)/(sqrt(var(opt_percentage_return_1mth_1(decile_2yr_1mth_7)-↵
decile_2yr_1mth_7_rates)));
1446 decile_2yr_1mth_7_stock_return = mean(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_7));
1447 [h,p,ci,decile_2yr_1mth_7_stock_return_ttest] = ttest↵
(stock_percentage_return_1mth_1(decile_2yr_1mth_7),0);
1448 decile_2yr_1mth_7_stock_return_std = std(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_7));
1449 decile_2yr_1mth_7_stock_return_min = min(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_7));
1450 decile_2yr_1mth_7_stock_return_max = max(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_7));
1451 decile_2yr_1mth_7_stock_SR = mean(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_7)-decile_2yr_1mth_7_rates)/(sqrt(var(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_7)-decile_2yr_1mth_7_rates)));
1452 decile_2yr_1mth_7_date = D_op_1mth_4(decile_2yr_1mth_7);
1453 decile_2yr_1mth_7_call_price = call_price_1mth_2(decile_2yr_1mth_7);
1454 decile_2yr_1mth_7_stock_price = underlying_1mth_3(decile_2yr_1mth_7);
1455 decile_2yr_1mth_7_opt_ex_price = opt_ex_payoff_1mth_1(decile_2yr_1mth_7);
1456 decile_2yr_1mth_7_strike_price = strike_price_1mth_4(decile_2yr_1mth_7);
1457 decile_2yr_1mth_7_D_op = D_op_1mth_4(decile_2yr_1mth_7);
1458 decile_2yr_1mth_7_ticker_op = ticker_op_1mth_4(decile_2yr_1mth_7);
1459 decile_2yr_1mth_7_calldelta = callDelta_1mth_2yr_1(decile_2yr_1mth_7);
1460 decile_2yr_1mth_7_stock_close = stock_close_1mth_1(decile_2yr_1mth_7);
1461 decile_2yr_1mth_7_delta_return = mean((decile_2yr_1mth_7_opt_ex_price-↵
decile_2yr_1mth_7_call_price+(decile_2yr_1mth_7_stock_price.↵
*decile_2yr_1mth_7_calldelta)-(decile_2yr_1mth_7_stock_close.↵
*decile_2yr_1mth_7_calldelta))./((-decile_2yr_1mth_7_stock_price.↵
*decile_2yr_1mth_7_calldelta)+decile_2yr_1mth_7_call_price));
1462 [h,p,ci,decile_2yr_1mth_7_delta_return_ttest] = ttest↵
((decile_2yr_1mth_7_opt_ex_price-decile_2yr_1mth_7_call_price+↵
(decile_2yr_1mth_7_stock_price.*decile_2yr_1mth_7_calldelta)-↵
(decile_2yr_1mth_7_stock_close.*decile_2yr_1mth_7_calldelta))./((-↵
decile_2yr_1mth_7_stock_price.*decile_2yr_1mth_7_calldelta)↵
+decile_2yr_1mth_7_call_price),0);
1463 decile_2yr_1mth_7_delta_std = std((decile_2yr_1mth_7_opt_ex_price-↵
decile_2yr_1mth_7_call_price+(decile_2yr_1mth_7_stock_price.↵
*decile_2yr_1mth_7_calldelta)-(decile_2yr_1mth_7_stock_close.↵
*decile_2yr_1mth_7_calldelta))./((-decile_2yr_1mth_7_stock_price.↵
*decile_2yr_1mth_7_calldelta)+decile_2yr_1mth_7_call_price));
1464 decile_2yr_1mth_7_delta_min = min((decile_2yr_1mth_7_opt_ex_price-↵
decile_2yr_1mth_7_call_price+(decile_2yr_1mth_7_stock_price.↵
*decile_2yr_1mth_7_calldelta)-(decile_2yr_1mth_7_stock_close.↵
*decile_2yr_1mth_7_calldelta))./((-decile_2yr_1mth_7_stock_price.↵
*decile_2yr_1mth_7_calldelta)+decile_2yr_1mth_7_call_price));
1465 decile_2yr_1mth_7_delta_max = max((decile_2yr_1mth_7_opt_ex_price-↵
decile_2yr_1mth_7_call_price+(decile_2yr_1mth_7_stock_price.↵
*decile_2yr_1mth_7_calldelta)-(decile_2yr_1mth_7_stock_close.↵
*decile_2yr_1mth_7_calldelta))./((-decile_2yr_1mth_7_stock_price.↵
*decile_2yr_1mth_7_calldelta)+decile_2yr_1mth_7_call_price));
1466 decile_2yr_1mth_7_delta_SR = mean((((decile_2yr_1mth_7_opt_ex_price-↵
decile_2yr_1mth_7_call_price+(decile_2yr_1mth_7_stock_price.↵
*decile_2yr_1mth_7_calldelta)-(decile_2yr_1mth_7_stock_close.↵
```

```
*decile_2yr_1mth_7_calldelta))./((-decile_2yr_1mth_7_stock_price.↙
*decile_2yr_1mth_7_calldelta)+decile_2yr_1mth_7_call_price))-decile_2yr_1mth_7_rates)↙
/...
1467      (sqrt(var((decile_2yr_1mth_7_opt_ex_price-decile_2yr_1mth_7_call_price+↙
(decile_2yr_1mth_7_stock_price.*decile_2yr_1mth_7_calldelta)-↙
(decile_2yr_1mth_7_stock_close.*decile_2yr_1mth_7_calldelta))./(-↙
decile_2yr_1mth_7_stock_price.↙
*decile_2yr_1mth_7_calldelta+decile_2yr_1mth_7_call_price)-↙
decile_2yr_1mth_7_rates)))));
1468
1469
1470 decile_2yr_1mth_8=find((logdiff_2yrRV_1mth > sort_logdiff_2yrRV_1mth(ff2*7,1)) &↙
(logdiff_2yrRV_1mth <= sort_logdiff_2yrRV_1mth(ff2*8,1)));
1471
1472 decile_2yr_1mth_8_mean = mean(diff_2yrRV_1mth(decile_2yr_1mth_8));
1473 decile_2yr_1mth_8_RV = mean(Hist_Vol_2yr_1mth_1(decile_2yr_1mth_8));
1474 decile_2yr_1mth_8_IV = mean(bsvolatility_1mth_1(decile_2yr_1mth_8));
1475 decile_2yr_1mth_8_CS = mean(CallDivStock_1mth(decile_2yr_1mth_8));
1476 decile_2yr_1mth_8_delta = mean(callDelta_1mth_2yr_1(decile_2yr_1mth_8));
1477 decile_2yr_1mth_8_rates = rates_1mth_2(decile_2yr_1mth_8);
1478 decile_2yr_1mth_8_call_return = mean(opt_percentage_return_1mth_1↙
(decile_2yr_1mth_8));
1479 [h,p,ci,decile_2yr_1mth_8_call_return_ttest] = ttest(opt_percentage_return_1mth_1↙
(decile_2yr_1mth_8),0);
1480 decile_2yr_1mth_8_call_return_std = std(opt_percentage_return_1mth_1↙
(decile_2yr_1mth_8));
1481 decile_2yr_1mth_8_call_return_min = min(opt_percentage_return_1mth_1↙
(decile_2yr_1mth_8));
1482 decile_2yr_1mth_8_call_return_max = max(opt_percentage_return_1mth_1↙
(decile_2yr_1mth_8));
1483 decile_2yr_1mth_8_call_SR = mean(opt_percentage_return_1mth_1(decile_2yr_1mth_8)-↙
decile_2yr_1mth_8_rates)/(sqrt(var(opt_percentage_return_1mth_1(decile_2yr_1mth_8)-↙
decile_2yr_1mth_8_rates)));
1484 decile_2yr_1mth_8_stock_return = mean(stock_percentage_return_1mth_1↙
(decile_2yr_1mth_8));
1485 [h,p,ci,decile_2yr_1mth_8_stock_return_ttest] = ttest↙
(stock_percentage_return_1mth_1(decile_2yr_1mth_8),0);
1486 decile_2yr_1mth_8_stock_return_std = std(stock_percentage_return_1mth_1↙
(decile_2yr_1mth_8));
1487 decile_2yr_1mth_8_stock_return_min = min(stock_percentage_return_1mth_1↙
(decile_2yr_1mth_8));
1488 decile_2yr_1mth_8_stock_return_max = max(stock_percentage_return_1mth_1↙
(decile_2yr_1mth_8));
1489 decile_2yr_1mth_8_stock_SR = mean(stock_percentage_return_1mth_1↙
(decile_2yr_1mth_8)-decile_2yr_1mth_8_rates)/(sqrt(var(stock_percentage_return_1mth_1↙
(decile_2yr_1mth_8)-decile_2yr_1mth_8_rates)));
1490 decile_2yr_1mth_8_date = D_op_1mth_4(decile_2yr_1mth_8);
1491 decile_2yr_1mth_8_call_price = call_price_1mth_2(decile_2yr_1mth_8);
1492 decile_2yr_1mth_8_stock_price = underlying_1mth_3(decile_2yr_1mth_8);
1493 decile_2yr_1mth_8_opt_ex_price = opt_ex_payoff_1mth_1(decile_2yr_1mth_8);
1494 decile_2yr_1mth_8_strike_price = strike_price_1mth_4(decile_2yr_1mth_8);
1495 decile_2yr_1mth_8_D_op = D_op_1mth_4(decile_2yr_1mth_8);
1496 decile_2yr_1mth_8_ticker_op = ticker_op_1mth_4(decile_2yr_1mth_8);
1497 decile_2yr_1mth_8_calldelta = callDelta_1mth_2yr_1(decile_2yr_1mth_8);
```

```
1498 decile_2yr_1mth_8_stock_close = stock_close_1mth_1(decile_2yr_1mth_8);
1499 decile_2yr_1mth_8_delta_return = mean((decile_2yr_1mth_8_opt_ex_price-↵
decile_2yr_1mth_8_call_price+(decile_2yr_1mth_8_stock_price.↵
*decile_2yr_1mth_8_calldelta)-(decile_2yr_1mth_8_stock_close.↵
*decile_2yr_1mth_8_calldelta))./((-decile_2yr_1mth_8_stock_price.↵
*decile_2yr_1mth_8_calldelta)+decile_2yr_1mth_8_call_price));
1500 [h,p,ci,decile_2yr_1mth_8_delta_return_ttest] = ttest↵
((decile_2yr_1mth_8_opt_ex_price-decile_2yr_1mth_8_call_price+↵
(decile_2yr_1mth_8_stock_price.*decile_2yr_1mth_8_calldelta)-↵
(decile_2yr_1mth_8_stock_close.*decile_2yr_1mth_8_calldelta))./((-↵
decile_2yr_1mth_8_stock_price.*decile_2yr_1mth_8_calldelta)↵
+decile_2yr_1mth_8_call_price),0);
1501 decile_2yr_1mth_8_delta_std = std((decile_2yr_1mth_8_opt_ex_price-↵
decile_2yr_1mth_8_call_price+(decile_2yr_1mth_8_stock_price.↵
*decile_2yr_1mth_8_calldelta)-(decile_2yr_1mth_8_stock_close.↵
*decile_2yr_1mth_8_calldelta))./((-decile_2yr_1mth_8_stock_price.↵
*decile_2yr_1mth_8_calldelta)+decile_2yr_1mth_8_call_price));
1502 decile_2yr_1mth_8_delta_min = min((decile_2yr_1mth_8_opt_ex_price-↵
decile_2yr_1mth_8_call_price+(decile_2yr_1mth_8_stock_price.↵
*decile_2yr_1mth_8_calldelta)-(decile_2yr_1mth_8_stock_close.↵
*decile_2yr_1mth_8_calldelta))./((-decile_2yr_1mth_8_stock_price.↵
*decile_2yr_1mth_8_calldelta)+decile_2yr_1mth_8_call_price));
1503 decile_2yr_1mth_8_delta_max = max((decile_2yr_1mth_8_opt_ex_price-↵
decile_2yr_1mth_8_call_price+(decile_2yr_1mth_8_stock_price.↵
*decile_2yr_1mth_8_calldelta)-(decile_2yr_1mth_8_stock_close.↵
*decile_2yr_1mth_8_calldelta))./((-decile_2yr_1mth_8_stock_price.↵
*decile_2yr_1mth_8_calldelta)+decile_2yr_1mth_8_call_price));
1504 decile_2yr_1mth_8_delta_SR = mean((((decile_2yr_1mth_8_opt_ex_price-↵
decile_2yr_1mth_8_call_price+(decile_2yr_1mth_8_stock_price.↵
*decile_2yr_1mth_8_calldelta)-(decile_2yr_1mth_8_stock_close.↵
*decile_2yr_1mth_8_calldelta))./((-decile_2yr_1mth_8_stock_price.↵
*decile_2yr_1mth_8_calldelta)+decile_2yr_1mth_8_call_price))-decile_2yr_1mth_8_rates)↵
/...
1505     (sqrt(var((decile_2yr_1mth_8_opt_ex_price-decile_2yr_1mth_8_call_price+↵
(decile_2yr_1mth_8_stock_price.*decile_2yr_1mth_8_calldelta)-↵
(decile_2yr_1mth_8_stock_close.*decile_2yr_1mth_8_calldelta))./(-↵
decile_2yr_1mth_8_stock_price.↵
*decile_2yr_1mth_8_calldelta+decile_2yr_1mth_8_call_price)-↵
decile_2yr_1mth_8_rates)))));
1506
1507
1508 decile_2yr_1mth_9=find((logdiff_2yrRV_1mth > sort_logdiff_2yrRV_1mth(ff2*8,1)) &↵
(logdiff_2yrRV_1mth <= sort_logdiff_2yrRV_1mth(ff2*9,1)));
1509
1510 decile_2yr_1mth_9_mean = mean(diff_2yrRV_1mth(decile_2yr_1mth_9));
1511 decile_2yr_1mth_9_RV = mean(Hist_Vol_2yr_1mth_1(decile_2yr_1mth_9));
1512 decile_2yr_1mth_9_IV = mean(bsvolatility_1mth_1(decile_2yr_1mth_9));
1513 decile_2yr_1mth_9_CS = mean(CallDivStock_1mth(decile_2yr_1mth_9));
1514 decile_2yr_1mth_9_delta = mean(callDelta_1mth_2yr_1(decile_2yr_1mth_9));
1515 decile_2yr_1mth_9_rates = rates_1mth_2(decile_2yr_1mth_9);
1516 decile_2yr_1mth_9_call_return = mean(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_9));
1517 [h,p,ci,decile_2yr_1mth_9_call_return_ttest] = ttest(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_9),0);
```

```
1518 decile_2yr_1mth_9_call_return_std = std(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_9));
1519 decile_2yr_1mth_9_call_return_min = min(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_9));
1520 decile_2yr_1mth_9_call_return_max = max(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_9));
1521 decile_2yr_1mth_9_call_SR = mean(opt_percentage_return_1mth_1(decile_2yr_1mth_9)-↵
decile_2yr_1mth_9_rates)/(sqrt(var(opt_percentage_return_1mth_1(decile_2yr_1mth_9)-↵
decile_2yr_1mth_9_rates)));
1522 decile_2yr_1mth_9_stock_return = mean(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_9));
1523 [h,p,ci,decile_2yr_1mth_9_stock_return_ttest] = ttest↵
(stock_percentage_return_1mth_1(decile_2yr_1mth_9),0);
1524 decile_2yr_1mth_9_stock_return_std = std(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_9));
1525 decile_2yr_1mth_9_stock_return_min = min(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_9));
1526 decile_2yr_1mth_9_stock_return_max = max(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_9));
1527 decile_2yr_1mth_9_stock_SR = mean(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_9)-decile_2yr_1mth_9_rates)/(sqrt(var(stock_percentage_return_1mth_1↵
(decile_2yr_1mth_9)-decile_2yr_1mth_9_rates)));
1528 decile_2yr_1mth_9_date = D_op_1mth_4(decile_2yr_1mth_9);
1529 decile_2yr_1mth_9_call_price = call_price_1mth_2(decile_2yr_1mth_9);
1530 decile_2yr_1mth_9_stock_price = underlying_1mth_3(decile_2yr_1mth_9);
1531 decile_2yr_1mth_9_opt_ex_price = opt_ex_payoff_1mth_1(decile_2yr_1mth_9);
1532 decile_2yr_1mth_9_strike_price = strike_price_1mth_4(decile_2yr_1mth_9);
1533 decile_2yr_1mth_9_D_op = D_op_1mth_4(decile_2yr_1mth_9);
1534 decile_2yr_1mth_9_ticker_op = ticker_op_1mth_4(decile_2yr_1mth_9);
1535 decile_2yr_1mth_9_calldelta = callDelta_1mth_2yr_1(decile_2yr_1mth_9);
1536 decile_2yr_1mth_9_stock_close = stock_close_1mth_1(decile_2yr_1mth_9);
1537 decile_2yr_1mth_9_delta_return = mean((decile_2yr_1mth_9_opt_ex_price-↵
decile_2yr_1mth_9_call_price+(decile_2yr_1mth_9_stock_price.↵
*decile_2yr_1mth_9_calldelta)-(decile_2yr_1mth_9_stock_close.↵
*decile_2yr_1mth_9_calldelta))./((-decile_2yr_1mth_9_stock_price.↵
*decile_2yr_1mth_9_calldelta)+decile_2yr_1mth_9_call_price));
1538 [h,p,ci,decile_2yr_1mth_9_delta_return_ttest] = ttest↵
((decile_2yr_1mth_9_opt_ex_price-decile_2yr_1mth_9_call_price+↵
(decile_2yr_1mth_9_stock_price.*decile_2yr_1mth_9_calldelta)-↵
(decile_2yr_1mth_9_stock_close.*decile_2yr_1mth_9_calldelta))./((-↵
decile_2yr_1mth_9_stock_price.*decile_2yr_1mth_9_calldelta)↵
+decile_2yr_1mth_9_call_price),0);
1539 decile_2yr_1mth_9_delta_std = std((decile_2yr_1mth_9_opt_ex_price-↵
decile_2yr_1mth_9_call_price+(decile_2yr_1mth_9_stock_price.↵
*decile_2yr_1mth_9_calldelta)-(decile_2yr_1mth_9_stock_close.↵
*decile_2yr_1mth_9_calldelta))./((-decile_2yr_1mth_9_stock_price.↵
*decile_2yr_1mth_9_calldelta)+decile_2yr_1mth_9_call_price));
1540 decile_2yr_1mth_9_delta_min = min((decile_2yr_1mth_9_opt_ex_price-↵
decile_2yr_1mth_9_call_price+(decile_2yr_1mth_9_stock_price.↵
*decile_2yr_1mth_9_calldelta)-(decile_2yr_1mth_9_stock_close.↵
*decile_2yr_1mth_9_calldelta))./((-decile_2yr_1mth_9_stock_price.↵
*decile_2yr_1mth_9_calldelta)+decile_2yr_1mth_9_call_price));
1541 decile_2yr_1mth_9_delta_max = max((decile_2yr_1mth_9_opt_ex_price-↵
decile_2yr_1mth_9_call_price+(decile_2yr_1mth_9_stock_price.↵
```

```
     *decile_2yr_1mth_9_calldelta)-(decile_2yr_1mth_9_stock_close.↵
     *decile_2yr_1mth_9_calldelta))./((-decile_2yr_1mth_9_stock_price.↵
     *decile_2yr_1mth_9_calldelta)+decile_2yr_1mth_9_call_price));
1542 decile_2yr_1mth_9_delta_SR = mean((((decile_2yr_1mth_9_opt_ex_price-↵
     decile_2yr_1mth_9_call_price+(decile_2yr_1mth_9_stock_price.↵
     *decile_2yr_1mth_9_calldelta)-(decile_2yr_1mth_9_stock_close.↵
     *decile_2yr_1mth_9_calldelta))./((-decile_2yr_1mth_9_stock_price.↵
     *decile_2yr_1mth_9_calldelta)+decile_2yr_1mth_9_call_price)-decile_2yr_1mth_9_rates)↵
     /...
1543     (sqrt(var((decile_2yr_1mth_9_opt_ex_price-decile_2yr_1mth_9_call_price+↵
     (decile_2yr_1mth_9_stock_price.*decile_2yr_1mth_9_calldelta)-↵
     (decile_2yr_1mth_9_stock_close.*decile_2yr_1mth_9_calldelta))./(-↵
     decile_2yr_1mth_9_stock_price.↵
     *decile_2yr_1mth_9_calldelta+decile_2yr_1mth_9_call_price)-↵
     decile_2yr_1mth_9_rates)))));
1544
1545
1546 decile_2yr_1mth_10=find((logdiff_2yrRV_1mth > sort_logdiff_2yrRV_1mth(ff2*9,1)));
1547
1548 decile_2yr_1mth_10_mean = mean(diff_2yrRV_1mth(decile_2yr_1mth_10));
1549 decile_2yr_1mth_10_RV = mean(Hist_Vol_2yr_1mth_1(decile_2yr_1mth_10));
1550 decile_2yr_1mth_10_IV = mean(bsvolatility_1mth_1(decile_2yr_1mth_10));
1551 decile_2yr_1mth_10_CS = mean(CallDivStock_1mth(decile_2yr_1mth_10));
1552 decile_2yr_1mth_10_delta = mean(callDelta_1mth_2yr_1(decile_2yr_1mth_10));
1553 decile_2yr_1mth_10_rates = rates_1mth_2(decile_2yr_1mth_10);
1554 decile_2yr_1mth_10_call_return = mean(opt_percentage_return_1mth_1↵
     (decile_2yr_1mth_10));
1555 [h,p,ci,decile_2yr_1mth_10_call_return_ttest] = ttest↵
     (opt_percentage_return_1mth_1(decile_2yr_1mth_10),0);
1556 decile_2yr_1mth_10_call_return_std = std(opt_percentage_return_1mth_1↵
     (decile_2yr_1mth_10));
1557 decile_2yr_1mth_10_call_return_min = min(opt_percentage_return_1mth_1↵
     (decile_2yr_1mth_10));
1558 decile_2yr_1mth_10_call_return_max = max(opt_percentage_return_1mth_1↵
     (decile_2yr_1mth_10));
1559 decile_2yr_1mth_10_call_SR = mean(opt_percentage_return_1mth_1↵
     (decile_2yr_1mth_10)-decile_2yr_1mth_10_rates)/(sqrt(var(opt_percentage_return_1mth_1↵
     (decile_2yr_1mth_10)-decile_2yr_1mth_10_rates)));
1560 decile_2yr_1mth_10_stock_return = mean(stock_percentage_return_1mth_1↵
     (decile_2yr_1mth_10));
1561 [h,p,ci,decile_2yr_1mth_10_stock_return_ttest] = ttest↵
     (stock_percentage_return_1mth_1(decile_2yr_1mth_10),0);
1562 decile_2yr_1mth_10_stock_return_std = std(stock_percentage_return_1mth_1↵
     (decile_2yr_1mth_10));
1563 decile_2yr_1mth_10_stock_return_min = min(stock_percentage_return_1mth_1↵
     (decile_2yr_1mth_10));
1564 decile_2yr_1mth_10_stock_return_max = max(stock_percentage_return_1mth_1↵
     (decile_2yr_1mth_10));
1565 decile_2yr_1mth_10_stock_SR = mean(stock_percentage_return_1mth_1↵
     (decile_2yr_1mth_10)-decile_2yr_1mth_10_rates)/(sqrt(var↵
     (stock_percentage_return_1mth_1(decile_2yr_1mth_10)-decile_2yr_1mth_10_rates)));
1566 decile_2yr_1mth_10_date = D_op_1mth_4(decile_2yr_1mth_10);
1567 decile_2yr_1mth_10_call_price = call_price_1mth_2(decile_2yr_1mth_10);
1568 decile_2yr_1mth_10_stock_price = underlying_1mth_3(decile_2yr_1mth_10);
```

```
1569 decile_2yr_1mth_10_opt_ex_price = opt_ex_payoff_1mth_1(decile_2yr_1mth_10);
1570 decile_2yr_1mth_10_strike_price = strike_price_1mth_4(decile_2yr_1mth_10);
1571 decile_2yr_1mth_10_D_op = D_op_1mth_4(decile_2yr_1mth_10);
1572 decile_2yr_1mth_10_ticker_op = ticker_op_1mth_4(decile_2yr_1mth_10);
1573 decile_2yr_1mth_10_calldelta = callDelta_1mth_2yr_1(decile_2yr_1mth_10);
1574 decile_2yr_1mth_10_stock_close = stock_close_1mth_1(decile_2yr_1mth_10);
1575 decile_2yr_1mth_10_delta_return = mean((decile_2yr_1mth_10_opt_ex_price-↵
decile_2yr_1mth_10_call_price+(decile_2yr_1mth_10_stock_price.↵
*decile_2yr_1mth_10_calldelta)-(decile_2yr_1mth_10_stock_close.↵
*decile_2yr_1mth_10_calldelta))./((-decile_2yr_1mth_10_stock_price.↵
*decile_2yr_1mth_10_calldelta)+decile_2yr_1mth_10_call_price));
1576 [h,p,ci,decile_2yr_1mth_10_delta_return_ttest] = ttest↵
((decile_2yr_1mth_10_opt_ex_price-decile_2yr_1mth_10_call_price+↵
(decile_2yr_1mth_10_stock_price.*decile_2yr_1mth_10_calldelta)-↵
(decile_2yr_1mth_10_stock_close.*decile_2yr_1mth_10_calldelta))./((-↵
decile_2yr_1mth_10_stock_price.*decile_2yr_1mth_10_calldelta↵
+decile_2yr_1mth_10_call_price),0);
1577 decile_2yr_1mth_10_delta_std = std((decile_2yr_1mth_10_opt_ex_price-↵
decile_2yr_1mth_10_call_price+(decile_2yr_1mth_10_stock_price.↵
*decile_2yr_1mth_10_calldelta)-(decile_2yr_1mth_10_stock_close.↵
*decile_2yr_1mth_10_calldelta))./((-decile_2yr_1mth_10_stock_price.↵
*decile_2yr_1mth_10_calldelta)+decile_2yr_1mth_10_call_price));
1578 decile_2yr_1mth_10_delta_min = min((decile_2yr_1mth_10_opt_ex_price-↵
decile_2yr_1mth_10_call_price+(decile_2yr_1mth_10_stock_price.↵
*decile_2yr_1mth_10_calldelta)-(decile_2yr_1mth_10_stock_close.↵
*decile_2yr_1mth_10_calldelta))./((-decile_2yr_1mth_10_stock_price.↵
*decile_2yr_1mth_10_calldelta)+decile_2yr_1mth_10_call_price));
1579 decile_2yr_1mth_10_delta_max = max((decile_2yr_1mth_10_opt_ex_price-↵
decile_2yr_1mth_10_call_price+(decile_2yr_1mth_10_stock_price.↵
*decile_2yr_1mth_10_calldelta)-(decile_2yr_1mth_10_stock_close.↵
*decile_2yr_1mth_10_calldelta))./((-decile_2yr_1mth_10_stock_price.↵
*decile_2yr_1mth_10_calldelta)+decile_2yr_1mth_10_call_price));
1580 decile_2yr_1mth_10_delta_SR = mean((((decile_2yr_1mth_10_opt_ex_price-↵
decile_2yr_1mth_10_call_price+(decile_2yr_1mth_10_stock_price.↵
*decile_2yr_1mth_10_calldelta)-(decile_2yr_1mth_10_stock_close.↵
*decile_2yr_1mth_10_calldelta))./((-decile_2yr_1mth_10_stock_price.↵
*decile_2yr_1mth_10_calldelta)+decile_2yr_1mth_10_call_price))-↵
decile_2yr_1mth_10_rates)/...
1581     (sqrt(var((decile_2yr_1mth_10_opt_ex_price-decile_2yr_1mth_10_call_price+↵
(decile_2yr_1mth_10_stock_price.*decile_2yr_1mth_10_calldelta)-↵
(decile_2yr_1mth_10_stock_close.*decile_2yr_1mth_10_calldelta))./(-↵
decile_2yr_1mth_10_stock_price.↵
*decile_2yr_1mth_10_calldelta+decile_2yr_1mth_10_call_price)-↵
decile_2yr_1mth_10_rates))));
1582
1583 decile101_2yr_1mth_call_return = mean(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_10)-opt_percentage_return_1mth_1(decile_2yr_1mth_1));
1584 [h,p,ci,decile101_2yr_1mth_call_return_ttest] = ttest↵
(opt_percentage_return_1mth_1(decile_2yr_1mth_10)-opt_percentage_return_1mth_1↵
(decile_2yr_1mth_1),0);
1585 decile101_2yr_1mth_call_return_std = std(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_10)-opt_percentage_return_1mth_1(decile_2yr_1mth_1));
1586 decile101_2yr_1mth_call_return_min = min(opt_percentage_return_1mth_1↵
(decile_2yr_1mth_10)-opt_percentage_return_1mth_1(decile_2yr_1mth_1));
```

```
1587 decile101_2yr_1mth_call_return_max = max(opt_percentage_return_1mth_1↙
(decile_2yr_1mth_10)-opt_percentage_return_1mth_1(decile_2yr_1mth_1));
1588 decile101_2yr_1mth_call_SR = mean((opt_percentage_return_1mth_1↙
(decile_2yr_1mth_10)-decile_2yr_1mth_10_rates)-(opt_percentage_return_1mth_1↙
(decile_2yr_1mth_1)-decile_2yr_1mth_1_rates))/(sqrt(var(opt_percentage_return_1mth_1↙
(decile_2yr_1mth_10)-decile_2yr_1mth_10_rates-(opt_percentage_return_1mth_1↙
(decile_2yr_1mth_1)-decile_2yr_1mth_1_rates))));
1589 decile101_2yr_1mth_stock_return = mean(stock_percentage_return_1mth_1↙
(decile_2yr_1mth_10)-stock_percentage_return_1mth_1(decile_2yr_1mth_1));
1590 [h,p,ci,decile101_2yr_1mth_stock_return_ttest] = ttest↙
(stock_percentage_return_1mth_1(decile_2yr_1mth_10)-stock_percentage_return_1mth_1↙
(decile_2yr_1mth_1),0);
1591 decile101_2yr_1mth_stock_return_std = std(stock_percentage_return_1mth_1↙
(decile_2yr_1mth_10)-stock_percentage_return_1mth_1(decile_2yr_1mth_1));
1592 decile101_2yr_1mth_stock_return_min = min(stock_percentage_return_1mth_1↙
(decile_2yr_1mth_10)-stock_percentage_return_1mth_1(decile_2yr_1mth_1));
1593 decile101_2yr_1mth_stock_return_max = max(stock_percentage_return_1mth_1↙
(decile_2yr_1mth_10)-stock_percentage_return_1mth_1(decile_2yr_1mth_1));
1594 decile101_2yr_1mth_stock_SR = mean(stock_percentage_return_1mth_1↙
(decile_2yr_1mth_10)-decile_2yr_1mth_10_rates-(stock_percentage_return_1mth_1↙
(decile_2yr_1mth_1)-decile_2yr_1mth_1_rates))/(sqrt(var(stock_percentage_return_1mth_1↙
(decile_2yr_1mth_10)-decile_2yr_1mth_10_rates-(stock_percentage_return_1mth_1↙
(decile_2yr_1mth_1)-decile_2yr_1mth_1_rates))));
1595 decile101_2yr_1mth_delta_return = mean((decile_2yr_1mth_10_opt_ex_price-↙
decile_2yr_1mth_10_call_price+(decile_2yr_1mth_10_stock_price.↙
*decile_2yr_1mth_10_calldelta)-(decile_2yr_1mth_10_stock_close.↙
*decile_2yr_1mth_10_calldelta))./((-decile_2yr_1mth_10_stock_price.↙
*decile_2yr_1mth_10_calldelta)+decile_2yr_1mth_10_call_price)-↙
(decile_2yr_1mth_1_opt_ex_price-decile_2yr_1mth_1_call_price+↙
(decile_2yr_1mth_1_stock_price.*decile_2yr_1mth_1_calldelta)-↙
(decile_2yr_1mth_1_stock_close.*decile_2yr_1mth_1_calldelta))./((-↙
decile_2yr_1mth_1_stock_price.*decile_2yr_1mth_1_calldelta)↙
+decile_2yr_1mth_1_call_price));
1596 [h,p,ci,decile101_2yr_1mth_delta_return_ttest] = ttest↙
((decile_2yr_1mth_10_opt_ex_price-decile_2yr_1mth_10_call_price+↙
(decile_2yr_1mth_10_stock_price.*decile_2yr_1mth_10_calldelta)-↙
(decile_2yr_1mth_10_stock_close.*decile_2yr_1mth_10_calldelta))./((-↙
decile_2yr_1mth_10_stock_price.*decile_2yr_1mth_10_calldelta)↙
+decile_2yr_1mth_10_call_price)-(decile_2yr_1mth_1_opt_ex_price-↙
decile_2yr_1mth_1_call_price+(decile_2yr_1mth_1_stock_price.↙
*decile_2yr_1mth_1_calldelta)-(decile_2yr_1mth_1_stock_close.↙
*decile_2yr_1mth_1_calldelta))./((-decile_2yr_1mth_1_stock_price.↙
*decile_2yr_1mth_1_calldelta)+decile_2yr_1mth_1_call_price),0);
1597 decile101_2yr_1mth_delta_std = std((decile_2yr_1mth_10_opt_ex_price-↙
decile_2yr_1mth_10_call_price+(decile_2yr_1mth_10_stock_price.↙
*decile_2yr_1mth_10_calldelta)-(decile_2yr_1mth_10_stock_close.↙
*decile_2yr_1mth_10_calldelta))./((-decile_2yr_1mth_10_stock_price.↙
*decile_2yr_1mth_10_calldelta)+decile_2yr_1mth_10_call_price)-↙
(decile_2yr_1mth_1_opt_ex_price-decile_2yr_1mth_1_call_price+↙
(decile_2yr_1mth_1_stock_price.*decile_2yr_1mth_1_calldelta)-↙
(decile_2yr_1mth_1_stock_close.*decile_2yr_1mth_1_calldelta))./((-↙
decile_2yr_1mth_1_stock_price.*decile_2yr_1mth_1_calldelta)↙
+decile_2yr_1mth_1_call_price));
1598 decile101_2yr_1mth_delta_min = min((decile_2yr_1mth_10_opt_ex_price-↙
```

```
decile_2yr_1mth_10_call_price+(decile_2yr_1mth_10_stock_price.↵
*decile_2yr_1mth_10_calldelta)-(decile_2yr_1mth_10_stock_close.↵
*decile_2yr_1mth_10_calldelta))./((-decile_2yr_1mth_10_stock_price.↵
*decile_2yr_1mth_10_calldelta)+decile_2yr_1mth_10_call_price)-↵
(decile_2yr_1mth_1_opt_ex_price-decile_2yr_1mth_1_call_price+↵
(decile_2yr_1mth_1_stock_price.*decile_2yr_1mth_1_calldelta)-↵
(decile_2yr_1mth_1_stock_close.*decile_2yr_1mth_1_calldelta))./((-↵
decile_2yr_1mth_1_stock_price.*decile_2yr_1mth_1_calldelta)↵
+decile_2yr_1mth_1_call_price));
1599 decile101_2yr_1mth_delta_max = max((decile_2yr_1mth_10_opt_ex_price-↵
decile_2yr_1mth_10_call_price+(decile_2yr_1mth_10_stock_price.↵
*decile_2yr_1mth_10_calldelta)-(decile_2yr_1mth_10_stock_close.↵
*decile_2yr_1mth_10_calldelta))./((-decile_2yr_1mth_10_stock_price.↵
*decile_2yr_1mth_10_calldelta)+decile_2yr_1mth_10_call_price)-↵
(decile_2yr_1mth_1_opt_ex_price-decile_2yr_1mth_1_call_price+↵
(decile_2yr_1mth_1_stock_price.*decile_2yr_1mth_1_calldelta)-↵
(decile_2yr_1mth_1_stock_close.*decile_2yr_1mth_1_calldelta))./((-↵
decile_2yr_1mth_1_stock_price.*decile_2yr_1mth_1_calldelta)↵
+decile_2yr_1mth_1_call_price));
1600 decile101_2yr_1mth_delta_SR = mean((((decile_2yr_1mth_10_opt_ex_price-↵
decile_2yr_1mth_10_call_price+(decile_2yr_1mth_10_stock_price.↵
*decile_2yr_1mth_10_calldelta)-(decile_2yr_1mth_10_stock_close.↵
*decile_2yr_1mth_10_calldelta))./((-decile_2yr_1mth_10_stock_price.↵
*decile_2yr_1mth_10_calldelta)+decile_2yr_1mth_10_call_price))-↵
decile_2yr_1mth_10_rates-((decile_2yr_1mth_1_opt_ex_price-↵
decile_2yr_1mth_1_call_price+(decile_2yr_1mth_1_stock_price.↵
*decile_2yr_1mth_1_calldelta)-(decile_2yr_1mth_1_stock_close.↵
*decile_2yr_1mth_1_calldelta))./((-decile_2yr_1mth_1_stock_price.↵
*decile_2yr_1mth_1_calldelta)+decile_2yr_1mth_1_call_price))-decile_2yr_1mth_1_rates)↵
/...
1601    (sqrt(var((((decile_2yr_1mth_10_opt_ex_price-decile_2yr_1mth_10_call_price+↵
(decile_2yr_1mth_10_stock_price.*decile_2yr_1mth_10_calldelta)-↵
(decile_2yr_1mth_10_stock_close.*decile_2yr_1mth_10_calldelta))./((-↵
decile_2yr_1mth_10_stock_price.*decile_2yr_1mth_10_calldelta)↵
+decile_2yr_1mth_10_call_price))-decile_2yr_1mth_10_rates)-↵
(((decile_2yr_1mth_1_opt_ex_price-decile_2yr_1mth_1_call_price+↵
(decile_2yr_1mth_1_stock_price.*decile_2yr_1mth_1_calldelta)-↵
(decile_2yr_1mth_1_stock_close.*decile_2yr_1mth_1_calldelta))./((-↵
decile_2yr_1mth_1_stock_price.*decile_2yr_1mth_1_calldelta)↵
+decile_2yr_1mth_1_call_price))-decile_2yr_1mth_1_rates)))));
1602
1603
1604 % Repeat the same procedures as above for 2mth-to-expiry options based on 1-yr RV
1605 sort_logdiff_1yrRV_2mth = sort(logdiff_1yrRV_2mth);
1606 ff3 = round(length(logdiff_1yrRV_2mth)/10);
1607
1608 decile_1yr_2mth_1=find(logdiff_1yrRV_2mth <= sort_logdiff_1yrRV_2mth(ff3,1));
1609
1610 decile_1yr_2mth_1_mean = mean(diff_1yrRV_2mth(decile_1yr_2mth_1));
1611 decile_1yr_2mth_1_RV = mean(Hist_Vol_1yr_2mth_1(decile_1yr_2mth_1));
1612 decile_1yr_2mth_1_IV = mean(bsvolatility_2mth_1(decile_1yr_2mth_1));
1613 decile_1yr_2mth_1_CS = mean(CallDivStock_2mth(decile_1yr_2mth_1));
1614 decile_1yr_2mth_1_delta = mean(callDelta_2mth_1yr_1(decile_1yr_2mth_1));
1615 decile_1yr_2mth_1_rates = rates_2mth_2(decile_1yr_2mth_1);
```

```
1616 decile_1yr_2mth_1_call_return = mean(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_1));
1617 [h,p,ci,decile_1yr_2mth_1_call_return_ttest] = ttest(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_1),0);
1618 decile_1yr_2mth_1_call_return_std = std(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_1));
1619 decile_1yr_2mth_1_call_return_min = min(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_1));
1620 decile_1yr_2mth_1_call_return_max = max(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_1));
1621 decile_1yr_2mth_1_call_SR = mean(opt_percentage_return_2mth_1(decile_1yr_2mth_1)-↵
decile_1yr_2mth_1_rates)/(sqrt(var(opt_percentage_return_2mth_1(decile_1yr_2mth_1)-↵
decile_1yr_2mth_1_rates)));
1622 decile_1yr_2mth_1_stock_return = mean(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_1));
1623 [h,p,ci,decile_1yr_2mth_1_stock_return_ttest] = ttest↵
(stock_percentage_return_2mth_1(decile_1yr_2mth_1),0);
1624 decile_1yr_2mth_1_stock_return_std = std(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_1));
1625 decile_1yr_2mth_1_stock_return_min = min(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_1));
1626 decile_1yr_2mth_1_stock_return_max = max(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_1));
1627 decile_1yr_2mth_1_stock_SR = mean(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_1)-decile_1yr_2mth_1_rates)/(sqrt(var(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_1)-decile_1yr_2mth_1_rates)));
1628 decile_1yr_2mth_1_date = D_op_2mth_4(decile_1yr_2mth_1);
1629 decile_1yr_2mth_1_call_price = call_price_2mth_2(decile_1yr_2mth_1);
1630 decile_1yr_2mth_1_stock_price = underlying_2mth_3(decile_1yr_2mth_1);
1631 decile_1yr_2mth_1_opt_ex_price = opt_ex_payoff_2mth_1(decile_1yr_2mth_1);
1632 decile_1yr_2mth_1_strike_price = strike_price_2mth_4(decile_1yr_2mth_1);
1633 decile_1yr_2mth_1_D_op = D_op_2mth_4(decile_1yr_2mth_1);
1634 decile_1yr_2mth_1_ticker_op = ticker_op_2mth_4(decile_1yr_2mth_1);
1635 decile_1yr_2mth_1_calldelta = callDelta_2mth_1yr_1(decile_1yr_2mth_1);
1636 decile_1yr_2mth_1_stock_close = stock_close_2mth_1(decile_1yr_2mth_1);
1637 decile_1yr_2mth_1_delta_return = mean((decile_1yr_2mth_1_opt_ex_price-↵
decile_1yr_2mth_1_call_price+(decile_1yr_2mth_1_stock_price.↵
*decile_1yr_2mth_1_calldelta)-(decile_1yr_2mth_1_stock_close.↵
*decile_1yr_2mth_1_calldelta))./((-decile_1yr_2mth_1_stock_price.↵
*decile_1yr_2mth_1_calldelta)+decile_1yr_2mth_1_call_price));
1638 [h,p,ci,decile_1yr_2mth_1_delta_return_ttest] = ttest↵
((decile_1yr_2mth_1_opt_ex_price-decile_1yr_2mth_1_call_price+↵
(decile_1yr_2mth_1_stock_price.*decile_1yr_2mth_1_calldelta)-↵
(decile_1yr_2mth_1_stock_close.*decile_1yr_2mth_1_calldelta))./((-↵
decile_1yr_2mth_1_stock_price.*decile_1yr_2mth_1_calldelta)↵
+decile_1yr_2mth_1_call_price),0);
1639 decile_1yr_2mth_1_delta_std = std((decile_1yr_2mth_1_opt_ex_price-↵
decile_1yr_2mth_1_call_price+(decile_1yr_2mth_1_stock_price.↵
*decile_1yr_2mth_1_calldelta)-(decile_1yr_2mth_1_stock_close.↵
*decile_1yr_2mth_1_calldelta))./((-decile_1yr_2mth_1_stock_price.↵
*decile_1yr_2mth_1_calldelta)+decile_1yr_2mth_1_call_price));
1640 decile_1yr_2mth_1_delta_min = min((decile_1yr_2mth_1_opt_ex_price-↵
decile_1yr_2mth_1_call_price+(decile_1yr_2mth_1_stock_price.↵
*decile_1yr_2mth_1_calldelta)-(decile_1yr_2mth_1_stock_close.↵
```

```
         *decile_1yr_2mth_1_calldelta))./((-decile_1yr_2mth_1_stock_price.↵
         *decile_1yr_2mth_1_calldelta)+decile_1yr_2mth_1_call_price));
    1641 decile_1yr_2mth_1_delta_max = max((decile_1yr_2mth_1_opt_ex_price-↵
         decile_1yr_2mth_1_call_price+(decile_1yr_2mth_1_stock_price.↵
         *decile_1yr_2mth_1_calldelta)-(decile_1yr_2mth_1_stock_close.↵
         *decile_1yr_2mth_1_calldelta))./((-decile_1yr_2mth_1_stock_price.↵
         *decile_1yr_2mth_1_calldelta)+decile_1yr_2mth_1_call_price));
    1642 decile_1yr_2mth_1_delta_SR = mean((((decile_1yr_2mth_1_opt_ex_price-↵
         decile_1yr_2mth_1_call_price+(decile_1yr_2mth_1_stock_price.↵
         *decile_1yr_2mth_1_calldelta)-(decile_1yr_2mth_1_stock_close.↵
         *decile_1yr_2mth_1_calldelta))./((-decile_1yr_2mth_1_stock_price.↵
         *decile_1yr_2mth_1_calldelta)+decile_1yr_2mth_1_call_price))-decile_1yr_2mth_1_rates)↵
         /...
    1643     (sqrt(var((decile_1yr_2mth_1_opt_ex_price-decile_1yr_2mth_1_call_price+↵
         (decile_1yr_2mth_1_stock_price.*decile_1yr_2mth_1_calldelta)-↵
         (decile_1yr_2mth_1_stock_close.*decile_1yr_2mth_1_calldelta))./(-↵
         decile_1yr_2mth_1_stock_price.↵
         *decile_1yr_2mth_1_calldelta+decile_1yr_2mth_1_call_price)-↵
         decile_1yr_2mth_1_rates))));
    1644
    1645
    1646 decile_1yr_2mth_2=find((logdiff_1yrRV_2mth > sort_logdiff_1yrRV_2mth(ff3,1)) &↵
         (logdiff_1yrRV_2mth <= sort_logdiff_1yrRV_2mth(ff3*2,1)));
    1647
    1648 decile_1yr_2mth_2_mean = mean(diff_1yrRV_2mth(decile_1yr_2mth_2));
    1649 decile_1yr_2mth_2_RV = mean(Hist_Vol_1yr_2mth_1(decile_1yr_2mth_2));
    1650 decile_1yr_2mth_2_IV = mean(bsvolatility_2mth_1(decile_1yr_2mth_2));
    1651 decile_1yr_2mth_2_CS = mean(CallDivStock_2mth(decile_1yr_2mth_2));
    1652 decile_1yr_2mth_2_delta = mean(callDelta_2mth_1yr_1(decile_1yr_2mth_2));
    1653 decile_1yr_2mth_2_rates = rates_2mth_2(decile_1yr_2mth_2);
    1654 decile_1yr_2mth_2_call_return = mean(opt_percentage_return_2mth_1↵
         (decile_1yr_2mth_2));
    1655 [h,p,ci,decile_1yr_2mth_2_call_return_ttest] = ttest(opt_percentage_return_2mth_1↵
         (decile_1yr_2mth_2),0);
    1656 decile_1yr_2mth_2_call_return_std = std(opt_percentage_return_2mth_1↵
         (decile_1yr_2mth_2));
    1657 decile_1yr_2mth_2_call_return_min = min(opt_percentage_return_2mth_1↵
         (decile_1yr_2mth_2));
    1658 decile_1yr_2mth_2_call_return_max = max(opt_percentage_return_2mth_1↵
         (decile_1yr_2mth_2));
    1659 decile_1yr_2mth_2_call_SR = mean(opt_percentage_return_2mth_1(decile_1yr_2mth_2)-↵
         decile_1yr_2mth_2_rates)/(sqrt(var(opt_percentage_return_2mth_1(decile_1yr_2mth_2)-↵
         decile_1yr_2mth_2_rates)));
    1660 decile_1yr_2mth_2_stock_return = mean(stock_percentage_return_2mth_1↵
         (decile_1yr_2mth_2));
    1661 [h,p,ci,decile_1yr_2mth_2_stock_return_ttest] = ttest↵
         (stock_percentage_return_2mth_1(decile_1yr_2mth_2),0);
    1662 decile_1yr_2mth_2_stock_return_std = std(stock_percentage_return_2mth_1↵
         (decile_1yr_2mth_2));
    1663 decile_1yr_2mth_2_stock_return_min = min(stock_percentage_return_2mth_1↵
         (decile_1yr_2mth_2));
    1664 decile_1yr_2mth_2_stock_return_max = max(stock_percentage_return_2mth_1↵
         (decile_1yr_2mth_2));
    1665 decile_1yr_2mth_2_stock_SR = mean(stock_percentage_return_2mth_1↵
```

```
(decile_1yr_2mth_2)-decile_1yr_2mth_2_rates)/(sqrt(var(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_2)-decile_1yr_2mth_2_rates)));
1666 decile_1yr_2mth_2_date = D_op_2mth_4(decile_1yr_2mth_2);
1667 decile_1yr_2mth_2_call_price = call_price_2mth_2(decile_1yr_2mth_2);
1668 decile_1yr_2mth_2_stock_price = underlying_2mth_3(decile_1yr_2mth_2);
1669 decile_1yr_2mth_2_opt_ex_price = opt_ex_payoff_2mth_1(decile_1yr_2mth_2);
1670 decile_1yr_2mth_2_strike_price = strike_price_2mth_4(decile_1yr_2mth_2);
1671 decile_1yr_2mth_2_D_op = D_op_2mth_4(decile_1yr_2mth_2);
1672 decile_1yr_2mth_2_ticker_op = ticker_op_2mth_4(decile_1yr_2mth_2);
1673 decile_1yr_2mth_2_calldelta = callDelta_2mth_1yr_1(decile_1yr_2mth_2);
1674 decile_1yr_2mth_2_stock_close = stock_close_2mth_1(decile_1yr_2mth_2);
1675 decile_1yr_2mth_2_delta_return = mean((decile_1yr_2mth_2_opt_ex_price-↵
decile_1yr_2mth_2_call_price+(decile_1yr_2mth_2_stock_price.↵
*decile_1yr_2mth_2_calldelta)-(decile_1yr_2mth_2_stock_close.↵
*decile_1yr_2mth_2_calldelta))./((-decile_1yr_2mth_2_stock_price.↵
*decile_1yr_2mth_2_calldelta)+decile_1yr_2mth_2_call_price));
1676 [h,p,ci,decile_1yr_2mth_2_delta_return_ttest] = ttest↵
((decile_1yr_2mth_2_opt_ex_price-decile_1yr_2mth_2_call_price+↵
(decile_1yr_2mth_2_stock_price.*decile_1yr_2mth_2_calldelta)-↵
(decile_1yr_2mth_2_stock_close.*decile_1yr_2mth_2_calldelta))./((-↵
decile_1yr_2mth_2_stock_price.*decile_1yr_2mth_2_calldelta)↵
+decile_1yr_2mth_2_call_price),0);
1677 decile_1yr_2mth_2_delta_std = std((decile_1yr_2mth_2_opt_ex_price-↵
decile_1yr_2mth_2_call_price+(decile_1yr_2mth_2_stock_price.↵
*decile_1yr_2mth_2_calldelta)-(decile_1yr_2mth_2_stock_close.↵
*decile_1yr_2mth_2_calldelta))./((-decile_1yr_2mth_2_stock_price.↵
*decile_1yr_2mth_2_calldelta)+decile_1yr_2mth_2_call_price));
1678 decile_1yr_2mth_2_delta_min = min((decile_1yr_2mth_2_opt_ex_price-↵
decile_1yr_2mth_2_call_price+(decile_1yr_2mth_2_stock_price.↵
*decile_1yr_2mth_2_calldelta)-(decile_1yr_2mth_2_stock_close.↵
*decile_1yr_2mth_2_calldelta))./((-decile_1yr_2mth_2_stock_price.↵
*decile_1yr_2mth_2_calldelta)+decile_1yr_2mth_2_call_price));
1679 decile_1yr_2mth_2_delta_max = max((decile_1yr_2mth_2_opt_ex_price-↵
decile_1yr_2mth_2_call_price+(decile_1yr_2mth_2_stock_price.↵
*decile_1yr_2mth_2_calldelta)-(decile_1yr_2mth_2_stock_close.↵
*decile_1yr_2mth_2_calldelta))./((-decile_1yr_2mth_2_stock_price.↵
*decile_1yr_2mth_2_calldelta)+decile_1yr_2mth_2_call_price));
1680 decile_1yr_2mth_2_delta_SR = mean((((decile_1yr_2mth_2_opt_ex_price-↵
decile_1yr_2mth_2_call_price+(decile_1yr_2mth_2_stock_price.↵
*decile_1yr_2mth_2_calldelta)-(decile_1yr_2mth_2_stock_close.↵
*decile_1yr_2mth_2_calldelta))./((-decile_1yr_2mth_2_stock_price.↵
*decile_1yr_2mth_2_calldelta)+decile_1yr_2mth_2_call_price))-decile_1yr_2mth_2_rates)↵
/...
1681     (sqrt(var((decile_1yr_2mth_2_opt_ex_price-decile_1yr_2mth_2_call_price+↵
(decile_1yr_2mth_2_stock_price.*decile_1yr_2mth_2_calldelta)-↵
(decile_1yr_2mth_2_stock_close.*decile_1yr_2mth_2_calldelta))./(-↵
decile_1yr_2mth_2_stock_price.↵
*decile_1yr_2mth_2_calldelta+decile_1yr_2mth_2_call_price)-↵
decile_1yr_2mth_2_rates))));
1682
1683
1684 decile_1yr_2mth_3=find((logdiff_1yrRV_2mth > sort_logdiff_1yrRV_2mth(ff3*2,1)) &↵
(logdiff_1yrRV_2mth <= sort_logdiff_1yrRV_2mth(ff3*3,1)));
1685
```

```
1686 decile_1yr_2mth_3_mean = mean(diff_1yrRV_2mth(decile_1yr_2mth_3));
1687 decile_1yr_2mth_3_RV = mean(Hist_Vol_1yr_2mth_1(decile_1yr_2mth_3));
1688 decile_1yr_2mth_3_IV = mean(bsvolatility_2mth_1(decile_1yr_2mth_3));
1689 decile_1yr_2mth_3_CS = mean(CallDivStock_2mth(decile_1yr_2mth_3));
1690 decile_1yr_2mth_3_delta = mean(callDelta_2mth_1yr_1(decile_1yr_2mth_3));
1691 decile_1yr_2mth_3_rates = rates_2mth_2(decile_1yr_2mth_3);
1692 decile_1yr_2mth_3_call_return = mean(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_3));
1693 [h,p,ci,decile_1yr_2mth_3_call_return_ttest] = ttest(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_3),0);
1694 decile_1yr_2mth_3_call_return_std = std(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_3));
1695 decile_1yr_2mth_3_call_return_min = min(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_3));
1696 decile_1yr_2mth_3_call_return_max = max(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_3));
1697 decile_1yr_2mth_3_call_SR = mean(opt_percentage_return_2mth_1(decile_1yr_2mth_3)-↵
decile_1yr_2mth_3_rates)/(sqrt(var(opt_percentage_return_2mth_1(decile_1yr_2mth_3)-↵
decile_1yr_2mth_3_rates)));
1698 decile_1yr_2mth_3_stock_return = mean(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_3));
1699 [h,p,ci,decile_1yr_2mth_3_stock_return_ttest] = ttest↵
(stock_percentage_return_2mth_1(decile_1yr_2mth_3),0);
1700 decile_1yr_2mth_3_stock_return_std = std(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_3));
1701 decile_1yr_2mth_3_stock_return_min = min(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_3));
1702 decile_1yr_2mth_3_stock_return_max = max(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_3));
1703 decile_1yr_2mth_3_stock_SR = mean(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_3)-decile_1yr_2mth_3_rates)/(sqrt(var(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_3)-decile_1yr_2mth_3_rates)));
1704 decile_1yr_2mth_3_date = D_op_2mth_4(decile_1yr_2mth_3);
1705 decile_1yr_2mth_3_call_price = call_price_2mth_2(decile_1yr_2mth_3);
1706 decile_1yr_2mth_3_stock_price = underlying_2mth_3(decile_1yr_2mth_3);
1707 decile_1yr_2mth_3_opt_ex_price = opt_ex_payoff_2mth_1(decile_1yr_2mth_3);
1708 decile_1yr_2mth_3_strike_price = strike_price_2mth_4(decile_1yr_2mth_3);
1709 decile_1yr_2mth_3_D_op = D_op_2mth_4(decile_1yr_2mth_3);
1710 decile_1yr_2mth_3_ticker_op = ticker_op_2mth_4(decile_1yr_2mth_3);
1711 decile_1yr_2mth_3_calldelta = callDelta_2mth_1yr_1(decile_1yr_2mth_3);
1712 decile_1yr_2mth_3_stock_close = stock_close_2mth_1(decile_1yr_2mth_3);
1713 decile_1yr_2mth_3_delta_return = mean((decile_1yr_2mth_3_opt_ex_price-↵
decile_1yr_2mth_3_call_price+(decile_1yr_2mth_3_stock_price.↵
*decile_1yr_2mth_3_calldelta)-(decile_1yr_2mth_3_stock_close.↵
*decile_1yr_2mth_3_calldelta))./((-decile_1yr_2mth_3_stock_price.↵
*decile_1yr_2mth_3_calldelta)+decile_1yr_2mth_3_call_price));
1714 [h,p,ci,decile_1yr_2mth_3_delta_return_ttest] = ttest↵
((decile_1yr_2mth_3_opt_ex_price-decile_1yr_2mth_3_call_price+↵
(decile_1yr_2mth_3_stock_price.*decile_1yr_2mth_3_calldelta)-↵
(decile_1yr_2mth_3_stock_close.*decile_1yr_2mth_3_calldelta))./((-↵
decile_1yr_2mth_3_stock_price.*decile_1yr_2mth_3_calldelta)↵
+decile_1yr_2mth_3_call_price),0);
1715 decile_1yr_2mth_3_delta_std = std((decile_1yr_2mth_3_opt_ex_price-↵
decile_1yr_2mth_3_call_price+(decile_1yr_2mth_3_stock_price.↵
```

```
     *decile_1yr_2mth_3_calldelta)-(decile_1yr_2mth_3_stock_close.↵
     *decile_1yr_2mth_3_calldelta))./((-decile_1yr_2mth_3_stock_price.↵
     *decile_1yr_2mth_3_calldelta)+decile_1yr_2mth_3_call_price));
1716 decile_1yr_2mth_3_delta_min = min((decile_1yr_2mth_3_opt_ex_price-↵
     decile_1yr_2mth_3_call_price+(decile_1yr_2mth_3_stock_price.↵
     *decile_1yr_2mth_3_calldelta)-(decile_1yr_2mth_3_stock_close.↵
     *decile_1yr_2mth_3_calldelta))./((-decile_1yr_2mth_3_stock_price.↵
     *decile_1yr_2mth_3_calldelta)+decile_1yr_2mth_3_call_price));
1717 decile_1yr_2mth_3_delta_max = max((decile_1yr_2mth_3_opt_ex_price-↵
     decile_1yr_2mth_3_call_price+(decile_1yr_2mth_3_stock_price.↵
     *decile_1yr_2mth_3_calldelta)-(decile_1yr_2mth_3_stock_close.↵
     *decile_1yr_2mth_3_calldelta))./((-decile_1yr_2mth_3_stock_price.↵
     *decile_1yr_2mth_3_calldelta)+decile_1yr_2mth_3_call_price));
1718 decile_1yr_2mth_3_delta_SR = mean((((decile_1yr_2mth_3_opt_ex_price-↵
     decile_1yr_2mth_3_call_price+(decile_1yr_2mth_3_stock_price.↵
     *decile_1yr_2mth_3_calldelta)-(decile_1yr_2mth_3_stock_close.↵
     *decile_1yr_2mth_3_calldelta))./((-decile_1yr_2mth_3_stock_price.↵
     *decile_1yr_2mth_3_calldelta)+decile_1yr_2mth_3_call_price))-decile_1yr_2mth_3_rates)↵
     /...
1719     (sqrt(var((decile_1yr_2mth_3_opt_ex_price-decile_1yr_2mth_3_call_price+↵
     (decile_1yr_2mth_3_stock_price.*decile_1yr_2mth_3_calldelta)-↵
     (decile_1yr_2mth_3_stock_close.*decile_1yr_2mth_3_calldelta))./(-↵
     decile_1yr_2mth_3_stock_price.↵
     *decile_1yr_2mth_3_calldelta+decile_1yr_2mth_3_call_price)-↵
     decile_1yr_2mth_3_rates))));
1720
1721
1722 decile_1yr_2mth_4=find((logdiff_1yrRV_2mth > sort_logdiff_1yrRV_2mth(ff3*3,1)) &↵
     (logdiff_1yrRV_2mth <= sort_logdiff_1yrRV_2mth(ff3*4,1)));
1723
1724 decile_1yr_2mth_4_mean = mean(diff_1yrRV_2mth(decile_1yr_2mth_4));
1725 decile_1yr_2mth_4_RV = mean(Hist_Vol_1yr_2mth_1(decile_1yr_2mth_4));
1726 decile_1yr_2mth_4_IV = mean(bsvolatility_2mth_1(decile_1yr_2mth_4));
1727 decile_1yr_2mth_4_CS = mean(CallDivStock_2mth(decile_1yr_2mth_4));
1728 decile_1yr_2mth_4_delta = mean(callDelta_2mth_1yr_1(decile_1yr_2mth_4));
1729 decile_1yr_2mth_4_rates = rates_2mth_2(decile_1yr_2mth_4);
1730 decile_1yr_2mth_4_call_return = mean(opt_percentage_return_2mth_1↵
     (decile_1yr_2mth_4));
1731 [h,p,ci,decile_1yr_2mth_4_call_return_ttest] = ttest(opt_percentage_return_2mth_1↵
     (decile_1yr_2mth_4),0);
1732 decile_1yr_2mth_4_call_return_std = std(opt_percentage_return_2mth_1↵
     (decile_1yr_2mth_4));
1733 decile_1yr_2mth_4_call_return_min = min(opt_percentage_return_2mth_1↵
     (decile_1yr_2mth_4));
1734 decile_1yr_2mth_4_call_return_max = max(opt_percentage_return_2mth_1↵
     (decile_1yr_2mth_4));
1735 decile_1yr_2mth_4_call_SR = mean(opt_percentage_return_2mth_1(decile_1yr_2mth_4)-↵
     decile_1yr_2mth_4_rates)/(sqrt(var(opt_percentage_return_2mth_1(decile_1yr_2mth_4)-↵
     decile_1yr_2mth_4_rates)));
1736 decile_1yr_2mth_4_stock_return = mean(stock_percentage_return_2mth_1↵
     (decile_1yr_2mth_4));
1737 [h,p,ci,decile_1yr_2mth_4_stock_return_ttest] = ttest↵
     (stock_percentage_return_2mth_1(decile_1yr_2mth_4),0);
1738 decile_1yr_2mth_4_stock_return_std = std(stock_percentage_return_2mth_1↵
```

```
(decile_1yr_2mth_4));
1739 decile_1yr_2mth_4_stock_return_min = min(stock_percentage_return_2mth_1↙
(decile_1yr_2mth_4));
1740 decile_1yr_2mth_4_stock_return_max = max(stock_percentage_return_2mth_1↙
(decile_1yr_2mth_4));
1741 decile_1yr_2mth_4_stock_SR = mean(stock_percentage_return_2mth_1↙
(decile_1yr_2mth_4)-decile_1yr_2mth_4_rates)/(sqrt(var(stock_percentage_return_2mth_1↙
(decile_1yr_2mth_4)-decile_1yr_2mth_4_rates)));
1742 decile_1yr_2mth_4_date = D_op_2mth_4(decile_1yr_2mth_4);
1743 decile_1yr_2mth_4_call_price = call_price_2mth_2(decile_1yr_2mth_4);
1744 decile_1yr_2mth_4_stock_price = underlying_2mth_3(decile_1yr_2mth_4);
1745 decile_1yr_2mth_4_opt_ex_price = opt_ex_payoff_2mth_1(decile_1yr_2mth_4);
1746 decile_1yr_2mth_4_strike_price = strike_price_2mth_4(decile_1yr_2mth_4);
1747 decile_1yr_2mth_4_D_op = D_op_2mth_4(decile_1yr_2mth_4);
1748 decile_1yr_2mth_4_ticker_op = ticker_op_2mth_4(decile_1yr_2mth_4);
1749 decile_1yr_2mth_4_calldelta = callDelta_2mth_1yr_1(decile_1yr_2mth_4);
1750 decile_1yr_2mth_4_stock_close = stock_close_2mth_1(decile_1yr_2mth_4);
1751 decile_1yr_2mth_4_delta_return = mean((decile_1yr_2mth_4_opt_ex_price-↙
decile_1yr_2mth_4_call_price+(decile_1yr_2mth_4_stock_price.↙
*decile_1yr_2mth_4_calldelta)-(decile_1yr_2mth_4_stock_close.↙
*decile_1yr_2mth_4_calldelta))./((-decile_1yr_2mth_4_stock_price.↙
*decile_1yr_2mth_4_calldelta)+decile_1yr_2mth_4_call_price));
1752 [h,p,ci,decile_1yr_2mth_4_delta_return_ttest] = ttest↙
((decile_1yr_2mth_4_opt_ex_price-decile_1yr_2mth_4_call_price+↙
(decile_1yr_2mth_4_stock_price.*decile_1yr_2mth_4_calldelta)-↙
(decile_1yr_2mth_4_stock_close.*decile_1yr_2mth_4_calldelta))./((-↙
decile_1yr_2mth_4_stock_price.*decile_1yr_2mth_4_calldelta)↙
+decile_1yr_2mth_4_call_price),0);
1753 decile_1yr_2mth_4_delta_std = std((decile_1yr_2mth_4_opt_ex_price-↙
decile_1yr_2mth_4_call_price+(decile_1yr_2mth_4_stock_price.↙
*decile_1yr_2mth_4_calldelta)-(decile_1yr_2mth_4_stock_close.↙
*decile_1yr_2mth_4_calldelta))./((-decile_1yr_2mth_4_stock_price.↙
*decile_1yr_2mth_4_calldelta)+decile_1yr_2mth_4_call_price));
1754 decile_1yr_2mth_4_delta_min = min((decile_1yr_2mth_4_opt_ex_price-↙
decile_1yr_2mth_4_call_price+(decile_1yr_2mth_4_stock_price.↙
*decile_1yr_2mth_4_calldelta)-(decile_1yr_2mth_4_stock_close.↙
*decile_1yr_2mth_4_calldelta))./((-decile_1yr_2mth_4_stock_price.↙
*decile_1yr_2mth_4_calldelta)+decile_1yr_2mth_4_call_price));
1755 decile_1yr_2mth_4_delta_max = max((decile_1yr_2mth_4_opt_ex_price-↙
decile_1yr_2mth_4_call_price+(decile_1yr_2mth_4_stock_price.↙
*decile_1yr_2mth_4_calldelta)-(decile_1yr_2mth_4_stock_close.↙
*decile_1yr_2mth_4_calldelta))./((-decile_1yr_2mth_4_stock_price.↙
*decile_1yr_2mth_4_calldelta)+decile_1yr_2mth_4_call_price));
1756 decile_1yr_2mth_4_delta_SR = mean((((decile_1yr_2mth_4_opt_ex_price-↙
decile_1yr_2mth_4_call_price+(decile_1yr_2mth_4_stock_price.↙
*decile_1yr_2mth_4_calldelta)-(decile_1yr_2mth_4_stock_close.↙
*decile_1yr_2mth_4_calldelta))./((-decile_1yr_2mth_4_stock_price.↙
*decile_1yr_2mth_4_calldelta)+decile_1yr_2mth_4_call_price))-decile_1yr_2mth_4_rates)↙
/...
1757    (sqrt(var((decile_1yr_2mth_4_opt_ex_price-decile_1yr_2mth_4_call_price+↙
(decile_1yr_2mth_4_stock_price.*decile_1yr_2mth_4_calldelta)-↙
(decile_1yr_2mth_4_stock_close.*decile_1yr_2mth_4_calldelta))./(-↙
decile_1yr_2mth_4_stock_price.↙
*decile_1yr_2mth_4_calldelta+decile_1yr_2mth_4_call_price)-↙
```

```
decile_1yr_2mth_4_rates))));
1758
1759
1760 decile_1yr_2mth_5=find((logdiff_1yrRV_2mth > sort_logdiff_1yrRV_2mth(ff3*4,1)) & ↵
(logdiff_1yrRV_2mth <= sort_logdiff_1yrRV_2mth(ff3*5,1)));
1761
1762 decile_1yr_2mth_5_mean = mean(diff_1yrRV_2mth(decile_1yr_2mth_5));
1763 decile_1yr_2mth_5_RV = mean(Hist_Vol_1yr_2mth_1(decile_1yr_2mth_5));
1764 decile_1yr_2mth_5_IV = mean(bsvolatility_2mth_1(decile_1yr_2mth_5));
1765 decile_1yr_2mth_5_CS = mean(CallDivStock_2mth(decile_1yr_2mth_5));
1766 decile_1yr_2mth_5_delta = mean(callDelta_2mth_1yr_1(decile_1yr_2mth_5));
1767 decile_1yr_2mth_5_rates = rates_2mth_2(decile_1yr_2mth_5);
1768 decile_1yr_2mth_5_call_return = mean(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_5));
1769 [h,p,ci,decile_1yr_2mth_5_call_return_ttest] = ttest(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_5),0);
1770 decile_1yr_2mth_5_call_return_std = std(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_5));
1771 decile_1yr_2mth_5_call_return_min = min(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_5));
1772 decile_1yr_2mth_5_call_return_max = max(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_5));
1773 decile_1yr_2mth_5_call_SR = mean(opt_percentage_return_2mth_1(decile_1yr_2mth_5)-↵
decile_1yr_2mth_5_rates)/(sqrt(var(opt_percentage_return_2mth_1(decile_1yr_2mth_5)-↵
decile_1yr_2mth_5_rates)));
1774 decile_1yr_2mth_5_stock_return = mean(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_5));
1775 [h,p,ci,decile_1yr_2mth_5_stock_return_ttest] = ttest↵
(stock_percentage_return_2mth_1(decile_1yr_2mth_5),0);
1776 decile_1yr_2mth_5_stock_return_std = std(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_5));
1777 decile_1yr_2mth_5_stock_return_min = min(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_5));
1778 decile_1yr_2mth_5_stock_return_max = max(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_5));
1779 decile_1yr_2mth_5_stock_SR = mean(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_5)-decile_1yr_2mth_5_rates)/(sqrt(var(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_5)-decile_1yr_2mth_5_rates)));
1780 decile_1yr_2mth_5_date = D_op_2mth_4(decile_1yr_2mth_5);
1781 decile_1yr_2mth_5_call_price = call_price_2mth_2(decile_1yr_2mth_5);
1782 decile_1yr_2mth_5_stock_price = underlying_2mth_3(decile_1yr_2mth_5);
1783 decile_1yr_2mth_5_opt_ex_price = opt_ex_payoff_2mth_1(decile_1yr_2mth_5);
1784 decile_1yr_2mth_5_strike_price = strike_price_2mth_4(decile_1yr_2mth_5);
1785 decile_1yr_2mth_5_D_op = D_op_2mth_4(decile_1yr_2mth_5);
1786 decile_1yr_2mth_5_ticker_op = ticker_op_2mth_4(decile_1yr_2mth_5);
1787 decile_1yr_2mth_5_calldelta = callDelta_2mth_1yr_1(decile_1yr_2mth_5);
1788 decile_1yr_2mth_5_stock_close = stock_close_2mth_1(decile_1yr_2mth_5);
1789 decile_1yr_2mth_5_delta_return = mean((decile_1yr_2mth_5_opt_ex_price-↵
decile_1yr_2mth_5_call_price+(decile_1yr_2mth_5_stock_price.↵
*decile_1yr_2mth_5_calldelta)-(decile_1yr_2mth_5_stock_close.↵
*decile_1yr_2mth_5_calldelta))./((-decile_1yr_2mth_5_stock_price.↵
*decile_1yr_2mth_5_calldelta)+decile_1yr_2mth_5_call_price));
1790 [h,p,ci,decile_1yr_2mth_5_delta_return_ttest] = ttest↵
((decile_1yr_2mth_5_opt_ex_price-decile_1yr_2mth_5_call_price+↵
```

```
       (decile_1yr_2mth_5_stock_price.*decile_1yr_2mth_5_calldelta)-↵
       (decile_1yr_2mth_5_stock_close.*decile_1yr_2mth_5_calldelta))./((-↵
       decile_1yr_2mth_5_stock_price.*decile_1yr_2mth_5_calldelta)↵
       +decile_1yr_2mth_5_call_price),0);
1791   decile_1yr_2mth_5_delta_std = std((decile_1yr_2mth_5_opt_ex_price-↵
       decile_1yr_2mth_5_call_price+(decile_1yr_2mth_5_stock_price.↵
       *decile_1yr_2mth_5_calldelta)-(decile_1yr_2mth_5_stock_close.↵
       *decile_1yr_2mth_5_calldelta))./((-decile_1yr_2mth_5_stock_price.↵
       *decile_1yr_2mth_5_calldelta)+decile_1yr_2mth_5_call_price));
1792   decile_1yr_2mth_5_delta_min = min((decile_1yr_2mth_5_opt_ex_price-↵
       decile_1yr_2mth_5_call_price+(decile_1yr_2mth_5_stock_price.↵
       *decile_1yr_2mth_5_calldelta)-(decile_1yr_2mth_5_stock_close.↵
       *decile_1yr_2mth_5_calldelta))./((-decile_1yr_2mth_5_stock_price.↵
       *decile_1yr_2mth_5_calldelta)+decile_1yr_2mth_5_call_price));
1793   decile_1yr_2mth_5_delta_max = max((decile_1yr_2mth_5_opt_ex_price-↵
       decile_1yr_2mth_5_call_price+(decile_1yr_2mth_5_stock_price.↵
       *decile_1yr_2mth_5_calldelta)-(decile_1yr_2mth_5_stock_close.↵
       *decile_1yr_2mth_5_calldelta))./((-decile_1yr_2mth_5_stock_price.↵
       *decile_1yr_2mth_5_calldelta)+decile_1yr_2mth_5_call_price));
1794   decile_1yr_2mth_5_delta_SR = mean((((decile_1yr_2mth_5_opt_ex_price-↵
       decile_1yr_2mth_5_call_price+(decile_1yr_2mth_5_stock_price.↵
       *decile_1yr_2mth_5_calldelta)-(decile_1yr_2mth_5_stock_close.↵
       *decile_1yr_2mth_5_calldelta))./((-decile_1yr_2mth_5_stock_price.↵
       *decile_1yr_2mth_5_calldelta)+decile_1yr_2mth_5_call_price))-decile_1yr_2mth_5_rates)↵
       /...
1795      (sqrt(var((decile_1yr_2mth_5_opt_ex_price-decile_1yr_2mth_5_call_price+↵
       (decile_1yr_2mth_5_stock_price.*decile_1yr_2mth_5_calldelta)-↵
       (decile_1yr_2mth_5_stock_close.*decile_1yr_2mth_5_calldelta))./(-↵
       decile_1yr_2mth_5_stock_price.↵
       *decile_1yr_2mth_5_calldelta+decile_1yr_2mth_5_call_price)-↵
       decile_1yr_2mth_5_rates)))));
1796
1797
1798   decile_1yr_2mth_6=find((logdiff_1yrRV_2mth > sort_logdiff_1yrRV_2mth(ff3*5,1)) &↵
       (logdiff_1yrRV_2mth <= sort_logdiff_1yrRV_2mth(ff3*6,1)));
1799
1800   decile_1yr_2mth_6_mean = mean(diff_1yrRV_2mth(decile_1yr_2mth_6));
1801   decile_1yr_2mth_6_RV = mean(Hist_Vol_1yr_2mth_1(decile_1yr_2mth_6));
1802   decile_1yr_2mth_6_IV = mean(bsvolatility_2mth_1(decile_1yr_2mth_6));
1803   decile_1yr_2mth_6_CS = mean(CallDivStock_2mth(decile_1yr_2mth_6));
1804   decile_1yr_2mth_6_delta = mean(callDelta_2mth_1yr_1(decile_1yr_2mth_6));
1805   decile_1yr_2mth_6_rates = rates_2mth_2(decile_1yr_2mth_6);
1806   decile_1yr_2mth_6_call_return = mean(opt_percentage_return_2mth_1↵
       (decile_1yr_2mth_6));
1807   [h,p,ci,decile_1yr_2mth_6_call_return_ttest] = ttest(opt_percentage_return_2mth_1↵
       (decile_1yr_2mth_6),0);
1808   decile_1yr_2mth_6_call_return_std = std(opt_percentage_return_2mth_1↵
       (decile_1yr_2mth_6));
1809   decile_1yr_2mth_6_call_return_min = min(opt_percentage_return_2mth_1↵
       (decile_1yr_2mth_6));
1810   decile_1yr_2mth_6_call_return_max = max(opt_percentage_return_2mth_1↵
       (decile_1yr_2mth_6));
1811   decile_1yr_2mth_6_call_SR = mean(opt_percentage_return_2mth_1(decile_1yr_2mth_6)-↵
       decile_1yr_2mth_6_rates)/(sqrt(var(opt_percentage_return_2mth_1(decile_1yr_2mth_6)-↵
```

```
decile_1yr_2mth_6_rates)));
1812 decile_1yr_2mth_6_stock_return = mean(stock_percentage_return_2mth_1↙
(decile_1yr_2mth_6));
1813 [h,p,ci,decile_1yr_2mth_6_stock_return_ttest] = ttest↙
(stock_percentage_return_2mth_1(decile_1yr_2mth_6),0);
1814 decile_1yr_2mth_6_stock_return_std = std(stock_percentage_return_2mth_1↙
(decile_1yr_2mth_6));
1815 decile_1yr_2mth_6_stock_return_min = min(stock_percentage_return_2mth_1↙
(decile_1yr_2mth_6));
1816 decile_1yr_2mth_6_stock_return_max = max(stock_percentage_return_2mth_1↙
(decile_1yr_2mth_6));
1817 decile_1yr_2mth_6_stock_SR = mean(stock_percentage_return_2mth_1↙
(decile_1yr_2mth_6)-decile_1yr_2mth_6_rates)/(sqrt(var(stock_percentage_return_2mth_1↙
(decile_1yr_2mth_6)-decile_1yr_2mth_6_rates)));
1818 decile_1yr_2mth_6_date = D_op_2mth_4(decile_1yr_2mth_6);
1819 decile_1yr_2mth_6_call_price = call_price_2mth_2(decile_1yr_2mth_6);
1820 decile_1yr_2mth_6_stock_price = underlying_2mth_3(decile_1yr_2mth_6);
1821 decile_1yr_2mth_6_opt_ex_price = opt_ex_payoff_2mth_1(decile_1yr_2mth_6);
1822 decile_1yr_2mth_6_strike_price = strike_price_2mth_4(decile_1yr_2mth_6);
1823 decile_1yr_2mth_6_D_op = D_op_2mth_4(decile_1yr_2mth_6);
1824 decile_1yr_2mth_6_ticker_op = ticker_op_2mth_4(decile_1yr_2mth_6);
1825 decile_1yr_2mth_6_calldelta = callDelta_2mth_1yr_1(decile_1yr_2mth_6);
1826 decile_1yr_2mth_6_stock_close = stock_close_2mth_1(decile_1yr_2mth_6);
1827 decile_1yr_2mth_6_delta_return = mean((decile_1yr_2mth_6_opt_ex_price-↙
decile_1yr_2mth_6_call_price+(decile_1yr_2mth_6_stock_price.↙
*decile_1yr_2mth_6_calldelta)-(decile_1yr_2mth_6_stock_close.↙
*decile_1yr_2mth_6_calldelta))./((-decile_1yr_2mth_6_stock_price.↙
*decile_1yr_2mth_6_calldelta)+decile_1yr_2mth_6_call_price));
1828 [h,p,ci,decile_1yr_2mth_6_delta_return_ttest] = ttest↙
((decile_1yr_2mth_6_opt_ex_price-decile_1yr_2mth_6_call_price+↙
(decile_1yr_2mth_6_stock_price.*decile_1yr_2mth_6_calldelta)-↙
(decile_1yr_2mth_6_stock_close.*decile_1yr_2mth_6_calldelta))./((-↙
decile_1yr_2mth_6_stock_price.*decile_1yr_2mth_6_calldelta)↙
+decile_1yr_2mth_6_call_price),0);
1829 decile_1yr_2mth_6_delta_std = std((decile_1yr_2mth_6_opt_ex_price-↙
decile_1yr_2mth_6_call_price+(decile_1yr_2mth_6_stock_price.↙
*decile_1yr_2mth_6_calldelta)-(decile_1yr_2mth_6_stock_close.↙
*decile_1yr_2mth_6_calldelta))./((-decile_1yr_2mth_6_stock_price.↙
*decile_1yr_2mth_6_calldelta)+decile_1yr_2mth_6_call_price));
1830 decile_1yr_2mth_6_delta_min = min((decile_1yr_2mth_6_opt_ex_price-↙
decile_1yr_2mth_6_call_price+(decile_1yr_2mth_6_stock_price.↙
*decile_1yr_2mth_6_calldelta)-(decile_1yr_2mth_6_stock_close.↙
*decile_1yr_2mth_6_calldelta))./((-decile_1yr_2mth_6_stock_price.↙
*decile_1yr_2mth_6_calldelta)+decile_1yr_2mth_6_call_price));
1831 decile_1yr_2mth_6_delta_max = max((decile_1yr_2mth_6_opt_ex_price-↙
decile_1yr_2mth_6_call_price+(decile_1yr_2mth_6_stock_price.↙
*decile_1yr_2mth_6_calldelta)-(decile_1yr_2mth_6_stock_close.↙
*decile_1yr_2mth_6_calldelta))./((-decile_1yr_2mth_6_stock_price.↙
*decile_1yr_2mth_6_calldelta)+decile_1yr_2mth_6_call_price));
1832 decile_1yr_2mth_6_delta_SR = mean((((decile_1yr_2mth_6_opt_ex_price-↙
decile_1yr_2mth_6_call_price+(decile_1yr_2mth_6_stock_price.↙
*decile_1yr_2mth_6_calldelta)-(decile_1yr_2mth_6_stock_close.↙
*decile_1yr_2mth_6_calldelta))./((-decile_1yr_2mth_6_stock_price.↙
*decile_1yr_2mth_6_calldelta)+decile_1yr_2mth_6_call_price))-decile_1yr_2mth_6_rates)↙
```

```
/...
1833    (sqrt(var((decile_1yr_2mth_6_opt_ex_price-decile_1yr_2mth_6_call_price+↵
(decile_1yr_2mth_6_stock_price.*decile_1yr_2mth_6_calldelta)-↵
(decile_1yr_2mth_6_stock_close.*decile_1yr_2mth_6_calldelta))./(-↵
decile_1yr_2mth_6_stock_price.↵
*decile_1yr_2mth_6_calldelta+decile_1yr_2mth_6_call_price)-↵
decile_1yr_2mth_6_rates))));
1834
1835
1836 decile_1yr_2mth_7=find((logdiff_1yrRV_2mth > sort_logdiff_1yrRV_2mth(ff3*6,1)) &↵
(logdiff_1yrRV_2mth <= sort_logdiff_1yrRV_2mth(ff3*7,1)));
1837
1838 decile_1yr_2mth_7_mean = mean(diff_1yrRV_2mth(decile_1yr_2mth_7));
1839 decile_1yr_2mth_7_RV = mean(Hist_Vol_1yr_2mth_1(decile_1yr_2mth_7));
1840 decile_1yr_2mth_7_IV = mean(bsvolatility_2mth_1(decile_1yr_2mth_7));
1841 decile_1yr_2mth_7_CS = mean(CallDivStock_2mth(decile_1yr_2mth_7));
1842 decile_1yr_2mth_7_delta = mean(callDelta_2mth_1yr_1(decile_1yr_2mth_7));
1843 decile_1yr_2mth_7_rates = rates_2mth_2(decile_1yr_2mth_7);
1844 decile_1yr_2mth_7_call_return = mean(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_7));
1845 [h,p,ci,decile_1yr_2mth_7_call_return_ttest] = ttest(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_7),0);
1846 decile_1yr_2mth_7_call_return_std = std(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_7));
1847 decile_1yr_2mth_7_call_return_min = min(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_7));
1848 decile_1yr_2mth_7_call_return_max = max(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_7));
1849 decile_1yr_2mth_7_call_SR = mean(opt_percentage_return_2mth_1(decile_1yr_2mth_7)-↵
decile_1yr_2mth_7_rates)/(sqrt(var(opt_percentage_return_2mth_1(decile_1yr_2mth_7)-↵
decile_1yr_2mth_7_rates)));
1850 decile_1yr_2mth_7_stock_return = mean(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_7));
1851 [h,p,ci,decile_1yr_2mth_7_stock_return_ttest] = ttest↵
(stock_percentage_return_2mth_1(decile_1yr_2mth_7),0);
1852 decile_1yr_2mth_7_stock_return_std = std(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_7));
1853 decile_1yr_2mth_7_stock_return_min = min(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_7));
1854 decile_1yr_2mth_7_stock_return_max = max(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_7));
1855 decile_1yr_2mth_7_stock_SR = mean(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_7)-decile_1yr_2mth_7_rates)/(sqrt(var(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_7)-decile_1yr_2mth_7_rates)));
1856 decile_1yr_2mth_7_date = D_op_2mth_4(decile_1yr_2mth_7);
1857 decile_1yr_2mth_7_call_price = call_price_2mth_2(decile_1yr_2mth_7);
1858 decile_1yr_2mth_7_stock_price = underlying_2mth_3(decile_1yr_2mth_7);
1859 decile_1yr_2mth_7_opt_ex_price = opt_ex_payoff_2mth_1(decile_1yr_2mth_7);
1860 decile_1yr_2mth_7_strike_price = strike_price_2mth_4(decile_1yr_2mth_7);
1861 decile_1yr_2mth_7_D_op = D_op_2mth_4(decile_1yr_2mth_7);
1862 decile_1yr_2mth_7_ticker_op = ticker_op_2mth_4(decile_1yr_2mth_7);
1863 decile_1yr_2mth_7_calldelta = callDelta_2mth_1yr_1(decile_1yr_2mth_7);
1864 decile_1yr_2mth_7_stock_close = stock_close_2mth_1(decile_1yr_2mth_7);
1865 decile_1yr_2mth_7_delta_return = mean((decile_1yr_2mth_7_opt_ex_price-↵
```

```matlab
decile_1yr_2mth_7_call_price+(decile_1yr_2mth_7_stock_price.↙
*decile_1yr_2mth_7_calldelta)-(decile_1yr_2mth_7_stock_close.↙
*decile_1yr_2mth_7_calldelta))./((-decile_1yr_2mth_7_stock_price.↙
*decile_1yr_2mth_7_calldelta)+decile_1yr_2mth_7_call_price));
1866 [h,p,ci,decile_1yr_2mth_7_delta_return_ttest] = ttest↙
((decile_1yr_2mth_7_opt_ex_price-decile_1yr_2mth_7_call_price+↙
(decile_1yr_2mth_7_stock_price.*decile_1yr_2mth_7_calldelta)-↙
(decile_1yr_2mth_7_stock_close.*decile_1yr_2mth_7_calldelta))./((-↙
decile_1yr_2mth_7_stock_price.*decile_1yr_2mth_7_calldelta)↙
+decile_1yr_2mth_7_call_price),0);
1867 decile_1yr_2mth_7_delta_std = std((decile_1yr_2mth_7_opt_ex_price-↙
decile_1yr_2mth_7_call_price+(decile_1yr_2mth_7_stock_price.↙
*decile_1yr_2mth_7_calldelta)-(decile_1yr_2mth_7_stock_close.↙
*decile_1yr_2mth_7_calldelta))./((-decile_1yr_2mth_7_stock_price.↙
*decile_1yr_2mth_7_calldelta)+decile_1yr_2mth_7_call_price));
1868 decile_1yr_2mth_7_delta_min = min((decile_1yr_2mth_7_opt_ex_price-↙
decile_1yr_2mth_7_call_price+(decile_1yr_2mth_7_stock_price.↙
*decile_1yr_2mth_7_calldelta)-(decile_1yr_2mth_7_stock_close.↙
*decile_1yr_2mth_7_calldelta))./((-decile_1yr_2mth_7_stock_price.↙
*decile_1yr_2mth_7_calldelta)+decile_1yr_2mth_7_call_price));
1869 decile_1yr_2mth_7_delta_max = max((decile_1yr_2mth_7_opt_ex_price-↙
decile_1yr_2mth_7_call_price+(decile_1yr_2mth_7_stock_price.↙
*decile_1yr_2mth_7_calldelta)-(decile_1yr_2mth_7_stock_close.↙
*decile_1yr_2mth_7_calldelta))./((-decile_1yr_2mth_7_stock_price.↙
*decile_1yr_2mth_7_calldelta)+decile_1yr_2mth_7_call_price));
1870 decile_1yr_2mth_7_delta_SR = mean((((decile_1yr_2mth_7_opt_ex_price-↙
decile_1yr_2mth_7_call_price+(decile_1yr_2mth_7_stock_price.↙
*decile_1yr_2mth_7_calldelta)-(decile_1yr_2mth_7_stock_close.↙
*decile_1yr_2mth_7_calldelta))./((-decile_1yr_2mth_7_stock_price.↙
*decile_1yr_2mth_7_calldelta)+decile_1yr_2mth_7_call_price))-decile_1yr_2mth_7_rates)↙
/ ...
1871     (sqrt(var((decile_1yr_2mth_7_opt_ex_price-decile_1yr_2mth_7_call_price+↙
(decile_1yr_2mth_7_stock_price.*decile_1yr_2mth_7_calldelta)-↙
(decile_1yr_2mth_7_stock_close.*decile_1yr_2mth_7_calldelta))./(-↙
decile_1yr_2mth_7_stock_price.↙
*decile_1yr_2mth_7_calldelta+decile_1yr_2mth_7_call_price)-↙
decile_1yr_2mth_7_rates))));
1872
1873
1874 decile_1yr_2mth_8=find((logdiff_1yrRV_2mth > sort_logdiff_1yrRV_2mth(ff3*7,1)) &↙
(logdiff_1yrRV_2mth <= sort_logdiff_1yrRV_2mth(ff3*8,1)));
1875
1876 decile_1yr_2mth_8_mean = mean(diff_1yrRV_2mth(decile_1yr_2mth_8));
1877 decile_1yr_2mth_8_RV = mean(Hist_Vol_1yr_2mth_1(decile_1yr_2mth_8));
1878 decile_1yr_2mth_8_IV = mean(bsvolatility_2mth_1(decile_1yr_2mth_8));
1879 decile_1yr_2mth_8_CS = mean(CallDivStock_2mth(decile_1yr_2mth_8));
1880 decile_1yr_2mth_8_delta = mean(callDelta_2mth_1yr_1(decile_1yr_2mth_8));
1881 decile_1yr_2mth_8_rates = rates_2mth_2(decile_1yr_2mth_8);
1882 decile_1yr_2mth_8_call_return = mean(opt_percentage_return_2mth_1↙
(decile_1yr_2mth_8));
1883 [h,p,ci,decile_1yr_2mth_8_call_return_ttest] = ttest(opt_percentage_return_2mth_1↙
(decile_1yr_2mth_8),0);
1884 decile_1yr_2mth_8_call_return_std = std(opt_percentage_return_2mth_1↙
(decile_1yr_2mth_8));
```

```matlab
1885 decile_1yr_2mth_8_call_return_min = min(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_8));
1886 decile_1yr_2mth_8_call_return_max = max(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_8));
1887 decile_1yr_2mth_8_call_SR = mean(opt_percentage_return_2mth_1(decile_1yr_2mth_8)-↵
decile_1yr_2mth_8_rates)/(sqrt(var(opt_percentage_return_2mth_1(decile_1yr_2mth_8)-↵
decile_1yr_2mth_8_rates)));
1888 decile_1yr_2mth_8_stock_return = mean(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_8));
1889 [h,p,ci,decile_1yr_2mth_8_stock_return_ttest] = ttest↵
(stock_percentage_return_2mth_1(decile_1yr_2mth_8),0);
1890 decile_1yr_2mth_8_stock_return_std = std(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_8));
1891 decile_1yr_2mth_8_stock_return_min = min(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_8));
1892 decile_1yr_2mth_8_stock_return_max = max(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_8));
1893 decile_1yr_2mth_8_stock_SR = mean(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_8)-decile_1yr_2mth_8_rates)/(sqrt(var(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_8)-decile_1yr_2mth_8_rates)));
1894 decile_1yr_2mth_8_date = D_op_2mth_4(decile_1yr_2mth_8);
1895 decile_1yr_2mth_8_call_price = call_price_2mth_2(decile_1yr_2mth_8);
1896 decile_1yr_2mth_8_stock_price = underlying_2mth_3(decile_1yr_2mth_8);
1897 decile_1yr_2mth_8_opt_ex_price = opt_ex_payoff_2mth_1(decile_1yr_2mth_8);
1898 decile_1yr_2mth_8_strike_price = strike_price_2mth_4(decile_1yr_2mth_8);
1899 decile_1yr_2mth_8_D_op = D_op_2mth_4(decile_1yr_2mth_8);
1900 decile_1yr_2mth_8_ticker_op = ticker_op_2mth_4(decile_1yr_2mth_8);
1901 decile_1yr_2mth_8_calldelta = callDelta_2mth_1yr_1(decile_1yr_2mth_8);
1902 decile_1yr_2mth_8_stock_close = stock_close_2mth_1(decile_1yr_2mth_8);
1903 decile_1yr_2mth_8_delta_return = mean((decile_1yr_2mth_8_opt_ex_price-↵
decile_1yr_2mth_8_call_price+(decile_1yr_2mth_8_stock_price.↵
*decile_1yr_2mth_8_calldelta)-(decile_1yr_2mth_8_stock_close.↵
*decile_1yr_2mth_8_calldelta))./((-decile_1yr_2mth_8_stock_price.↵
*decile_1yr_2mth_8_calldelta)+decile_1yr_2mth_8_call_price));
1904 [h,p,ci,decile_1yr_2mth_8_delta_return_ttest] = ttest↵
((decile_1yr_2mth_8_opt_ex_price-decile_1yr_2mth_8_call_price+↵
(decile_1yr_2mth_8_stock_price.*decile_1yr_2mth_8_calldelta)-↵
(decile_1yr_2mth_8_stock_close.*decile_1yr_2mth_8_calldelta))./((-↵
decile_1yr_2mth_8_stock_price.*decile_1yr_2mth_8_calldelta)↵
+decile_1yr_2mth_8_call_price),0);
1905 decile_1yr_2mth_8_delta_std = std((decile_1yr_2mth_8_opt_ex_price-↵
decile_1yr_2mth_8_call_price+(decile_1yr_2mth_8_stock_price.↵
*decile_1yr_2mth_8_calldelta)-(decile_1yr_2mth_8_stock_close.↵
*decile_1yr_2mth_8_calldelta))./((-decile_1yr_2mth_8_stock_price.↵
*decile_1yr_2mth_8_calldelta)+decile_1yr_2mth_8_call_price));
1906 decile_1yr_2mth_8_delta_min = min((decile_1yr_2mth_8_opt_ex_price-↵
decile_1yr_2mth_8_call_price+(decile_1yr_2mth_8_stock_price.↵
*decile_1yr_2mth_8_calldelta)-(decile_1yr_2mth_8_stock_close.↵
*decile_1yr_2mth_8_calldelta))./((-decile_1yr_2mth_8_stock_price.↵
*decile_1yr_2mth_8_calldelta)+decile_1yr_2mth_8_call_price));
1907 decile_1yr_2mth_8_delta_max = max((decile_1yr_2mth_8_opt_ex_price-↵
decile_1yr_2mth_8_call_price+(decile_1yr_2mth_8_stock_price.↵
*decile_1yr_2mth_8_calldelta)-(decile_1yr_2mth_8_stock_close.↵
*decile_1yr_2mth_8_calldelta))./((-decile_1yr_2mth_8_stock_price.↵
```

```matlab
*decile_1yr_2mth_8_calldelta)+decile_1yr_2mth_8_call_price));
1908 decile_1yr_2mth_8_delta_SR = mean((((decile_1yr_2mth_8_opt_ex_price-↵
decile_1yr_2mth_8_call_price+(decile_1yr_2mth_8_stock_price.↵
*decile_1yr_2mth_8_calldelta)-(decile_1yr_2mth_8_stock_close.↵
*decile_1yr_2mth_8_calldelta))./((-decile_1yr_2mth_8_stock_price.↵
*decile_1yr_2mth_8_calldelta)+decile_1yr_2mth_8_call_price))-decile_1yr_2mth_8_rates)↵
/...
1909      (sqrt(var((decile_1yr_2mth_8_opt_ex_price-decile_1yr_2mth_8_call_price+↵
(decile_1yr_2mth_8_stock_price.*decile_1yr_2mth_8_calldelta)-↵
(decile_1yr_2mth_8_stock_close.*decile_1yr_2mth_8_calldelta))./(-↵
decile_1yr_2mth_8_stock_price.↵
*decile_1yr_2mth_8_calldelta+decile_1yr_2mth_8_call_price)-↵
decile_1yr_2mth_8_rates))));
1910
1911
1912 decile_1yr_2mth_9=find((logdiff_1yrRV_2mth > sort_logdiff_1yrRV_2mth(ff3*8,1)) &↵
(logdiff_1yrRV_2mth <= sort_logdiff_1yrRV_2mth(ff3*9,1)));
1913
1914 decile_1yr_2mth_9_mean = mean(diff_1yrRV_2mth(decile_1yr_2mth_9));
1915 decile_1yr_2mth_9_RV = mean(Hist_Vol_1yr_2mth_1(decile_1yr_2mth_9));
1916 decile_1yr_2mth_9_IV = mean(bsvolatility_2mth_1(decile_1yr_2mth_9));
1917 decile_1yr_2mth_9_CS = mean(CallDivStock_2mth(decile_1yr_2mth_9));
1918 decile_1yr_2mth_9_delta = mean(callDelta_2mth_1yr_1(decile_1yr_2mth_9));
1919 decile_1yr_2mth_9_rates = rates_2mth_2(decile_1yr_2mth_9);
1920 decile_1yr_2mth_9_call_return = mean(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_9));
1921 [h,p,ci,decile_1yr_2mth_9_call_return_ttest] = ttest(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_9),0);
1922 decile_1yr_2mth_9_call_return_std = std(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_9));
1923 decile_1yr_2mth_9_call_return_min = min(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_9));
1924 decile_1yr_2mth_9_call_return_max = max(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_9));
1925 decile_1yr_2mth_9_call_SR = mean(opt_percentage_return_2mth_1(decile_1yr_2mth_9)-↵
decile_1yr_2mth_9_rates)/(sqrt(var(opt_percentage_return_2mth_1(decile_1yr_2mth_9)-↵
decile_1yr_2mth_9_rates)));
1926 decile_1yr_2mth_9_stock_return = mean(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_9));
1927 [h,p,ci,decile_1yr_2mth_9_stock_return_ttest] = ttest↵
(stock_percentage_return_2mth_1(decile_1yr_2mth_9),0);
1928 decile_1yr_2mth_9_stock_return_std = std(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_9));
1929 decile_1yr_2mth_9_stock_return_min = min(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_9));
1930 decile_1yr_2mth_9_stock_return_max = max(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_9));
1931 decile_1yr_2mth_9_stock_SR = mean(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_9)-decile_1yr_2mth_9_rates)/(sqrt(var(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_9)-decile_1yr_2mth_9_rates)));
1932 decile_1yr_2mth_9_date = D_op_2mth_4(decile_1yr_2mth_9);
1933 decile_1yr_2mth_9_call_price = call_price_2mth_2(decile_1yr_2mth_9);
1934 decile_1yr_2mth_9_stock_price = underlying_2mth_3(decile_1yr_2mth_9);
1935 decile_1yr_2mth_9_opt_ex_price = opt_ex_payoff_2mth_1(decile_1yr_2mth_9);
```

```
1936 decile_1yr_2mth_9_strike_price = strike_price_2mth_4(decile_1yr_2mth_9);
1937 decile_1yr_2mth_9_D_op = D_op_2mth_4(decile_1yr_2mth_9);
1938 decile_1yr_2mth_9_ticker_op = ticker_op_2mth_4(decile_1yr_2mth_9);
1939 decile_1yr_2mth_9_calldelta = callDelta_2mth_1yr_1(decile_1yr_2mth_9);
1940 decile_1yr_2mth_9_stock_close = stock_close_2mth_1(decile_1yr_2mth_9);
1941 decile_1yr_2mth_9_delta_return = mean((decile_1yr_2mth_9_opt_ex_price-↵
decile_1yr_2mth_9_call_price+(decile_1yr_2mth_9_stock_price.↵
*decile_1yr_2mth_9_calldelta)-(decile_1yr_2mth_9_stock_close.↵
*decile_1yr_2mth_9_calldelta))./((-decile_1yr_2mth_9_stock_price.↵
*decile_1yr_2mth_9_calldelta)+decile_1yr_2mth_9_call_price));
1942 [h,p,ci,decile_1yr_2mth_9_delta_return_ttest] = ttest↵
((decile_1yr_2mth_9_opt_ex_price-decile_1yr_2mth_9_call_price+↵
(decile_1yr_2mth_9_stock_price.*decile_1yr_2mth_9_calldelta)-↵
(decile_1yr_2mth_9_stock_close.*decile_1yr_2mth_9_calldelta))./((-↵
decile_1yr_2mth_9_stock_price.*decile_1yr_2mth_9_calldelta)↵
+decile_1yr_2mth_9_call_price),0);
1943 decile_1yr_2mth_9_delta_std = std((decile_1yr_2mth_9_opt_ex_price-↵
decile_1yr_2mth_9_call_price+(decile_1yr_2mth_9_stock_price.↵
*decile_1yr_2mth_9_calldelta)-(decile_1yr_2mth_9_stock_close.↵
*decile_1yr_2mth_9_calldelta))./((-decile_1yr_2mth_9_stock_price.↵
*decile_1yr_2mth_9_calldelta)+decile_1yr_2mth_9_call_price));
1944 decile_1yr_2mth_9_delta_min = min((decile_1yr_2mth_9_opt_ex_price-↵
decile_1yr_2mth_9_call_price+(decile_1yr_2mth_9_stock_price.↵
*decile_1yr_2mth_9_calldelta)-(decile_1yr_2mth_9_stock_close.↵
*decile_1yr_2mth_9_calldelta))./((-decile_1yr_2mth_9_stock_price.↵
*decile_1yr_2mth_9_calldelta)+decile_1yr_2mth_9_call_price));
1945 decile_1yr_2mth_9_delta_max = max((decile_1yr_2mth_9_opt_ex_price-↵
decile_1yr_2mth_9_call_price+(decile_1yr_2mth_9_stock_price.↵
*decile_1yr_2mth_9_calldelta)-(decile_1yr_2mth_9_stock_close.↵
*decile_1yr_2mth_9_calldelta))./((-decile_1yr_2mth_9_stock_price.↵
*decile_1yr_2mth_9_calldelta)+decile_1yr_2mth_9_call_price));
1946 decile_1yr_2mth_9_delta_SR = mean((((decile_1yr_2mth_9_opt_ex_price-↵
decile_1yr_2mth_9_call_price+(decile_1yr_2mth_9_stock_price.↵
*decile_1yr_2mth_9_calldelta)-(decile_1yr_2mth_9_stock_close.↵
*decile_1yr_2mth_9_calldelta))./((-decile_1yr_2mth_9_stock_price.↵
*decile_1yr_2mth_9_calldelta)+decile_1yr_2mth_9_call_price))-decile_1yr_2mth_9_rates)↵
/...
1947     (sqrt(var((decile_1yr_2mth_9_opt_ex_price-decile_1yr_2mth_9_call_price+↵
(decile_1yr_2mth_9_stock_price.*decile_1yr_2mth_9_calldelta)-↵
(decile_1yr_2mth_9_stock_close.*decile_1yr_2mth_9_calldelta))./(-↵
decile_1yr_2mth_9_stock_price.↵
*decile_1yr_2mth_9_calldelta+decile_1yr_2mth_9_call_price)-↵
decile_1yr_2mth_9_rates))));
1948
1949
1950 decile_1yr_2mth_10=find((logdiff_1yrRV_2mth > sort_logdiff_1yrRV_2mth(ff3*9,1)));
1951
1952 decile_1yr_2mth_10_mean = mean(diff_1yrRV_2mth(decile_1yr_2mth_10));
1953 decile_1yr_2mth_10_RV = mean(Hist_Vol_1yr_2mth_1(decile_1yr_2mth_10));
1954 decile_1yr_2mth_10_IV = mean(bsvolatility_2mth_1(decile_1yr_2mth_10));
1955 decile_1yr_2mth_10_CS = mean(CallDivStock_2mth(decile_1yr_2mth_10));
1956 decile_1yr_2mth_10_delta = mean(callDelta_2mth_1yr_1(decile_1yr_2mth_10));
1957 decile_1yr_2mth_10_rates = rates_2mth_2(decile_1yr_2mth_10);
1958 decile_1yr_2mth_10_call_return = mean(opt_percentage_return_2mth_1↵
```

```
(decile_1yr_2mth_10));
1959 [h,p,ci,decile_1yr_2mth_10_call_return_ttest] = ttest↙
(opt_percentage_return_2mth_1(decile_1yr_2mth_10),0);
1960 decile_1yr_2mth_10_call_return_std = std(opt_percentage_return_2mth_1↙
(decile_1yr_2mth_10));
1961 decile_1yr_2mth_10_call_return_min = min(opt_percentage_return_2mth_1↙
(decile_1yr_2mth_10));
1962 decile_1yr_2mth_10_call_return_max = max(opt_percentage_return_2mth_1↙
(decile_1yr_2mth_10));
1963 decile_1yr_2mth_10_call_SR = mean(opt_percentage_return_2mth_1↙
(decile_1yr_2mth_10)-decile_1yr_2mth_10_rates)/(sqrt(var(opt_percentage_return_2mth_1↙
(decile_1yr_2mth_10)-decile_1yr_2mth_10_rates)));
1964 decile_1yr_2mth_10_stock_return = mean(stock_percentage_return_2mth_1↙
(decile_1yr_2mth_10));
1965 [h,p,ci,decile_1yr_2mth_10_stock_return_ttest] = ttest↙
(stock_percentage_return_2mth_1(decile_1yr_2mth_10),0);
1966 decile_1yr_2mth_10_stock_return_std = std(stock_percentage_return_2mth_1↙
(decile_1yr_2mth_10));
1967 decile_1yr_2mth_10_stock_return_min = min(stock_percentage_return_2mth_1↙
(decile_1yr_2mth_10));
1968 decile_1yr_2mth_10_stock_return_max = max(stock_percentage_return_2mth_1↙
(decile_1yr_2mth_10));
1969 decile_1yr_2mth_10_stock_SR = mean(stock_percentage_return_2mth_1↙
(decile_1yr_2mth_10)-decile_1yr_2mth_10_rates)/(sqrt(var↙
(stock_percentage_return_2mth_1(decile_1yr_2mth_10)-decile_1yr_2mth_10_rates)));
1970 decile_1yr_2mth_10_date = D_op_2mth_4(decile_1yr_2mth_10);
1971 decile_1yr_2mth_10_call_price = call_price_2mth_2(decile_1yr_2mth_10);
1972 decile_1yr_2mth_10_stock_price = underlying_2mth_3(decile_1yr_2mth_10);
1973 decile_1yr_2mth_10_opt_ex_price = opt_ex_payoff_2mth_1(decile_1yr_2mth_10);
1974 decile_1yr_2mth_10_strike_price = strike_price_2mth_4(decile_1yr_2mth_10);
1975 decile_1yr_2mth_10_D_op = D_op_2mth_4(decile_1yr_2mth_10);
1976 decile_1yr_2mth_10_ticker_op = ticker_op_2mth_4(decile_1yr_2mth_10);
1977 decile_1yr_2mth_10_calldelta = callDelta_2mth_1yr_1(decile_1yr_2mth_10);
1978 decile_1yr_2mth_10_stock_close = stock_close_2mth_1(decile_1yr_2mth_10);
1979 decile_1yr_2mth_10_delta_return = mean((decile_1yr_2mth_10_opt_ex_price-↙
decile_1yr_2mth_10_call_price+(decile_1yr_2mth_10_stock_price.↙
*decile_1yr_2mth_10_calldelta)-(decile_1yr_2mth_10_stock_close.↙
*decile_1yr_2mth_10_calldelta))./((-decile_1yr_2mth_10_stock_price.↙
*decile_1yr_2mth_10_calldelta)+decile_1yr_2mth_10_call_price));
1980 [h,p,ci,decile_1yr_2mth_10_delta_return_ttest] = ttest↙
((decile_1yr_2mth_10_opt_ex_price-decile_1yr_2mth_10_call_price+↙
(decile_1yr_2mth_10_stock_price.*decile_1yr_2mth_10_calldelta)-↙
(decile_1yr_2mth_10_stock_close.*decile_1yr_2mth_10_calldelta))./((-↙
decile_1yr_2mth_10_stock_price.*decile_1yr_2mth_10_calldelta)↙
+decile_1yr_2mth_10_call_price),0);
1981 decile_1yr_2mth_10_delta_std = std((decile_1yr_2mth_10_opt_ex_price-↙
decile_1yr_2mth_10_call_price+(decile_1yr_2mth_10_stock_price.↙
*decile_1yr_2mth_10_calldelta)-(decile_1yr_2mth_10_stock_close.↙
*decile_1yr_2mth_10_calldelta))./((-decile_1yr_2mth_10_stock_price.↙
*decile_1yr_2mth_10_calldelta)+decile_1yr_2mth_10_call_price));
1982 decile_1yr_2mth_10_delta_min = min((decile_1yr_2mth_10_opt_ex_price-↙
decile_1yr_2mth_10_call_price+(decile_1yr_2mth_10_stock_price.↙
*decile_1yr_2mth_10_calldelta)-(decile_1yr_2mth_10_stock_close.↙
*decile_1yr_2mth_10_calldelta))./((-decile_1yr_2mth_10_stock_price.↙
```

```
       *decile_1yr_2mth_10_calldelta)+decile_1yr_2mth_10_call_price));
1983 decile_1yr_2mth_10_delta_max = max((decile_1yr_2mth_10_opt_ex_price-↵
decile_1yr_2mth_10_call_price+(decile_1yr_2mth_10_stock_price.↵
*decile_1yr_2mth_10_calldelta)-(decile_1yr_2mth_10_stock_close.↵
*decile_1yr_2mth_10_calldelta))./((-decile_1yr_2mth_10_stock_price.↵
*decile_1yr_2mth_10_calldelta)+decile_1yr_2mth_10_call_price));
1984 decile_1yr_2mth_10_delta_SR = mean((((decile_1yr_2mth_10_opt_ex_price-↵
decile_1yr_2mth_10_call_price+(decile_1yr_2mth_10_stock_price.↵
*decile_1yr_2mth_10_calldelta)-(decile_1yr_2mth_10_stock_close.↵
*decile_1yr_2mth_10_calldelta))./((-decile_1yr_2mth_10_stock_price.↵
*decile_1yr_2mth_10_calldelta)+decile_1yr_2mth_10_call_price))-↵
decile_1yr_2mth_10_rates)/...
1985      (sqrt(var((decile_1yr_2mth_10_opt_ex_price-decile_1yr_2mth_10_call_price+↵
(decile_1yr_2mth_10_stock_price.*decile_1yr_2mth_10_calldelta)-↵
(decile_1yr_2mth_10_stock_close.*decile_1yr_2mth_10_calldelta))./(-↵
decile_1yr_2mth_10_stock_price.↵
*decile_1yr_2mth_10_calldelta+decile_1yr_2mth_10_call_price)-↵
decile_1yr_2mth_10_rates))));
1986
1987 decile101_1yr_2mth_call_return = mean(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_10)-opt_percentage_return_2mth_1(decile_1yr_2mth_1(1:end-4)));
1988 [h,p,ci,decile101_1yr_2mth_call_return_ttest] = ttest↵
(opt_percentage_return_2mth_1(decile_1yr_2mth_10)-opt_percentage_return_2mth_1↵
(decile_1yr_2mth_1(1:end-4)),0);
1989 decile101_1yr_2mth_call_return_std = std(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_10)-opt_percentage_return_2mth_1(decile_1yr_2mth_1(1:end-4)));
1990 decile101_1yr_2mth_call_return_min = min(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_10)-opt_percentage_return_2mth_1(decile_1yr_2mth_1(1:end-4)));
1991 decile101_1yr_2mth_call_return_max = max(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_10)-opt_percentage_return_2mth_1(decile_1yr_2mth_1(1:end-4)));
1992 decile101_1yr_2mth_call_SR = mean((opt_percentage_return_2mth_1↵
(decile_1yr_2mth_10)-decile_1yr_2mth_10_rates)-(opt_percentage_return_2mth_1↵
(decile_1yr_2mth_1(1:end-4))-decile_1yr_2mth_1_rates(1:end-4)))/(sqrt(var↵
(opt_percentage_return_2mth_1(decile_1yr_2mth_10)-decile_1yr_2mth_10_rates-↵
(opt_percentage_return_2mth_1(decile_1yr_2mth_1(1:end-4))-decile_1yr_2mth_1_rates(1:↵
end-4)))));
1993 decile101_1yr_2mth_stock_return = mean(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_10)-stock_percentage_return_2mth_1(decile_1yr_2mth_1(1:end-4)));
1994 [h,p,ci,decile101_1yr_2mth_stock_return_ttest] = ttest↵
(stock_percentage_return_2mth_1(decile_1yr_2mth_10)-stock_percentage_return_2mth_1↵
(decile_1yr_2mth_1(1:end-4)),0);
1995 decile101_1yr_2mth_stock_return_std = std(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_10)-stock_percentage_return_2mth_1(decile_1yr_2mth_1(1:end-4)));
1996 decile101_1yr_2mth_stock_return_min = min(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_10)-stock_percentage_return_2mth_1(decile_1yr_2mth_1(1:end-4)));
1997 decile101_1yr_2mth_stock_return_max = max(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_10)-stock_percentage_return_2mth_1(decile_1yr_2mth_1(1:end-4)));
1998 decile101_1yr_2mth_stock_SR = mean(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_10)-decile_1yr_2mth_10_rates-(stock_percentage_return_2mth_1↵
(decile_1yr_2mth_1(1:end-4))-decile_1yr_2mth_1_rates(1:end-4)))/(sqrt(var↵
(stock_percentage_return_2mth_1(decile_1yr_2mth_10)-decile_1yr_2mth_10_rates-↵
(stock_percentage_return_2mth_1(decile_1yr_2mth_1(1:end-4))-decile_1yr_2mth_1_rates(1:↵
end-4)))));
1999 decile101_1yr_2mth_delta_return = mean((decile_1yr_2mth_10_opt_ex_price-↵
```

```
decile_1yr_2mth_10_call_price+(decile_1yr_2mth_10_stock_price.↵
*decile_1yr_2mth_10_calldelta)-(decile_1yr_2mth_10_stock_close.↵
*decile_1yr_2mth_10_calldelta))./((-decile_1yr_2mth_10_stock_price.↵
*decile_1yr_2mth_10_calldelta)+decile_1yr_2mth_10_call_price)-↵
(decile_1yr_2mth_1_opt_ex_price(1:end-4)-decile_1yr_2mth_1_call_price(1:end-4)+↵
(decile_1yr_2mth_1_stock_price(1:end-4).*decile_1yr_2mth_1_calldelta(1:end-4))-↵
(decile_1yr_2mth_1_stock_close(1:end-4).*decile_1yr_2mth_1_calldelta(1:end-4)))./((-↵
decile_1yr_2mth_1_stock_price(1:end-4).*decile_1yr_2mth_1_calldelta(1:end-4))↵
+decile_1yr_2mth_1_call_price(1:end-4)));
2000 [h,p,ci,decile101_1yr_2mth_delta_return_ttest] = ttest↵
((decile_1yr_2mth_10_opt_ex_price-decile_1yr_2mth_10_call_price+↵
(decile_1yr_2mth_10_stock_price.*decile_1yr_2mth_10_calldelta)-↵
(decile_1yr_2mth_10_stock_close.*decile_1yr_2mth_10_calldelta))./((-↵
decile_1yr_2mth_10_stock_price.*decile_1yr_2mth_10_calldelta)↵
+decile_1yr_2mth_10_call_price)-(decile_1yr_2mth_1_opt_ex_price(1:end-4)-↵
decile_1yr_2mth_1_call_price(1:end-4)+(decile_1yr_2mth_1_stock_price(1:end-4).↵
*decile_1yr_2mth_1_calldelta(1:end-4))-(decile_1yr_2mth_1_stock_close(1:end-4).↵
*decile_1yr_2mth_1_calldelta(1:end-4)))./((-decile_1yr_2mth_1_stock_price(1:end-4).↵
*decile_1yr_2mth_1_calldelta(1:end-4))+decile_1yr_2mth_1_call_price(1:end-4)),0);
2001 decile101_1yr_2mth_delta_std = std((decile_1yr_2mth_10_opt_ex_price-↵
decile_1yr_2mth_10_call_price+(decile_1yr_2mth_10_stock_price.↵
*decile_1yr_2mth_10_calldelta)-(decile_1yr_2mth_10_stock_close.↵
*decile_1yr_2mth_10_calldelta))./((-decile_1yr_2mth_10_stock_price.↵
*decile_1yr_2mth_10_calldelta)+decile_1yr_2mth_10_call_price)-↵
(decile_1yr_2mth_1_opt_ex_price(1:end-4)-decile_1yr_2mth_1_call_price(1:end-4)+↵
(decile_1yr_2mth_1_stock_price(1:end-4).*decile_1yr_2mth_1_calldelta(1:end-4))-↵
(decile_1yr_2mth_1_stock_close(1:end-4).*decile_1yr_2mth_1_calldelta(1:end-4)))./((-↵
decile_1yr_2mth_1_stock_price(1:end-4).*decile_1yr_2mth_1_calldelta(1:end-4))↵
+decile_1yr_2mth_1_call_price(1:end-4)));
2002 decile101_1yr_2mth_delta_min = min((decile_1yr_2mth_10_opt_ex_price-↵
decile_1yr_2mth_10_call_price+(decile_1yr_2mth_10_stock_price.↵
*decile_1yr_2mth_10_calldelta)-(decile_1yr_2mth_10_stock_close.↵
*decile_1yr_2mth_10_calldelta))./((-decile_1yr_2mth_10_stock_price.↵
*decile_1yr_2mth_10_calldelta)+decile_1yr_2mth_10_call_price)-↵
(decile_1yr_2mth_1_opt_ex_price(1:end-4)-decile_1yr_2mth_1_call_price(1:end-4)+↵
(decile_1yr_2mth_1_stock_price(1:end-4).*decile_1yr_2mth_1_calldelta(1:end-4))-↵
(decile_1yr_2mth_1_stock_close(1:end-4).*decile_1yr_2mth_1_calldelta(1:end-4)))./((-↵
decile_1yr_2mth_1_stock_price(1:end-4).*decile_1yr_2mth_1_calldelta(1:end-4))↵
+decile_1yr_2mth_1_call_price(1:end-4)));
2003 decile101_1yr_2mth_delta_max = max((decile_1yr_2mth_10_opt_ex_price-↵
decile_1yr_2mth_10_call_price+(decile_1yr_2mth_10_stock_price.↵
*decile_1yr_2mth_10_calldelta)-(decile_1yr_2mth_10_stock_close.↵
*decile_1yr_2mth_10_calldelta))./((-decile_1yr_2mth_10_stock_price.↵
*decile_1yr_2mth_10_calldelta)+decile_1yr_2mth_10_call_price)-↵
(decile_1yr_2mth_1_opt_ex_price(1:end-4)-decile_1yr_2mth_1_call_price(1:end-4)+↵
(decile_1yr_2mth_1_stock_price(1:end-4).*decile_1yr_2mth_1_calldelta(1:end-4))-↵
(decile_1yr_2mth_1_stock_close(1:end-4).*decile_1yr_2mth_1_calldelta(1:end-4)))./((-↵
decile_1yr_2mth_1_stock_price(1:end-4).*decile_1yr_2mth_1_calldelta(1:end-4))↵
+decile_1yr_2mth_1_call_price(1:end-4)));
2004 decile101_1yr_2mth_delta_SR = mean((((decile_1yr_2mth_10_opt_ex_price-↵
decile_1yr_2mth_10_call_price+(decile_1yr_2mth_10_stock_price.↵
*decile_1yr_2mth_10_calldelta)-(decile_1yr_2mth_10_stock_close.↵
*decile_1yr_2mth_10_calldelta))./((-decile_1yr_2mth_10_stock_price.↵
*decile_1yr_2mth_10_calldelta)+decile_1yr_2mth_10_call_price))-↵
```

```
      decile_1yr_2mth_10_rates-((decile_1yr_2mth_1_opt_ex_price(1:end-4)-↵
      decile_1yr_2mth_1_call_price(1:end-4)+(decile_1yr_2mth_1_stock_price(1:end-4).↵
      *decile_1yr_2mth_1_calldelta(1:end-4))-(decile_1yr_2mth_1_stock_close(1:end-4).↵
      *decile_1yr_2mth_1_calldelta(1:end-4)))./((-decile_1yr_2mth_1_stock_price(1:end-4).↵
      *decile_1yr_2mth_1_calldelta(1:end-4))+decile_1yr_2mth_1_call_price(1:end-4)))-↵
      decile_1yr_2mth_1_rates(1:end-4))/...
2005      (sqrt(var((((decile_1yr_2mth_10_opt_ex_price-decile_1yr_2mth_10_call_price+↵
      (decile_1yr_2mth_10_stock_price.*decile_1yr_2mth_10_calldelta)-↵
      (decile_1yr_2mth_10_stock_close.*decile_1yr_2mth_10_calldelta))./((-↵
      decile_1yr_2mth_10_stock_price.*decile_1yr_2mth_10_calldelta)↵
      +decile_1yr_2mth_10_call_price))-decile_1yr_2mth_10_rates)-↵
      (((decile_1yr_2mth_1_opt_ex_price(1:end-4)-decile_1yr_2mth_1_call_price(1:end-4)+↵
      (decile_1yr_2mth_1_stock_price(1:end-4).*decile_1yr_2mth_1_calldelta(1:end-4))-↵
      (decile_1yr_2mth_1_stock_close(1:end-4).*decile_1yr_2mth_1_calldelta(1:end-4)))./((-↵
      decile_1yr_2mth_1_stock_price(1:end-4).*decile_1yr_2mth_1_calldelta(1:end-4))↵
      +decile_1yr_2mth_1_call_price(1:end-4)))-decile_1yr_2mth_1_rates(1:end-4))))));
2006
2007
2008 % Repeat the same procedures as above for 2mth-to-expiry options based on 2-yr RV
2009 sort_logdiff_2yrRV_2mth = sort(logdiff_2yrRV_2mth);
2010 ff4 = round(length(logdiff_2yrRV_2mth)/10);
2011
2012
2013 decile_2yr_2mth_1=find(logdiff_2yrRV_2mth <= sort_logdiff_2yrRV_2mth(ff4,1));
2014
2015 decile_2yr_2mth_1_mean = mean(diff_2yrRV_2mth(decile_2yr_2mth_1));
2016 decile_2yr_2mth_1_RV = mean(Hist_Vol_2yr_2mth_1(decile_2yr_2mth_1));
2017 decile_2yr_2mth_1_IV = mean(bsvolatility_2mth_1(decile_2yr_2mth_1));
2018 decile_2yr_2mth_1_CS = mean(CallDivStock_2mth(decile_2yr_2mth_1));
2019 decile_2yr_2mth_1_delta = mean(callDelta_2mth_2yr_1(decile_2yr_2mth_1));
2020 decile_2yr_2mth_1_rates = rates_2mth_2(decile_2yr_2mth_1);
2021 decile_2yr_2mth_1_call_return = mean(opt_percentage_return_2mth_1↵
      (decile_2yr_2mth_1));
2022 [h,p,ci,decile_2yr_2mth_1_call_return_ttest] = ttest(opt_percentage_return_2mth_1↵
      (decile_2yr_2mth_1),0);
2023 decile_2yr_2mth_1_call_return_std = std(opt_percentage_return_2mth_1↵
      (decile_2yr_2mth_1));
2024 decile_2yr_2mth_1_call_return_min = min(opt_percentage_return_2mth_1↵
      (decile_2yr_2mth_1));
2025 decile_2yr_2mth_1_call_return_max = max(opt_percentage_return_2mth_1↵
      (decile_2yr_2mth_1));
2026 decile_2yr_2mth_1_call_SR = mean(opt_percentage_return_2mth_1(decile_2yr_2mth_1)-↵
      decile_2yr_2mth_1_rates)/(sqrt(var(opt_percentage_return_2mth_1(decile_2yr_2mth_1)-↵
      decile_2yr_2mth_1_rates)));
2027 decile_2yr_2mth_1_stock_return = mean(stock_percentage_return_2mth_1↵
      (decile_2yr_2mth_1));
2028 [h,p,ci,decile_2yr_2mth_1_stock_return_ttest] = ttest↵
      (stock_percentage_return_2mth_1(decile_2yr_2mth_1),0);
2029 decile_2yr_2mth_1_stock_return_std = std(stock_percentage_return_2mth_1↵
      (decile_2yr_2mth_1));
2030 decile_2yr_2mth_1_stock_return_min = min(stock_percentage_return_2mth_1↵
      (decile_2yr_2mth_1));
2031 decile_2yr_2mth_1_stock_return_max = max(stock_percentage_return_2mth_1↵
      (decile_2yr_2mth_1));
```

```
2032 decile_2yr_2mth_1_stock_SR = mean(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_1)-decile_2yr_2mth_1_rates)/(sqrt(var(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_1)-decile_2yr_2mth_1_rates)));
2033 decile_2yr_2mth_1_date = D_op_2mth_4(decile_2yr_2mth_1);
2034 decile_2yr_2mth_1_call_price = call_price_2mth_2(decile_2yr_2mth_1);
2035 decile_2yr_2mth_1_stock_price = underlying_2mth_3(decile_2yr_2mth_1);
2036 decile_2yr_2mth_1_opt_ex_price = opt_ex_payoff_2mth_1(decile_2yr_2mth_1);
2037 decile_2yr_2mth_1_strike_price = strike_price_2mth_4(decile_2yr_2mth_1);
2038 decile_2yr_2mth_1_D_op = D_op_2mth_4(decile_2yr_2mth_1);
2039 decile_2yr_2mth_1_ticker_op = ticker_op_2mth_4(decile_2yr_2mth_1);
2040 decile_2yr_2mth_1_calldelta = callDelta_2mth_2yr_1(decile_2yr_2mth_1);
2041 decile_2yr_2mth_1_stock_close = stock_close_2mth_1(decile_2yr_2mth_1);
2042 decile_2yr_2mth_1_delta_return = mean((decile_2yr_2mth_1_opt_ex_price-↵
decile_2yr_2mth_1_call_price+(decile_2yr_2mth_1_stock_price.↵
*decile_2yr_2mth_1_calldelta)-(decile_2yr_2mth_1_stock_close.↵
*decile_2yr_2mth_1_calldelta))./((-decile_2yr_2mth_1_stock_price.↵
*decile_2yr_2mth_1_calldelta)+decile_2yr_2mth_1_call_price));
2043 [h,p,ci,decile_2yr_2mth_1_delta_return_ttest] = ttest↵
((decile_2yr_2mth_1_opt_ex_price-decile_2yr_2mth_1_call_price+↵
(decile_2yr_2mth_1_stock_price.*decile_2yr_2mth_1_calldelta)-↵
(decile_2yr_2mth_1_stock_close.*decile_2yr_2mth_1_calldelta))./((-↵
decile_2yr_2mth_1_stock_price.*decile_2yr_2mth_1_calldelta)↵
+decile_2yr_2mth_1_call_price),0);
2044 decile_2yr_2mth_1_delta_std = std((decile_2yr_2mth_1_opt_ex_price-↵
decile_2yr_2mth_1_call_price+(decile_2yr_2mth_1_stock_price.↵
*decile_2yr_2mth_1_calldelta)-(decile_2yr_2mth_1_stock_close.↵
*decile_2yr_2mth_1_calldelta))./((-decile_2yr_2mth_1_stock_price.↵
*decile_2yr_2mth_1_calldelta)+decile_2yr_2mth_1_call_price));
2045 decile_2yr_2mth_1_delta_min = min((decile_2yr_2mth_1_opt_ex_price-↵
decile_2yr_2mth_1_call_price+(decile_2yr_2mth_1_stock_price.↵
*decile_2yr_2mth_1_calldelta)-(decile_2yr_2mth_1_stock_close.↵
*decile_2yr_2mth_1_calldelta))./((-decile_2yr_2mth_1_stock_price.↵
*decile_2yr_2mth_1_calldelta)+decile_2yr_2mth_1_call_price));
2046 decile_2yr_2mth_1_delta_max = max((decile_2yr_2mth_1_opt_ex_price-↵
decile_2yr_2mth_1_call_price+(decile_2yr_2mth_1_stock_price.↵
*decile_2yr_2mth_1_calldelta)-(decile_2yr_2mth_1_stock_close.↵
*decile_2yr_2mth_1_calldelta))./((-decile_2yr_2mth_1_stock_price.↵
*decile_2yr_2mth_1_calldelta)+decile_2yr_2mth_1_call_price));
2047 decile_2yr_2mth_1_delta_SR = mean((((decile_2yr_2mth_1_opt_ex_price-↵
decile_2yr_2mth_1_call_price+(decile_2yr_2mth_1_stock_price.↵
*decile_2yr_2mth_1_calldelta)-(decile_2yr_2mth_1_stock_close.↵
*decile_2yr_2mth_1_calldelta))./((-decile_2yr_2mth_1_stock_price.↵
*decile_2yr_2mth_1_calldelta)+decile_2yr_2mth_1_call_price))-decile_2yr_2mth_1_rates)↵
/...
2048    (sqrt(var((decile_2yr_2mth_1_opt_ex_price-decile_2yr_2mth_1_call_price+↵
(decile_2yr_2mth_1_stock_price.*decile_2yr_2mth_1_calldelta)-↵
(decile_2yr_2mth_1_stock_close.*decile_2yr_2mth_1_calldelta))./(-↵
decile_2yr_2mth_1_stock_price.↵
*decile_2yr_2mth_1_calldelta+decile_2yr_2mth_1_call_price)-↵
decile_2yr_2mth_1_rates))));
2049
2050
2051 decile_2yr_2mth_2=find((logdiff_2yrRV_2mth > sort_logdiff_2yrRV_2mth(ff4,1)) &↵
(logdiff_2yrRV_2mth <= sort_logdiff_2yrRV_2mth(ff4*2,1)));
```

```
2052
2053 decile_2yr_2mth_2_mean = mean(diff_2yrRV_2mth(decile_2yr_2mth_2));
2054 decile_2yr_2mth_2_RV = mean(Hist_Vol_2yr_2mth_1(decile_2yr_2mth_2));
2055 decile_2yr_2mth_2_IV = mean(bsvolatility_2mth_1(decile_2yr_2mth_2));
2056 decile_2yr_2mth_2_CS = mean(CallDivStock_2mth(decile_2yr_2mth_2));
2057 decile_2yr_2mth_2_delta = mean(callDelta_2mth_2yr_1(decile_2yr_2mth_2));
2058 decile_2yr_2mth_2_rates = rates_2mth_2(decile_2yr_2mth_2);
2059 decile_2yr_2mth_2_call_return = mean(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_2));
2060 [h,p,ci,decile_2yr_2mth_2_call_return_ttest] = ttest(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_2),0);
2061 decile_2yr_2mth_2_call_return_std = std(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_2));
2062 decile_2yr_2mth_2_call_return_min = min(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_2));
2063 decile_2yr_2mth_2_call_return_max = max(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_2));
2064 decile_2yr_2mth_2_call_SR = mean(opt_percentage_return_2mth_1(decile_2yr_2mth_2)-↵
decile_2yr_2mth_2_rates)/(sqrt(var(opt_percentage_return_2mth_1(decile_2yr_2mth_2)-↵
decile_2yr_2mth_2_rates)));
2065 decile_2yr_2mth_2_stock_return = mean(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_2));
2066 [h,p,ci,decile_2yr_2mth_2_stock_return_ttest] = ttest↵
(stock_percentage_return_2mth_1(decile_2yr_2mth_2),0);
2067 decile_2yr_2mth_2_stock_return_std = std(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_2));
2068 decile_2yr_2mth_2_stock_return_min = min(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_2));
2069 decile_2yr_2mth_2_stock_return_max = max(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_2));
2070 decile_2yr_2mth_2_stock_SR = mean(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_2)-decile_2yr_2mth_2_rates)/(sqrt(var(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_2)-decile_2yr_2mth_2_rates)));
2071 decile_2yr_2mth_2_date = D_op_2mth_4(decile_2yr_2mth_2);
2072 decile_2yr_2mth_2_call_price = call_price_2mth_2(decile_2yr_2mth_2);
2073 decile_2yr_2mth_2_stock_price = underlying_2mth_3(decile_2yr_2mth_2);
2074 decile_2yr_2mth_2_opt_ex_price = opt_ex_payoff_2mth_1(decile_2yr_2mth_2);
2075 decile_2yr_2mth_2_strike_price = strike_price_2mth_4(decile_2yr_2mth_2);
2076 decile_2yr_2mth_2_D_op = D_op_2mth_4(decile_2yr_2mth_2);
2077 decile_2yr_2mth_2_ticker_op = ticker_op_2mth_4(decile_2yr_2mth_2);
2078 decile_2yr_2mth_2_calldelta = callDelta_2mth_2yr_1(decile_2yr_2mth_2);
2079 decile_2yr_2mth_2_stock_close = stock_close_2mth_1(decile_2yr_2mth_2);
2080 decile_2yr_2mth_2_delta_return = mean((decile_2yr_2mth_2_opt_ex_price-↵
decile_2yr_2mth_2_call_price+(decile_2yr_2mth_2_stock_price.↵
*decile_2yr_2mth_2_calldelta)-(decile_2yr_2mth_2_stock_close.↵
*decile_2yr_2mth_2_calldelta))./((-decile_2yr_2mth_2_stock_price.↵
*decile_2yr_2mth_2_calldelta)+decile_2yr_2mth_2_call_price));
2081 [h,p,ci,decile_2yr_2mth_2_delta_return_ttest] = ttest↵
((decile_2yr_2mth_2_opt_ex_price-decile_2yr_2mth_2_call_price+↵
(decile_2yr_2mth_2_stock_price.*decile_2yr_2mth_2_calldelta)-↵
(decile_2yr_2mth_2_stock_close.*decile_2yr_2mth_2_calldelta))./((-↵
decile_2yr_2mth_2_stock_price.*decile_2yr_2mth_2_calldelta)↵
+decile_2yr_2mth_2_call_price),0);
2082 decile_2yr_2mth_2_delta_std = std((decile_2yr_2mth_2_opt_ex_price-↵
```

```
decile_2yr_2mth_2_call_price+(decile_2yr_2mth_2_stock_price.↵
*decile_2yr_2mth_2_calldelta)-(decile_2yr_2mth_2_stock_close.↵
*decile_2yr_2mth_2_calldelta))./((-decile_2yr_2mth_2_stock_price.↵
*decile_2yr_2mth_2_calldelta)+decile_2yr_2mth_2_call_price));
2083 decile_2yr_2mth_2_delta_min = min((decile_2yr_2mth_2_opt_ex_price-↵
decile_2yr_2mth_2_call_price+(decile_2yr_2mth_2_stock_price.↵
*decile_2yr_2mth_2_calldelta)-(decile_2yr_2mth_2_stock_close.↵
*decile_2yr_2mth_2_calldelta))./((-decile_2yr_2mth_2_stock_price.↵
*decile_2yr_2mth_2_calldelta)+decile_2yr_2mth_2_call_price));
2084 decile_2yr_2mth_2_delta_max = max((decile_2yr_2mth_2_opt_ex_price-↵
decile_2yr_2mth_2_call_price+(decile_2yr_2mth_2_stock_price.↵
*decile_2yr_2mth_2_calldelta)-(decile_2yr_2mth_2_stock_close.↵
*decile_2yr_2mth_2_calldelta))./((-decile_2yr_2mth_2_stock_price.↵
*decile_2yr_2mth_2_calldelta)+decile_2yr_2mth_2_call_price));
2085 decile_2yr_2mth_2_delta_SR = mean((((decile_2yr_2mth_2_opt_ex_price-↵
decile_2yr_2mth_2_call_price+(decile_2yr_2mth_2_stock_price.↵
*decile_2yr_2mth_2_calldelta)-(decile_2yr_2mth_2_stock_close.↵
*decile_2yr_2mth_2_calldelta))./((-decile_2yr_2mth_2_stock_price.↵
*decile_2yr_2mth_2_calldelta)+decile_2yr_2mth_2_call_price))-decile_2yr_2mth_2_rates)↵
/...
2086     (sqrt(var((decile_2yr_2mth_2_opt_ex_price-decile_2yr_2mth_2_call_price+↵
(decile_2yr_2mth_2_stock_price.*decile_2yr_2mth_2_calldelta)-↵
(decile_2yr_2mth_2_stock_close.*decile_2yr_2mth_2_calldelta))./(-↵
decile_2yr_2mth_2_stock_price.↵
*decile_2yr_2mth_2_calldelta+decile_2yr_2mth_2_call_price)-↵
decile_2yr_2mth_2_rates))));
2087
2088
2089 decile_2yr_2mth_3=find((logdiff_2yrRV_2mth > sort_logdiff_2yrRV_2mth(ff4*2,1)) &↵
(logdiff_2yrRV_2mth <= sort_logdiff_2yrRV_2mth(ff4*3,1)));
2090
2091 decile_2yr_2mth_3_mean = mean(diff_2yrRV_2mth(decile_2yr_2mth_3));
2092 decile_2yr_2mth_3_RV = mean(Hist_Vol_2yr_2mth_1(decile_2yr_2mth_3));
2093 decile_2yr_2mth_3_IV = mean(bsvolatility_2mth_1(decile_2yr_2mth_3));
2094 decile_2yr_2mth_3_CS = mean(CallDivStock_2mth(decile_2yr_2mth_3));
2095 decile_2yr_2mth_3_delta = mean(callDelta_2mth_2yr_1(decile_2yr_2mth_3));
2096 decile_2yr_2mth_3_rates = rates_2mth_2(decile_2yr_2mth_3);
2097 decile_2yr_2mth_3_call_return = mean(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_3));
2098 [h,p,ci,decile_2yr_2mth_3_call_return_ttest] = ttest(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_3),0);
2099 decile_2yr_2mth_3_call_return_std = std(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_3));
2100 decile_2yr_2mth_3_call_return_min = min(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_3));
2101 decile_2yr_2mth_3_call_return_max = max(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_3));
2102 decile_2yr_2mth_3_call_SR = mean(opt_percentage_return_2mth_1(decile_2yr_2mth_3)-↵
decile_2yr_2mth_3_rates)/(sqrt(var(opt_percentage_return_2mth_1(decile_2yr_2mth_3)-↵
decile_2yr_2mth_3_rates)));
2103 decile_2yr_2mth_3_stock_return = mean(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_3));
2104 [h,p,ci,decile_2yr_2mth_3_stock_return_ttest] = ttest↵
(stock_percentage_return_2mth_1(decile_2yr_2mth_3),0);
```

```
2105 decile_2yr_2mth_3_stock_return_std = std(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_3));
2106 decile_2yr_2mth_3_stock_return_min = min(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_3));
2107 decile_2yr_2mth_3_stock_return_max = max(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_3));
2108 decile_2yr_2mth_3_stock_SR = mean(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_3)-decile_2yr_2mth_3_rates)/(sqrt(var(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_3)-decile_2yr_2mth_3_rates)));
2109 decile_2yr_2mth_3_date = D_op_2mth_4(decile_2yr_2mth_3);
2110 decile_2yr_2mth_3_call_price = call_price_2mth_2(decile_2yr_2mth_3);
2111 decile_2yr_2mth_3_stock_price = underlying_2mth_3(decile_2yr_2mth_3);
2112 decile_2yr_2mth_3_opt_ex_price = opt_ex_payoff_2mth_1(decile_2yr_2mth_3);
2113 decile_2yr_2mth_3_strike_price = strike_price_2mth_4(decile_2yr_2mth_3);
2114 decile_2yr_2mth_3_D_op = D_op_2mth_4(decile_2yr_2mth_3);
2115 decile_2yr_2mth_3_ticker_op = ticker_op_2mth_4(decile_2yr_2mth_3);
2116 decile_2yr_2mth_3_calldelta = callDelta_2mth_2yr_1(decile_2yr_2mth_3);
2117 decile_2yr_2mth_3_stock_close = stock_close_2mth_1(decile_2yr_2mth_3);
2118 decile_2yr_2mth_3_delta_return = mean((decile_2yr_2mth_3_opt_ex_price-↵
decile_2yr_2mth_3_call_price+(decile_2yr_2mth_3_stock_price.↵
*decile_2yr_2mth_3_calldelta)-(decile_2yr_2mth_3_stock_close.↵
*decile_2yr_2mth_3_calldelta))./((-decile_2yr_2mth_3_stock_price.↵
*decile_2yr_2mth_3_calldelta)+decile_2yr_2mth_3_call_price));
2119 [h,p,ci,decile_2yr_2mth_3_delta_return_ttest] = ttest↵
((decile_2yr_2mth_3_opt_ex_price-decile_2yr_2mth_3_call_price+↵
(decile_2yr_2mth_3_stock_price.*decile_2yr_2mth_3_calldelta)-↵
(decile_2yr_2mth_3_stock_close.*decile_2yr_2mth_3_calldelta))./((-↵
decile_2yr_2mth_3_stock_price.*decile_2yr_2mth_3_calldelta)↵
+decile_2yr_2mth_3_call_price),0);
2120 decile_2yr_2mth_3_delta_std = std((decile_2yr_2mth_3_opt_ex_price-↵
decile_2yr_2mth_3_call_price+(decile_2yr_2mth_3_stock_price.↵
*decile_2yr_2mth_3_calldelta)-(decile_2yr_2mth_3_stock_close.↵
*decile_2yr_2mth_3_calldelta))./((-decile_2yr_2mth_3_stock_price.↵
*decile_2yr_2mth_3_calldelta)+decile_2yr_2mth_3_call_price));
2121 decile_2yr_2mth_3_delta_min = min((decile_2yr_2mth_3_opt_ex_price-↵
decile_2yr_2mth_3_call_price+(decile_2yr_2mth_3_stock_price.↵
*decile_2yr_2mth_3_calldelta)-(decile_2yr_2mth_3_stock_close.↵
*decile_2yr_2mth_3_calldelta))./((-decile_2yr_2mth_3_stock_price.↵
*decile_2yr_2mth_3_calldelta)+decile_2yr_2mth_3_call_price));
2122 decile_2yr_2mth_3_delta_max = max((decile_2yr_2mth_3_opt_ex_price-↵
decile_2yr_2mth_3_call_price+(decile_2yr_2mth_3_stock_price.↵
*decile_2yr_2mth_3_calldelta)-(decile_2yr_2mth_3_stock_close.↵
*decile_2yr_2mth_3_calldelta))./((-decile_2yr_2mth_3_stock_price.↵
*decile_2yr_2mth_3_calldelta)+decile_2yr_2mth_3_call_price));
2123 decile_2yr_2mth_3_delta_SR = mean((((decile_2yr_2mth_3_opt_ex_price-↵
decile_2yr_2mth_3_call_price+(decile_2yr_2mth_3_stock_price.↵
*decile_2yr_2mth_3_calldelta)-(decile_2yr_2mth_3_stock_close.↵
*decile_2yr_2mth_3_calldelta))./((-decile_2yr_2mth_3_stock_price.↵
*decile_2yr_2mth_3_calldelta)+decile_2yr_2mth_3_call_price))-decile_2yr_2mth_3_rates)↵
/...
2124     (sqrt(var((decile_2yr_2mth_3_opt_ex_price-decile_2yr_2mth_3_call_price+↵
(decile_2yr_2mth_3_stock_price.*decile_2yr_2mth_3_calldelta)-↵
(decile_2yr_2mth_3_stock_close.*decile_2yr_2mth_3_calldelta))./(-↵
decile_2yr_2mth_3_stock_price.↵
```

```
*decile_2yr_2mth_3_calldelta+decile_2yr_2mth_3_call_price)-↲
decile_2yr_2mth_3_rates))));
2125
2126
2127 decile_2yr_2mth_4=find((logdiff_2yrRV_2mth > sort_logdiff_2yrRV_2mth(ff4*3,1)) &↲
(logdiff_2yrRV_2mth <= sort_logdiff_2yrRV_2mth(ff4*4,1)));
2128
2129 decile_2yr_2mth_4_mean = mean(diff_2yrRV_2mth(decile_2yr_2mth_4));
2130 decile_2yr_2mth_4_RV = mean(Hist_Vol_2yr_2mth_1(decile_2yr_2mth_4));
2131 decile_2yr_2mth_4_IV = mean(bsvolatility_2mth_1(decile_2yr_2mth_4));
2132 decile_2yr_2mth_4_CS = mean(CallDivStock_2mth(decile_2yr_2mth_4));
2133 decile_2yr_2mth_4_delta = mean(callDelta_2mth_2yr_1(decile_2yr_2mth_4));
2134 decile_2yr_2mth_4_rates = rates_2mth_2(decile_2yr_2mth_4);
2135 decile_2yr_2mth_4_call_return = mean(opt_percentage_return_2mth_1↲
(decile_2yr_2mth_4));
2136 [h,p,ci,decile_2yr_2mth_4_call_return_ttest] = ttest(opt_percentage_return_2mth_1↲
(decile_2yr_2mth_4),0);
2137 decile_2yr_2mth_4_call_return_std = std(opt_percentage_return_2mth_1↲
(decile_2yr_2mth_4));
2138 decile_2yr_2mth_4_call_return_min = min(opt_percentage_return_2mth_1↲
(decile_2yr_2mth_4));
2139 decile_2yr_2mth_4_call_return_max = max(opt_percentage_return_2mth_1↲
(decile_2yr_2mth_4));
2140 decile_2yr_2mth_4_call_SR = mean(opt_percentage_return_2mth_1(decile_2yr_2mth_4)-↲
decile_2yr_2mth_4_rates)/(sqrt(var(opt_percentage_return_2mth_1(decile_2yr_2mth_4)-↲
decile_2yr_2mth_4_rates)));
2141 decile_2yr_2mth_4_stock_return = mean(stock_percentage_return_2mth_1↲
(decile_2yr_2mth_4));
2142 [h,p,ci,decile_2yr_2mth_4_stock_return_ttest] = ttest↲
(stock_percentage_return_2mth_1(decile_2yr_2mth_4),0);
2143 decile_2yr_2mth_4_stock_return_std = std(stock_percentage_return_2mth_1↲
(decile_2yr_2mth_4));
2144 decile_2yr_2mth_4_stock_return_min = min(stock_percentage_return_2mth_1↲
(decile_2yr_2mth_4));
2145 decile_2yr_2mth_4_stock_return_max = max(stock_percentage_return_2mth_1↲
(decile_2yr_2mth_4));
2146 decile_2yr_2mth_4_stock_SR = mean(stock_percentage_return_2mth_1↲
(decile_2yr_2mth_4)-decile_2yr_2mth_4_rates)/(sqrt(var(stock_percentage_return_2mth_1↲
(decile_2yr_2mth_4)-decile_2yr_2mth_4_rates)));
2147 decile_2yr_2mth_4_date = D_op_2mth_4(decile_2yr_2mth_4);
2148 decile_2yr_2mth_4_call_price = call_price_2mth_2(decile_2yr_2mth_4);
2149 decile_2yr_2mth_4_stock_price = underlying_2mth_3(decile_2yr_2mth_4);
2150 decile_2yr_2mth_4_opt_ex_price = opt_ex_payoff_2mth_1(decile_2yr_2mth_4);
2151 decile_2yr_2mth_4_strike_price = strike_price_2mth_4(decile_2yr_2mth_4);
2152 decile_2yr_2mth_4_D_op = D_op_2mth_4(decile_2yr_2mth_4);
2153 decile_2yr_2mth_4_ticker_op = ticker_op_2mth_4(decile_2yr_2mth_4);
2154 decile_2yr_2mth_4_calldelta = callDelta_2mth_2yr_1(decile_2yr_2mth_4);
2155 decile_2yr_2mth_4_stock_close = stock_close_2mth_1(decile_2yr_2mth_4);
2156 decile_2yr_2mth_4_delta_return = mean((decile_2yr_2mth_4_opt_ex_price-↲
decile_2yr_2mth_4_call_price+(decile_2yr_2mth_4_stock_price.↲
*decile_2yr_2mth_4_calldelta)-(decile_2yr_2mth_4_stock_close.↲
*decile_2yr_2mth_4_calldelta))./((-decile_2yr_2mth_4_stock_price.↲
*decile_2yr_2mth_4_calldelta)+decile_2yr_2mth_4_call_price));
2157 [h,p,ci,decile_2yr_2mth_4_delta_return_ttest] = ttest↲
```

```
((decile_2yr_2mth_4_opt_ex_price-decile_2yr_2mth_4_call_price+↵
(decile_2yr_2mth_4_stock_price.*decile_2yr_2mth_4_calldelta)-↵
(decile_2yr_2mth_4_stock_close.*decile_2yr_2mth_4_calldelta))./((-↵
decile_2yr_2mth_4_stock_price.*decile_2yr_2mth_4_calldelta↵
+decile_2yr_2mth_4_call_price),0);
2158 decile_2yr_2mth_4_delta_std = std((decile_2yr_2mth_4_opt_ex_price-↵
decile_2yr_2mth_4_call_price+(decile_2yr_2mth_4_stock_price.↵
*decile_2yr_2mth_4_calldelta)-(decile_2yr_2mth_4_stock_close.↵
*decile_2yr_2mth_4_calldelta))./((-decile_2yr_2mth_4_stock_price.↵
*decile_2yr_2mth_4_calldelta+decile_2yr_2mth_4_call_price));
2159 decile_2yr_2mth_4_delta_min = min((decile_2yr_2mth_4_opt_ex_price-↵
decile_2yr_2mth_4_call_price+(decile_2yr_2mth_4_stock_price.↵
*decile_2yr_2mth_4_calldelta)-(decile_2yr_2mth_4_stock_close.↵
*decile_2yr_2mth_4_calldelta))./((-decile_2yr_2mth_4_stock_price.↵
*decile_2yr_2mth_4_calldelta+decile_2yr_2mth_4_call_price));
2160 decile_2yr_2mth_4_delta_max = max((decile_2yr_2mth_4_opt_ex_price-↵
decile_2yr_2mth_4_call_price+(decile_2yr_2mth_4_stock_price.↵
*decile_2yr_2mth_4_calldelta)-(decile_2yr_2mth_4_stock_close.↵
*decile_2yr_2mth_4_calldelta))./((-decile_2yr_2mth_4_stock_price.↵
*decile_2yr_2mth_4_calldelta+decile_2yr_2mth_4_call_price));
2161 decile_2yr_2mth_4_delta_SR = mean((((decile_2yr_2mth_4_opt_ex_price-↵
decile_2yr_2mth_4_call_price+(decile_2yr_2mth_4_stock_price.↵
*decile_2yr_2mth_4_calldelta)-(decile_2yr_2mth_4_stock_close.↵
*decile_2yr_2mth_4_calldelta))./((-decile_2yr_2mth_4_stock_price.↵
*decile_2yr_2mth_4_calldelta+decile_2yr_2mth_4_call_price))-decile_2yr_2mth_4_rates)↵
/...
2162    (sqrt(var((decile_2yr_2mth_4_opt_ex_price-decile_2yr_2mth_4_call_price+↵
(decile_2yr_2mth_4_stock_price.*decile_2yr_2mth_4_calldelta)-↵
(decile_2yr_2mth_4_stock_close.*decile_2yr_2mth_4_calldelta))./(-↵
decile_2yr_2mth_4_stock_price.↵
*decile_2yr_2mth_4_calldelta+decile_2yr_2mth_4_call_price)-↵
decile_2yr_2mth_4_rates))));
2163
2164
2165 decile_2yr_2mth_5=find((logdiff_2yrRV_2mth > sort_logdiff_2yrRV_2mth(ff4*4,1)) &↵
(logdiff_2yrRV_2mth <= sort_logdiff_2yrRV_2mth(ff4*5,1)));
2166
2167 decile_2yr_2mth_5_mean = mean(diff_2yrRV_2mth(decile_2yr_2mth_5));
2168 decile_2yr_2mth_5_RV = mean(Hist_Vol_2yr_2mth_1(decile_2yr_2mth_5));
2169 decile_2yr_2mth_5_IV = mean(bsvolatility_2mth_1(decile_2yr_2mth_5));
2170 decile_2yr_2mth_5_CS = mean(CallDivStock_2mth(decile_2yr_2mth_5));
2171 decile_2yr_2mth_5_delta = mean(callDelta_2mth_2yr_1(decile_2yr_2mth_5));
2172 decile_2yr_2mth_5_rates = rates_2mth_2(decile_2yr_2mth_5);
2173 decile_2yr_2mth_5_call_return = mean(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_5));
2174 [h,p,ci,decile_2yr_2mth_5_call_return_ttest] = ttest(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_5),0);
2175 decile_2yr_2mth_5_call_return_std = std(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_5));
2176 decile_2yr_2mth_5_call_return_min = min(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_5));
2177 decile_2yr_2mth_5_call_return_max = max(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_5));
2178 decile_2yr_2mth_5_call_SR = mean(opt_percentage_return_2mth_1(decile_2yr_2mth_5)-↵
```

```
decile_2yr_2mth_5_rates)/(sqrt(var(opt_percentage_return_2mth_1(decile_2yr_2mth_5)-↵
decile_2yr_2mth_5_rates)));
2179 decile_2yr_2mth_5_stock_return = mean(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_5));
2180 [h,p,ci,decile_2yr_2mth_5_stock_return_ttest] = ttest↵
(stock_percentage_return_2mth_1(decile_2yr_2mth_5),0);
2181 decile_2yr_2mth_5_stock_return_std = std(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_5));
2182 decile_2yr_2mth_5_stock_return_min = min(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_5));
2183 decile_2yr_2mth_5_stock_return_max = max(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_5));
2184 decile_2yr_2mth_5_stock_SR = mean(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_5)-decile_2yr_2mth_5_rates)/(sqrt(var(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_5)-decile_2yr_2mth_5_rates)));
2185 decile_2yr_2mth_5_date = D_op_2mth_4(decile_2yr_2mth_5);
2186 decile_2yr_2mth_5_call_price = call_price_2mth_2(decile_2yr_2mth_5);
2187 decile_2yr_2mth_5_stock_price = underlying_2mth_3(decile_2yr_2mth_5);
2188 decile_2yr_2mth_5_opt_ex_price = opt_ex_payoff_2mth_1(decile_2yr_2mth_5);
2189 decile_2yr_2mth_5_strike_price = strike_price_2mth_4(decile_2yr_2mth_5);
2190 decile_2yr_2mth_5_D_op = D_op_2mth_4(decile_2yr_2mth_5);
2191 decile_2yr_2mth_5_ticker_op = ticker_op_2mth_4(decile_2yr_2mth_5);
2192 decile_2yr_2mth_5_calldelta = callDelta_2mth_2yr_1(decile_2yr_2mth_5);
2193 decile_2yr_2mth_5_stock_close = stock_close_2mth_1(decile_2yr_2mth_5);
2194 decile_2yr_2mth_5_delta_return = mean((decile_2yr_2mth_5_opt_ex_price-↵
decile_2yr_2mth_5_call_price+(decile_2yr_2mth_5_stock_price.↵
*decile_2yr_2mth_5_calldelta)-(decile_2yr_2mth_5_stock_close.↵
*decile_2yr_2mth_5_calldelta))./((-decile_2yr_2mth_5_stock_price.↵
*decile_2yr_2mth_5_calldelta)+decile_2yr_2mth_5_call_price));
2195 [h,p,ci,decile_2yr_2mth_5_delta_return_ttest] = ttest↵
((decile_2yr_2mth_5_opt_ex_price-decile_2yr_2mth_5_call_price+↵
(decile_2yr_2mth_5_stock_price.*decile_2yr_2mth_5_calldelta)-↵
(decile_2yr_2mth_5_stock_close.*decile_2yr_2mth_5_calldelta))./((-↵
decile_2yr_2mth_5_stock_price.*decile_2yr_2mth_5_calldelta)↵
+decile_2yr_2mth_5_call_price),0);
2196 decile_2yr_2mth_5_delta_std = std((decile_2yr_2mth_5_opt_ex_price-↵
decile_2yr_2mth_5_call_price+(decile_2yr_2mth_5_stock_price.↵
*decile_2yr_2mth_5_calldelta)-(decile_2yr_2mth_5_stock_close.↵
*decile_2yr_2mth_5_calldelta))./((-decile_2yr_2mth_5_stock_price.↵
*decile_2yr_2mth_5_calldelta)+decile_2yr_2mth_5_call_price));
2197 decile_2yr_2mth_5_delta_min = min((decile_2yr_2mth_5_opt_ex_price-↵
decile_2yr_2mth_5_call_price+(decile_2yr_2mth_5_stock_price.↵
*decile_2yr_2mth_5_calldelta)-(decile_2yr_2mth_5_stock_close.↵
*decile_2yr_2mth_5_calldelta))./((-decile_2yr_2mth_5_stock_price.↵
*decile_2yr_2mth_5_calldelta)+decile_2yr_2mth_5_call_price));
2198 decile_2yr_2mth_5_delta_max = max((decile_2yr_2mth_5_opt_ex_price-↵
decile_2yr_2mth_5_call_price+(decile_2yr_2mth_5_stock_price.↵
*decile_2yr_2mth_5_calldelta)-(decile_2yr_2mth_5_stock_close.↵
*decile_2yr_2mth_5_calldelta))./((-decile_2yr_2mth_5_stock_price.↵
*decile_2yr_2mth_5_calldelta)+decile_2yr_2mth_5_call_price));
2199 decile_2yr_2mth_5_delta_SR = mean((((decile_2yr_2mth_5_opt_ex_price-↵
decile_2yr_2mth_5_call_price+(decile_2yr_2mth_5_stock_price.↵
*decile_2yr_2mth_5_calldelta)-(decile_2yr_2mth_5_stock_close.↵
*decile_2yr_2mth_5_calldelta))./((-decile_2yr_2mth_5_stock_price.↵
```

```
     *decile_2yr_2mth_5_calldelta)+decile_2yr_2mth_5_call_price))-decile_2yr_2mth_5_rates)↵
     /...
2200      (sqrt(var((decile_2yr_2mth_5_opt_ex_price-decile_2yr_2mth_5_call_price+↵
     (decile_2yr_2mth_5_stock_price.*decile_2yr_2mth_5_calldelta)-↵
     (decile_2yr_2mth_5_stock_close.*decile_2yr_2mth_5_calldelta))./(-↵
     decile_2yr_2mth_5_stock_price.↵
     *decile_2yr_2mth_5_calldelta+decile_2yr_2mth_5_call_price)-↵
     decile_2yr_2mth_5_rates)))));
2201
2202
2203 decile_2yr_2mth_6=find((logdiff_2yrRV_2mth > sort_logdiff_2yrRV_2mth(ff4*5,1)) &↵
     (logdiff_2yrRV_2mth <= sort_logdiff_2yrRV_2mth(ff4*6,1)));
2204
2205 decile_2yr_2mth_6_mean = mean(diff_2yrRV_2mth(decile_2yr_2mth_6));
2206 decile_2yr_2mth_6_RV = mean(Hist_Vol_2yr_2mth_1(decile_2yr_2mth_6));
2207 decile_2yr_2mth_6_IV = mean(bsvolatility_2mth_1(decile_2yr_2mth_6));
2208 decile_2yr_2mth_6_CS = mean(CallDivStock_2mth(decile_2yr_2mth_6));
2209 decile_2yr_2mth_6_delta = mean(callDelta_2mth_2yr_1(decile_2yr_2mth_6));
2210 decile_2yr_2mth_6_rates = rates_2mth_2(decile_2yr_2mth_6);
2211 decile_2yr_2mth_6_call_return = mean(opt_percentage_return_2mth_1↵
     (decile_2yr_2mth_6));
2212 [h,p,ci,decile_2yr_2mth_6_call_return_ttest] = ttest(opt_percentage_return_2mth_1↵
     (decile_2yr_2mth_6),0);
2213 decile_2yr_2mth_6_call_return_std = std(opt_percentage_return_2mth_1↵
     (decile_2yr_2mth_6));
2214 decile_2yr_2mth_6_call_return_min = min(opt_percentage_return_2mth_1↵
     (decile_2yr_2mth_6));
2215 decile_2yr_2mth_6_call_return_max = max(opt_percentage_return_2mth_1↵
     (decile_2yr_2mth_6));
2216 decile_2yr_2mth_6_call_SR = mean(opt_percentage_return_2mth_1(decile_2yr_2mth_6)-↵
     decile_2yr_2mth_6_rates)/(sqrt(var(opt_percentage_return_2mth_1(decile_2yr_2mth_6)-↵
     decile_2yr_2mth_6_rates)));
2217 decile_2yr_2mth_6_stock_return = mean(stock_percentage_return_2mth_1↵
     (decile_2yr_2mth_6));
2218 [h,p,ci,decile_2yr_2mth_6_stock_return_ttest] = ttest↵
     (stock_percentage_return_2mth_1(decile_2yr_2mth_6),0);
2219 decile_2yr_2mth_6_stock_return_std = std(stock_percentage_return_2mth_1↵
     (decile_2yr_2mth_6));
2220 decile_2yr_2mth_6_stock_return_min = min(stock_percentage_return_2mth_1↵
     (decile_2yr_2mth_6));
2221 decile_2yr_2mth_6_stock_return_max = max(stock_percentage_return_2mth_1↵
     (decile_2yr_2mth_6));
2222 decile_2yr_2mth_6_stock_SR = mean(stock_percentage_return_2mth_1↵
     (decile_2yr_2mth_6)-decile_2yr_2mth_6_rates)/(sqrt(var(stock_percentage_return_2mth_1↵
     (decile_2yr_2mth_6)-decile_2yr_2mth_6_rates)));
2223 decile_2yr_2mth_6_date = D_op_2mth_4(decile_2yr_2mth_6);
2224 decile_2yr_2mth_6_call_price = call_price_2mth_2(decile_2yr_2mth_6);
2225 decile_2yr_2mth_6_stock_price = underlying_2mth_3(decile_2yr_2mth_6);
2226 decile_2yr_2mth_6_opt_ex_price = opt_ex_payoff_2mth_1(decile_2yr_2mth_6);
2227 decile_2yr_2mth_6_strike_price = strike_price_2mth_4(decile_2yr_2mth_6);
2228 decile_2yr_2mth_6_D_op = D_op_2mth_4(decile_2yr_2mth_6);
2229 decile_2yr_2mth_6_ticker_op = ticker_op_2mth_4(decile_2yr_2mth_6);
2230 decile_2yr_2mth_6_calldelta = callDelta_2mth_2yr_1(decile_2yr_2mth_6);
2231 decile_2yr_2mth_6_stock_close = stock_close_2mth_1(decile_2yr_2mth_6);
```

```
2232 decile_2yr_2mth_6_delta_return = mean((decile_2yr_2mth_6_opt_ex_price-↵
decile_2yr_2mth_6_call_price+(decile_2yr_2mth_6_stock_price.↵
*decile_2yr_2mth_6_calldelta)-(decile_2yr_2mth_6_stock_close.↵
*decile_2yr_2mth_6_calldelta))./((-decile_2yr_2mth_6_stock_price.↵
*decile_2yr_2mth_6_calldelta)+decile_2yr_2mth_6_call_price));
2233 [h,p,ci,decile_2yr_2mth_6_delta_return_ttest] = ttest↵
((decile_2yr_2mth_6_opt_ex_price-decile_2yr_2mth_6_call_price+↵
(decile_2yr_2mth_6_stock_price.*decile_2yr_2mth_6_calldelta)-↵
(decile_2yr_2mth_6_stock_close.*decile_2yr_2mth_6_calldelta))./((-↵
decile_2yr_2mth_6_stock_price.*decile_2yr_2mth_6_calldelta)↵
+decile_2yr_2mth_6_call_price),0);
2234 decile_2yr_2mth_6_delta_std = std((decile_2yr_2mth_6_opt_ex_price-↵
decile_2yr_2mth_6_call_price+(decile_2yr_2mth_6_stock_price.↵
*decile_2yr_2mth_6_calldelta)-(decile_2yr_2mth_6_stock_close.↵
*decile_2yr_2mth_6_calldelta))./((-decile_2yr_2mth_6_stock_price.↵
*decile_2yr_2mth_6_calldelta)+decile_2yr_2mth_6_call_price));
2235 decile_2yr_2mth_6_delta_min = min((decile_2yr_2mth_6_opt_ex_price-↵
decile_2yr_2mth_6_call_price+(decile_2yr_2mth_6_stock_price.↵
*decile_2yr_2mth_6_calldelta)-(decile_2yr_2mth_6_stock_close.↵
*decile_2yr_2mth_6_calldelta))./((-decile_2yr_2mth_6_stock_price.↵
*decile_2yr_2mth_6_calldelta)+decile_2yr_2mth_6_call_price));
2236 decile_2yr_2mth_6_delta_max = max((decile_2yr_2mth_6_opt_ex_price-↵
decile_2yr_2mth_6_call_price+(decile_2yr_2mth_6_stock_price.↵
*decile_2yr_2mth_6_calldelta)-(decile_2yr_2mth_6_stock_close.↵
*decile_2yr_2mth_6_calldelta))./((-decile_2yr_2mth_6_stock_price.↵
*decile_2yr_2mth_6_calldelta)+decile_2yr_2mth_6_call_price));
2237 decile_2yr_2mth_6_delta_SR = mean((((decile_2yr_2mth_6_opt_ex_price-↵
decile_2yr_2mth_6_call_price+(decile_2yr_2mth_6_stock_price.↵
*decile_2yr_2mth_6_calldelta)-(decile_2yr_2mth_6_stock_close.↵
*decile_2yr_2mth_6_calldelta))./((-decile_2yr_2mth_6_stock_price.↵
*decile_2yr_2mth_6_calldelta)+decile_2yr_2mth_6_call_price))-decile_2yr_2mth_6_rates)↵
/...
2238     (sqrt(var((decile_2yr_2mth_6_opt_ex_price-decile_2yr_2mth_6_call_price+↵
(decile_2yr_2mth_6_stock_price.*decile_2yr_2mth_6_calldelta)-↵
(decile_2yr_2mth_6_stock_close.*decile_2yr_2mth_6_calldelta))./(-↵
decile_2yr_2mth_6_stock_price.↵
*decile_2yr_2mth_6_calldelta+decile_2yr_2mth_6_call_price)-↵
decile_2yr_2mth_6_rates))));
2239
2240
2241 decile_2yr_2mth_7=find((logdiff_2yrRV_2mth > sort_logdiff_2yrRV_2mth(ff4*6,1)) &↵
(logdiff_2yrRV_2mth <= sort_logdiff_2yrRV_2mth(ff4*7,1)));
2242
2243 decile_2yr_2mth_7_mean = mean(diff_2yrRV_2mth(decile_2yr_2mth_7));
2244 decile_2yr_2mth_7_RV = mean(Hist_Vol_2yr_2mth_1(decile_2yr_2mth_7));
2245 decile_2yr_2mth_7_IV = mean(bsvolatility_2mth_1(decile_2yr_2mth_7));
2246 decile_2yr_2mth_7_CS = mean(CallDivStock_2mth(decile_2yr_2mth_7));
2247 decile_2yr_2mth_7_delta = mean(callDelta_2mth_2yr_1(decile_2yr_2mth_7));
2248 decile_2yr_2mth_7_rates = rates_2mth_2(decile_2yr_2mth_7);
2249 decile_2yr_2mth_7_call_return = mean(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_7));
2250 [h,p,ci,decile_2yr_2mth_7_call_return_ttest] = ttest(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_7),0);
2251 decile_2yr_2mth_7_call_return_std = std(opt_percentage_return_2mth_1↵
```

```matlab
(decile_2yr_2mth_7));
2252 decile_2yr_2mth_7_call_return_min = min(opt_percentage_return_2mth_1↲
(decile_2yr_2mth_7));
2253 decile_2yr_2mth_7_call_return_max = max(opt_percentage_return_2mth_1↲
(decile_2yr_2mth_7));
2254 decile_2yr_2mth_7_call_SR = mean(opt_percentage_return_2mth_1(decile_2yr_2mth_7)-↲
decile_2yr_2mth_7_rates)/(sqrt(var(opt_percentage_return_2mth_1(decile_2yr_2mth_7)-↲
decile_2yr_2mth_7_rates)));
2255 decile_2yr_2mth_7_stock_return = mean(stock_percentage_return_2mth_1↲
(decile_2yr_2mth_7));
2256 [h,p,ci,decile_2yr_2mth_7_stock_return_ttest] = ttest↲
(stock_percentage_return_2mth_1(decile_2yr_2mth_7),0);
2257 decile_2yr_2mth_7_stock_return_std = std(stock_percentage_return_2mth_1↲
(decile_2yr_2mth_7));
2258 decile_2yr_2mth_7_stock_return_min = min(stock_percentage_return_2mth_1↲
(decile_2yr_2mth_7));
2259 decile_2yr_2mth_7_stock_return_max = max(stock_percentage_return_2mth_1↲
(decile_2yr_2mth_7));
2260 decile_2yr_2mth_7_stock_SR = mean(stock_percentage_return_2mth_1↲
(decile_2yr_2mth_7)-decile_2yr_2mth_7_rates)/(sqrt(var(stock_percentage_return_2mth_1↲
(decile_2yr_2mth_7)-decile_2yr_2mth_7_rates)));
2261 decile_2yr_2mth_7_date = D_op_2mth_4(decile_2yr_2mth_7);
2262 decile_2yr_2mth_7_call_price = call_price_2mth_2(decile_2yr_2mth_7);
2263 decile_2yr_2mth_7_stock_price = underlying_2mth_3(decile_2yr_2mth_7);
2264 decile_2yr_2mth_7_opt_ex_price = opt_ex_payoff_2mth_1(decile_2yr_2mth_7);
2265 decile_2yr_2mth_7_strike_price = strike_price_2mth_4(decile_2yr_2mth_7);
2266 decile_2yr_2mth_7_D_op = D_op_2mth_4(decile_2yr_2mth_7);
2267 decile_2yr_2mth_7_ticker_op = ticker_op_2mth_4(decile_2yr_2mth_7);
2268 decile_2yr_2mth_7_calldelta = callDelta_2mth_2yr_1(decile_2yr_2mth_7);
2269 decile_2yr_2mth_7_stock_close = stock_close_2mth_1(decile_2yr_2mth_7);
2270 decile_2yr_2mth_7_delta_return = mean((decile_2yr_2mth_7_opt_ex_price-↲
decile_2yr_2mth_7_call_price+(decile_2yr_2mth_7_stock_price.↲
*decile_2yr_2mth_7_calldelta)-(decile_2yr_2mth_7_stock_close.↲
*decile_2yr_2mth_7_calldelta))./((-decile_2yr_2mth_7_stock_price.↲
*decile_2yr_2mth_7_calldelta)+decile_2yr_2mth_7_call_price));
2271 [h,p,ci,decile_2yr_2mth_7_delta_return_ttest] = ttest↲
((decile_2yr_2mth_7_opt_ex_price-decile_2yr_2mth_7_call_price+↲
(decile_2yr_2mth_7_stock_price.*decile_2yr_2mth_7_calldelta)-↲
(decile_2yr_2mth_7_stock_close.*decile_2yr_2mth_7_calldelta))./((-↲
decile_2yr_2mth_7_stock_price.*decile_2yr_2mth_7_calldelta)↲
+decile_2yr_2mth_7_call_price),0);
2272 decile_2yr_2mth_7_delta_std = std((decile_2yr_2mth_7_opt_ex_price-↲
decile_2yr_2mth_7_call_price+(decile_2yr_2mth_7_stock_price.↲
*decile_2yr_2mth_7_calldelta)-(decile_2yr_2mth_7_stock_close.↲
*decile_2yr_2mth_7_calldelta))./((-decile_2yr_2mth_7_stock_price.↲
*decile_2yr_2mth_7_calldelta)+decile_2yr_2mth_7_call_price));
2273 decile_2yr_2mth_7_delta_min = min((decile_2yr_2mth_7_opt_ex_price-↲
decile_2yr_2mth_7_call_price+(decile_2yr_2mth_7_stock_price.↲
*decile_2yr_2mth_7_calldelta)-(decile_2yr_2mth_7_stock_close.↲
*decile_2yr_2mth_7_calldelta))./((-decile_2yr_2mth_7_stock_price.↲
*decile_2yr_2mth_7_calldelta)+decile_2yr_2mth_7_call_price));
2274 decile_2yr_2mth_7_delta_max = max((decile_2yr_2mth_7_opt_ex_price-↲
decile_2yr_2mth_7_call_price+(decile_2yr_2mth_7_stock_price.↲
*decile_2yr_2mth_7_calldelta)-(decile_2yr_2mth_7_stock_close.↲
```

```
*decile_2yr_2mth_7_calldelta))./((-decile_2yr_2mth_7_stock_price.↵
*decile_2yr_2mth_7_calldelta)+decile_2yr_2mth_7_call_price));
2275 decile_2yr_2mth_7_delta_SR = mean((((decile_2yr_2mth_7_opt_ex_price-↵
decile_2yr_2mth_7_call_price+(decile_2yr_2mth_7_stock_price.↵
*decile_2yr_2mth_7_calldelta)-(decile_2yr_2mth_7_stock_close.↵
*decile_2yr_2mth_7_calldelta))./((-decile_2yr_2mth_7_stock_price.↵
*decile_2yr_2mth_7_calldelta)+decile_2yr_2mth_7_call_price))-decile_2yr_2mth_7_rates)↵
/...
2276     (sqrt(var((decile_2yr_2mth_7_opt_ex_price-decile_2yr_2mth_7_call_price+↵
(decile_2yr_2mth_7_stock_price.*decile_2yr_2mth_7_calldelta)-↵
(decile_2yr_2mth_7_stock_close.*decile_2yr_2mth_7_calldelta))./(-↵
decile_2yr_2mth_7_stock_price.↵
*decile_2yr_2mth_7_calldelta+decile_2yr_2mth_7_call_price)-↵
decile_2yr_2mth_7_rates))));
2277
2278
2279 decile_2yr_2mth_8=find((logdiff_2yrRV_2mth > sort_logdiff_2yrRV_2mth(ff4*7,1)) &↵
(logdiff_2yrRV_2mth <= sort_logdiff_2yrRV_2mth(ff4*8,1)));
2280
2281 decile_2yr_2mth_8_mean = mean(diff_2yrRV_2mth(decile_2yr_2mth_8));
2282 decile_2yr_2mth_8_RV = mean(Hist_Vol_2yr_2mth_1(decile_2yr_2mth_8));
2283 decile_2yr_2mth_8_IV = mean(bsvolatility_2mth_1(decile_2yr_2mth_8));
2284 decile_2yr_2mth_8_CS = mean(CallDivStock_2mth(decile_2yr_2mth_8));
2285 decile_2yr_2mth_8_delta = mean(callDelta_2mth_2yr_1(decile_2yr_2mth_8));
2286 decile_2yr_2mth_8_rates = rates_2mth_2(decile_2yr_2mth_8);
2287 decile_2yr_2mth_8_call_return = mean(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_8));
2288 [h,p,ci,decile_2yr_2mth_8_call_return_ttest] = ttest(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_8),0);
2289 decile_2yr_2mth_8_call_return_std = std(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_8));
2290 decile_2yr_2mth_8_call_return_min = min(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_8));
2291 decile_2yr_2mth_8_call_return_max = max(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_8));
2292 decile_2yr_2mth_8_call_SR = mean(opt_percentage_return_2mth_1(decile_2yr_2mth_8)-↵
decile_2yr_2mth_8_rates)/(sqrt(var(opt_percentage_return_2mth_1(decile_2yr_2mth_8)-↵
decile_2yr_2mth_8_rates)));
2293 decile_2yr_2mth_8_stock_return = mean(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_8));
2294 [h,p,ci,decile_2yr_2mth_8_stock_return_ttest] = ttest↵
(stock_percentage_return_2mth_1(decile_2yr_2mth_8),0);
2295 decile_2yr_2mth_8_stock_return_std = std(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_8));
2296 decile_2yr_2mth_8_stock_return_min = min(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_8));
2297 decile_2yr_2mth_8_stock_return_max = max(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_8));
2298 decile_2yr_2mth_8_stock_SR = mean(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_8)-decile_2yr_2mth_8_rates)/(sqrt(var(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_8)-decile_2yr_2mth_8_rates)));
2299 decile_2yr_2mth_8_date = D_op_2mth_4(decile_2yr_2mth_8);
2300 decile_2yr_2mth_8_call_price = call_price_2mth_2(decile_2yr_2mth_8);
2301 decile_2yr_2mth_8_stock_price = underlying_2mth_3(decile_2yr_2mth_8);
```

```
2302 decile_2yr_2mth_8_opt_ex_price = opt_ex_payoff_2mth_1(decile_2yr_2mth_8);
2303 decile_2yr_2mth_8_strike_price = strike_price_2mth_4(decile_2yr_2mth_8);
2304 decile_2yr_2mth_8_D_op = D_op_2mth_4(decile_2yr_2mth_8);
2305 decile_2yr_2mth_8_ticker_op = ticker_op_2mth_4(decile_2yr_2mth_8);
2306 decile_2yr_2mth_8_calldelta = callDelta_2mth_2yr_1(decile_2yr_2mth_8);
2307 decile_2yr_2mth_8_stock_close = stock_close_2mth_1(decile_2yr_2mth_8);
2308 decile_2yr_2mth_8_delta_return = mean((decile_2yr_2mth_8_opt_ex_price-↵
decile_2yr_2mth_8_call_price+(decile_2yr_2mth_8_stock_price.↵
*decile_2yr_2mth_8_calldelta)-(decile_2yr_2mth_8_stock_close.↵
*decile_2yr_2mth_8_calldelta))./((-decile_2yr_2mth_8_stock_price.↵
*decile_2yr_2mth_8_calldelta)+decile_2yr_2mth_8_call_price));
2309 [h,p,ci,decile_2yr_2mth_8_delta_return_ttest] = ttest↵
((decile_2yr_2mth_8_opt_ex_price-decile_2yr_2mth_8_call_price+↵
(decile_2yr_2mth_8_stock_price.*decile_2yr_2mth_8_calldelta)-↵
(decile_2yr_2mth_8_stock_close.*decile_2yr_2mth_8_calldelta))./((-↵
decile_2yr_2mth_8_stock_price.*decile_2yr_2mth_8_calldelta)↵
+decile_2yr_2mth_8_call_price),0);
2310 decile_2yr_2mth_8_delta_std = std((decile_2yr_2mth_8_opt_ex_price-↵
decile_2yr_2mth_8_call_price+(decile_2yr_2mth_8_stock_price.↵
*decile_2yr_2mth_8_calldelta)-(decile_2yr_2mth_8_stock_close.↵
*decile_2yr_2mth_8_calldelta))./((-decile_2yr_2mth_8_stock_price.↵
*decile_2yr_2mth_8_calldelta)+decile_2yr_2mth_8_call_price));
2311 decile_2yr_2mth_8_delta_min = min((decile_2yr_2mth_8_opt_ex_price-↵
decile_2yr_2mth_8_call_price+(decile_2yr_2mth_8_stock_price.↵
*decile_2yr_2mth_8_calldelta)-(decile_2yr_2mth_8_stock_close.↵
*decile_2yr_2mth_8_calldelta))./((-decile_2yr_2mth_8_stock_price.↵
*decile_2yr_2mth_8_calldelta)+decile_2yr_2mth_8_call_price));
2312 decile_2yr_2mth_8_delta_max = max((decile_2yr_2mth_8_opt_ex_price-↵
decile_2yr_2mth_8_call_price+(decile_2yr_2mth_8_stock_price.↵
*decile_2yr_2mth_8_calldelta)-(decile_2yr_2mth_8_stock_close.↵
*decile_2yr_2mth_8_calldelta))./((-decile_2yr_2mth_8_stock_price.↵
*decile_2yr_2mth_8_calldelta)+decile_2yr_2mth_8_call_price));
2313 decile_2yr_2mth_8_delta_SR = mean((((decile_2yr_2mth_8_opt_ex_price-↵
decile_2yr_2mth_8_call_price+(decile_2yr_2mth_8_stock_price.↵
*decile_2yr_2mth_8_calldelta)-(decile_2yr_2mth_8_stock_close.↵
*decile_2yr_2mth_8_calldelta))./((-decile_2yr_2mth_8_stock_price.↵
*decile_2yr_2mth_8_calldelta)+decile_2yr_2mth_8_call_price))-decile_2yr_2mth_8_rates)↵
/...
2314     (sqrt(var((decile_2yr_2mth_8_opt_ex_price-decile_2yr_2mth_8_call_price+↵
(decile_2yr_2mth_8_stock_price.*decile_2yr_2mth_8_calldelta)-↵
(decile_2yr_2mth_8_stock_close.*decile_2yr_2mth_8_calldelta))./(-↵
decile_2yr_2mth_8_stock_price.↵
*decile_2yr_2mth_8_calldelta+decile_2yr_2mth_8_call_price)-↵
decile_2yr_2mth_8_rates))));
2315
2316
2317 decile_2yr_2mth_9=find((logdiff_2yrRV_2mth > sort_logdiff_2yrRV_2mth(ff4*8,1)) &↵
(logdiff_2yrRV_2mth <= sort_logdiff_2yrRV_2mth(ff4*9,1)));
2318
2319 decile_2yr_2mth_9_mean = mean(diff_2yrRV_2mth(decile_2yr_2mth_9));
2320 decile_2yr_2mth_9_RV = mean(Hist_Vol_2yr_2mth_1(decile_2yr_2mth_9));
2321 decile_2yr_2mth_9_IV = mean(bsvolatility_2mth_1(decile_2yr_2mth_9));
2322 decile_2yr_2mth_9_CS = mean(CallDivStock_2mth(decile_2yr_2mth_9));
2323 decile_2yr_2mth_9_delta = mean(callDelta_2mth_2yr_1(decile_2yr_2mth_9));
```

```
2324 decile_2yr_2mth_9_rates = rates_2mth_2(decile_2yr_2mth_9);
2325 decile_2yr_2mth_9_call_return = mean(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_9));
2326 [h,p,ci,decile_2yr_2mth_9_call_return_ttest] = ttest(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_9),0);
2327 decile_2yr_2mth_9_call_return_std = std(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_9));
2328 decile_2yr_2mth_9_call_return_min = min(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_9));
2329 decile_2yr_2mth_9_call_return_max = max(opt_percentage_return_2mth_1↵
(decile_2yr_2mth_9));
2330 decile_2yr_2mth_9_call_SR = mean(opt_percentage_return_2mth_1(decile_2yr_2mth_9)-↵
decile_2yr_2mth_9_rates)/(sqrt(var(opt_percentage_return_2mth_1(decile_2yr_2mth_9)-↵
decile_2yr_2mth_9_rates)));
2331 decile_2yr_2mth_9_stock_return = mean(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_9));
2332 [h,p,ci,decile_2yr_2mth_9_stock_return_ttest] = ttest↵
(stock_percentage_return_2mth_1(decile_2yr_2mth_9),0);
2333 decile_2yr_2mth_9_stock_return_std = std(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_9));
2334 decile_2yr_2mth_9_stock_return_min = min(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_9));
2335 decile_2yr_2mth_9_stock_return_max = max(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_9));
2336 decile_2yr_2mth_9_stock_SR = mean(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_9)-decile_2yr_2mth_9_rates)/(sqrt(var(stock_percentage_return_2mth_1↵
(decile_2yr_2mth_9)-decile_2yr_2mth_9_rates)));
2337 decile_2yr_2mth_9_date = D_op_2mth_4(decile_2yr_2mth_9);
2338 decile_2yr_2mth_9_call_price = call_price_2mth_2(decile_2yr_2mth_9);
2339 decile_2yr_2mth_9_stock_price = underlying_2mth_3(decile_2yr_2mth_9);
2340 decile_2yr_2mth_9_opt_ex_price = opt_ex_payoff_2mth_1(decile_2yr_2mth_9);
2341 decile_2yr_2mth_9_strike_price = strike_price_2mth_4(decile_2yr_2mth_9);
2342 decile_2yr_2mth_9_D_op = D_op_2mth_4(decile_2yr_2mth_9);
2343 decile_2yr_2mth_9_ticker_op = ticker_op_2mth_4(decile_2yr_2mth_9);
2344 decile_2yr_2mth_9_calldelta = callDelta_2mth_2yr_1(decile_2yr_2mth_9);
2345 decile_2yr_2mth_9_stock_close = stock_close_2mth_1(decile_2yr_2mth_9);
2346 decile_2yr_2mth_9_delta_return = mean((decile_2yr_2mth_9_opt_ex_price-↵
decile_2yr_2mth_9_call_price+(decile_2yr_2mth_9_stock_price.↵
*decile_2yr_2mth_9_calldelta)-(decile_2yr_2mth_9_stock_close.↵
*decile_2yr_2mth_9_calldelta))./((-decile_2yr_2mth_9_stock_price.↵
*decile_2yr_2mth_9_calldelta)+decile_2yr_2mth_9_call_price));
2347 [h,p,ci,decile_2yr_2mth_9_delta_return_ttest] = ttest↵
((decile_2yr_2mth_9_opt_ex_price-decile_2yr_2mth_9_call_price+↵
(decile_2yr_2mth_9_stock_price.*decile_2yr_2mth_9_calldelta)-↵
(decile_2yr_2mth_9_stock_close.*decile_2yr_2mth_9_calldelta))./((-↵
decile_2yr_2mth_9_stock_price.*decile_2yr_2mth_9_calldelta)↵
+decile_2yr_2mth_9_call_price),0);
2348 decile_2yr_2mth_9_delta_std = std((decile_2yr_2mth_9_opt_ex_price-↵
decile_2yr_2mth_9_call_price+(decile_2yr_2mth_9_stock_price.↵
*decile_2yr_2mth_9_calldelta)-(decile_2yr_2mth_9_stock_close.↵
*decile_2yr_2mth_9_calldelta))./((-decile_2yr_2mth_9_stock_price.↵
*decile_2yr_2mth_9_calldelta)+decile_2yr_2mth_9_call_price));
2349 decile_2yr_2mth_9_delta_min = min((decile_2yr_2mth_9_opt_ex_price-↵
decile_2yr_2mth_9_call_price+(decile_2yr_2mth_9_stock_price.↵
```

```
       *decile_2yr_2mth_9_calldelta)-(decile_2yr_2mth_9_stock_close.↙
       *decile_2yr_2mth_9_calldelta))./((-decile_2yr_2mth_9_stock_price.↙
       *decile_2yr_2mth_9_calldelta)+decile_2yr_2mth_9_call_price));
2350 decile_2yr_2mth_9_delta_max = max((decile_2yr_2mth_9_opt_ex_price-↙
     decile_2yr_2mth_9_call_price+(decile_2yr_2mth_9_stock_price.↙
       *decile_2yr_2mth_9_calldelta)-(decile_2yr_2mth_9_stock_close.↙
       *decile_2yr_2mth_9_calldelta))./((-decile_2yr_2mth_9_stock_price.↙
       *decile_2yr_2mth_9_calldelta)+decile_2yr_2mth_9_call_price));
2351 decile_2yr_2mth_9_delta_SR = mean((((decile_2yr_2mth_9_opt_ex_price-↙
     decile_2yr_2mth_9_call_price+(decile_2yr_2mth_9_stock_price.↙
       *decile_2yr_2mth_9_calldelta)-(decile_2yr_2mth_9_stock_close.↙
       *decile_2yr_2mth_9_calldelta))./((-decile_2yr_2mth_9_stock_price.↙
       *decile_2yr_2mth_9_calldelta)+decile_2yr_2mth_9_call_price))-decile_2yr_2mth_9_rates)↙
     /...
2352     (sqrt(var((decile_2yr_2mth_9_opt_ex_price-decile_2yr_2mth_9_call_price+↙
     (decile_2yr_2mth_9_stock_price.*decile_2yr_2mth_9_calldelta)-↙
     (decile_2yr_2mth_9_stock_close.*decile_2yr_2mth_9_calldelta))./(-↙
     decile_2yr_2mth_9_stock_price.↙
       *decile_2yr_2mth_9_calldelta+decile_2yr_2mth_9_call_price)-↙
     decile_2yr_2mth_9_rates))));
2353
2354
2355 decile_2yr_2mth_10=find((logdiff_2yrRV_2mth > sort_logdiff_2yrRV_2mth(ff4*9,1)));
2356
2357 decile_2yr_2mth_10_mean = mean(diff_2yrRV_2mth(decile_2yr_2mth_10));
2358 decile_2yr_2mth_10_RV = mean(Hist_Vol_2yr_2mth_1(decile_2yr_2mth_10));
2359 decile_2yr_2mth_10_IV = mean(bsvolatility_2mth_1(decile_2yr_2mth_10));
2360 decile_2yr_2mth_10_CS = mean(CallDivStock_2mth(decile_2yr_2mth_10));
2361 decile_2yr_2mth_10_delta = mean(callDelta_2mth_2yr_1(decile_2yr_2mth_10));
2362 decile_2yr_2mth_10_rates = rates_2mth_2(decile_2yr_2mth_10);
2363 decile_2yr_2mth_10_call_return = mean(opt_percentage_return_2mth_1↙
     (decile_2yr_2mth_10));
2364 [h,p,ci,decile_2yr_2mth_10_call_return_ttest] = ttest↙
     (opt_percentage_return_2mth_1(decile_2yr_2mth_10),0);
2365 decile_2yr_2mth_10_call_return_std = std(opt_percentage_return_2mth_1↙
     (decile_2yr_2mth_10));
2366 decile_2yr_2mth_10_call_return_min = min(opt_percentage_return_2mth_1↙
     (decile_2yr_2mth_10));
2367 decile_2yr_2mth_10_call_return_max = max(opt_percentage_return_2mth_1↙
     (decile_2yr_2mth_10));
2368 decile_2yr_2mth_10_call_SR = mean(opt_percentage_return_2mth_1↙
     (decile_2yr_2mth_10)-decile_2yr_2mth_10_rates)/(sqrt(var(opt_percentage_return_2mth_1↙
     (decile_2yr_2mth_10)-decile_2yr_2mth_10_rates)));
2369 decile_2yr_2mth_10_stock_return = mean(stock_percentage_return_2mth_1↙
     (decile_2yr_2mth_10));
2370 [h,p,ci,decile_2yr_2mth_10_stock_return_ttest] = ttest↙
     (stock_percentage_return_2mth_1(decile_2yr_2mth_10),0);
2371 decile_2yr_2mth_10_stock_return_std = std(stock_percentage_return_2mth_1↙
     (decile_2yr_2mth_10));
2372 decile_2yr_2mth_10_stock_return_min = min(stock_percentage_return_2mth_1↙
     (decile_2yr_2mth_10));
2373 decile_2yr_2mth_10_stock_return_max = max(stock_percentage_return_2mth_1↙
     (decile_2yr_2mth_10));
2374 decile_2yr_2mth_10_stock_SR = mean(stock_percentage_return_2mth_1↙
```

```
(decile_2yr_2mth_10)-decile_2yr_2mth_10_rates)/(sqrt(var↙
(stock_percentage_return_2mth_1(decile_2yr_2mth_10)-decile_2yr_2mth_10_rates)));
2375 decile_2yr_2mth_10_date = D_op_2mth_4(decile_2yr_2mth_10);
2376 decile_2yr_2mth_10_call_price = call_price_2mth_2(decile_2yr_2mth_10);
2377 decile_2yr_2mth_10_stock_price = underlying_2mth_3(decile_2yr_2mth_10);
2378 decile_2yr_2mth_10_opt_ex_price = opt_ex_payoff_2mth_1(decile_2yr_2mth_10);
2379 decile_2yr_2mth_10_strike_price = strike_price_2mth_4(decile_2yr_2mth_10);
2380 decile_2yr_2mth_10_D_op = D_op_2mth_4(decile_2yr_2mth_10);
2381 decile_2yr_2mth_10_ticker_op = ticker_op_2mth_4(decile_2yr_2mth_10);
2382 decile_2yr_2mth_10_calldelta = callDelta_2mth_2yr_1(decile_2yr_2mth_10);
2383 decile_2yr_2mth_10_stock_close = stock_close_2mth_1(decile_2yr_2mth_10);
2384 decile_2yr_2mth_10_delta_return = mean((decile_2yr_2mth_10_opt_ex_price-↙
decile_2yr_2mth_10_call_price+(decile_2yr_2mth_10_stock_price.↙
*decile_2yr_2mth_10_calldelta)-(decile_2yr_2mth_10_stock_close.↙
*decile_2yr_2mth_10_calldelta))./((-decile_2yr_2mth_10_stock_price.↙
*decile_2yr_2mth_10_calldelta)+decile_2yr_2mth_10_call_price));
2385 [h,p,ci,decile_2yr_2mth_10_delta_return_ttest] = ttest↙
((decile_2yr_2mth_10_opt_ex_price-decile_2yr_2mth_10_call_price+↙
(decile_2yr_2mth_10_stock_price.*decile_2yr_2mth_10_calldelta)-↙
(decile_2yr_2mth_10_stock_close.*decile_2yr_2mth_10_calldelta))./((-↙
decile_2yr_2mth_10_stock_price.*decile_2yr_2mth_10_calldelta)↙
+decile_2yr_2mth_10_call_price),0);
2386 decile_2yr_2mth_10_delta_std = std((decile_2yr_2mth_10_opt_ex_price-↙
decile_2yr_2mth_10_call_price+(decile_2yr_2mth_10_stock_price.↙
*decile_2yr_2mth_10_calldelta)-(decile_2yr_2mth_10_stock_close.↙
*decile_2yr_2mth_10_calldelta))./((-decile_2yr_2mth_10_stock_price.↙
*decile_2yr_2mth_10_calldelta)+decile_2yr_2mth_10_call_price));
2387 decile_2yr_2mth_10_delta_min = min((decile_2yr_2mth_10_opt_ex_price-↙
decile_2yr_2mth_10_call_price+(decile_2yr_2mth_10_stock_price.↙
*decile_2yr_2mth_10_calldelta)-(decile_2yr_2mth_10_stock_close.↙
*decile_2yr_2mth_10_calldelta))./((-decile_2yr_2mth_10_stock_price.↙
*decile_2yr_2mth_10_calldelta)+decile_2yr_2mth_10_call_price));
2388 decile_2yr_2mth_10_delta_max = max((decile_2yr_2mth_10_opt_ex_price-↙
decile_2yr_2mth_10_call_price+(decile_2yr_2mth_10_stock_price.↙
*decile_2yr_2mth_10_calldelta)-(decile_2yr_2mth_10_stock_close.↙
*decile_2yr_2mth_10_calldelta))./((-decile_2yr_2mth_10_stock_price.↙
*decile_2yr_2mth_10_calldelta)+decile_2yr_2mth_10_call_price));
2389 decile_2yr_2mth_10_delta_SR = mean((((decile_2yr_2mth_10_opt_ex_price-↙
decile_2yr_2mth_10_call_price+(decile_2yr_2mth_10_stock_price.↙
*decile_2yr_2mth_10_calldelta)-(decile_2yr_2mth_10_stock_close.↙
*decile_2yr_2mth_10_calldelta))./((-decile_2yr_2mth_10_stock_price.↙
*decile_2yr_2mth_10_calldelta)+decile_2yr_2mth_10_call_price))-↙
decile_2yr_2mth_10_rates)/...
2390     (sqrt(var((decile_2yr_2mth_10_opt_ex_price-decile_2yr_2mth_10_call_price+↙
(decile_2yr_2mth_10_stock_price.*decile_2yr_2mth_10_calldelta)-↙
(decile_2yr_2mth_10_stock_close.*decile_2yr_2mth_10_calldelta))./(-↙
decile_2yr_2mth_10_stock_price.↙
*decile_2yr_2mth_10_calldelta+decile_2yr_2mth_10_call_price)-↙
decile_2yr_2mth_10_rates))));
2391
2392 decile101_2yr_2mth_call_return = mean(opt_percentage_return_2mth_1↙
(decile_2yr_2mth_10)-opt_percentage_return_2mth_1(decile_2yr_2mth_1(1:end-4)));
2393 [h,p,ci,decile101_2yr_2mth_call_return_ttest] = ttest↙
(opt_percentage_return_2mth_1(decile_2yr_2mth_10)-opt_percentage_return_2mth_1↙
```

```
(decile_2yr_2mth_1(1:end-4)),0);
2394 decile101_2yr_2mth_call_return_std = std(opt_percentage_return_2mth_1↙
(decile_2yr_2mth_10)-opt_percentage_return_2mth_1(decile_2yr_2mth_1(1:end-4)));
2395 decile101_2yr_2mth_call_return_min = min(opt_percentage_return_2mth_1↙
(decile_2yr_2mth_10)-opt_percentage_return_2mth_1(decile_2yr_2mth_1(1:end-4)));
2396 decile101_2yr_2mth_call_return_max = max(opt_percentage_return_2mth_1↙
(decile_2yr_2mth_10)-opt_percentage_return_2mth_1(decile_2yr_2mth_1(1:end-4)));
2397 decile101_2yr_2mth_call_SR = mean((opt_percentage_return_2mth_1↙
(decile_2yr_2mth_10)-decile_2yr_2mth_10_rates)-(opt_percentage_return_2mth_1↙
(decile_2yr_2mth_1(1:end-4))-decile_2yr_2mth_1_rates(1:end-4)))/(sqrt(var↙
(opt_percentage_return_2mth_1(decile_2yr_2mth_10)-decile_2yr_2mth_10_rates-↙
(opt_percentage_return_2mth_1(decile_2yr_2mth_1(1:end-4))-decile_2yr_2mth_1_rates(1:↙
end-4)))));
2398 decile101_2yr_2mth_stock_return = mean(stock_percentage_return_2mth_1↙
(decile_2yr_2mth_10)-stock_percentage_return_2mth_1(decile_2yr_2mth_1(1:end-4)));
2399 [h,p,ci,decile101_2yr_2mth_stock_return_ttest] = ttest↙
(stock_percentage_return_2mth_1(decile_2yr_2mth_10)-stock_percentage_return_2mth_1↙
(decile_2yr_2mth_1(1:end-4)),0);
2400 decile101_2yr_2mth_stock_return_std = std(stock_percentage_return_2mth_1↙
(decile_2yr_2mth_10)-stock_percentage_return_2mth_1(decile_2yr_2mth_1(1:end-4)));
2401 decile101_2yr_2mth_stock_return_min = min(stock_percentage_return_2mth_1↙
(decile_2yr_2mth_10)-stock_percentage_return_2mth_1(decile_2yr_2mth_1(1:end-4)));
2402 decile101_2yr_2mth_stock_return_max = max(stock_percentage_return_2mth_1↙
(decile_2yr_2mth_10)-stock_percentage_return_2mth_1(decile_2yr_2mth_1(1:end-4)));
2403 decile101_2yr_2mth_stock_SR = mean(stock_percentage_return_2mth_1↙
(decile_2yr_2mth_10)-decile_2yr_2mth_10_rates-(stock_percentage_return_2mth_1↙
(decile_2yr_2mth_1(1:end-4))-decile_2yr_2mth_1_rates(1:end-4)))/(sqrt(var↙
(stock_percentage_return_2mth_1(decile_2yr_2mth_10)-decile_2yr_2mth_10_rates-↙
(stock_percentage_return_2mth_1(decile_2yr_2mth_1(1:end-4))-decile_2yr_2mth_1_rates(1:↙
end-4)))));
2404 decile101_2yr_2mth_delta_return = mean((decile_2yr_2mth_10_opt_ex_price-↙
decile_2yr_2mth_10_call_price+(decile_2yr_2mth_10_stock_price.↙
*decile_2yr_2mth_10_calldelta)-(decile_2yr_2mth_10_stock_close.↙
*decile_2yr_2mth_10_calldelta))./((-decile_2yr_2mth_10_stock_price.↙
*decile_2yr_2mth_10_calldelta)+decile_2yr_2mth_10_call_price)-↙
(decile_2yr_2mth_1_opt_ex_price(1:end-4)-decile_2yr_2mth_1_call_price(1:end-4)+↙
(decile_2yr_2mth_1_stock_price(1:end-4).*decile_2yr_2mth_1_calldelta(1:end-4))-↙
(decile_2yr_2mth_1_stock_close(1:end-4).*decile_2yr_2mth_1_calldelta(1:end-4)))./((-↙
decile_2yr_2mth_1_stock_price(1:end-4).*decile_2yr_2mth_1_calldelta(1:end-4))↙
+decile_2yr_2mth_1_call_price(1:end-4)));
2405 [h,p,ci,decile101_2yr_2mth_delta_return_ttest] = ttest↙
((decile_2yr_2mth_10_opt_ex_price-decile_2yr_2mth_10_call_price+↙
(decile_2yr_2mth_10_stock_price.*decile_2yr_2mth_10_calldelta)-↙
(decile_2yr_2mth_10_stock_close.*decile_2yr_2mth_10_calldelta))./((-↙
decile_2yr_2mth_10_stock_price.*decile_2yr_2mth_10_calldelta)↙
+decile_2yr_2mth_10_call_price)-(decile_2yr_2mth_1_opt_ex_price(1:end-4)-↙
decile_2yr_2mth_1_call_price(1:end-4)+(decile_2yr_2mth_1_stock_price(1:end-4).↙
*decile_2yr_2mth_1_calldelta(1:end-4))-(decile_2yr_2mth_1_stock_close(1:end-4).↙
*decile_2yr_2mth_1_calldelta(1:end-4)))./((-decile_2yr_2mth_1_stock_price(1:end-4).↙
*decile_2yr_2mth_1_calldelta(1:end-4))+decile_2yr_2mth_1_call_price(1:end-4)),0);
2406 decile101_2yr_2mth_delta_std = std((decile_2yr_2mth_10_opt_ex_price-↙
decile_2yr_2mth_10_call_price+(decile_2yr_2mth_10_stock_price.↙
*decile_2yr_2mth_10_calldelta)-(decile_2yr_2mth_10_stock_close.↙
*decile_2yr_2mth_10_calldelta))./((-decile_2yr_2mth_10_stock_price.↙
```

```
*decile_2yr_2mth_10_calldelta)+decile_2yr_2mth_10_call_price)-↵
(decile_2yr_2mth_1_opt_ex_price(1:end-4)-decile_2yr_2mth_1_call_price(1:end-4)+↵
(decile_2yr_2mth_1_stock_price(1:end-4).*decile_2yr_2mth_1_calldelta(1:end-4))-↵
(decile_2yr_2mth_1_stock_close(1:end-4).*decile_2yr_2mth_1_calldelta(1:end-4)))./((-↵
decile_2yr_2mth_1_stock_price(1:end-4).*decile_2yr_2mth_1_calldelta(1:end-4))↵
+decile_2yr_2mth_1_call_price(1:end-4)));
2407 decile101_2yr_2mth_delta_min = min((decile_2yr_2mth_10_opt_ex_price-↵
decile_2yr_2mth_10_call_price+(decile_2yr_2mth_10_stock_price.↵
*decile_2yr_2mth_10_calldelta)-(decile_2yr_2mth_10_stock_close.↵
*decile_2yr_2mth_10_calldelta))./((-decile_2yr_2mth_10_stock_price.↵
*decile_2yr_2mth_10_calldelta)+decile_2yr_2mth_10_call_price)-↵
(decile_2yr_2mth_1_opt_ex_price(1:end-4)-decile_2yr_2mth_1_call_price(1:end-4)+↵
(decile_2yr_2mth_1_stock_price(1:end-4).*decile_2yr_2mth_1_calldelta(1:end-4))-↵
(decile_2yr_2mth_1_stock_close(1:end-4).*decile_2yr_2mth_1_calldelta(1:end-4)))./((-↵
decile_2yr_2mth_1_stock_price(1:end-4).*decile_2yr_2mth_1_calldelta(1:end-4))↵
+decile_2yr_2mth_1_call_price(1:end-4)));
2408 decile101_2yr_2mth_delta_max = max((decile_2yr_2mth_10_opt_ex_price-↵
decile_2yr_2mth_10_call_price+(decile_2yr_2mth_10_stock_price.↵
*decile_2yr_2mth_10_calldelta)-(decile_2yr_2mth_10_stock_close.↵
*decile_2yr_2mth_10_calldelta))./((-decile_2yr_2mth_10_stock_price.↵
*decile_2yr_2mth_10_calldelta)+decile_2yr_2mth_10_call_price)-↵
(decile_2yr_2mth_1_opt_ex_price(1:end-4)-decile_2yr_2mth_1_call_price(1:end-4)+↵
(decile_2yr_2mth_1_stock_price(1:end-4).*decile_2yr_2mth_1_calldelta(1:end-4))-↵
(decile_2yr_2mth_1_stock_close(1:end-4).*decile_2yr_2mth_1_calldelta(1:end-4)))./((-↵
decile_2yr_2mth_1_stock_price(1:end-4).*decile_2yr_2mth_1_calldelta(1:end-4))↵
+decile_2yr_2mth_1_call_price(1:end-4)));
2409 decile101_2yr_2mth_delta_SR = mean(((((decile_2yr_2mth_10_opt_ex_price-↵
decile_2yr_2mth_10_call_price+(decile_2yr_2mth_10_stock_price.↵
*decile_2yr_2mth_10_calldelta)-(decile_2yr_2mth_10_stock_close.↵
*decile_2yr_2mth_10_calldelta))./((-decile_2yr_2mth_10_stock_price.↵
*decile_2yr_2mth_10_calldelta)+decile_2yr_2mth_10_call_price))-↵
decile_2yr_2mth_10_rates-((decile_2yr_2mth_1_opt_ex_price(1:end-4)-↵
decile_2yr_2mth_1_call_price(1:end-4)+(decile_2yr_2mth_1_stock_price(1:end-4).↵
*decile_2yr_2mth_1_calldelta(1:end-4))-(decile_2yr_2mth_1_stock_close(1:end-4).↵
*decile_2yr_2mth_1_calldelta(1:end-4)))./((-decile_2yr_2mth_1_stock_price(1:end-4).↵
*decile_2yr_2mth_1_calldelta(1:end-4))+decile_2yr_2mth_1_call_price(1:end-4)))-↵
decile_2yr_2mth_1_rates(1:end-4))/...
2410    (sqrt(var(((((decile_2yr_2mth_10_opt_ex_price-decile_2yr_2mth_10_call_price+↵
(decile_2yr_2mth_10_stock_price.*decile_2yr_2mth_10_calldelta)-↵
(decile_2yr_2mth_10_stock_close.*decile_2yr_2mth_10_calldelta))./((-↵
decile_2yr_2mth_10_stock_price.*decile_2yr_2mth_10_calldelta)↵
+decile_2yr_2mth_10_call_price))-decile_2yr_2mth_10_rates)-↵
(((decile_2yr_2mth_1_opt_ex_price(1:end-4)-decile_2yr_2mth_1_call_price(1:end-4)+↵
(decile_2yr_2mth_1_stock_price(1:end-4).*decile_2yr_2mth_1_calldelta(1:end-4))-↵
(decile_2yr_2mth_1_stock_close(1:end-4).*decile_2yr_2mth_1_calldelta(1:end-4)))./((-↵
decile_2yr_2mth_1_stock_price(1:end-4).*decile_2yr_2mth_1_calldelta(1:end-4))↵
+decile_2yr_2mth_1_call_price(1:end-4)))-decile_2yr_2mth_1_rates(1:end-4))))));
2411
2412
2413 % ----- Table 2: Summary Statistics of Volatility -----
2414 table2_1mth = [mean(bsvolatility_1mth_1) median(bsvolatility_1mth_1) std↵
(bsvolatility_1mth_1) min(bsvolatility_1mth_1) max(bsvolatility_1mth_1) skewness↵
(bsvolatility_1mth_1) kurtosis(bsvolatility_1mth_1);...
2415    mean(Hist_Vol_1yr_1mth_1) median(Hist_Vol_1yr_1mth_1) std↵
```

```matlab
     (Hist_Vol_1yr_1mth_1) min(Hist_Vol_1yr_1mth_1) max(Hist_Vol_1yr_1mth_1) skewness↙
     (Hist_Vol_1yr_1mth_1) kurtosis(Hist_Vol_1yr_1mth_1);...
2416      mean(Hist_Vol_2yr_1mth_1) median(Hist_Vol_2yr_1mth_1) std↙
     (Hist_Vol_2yr_1mth_1) min(Hist_Vol_2yr_1mth_1) max(Hist_Vol_2yr_1mth_1) skewness↙
     (Hist_Vol_2yr_1mth_1) kurtosis(Hist_Vol_2yr_1mth_1)];
2417
2418 %Plot the distributions for above volatilities
2419 hist(bsvolatility_1mth_1,min(bsvolatility_1mth_1):0.01:max(bsvolatility_1mth_1))
2420 title('Histogram of Implied Volatilities of 1mth-to-expiry Options Using Black-↙
     Schole Formula')
2421 xlabel('Implied Volatility')
2422 ylabel('Frequency')
2423
2424
2425 hist(Hist_Vol_1yr_1mth_1,min(Hist_Vol_1yr_1mth_1):0.01:max(Hist_Vol_1yr_1mth_1))
2426 title('Histogram of One-year Historical Volatilities of 1mth-to-expiry Options')
2427 xlabel('One-year Historical Volatility')
2428 ylabel('Frequency')
2429
2430 hist(Hist_Vol_2yr_1mth_1,min(Hist_Vol_2yr_1mth_1):0.01:max(Hist_Vol_2yr_1mth_1))
2431 title('Histogram of Two-year Historical Volatilities of 1mth-to-expiry Options')
2432 xlabel('Two-year Historical Volatility')
2433 ylabel('Frequency')
2434
2435
2436 table2_2mth = [mean(bsvolatility_2mth_1) median(bsvolatility_2mth_1) std↙
     (bsvolatility_2mth_1) min(bsvolatility_2mth_1) max(bsvolatility_2mth_1) skewness↙
     (bsvolatility_2mth_1) kurtosis(bsvolatility_2mth_1);...
2437      mean(Hist_Vol_1yr_2mth_1) median(Hist_Vol_1yr_2mth_1) std↙
     (Hist_Vol_1yr_2mth_1) min(Hist_Vol_1yr_2mth_1) max(Hist_Vol_1yr_2mth_1) skewness↙
     (Hist_Vol_1yr_2mth_1) kurtosis(Hist_Vol_1yr_2mth_1);...
2438      mean(Hist_Vol_2yr_2mth_1) median(Hist_Vol_2yr_2mth_1) std↙
     (Hist_Vol_2yr_2mth_1) min(Hist_Vol_2yr_2mth_1) max(Hist_Vol_2yr_2mth_1) skewness↙
     (Hist_Vol_2yr_2mth_1) kurtosis(Hist_Vol_2yr_2mth_1)];
2439
2440 hist(bsvolatility_2mth_1,min(bsvolatility_2mth_1):0.01:max(bsvolatility_2mth_1))
2441 title('Histogram of Implied Volatilities of 2mth-to-expiry Options Using Black-↙
     Schole Formula')
2442 xlabel('Implied Volatility')
2443 ylabel('Frequency')
2444
2445 hist(Hist_Vol_1yr_2mth_1,min(Hist_Vol_1yr_2mth_1):0.01:max(Hist_Vol_1yr_2mth_1))
2446 title('Histogram of One-year Historical Volatilities of 2mth-to-expiry Options')
2447 xlabel('One-year Historical Volatility')
2448 ylabel('Frequency')
2449
2450 hist(Hist_Vol_2yr_2mth_1,min(Hist_Vol_2yr_2mth_1):0.01:max(Hist_Vol_2yr_2mth_1))
2451 title('Histogram of Two-year Historical Volatilities of 2mth-to-expiry Options')
2452 xlabel('Two-year Historical Volatility')
2453 ylabel('Frequency')
2454
2455 % ----- Table 3: Statistics of Portfolios Sorted on the Difference Between HV and↙
     IV -----
2456
```

```
2457 table3_1yr_1mth = [decile_1yr_1mth_1_mean decile_1yr_1mth_2_mean↙
decile_1yr_1mth_3_mean decile_1yr_1mth_4_mean decile_1yr_1mth_5_mean...
2458     decile_1yr_1mth_6_mean decile_1yr_1mth_7_mean decile_1yr_1mth_8_mean↙
decile_1yr_1mth_9_mean decile_1yr_1mth_10_mean;...
2459     decile_1yr_1mth_1_RV decile_1yr_1mth_2_RV decile_1yr_1mth_3_RV↙
decile_1yr_1mth_4_RV decile_1yr_1mth_5_RV...
2460     decile_1yr_1mth_6_RV decile_1yr_1mth_7_RV decile_1yr_1mth_8_RV↙
decile_1yr_1mth_9_RV decile_1yr_1mth_10_RV;...
2461     decile_1yr_1mth_1_IV decile_1yr_1mth_2_IV decile_1yr_1mth_3_IV↙
decile_1yr_1mth_4_IV decile_1yr_1mth_5_IV...
2462     decile_1yr_1mth_6_IV decile_1yr_1mth_7_IV decile_1yr_1mth_8_IV↙
decile_1yr_1mth_9_IV decile_1yr_1mth_10_IV;...
2463     decile_1yr_1mth_1_CS decile_1yr_1mth_2_CS decile_1yr_1mth_3_CS↙
decile_1yr_1mth_4_CS decile_1yr_1mth_5_CS...
2464     decile_1yr_1mth_6_CS decile_1yr_1mth_7_CS decile_1yr_1mth_8_CS↙
decile_1yr_1mth_9_CS decile_1yr_1mth_10_CS;...
2465     decile_1yr_1mth_1_delta decile_1yr_1mth_2_delta decile_1yr_1mth_3_delta↙
decile_1yr_1mth_4_delta decile_1yr_1mth_5_delta...
2466     decile_1yr_1mth_6_delta decile_1yr_1mth_7_delta decile_1yr_1mth_8_delta↙
decile_1yr_1mth_9_delta decile_1yr_1mth_10_delta];
2467
2468
2469 table3_2yr_1mth = [decile_2yr_1mth_1_mean decile_2yr_1mth_2_mean↙
decile_2yr_1mth_3_mean decile_2yr_1mth_4_mean decile_2yr_1mth_5_mean...
2470     decile_2yr_1mth_6_mean decile_2yr_1mth_7_mean decile_2yr_1mth_8_mean↙
decile_2yr_1mth_9_mean decile_2yr_1mth_10_mean;...
2471     decile_2yr_1mth_1_RV decile_2yr_1mth_2_RV decile_2yr_1mth_3_RV↙
decile_2yr_1mth_4_RV decile_2yr_1mth_5_RV...
2472     decile_2yr_1mth_6_RV decile_2yr_1mth_7_RV decile_2yr_1mth_8_RV↙
decile_2yr_1mth_9_RV decile_2yr_1mth_10_RV;...
2473     decile_2yr_1mth_1_IV decile_2yr_1mth_2_IV decile_2yr_1mth_3_IV↙
decile_2yr_1mth_4_IV decile_2yr_1mth_5_IV...
2474     decile_2yr_1mth_6_IV decile_2yr_1mth_7_IV decile_2yr_1mth_8_IV↙
decile_2yr_1mth_9_IV decile_2yr_1mth_10_IV;...
2475     decile_2yr_1mth_1_CS decile_2yr_1mth_2_CS decile_2yr_1mth_3_CS↙
decile_2yr_1mth_4_CS decile_2yr_1mth_5_CS...
2476     decile_2yr_1mth_6_CS decile_2yr_1mth_7_CS decile_2yr_1mth_8_CS↙
decile_2yr_1mth_9_CS decile_2yr_1mth_10_CS;...
2477     decile_2yr_1mth_1_delta decile_2yr_1mth_2_delta decile_2yr_1mth_3_delta↙
decile_2yr_1mth_4_delta decile_2yr_1mth_5_delta...
2478     decile_2yr_1mth_6_delta decile_2yr_1mth_7_delta decile_2yr_1mth_8_delta↙
decile_2yr_1mth_9_delta decile_2yr_1mth_10_delta];
2479
2480 table3_1yr_2mth = [decile_1yr_2mth_1_mean decile_1yr_2mth_2_mean↙
decile_1yr_2mth_3_mean decile_1yr_2mth_4_mean decile_1yr_2mth_5_mean...
2481     decile_1yr_2mth_6_mean decile_1yr_2mth_7_mean decile_1yr_2mth_8_mean↙
decile_1yr_2mth_9_mean decile_1yr_2mth_10_mean;...
2482     decile_1yr_2mth_1_RV decile_1yr_2mth_2_RV decile_1yr_2mth_3_RV↙
decile_1yr_2mth_4_RV decile_1yr_2mth_5_RV...
2483     decile_1yr_2mth_6_RV decile_1yr_2mth_7_RV decile_1yr_2mth_8_RV↙
decile_1yr_2mth_9_RV decile_1yr_2mth_10_RV;...
2484     decile_1yr_2mth_1_IV decile_1yr_2mth_2_IV decile_1yr_2mth_3_IV↙
decile_1yr_2mth_4_IV decile_1yr_2mth_5_IV...
2485     decile_1yr_2mth_6_IV decile_1yr_2mth_7_IV decile_1yr_2mth_8_IV↙
```

```matlab
    decile_1yr_2mth_9_IV decile_1yr_2mth_10_IV;...
2486      decile_1yr_2mth_1_CS decile_1yr_2mth_2_CS decile_1yr_2mth_3_CS↙
decile_1yr_2mth_4_CS decile_1yr_2mth_5_CS...
2487      decile_1yr_2mth_6_CS decile_1yr_2mth_7_CS decile_1yr_2mth_8_CS↙
decile_1yr_2mth_9_CS decile_1yr_2mth_10_CS;...
2488      decile_1yr_2mth_1_delta decile_1yr_2mth_2_delta decile_1yr_2mth_3_delta↙
decile_1yr_2mth_4_delta decile_1yr_2mth_5_delta...
2489      decile_1yr_2mth_6_delta decile_1yr_2mth_7_delta decile_1yr_2mth_8_delta↙
decile_1yr_2mth_9_delta decile_1yr_2mth_10_delta];
2490
2491 table3_2yr_2mth = [decile_2yr_2mth_1_mean decile_2yr_2mth_2_mean↙
decile_2yr_2mth_3_mean decile_2yr_2mth_4_mean decile_2yr_2mth_5_mean...
2492      decile_2yr_2mth_6_mean decile_2yr_2mth_7_mean decile_2yr_2mth_8_mean↙
decile_2yr_2mth_9_mean decile_2yr_2mth_10_mean;...
2493      decile_2yr_2mth_1_RV decile_2yr_2mth_2_RV decile_2yr_2mth_3_RV↙
decile_2yr_2mth_4_RV decile_2yr_2mth_5_RV...
2494      decile_2yr_2mth_6_RV decile_2yr_2mth_7_RV decile_2yr_2mth_8_RV↙
decile_2yr_2mth_9_RV decile_2yr_2mth_10_RV;...
2495      decile_2yr_2mth_1_IV decile_2yr_2mth_2_IV decile_2yr_2mth_3_IV↙
decile_2yr_2mth_4_IV decile_2yr_2mth_5_IV...
2496      decile_2yr_2mth_6_IV decile_2yr_2mth_7_IV decile_2yr_2mth_8_IV↙
decile_2yr_2mth_9_IV decile_2yr_2mth_10_IV;...
2497      decile_2yr_2mth_1_CS decile_2yr_2mth_2_CS decile_2yr_2mth_3_CS↙
decile_2yr_2mth_4_CS decile_2yr_2mth_5_CS...
2498      decile_2yr_2mth_6_CS decile_2yr_2mth_7_CS decile_2yr_2mth_8_CS↙
decile_2yr_2mth_9_CS decile_2yr_2mth_10_CS;...
2499      decile_2yr_2mth_1_delta decile_2yr_2mth_2_delta decile_2yr_2mth_3_delta↙
decile_2yr_2mth_4_delta decile_2yr_2mth_5_delta...
2500      decile_2yr_2mth_6_delta decile_2yr_2mth_7_delta decile_2yr_2mth_8_delta↙
decile_2yr_2mth_9_delta decile_2yr_2mth_10_delta];
2501
2502 % ----- Table 4: 1mth HPRR of 1mth-to-expiry Portfolios Sorted on the Difference
2503 %Between 1YR HV and IV-----
2504 %Panel A: Call Returns
2505 table4_1yr_1mth_call_return = [decile_1yr_1mth_1_call_return↙
decile_1yr_1mth_2_call_return decile_1yr_1mth_3_call_return↙
decile_1yr_1mth_4_call_return decile_1yr_1mth_5_call_return...
2506      decile_1yr_1mth_6_call_return decile_1yr_1mth_7_call_return↙
decile_1yr_1mth_8_call_return decile_1yr_1mth_9_call_return↙
decile_1yr_1mth_10_call_return decile101_1yr_1mth_call_return;...
2507      decile_1yr_1mth_1_call_return_ttest.tstat↙
decile_1yr_1mth_2_call_return_ttest.tstat decile_1yr_1mth_3_call_return_ttest.tstat↙
decile_1yr_1mth_4_call_return_ttest.tstat decile_1yr_1mth_5_call_return_ttest.tstat...
2508      decile_1yr_1mth_6_call_return_ttest.tstat↙
decile_1yr_1mth_7_call_return_ttest.tstat decile_1yr_1mth_8_call_return_ttest.tstat↙
decile_1yr_1mth_9_call_return_ttest.tstat decile_1yr_1mth_10_call_return_ttest.tstat↙
decile101_1yr_1mth_call_return_ttest.tstat;...
2509      decile_1yr_1mth_1_call_return_std decile_1yr_1mth_2_call_return_std↙
decile_1yr_1mth_3_call_return_std decile_1yr_1mth_4_call_return_std↙
decile_1yr_1mth_5_call_return_std...
2510      decile_1yr_1mth_6_call_return_std decile_1yr_1mth_7_call_return_std↙
decile_1yr_1mth_8_call_return_std decile_1yr_1mth_9_call_return_std↙
decile_1yr_1mth_10_call_return_std decile101_1yr_1mth_call_return_std;...
2511      decile_1yr_1mth_1_call_return_min decile_1yr_1mth_2_call_return_min↙
```

```matlab
      decile_1yr_1mth_3_call_return_min decile_1yr_1mth_4_call_return_min↵
decile_1yr_1mth_5_call_return_min...
2512     decile_1yr_1mth_6_call_return_min decile_1yr_1mth_7_call_return_min↵
decile_1yr_1mth_8_call_return_min decile_1yr_1mth_9_call_return_min↵
decile_1yr_1mth_10_call_return_min decile101_1yr_1mth_call_return_min;...
2513     decile_1yr_1mth_1_call_return_max decile_1yr_1mth_2_call_return_max↵
decile_1yr_1mth_3_call_return_max decile_1yr_1mth_4_call_return_max↵
decile_1yr_1mth_5_call_return_max...
2514     decile_1yr_1mth_6_call_return_max decile_1yr_1mth_7_call_return_max↵
decile_1yr_1mth_8_call_return_max decile_1yr_1mth_9_call_return_max↵
decile_1yr_1mth_10_call_return_max decile101_1yr_1mth_call_return_max;...
2515     decile_1yr_1mth_1_call_SR decile_1yr_1mth_2_call_SR decile_1yr_1mth_3_call_SR↵
decile_1yr_1mth_4_call_SR decile_1yr_1mth_5_call_SR...
2516     decile_1yr_1mth_6_call_SR decile_1yr_1mth_7_call_SR decile_1yr_1mth_8_call_SR↵
decile_1yr_1mth_9_call_SR decile_1yr_1mth_10_call_SR decile101_1yr_1mth_call_SR];
2517
2518 %Panel B: Stock Returns
2519 table4_1yr_1mth_stock_return = [decile_1yr_1mth_1_stock_return↵
decile_1yr_1mth_2_stock_return decile_1yr_1mth_3_stock_return↵
decile_1yr_1mth_4_stock_return decile_1yr_1mth_5_stock_return...
2520     decile_1yr_1mth_6_stock_return decile_1yr_1mth_7_stock_return↵
decile_1yr_1mth_8_stock_return decile_1yr_1mth_9_stock_return↵
decile_1yr_1mth_10_stock_return decile101_1yr_1mth_stock_return;...
2521     decile_1yr_1mth_1_stock_return_ttest.tstat↵
decile_1yr_1mth_2_stock_return_ttest.tstat decile_1yr_1mth_3_stock_return_ttest.tstat↵
decile_1yr_1mth_4_stock_return_ttest.tstat decile_1yr_1mth_5_stock_return_ttest.↵
tstat...
2522     decile_1yr_1mth_6_stock_return_ttest.tstat↵
decile_1yr_1mth_7_stock_return_ttest.tstat decile_1yr_1mth_8_stock_return_ttest.tstat↵
decile_1yr_1mth_9_stock_return_ttest.tstat decile_1yr_1mth_10_stock_return_ttest.tstat↵
decile101_1yr_1mth_stock_return_ttest.tstat;...
2523     decile_1yr_1mth_1_stock_return_std decile_1yr_1mth_2_stock_return_std↵
decile_1yr_1mth_3_stock_return_std decile_1yr_1mth_4_stock_return_std↵
decile_1yr_1mth_5_stock_return_std...
2524     decile_1yr_1mth_6_stock_return_std decile_1yr_1mth_7_stock_return_std↵
decile_1yr_1mth_8_stock_return_std decile_1yr_1mth_9_stock_return_std↵
decile_1yr_1mth_10_stock_return_std decile101_1yr_1mth_stock_return_std;...
2525     decile_1yr_1mth_1_stock_return_min decile_1yr_1mth_2_stock_return_min↵
decile_1yr_1mth_3_stock_return_min decile_1yr_1mth_4_stock_return_min↵
decile_1yr_1mth_5_stock_return_min...
2526     decile_1yr_1mth_6_stock_return_min decile_1yr_1mth_7_stock_return_min↵
decile_1yr_1mth_8_stock_return_min decile_1yr_1mth_9_stock_return_min↵
decile_1yr_1mth_10_stock_return_min decile101_1yr_1mth_stock_return_min;...
2527     decile_1yr_1mth_1_stock_return_max decile_1yr_1mth_2_stock_return_max↵
decile_1yr_1mth_3_stock_return_max decile_1yr_1mth_4_stock_return_max↵
decile_1yr_1mth_5_stock_return_max...
2528     decile_1yr_1mth_6_stock_return_max decile_1yr_1mth_7_stock_return_max↵
decile_1yr_1mth_8_stock_return_max decile_1yr_1mth_9_stock_return_max↵
decile_1yr_1mth_10_stock_return_max decile101_1yr_1mth_stock_return_max;...
2529     decile_1yr_1mth_1_stock_SR decile_1yr_1mth_2_stock_SR↵
decile_1yr_1mth_3_stock_SR decile_1yr_1mth_4_stock_SR decile_1yr_1mth_5_stock_SR...
2530     decile_1yr_1mth_6_stock_SR decile_1yr_1mth_7_stock_SR↵
decile_1yr_1mth_8_stock_SR decile_1yr_1mth_9_stock_SR decile_1yr_1mth_10_stock_SR↵
decile101_1yr_1mth_stock_SR];
```

```matlab
2531
2532 %Panel C: Delta-Hedged Call Returns
2533 table4_1yr_1mth_delta = [decile_1yr_1mth_1_delta_return↲
decile_1yr_1mth_2_delta_return decile_1yr_1mth_3_delta_return↲
decile_1yr_1mth_4_delta_return decile_1yr_1mth_5_delta_return...
2534     decile_1yr_1mth_6_delta_return decile_1yr_1mth_7_delta_return↲
decile_1yr_1mth_8_delta_return decile_1yr_1mth_9_delta_return↲
decile_1yr_1mth_10_delta_return decile101_1yr_1mth_delta_return;...
2535     decile_1yr_1mth_1_delta_return_ttest.tstat↲
decile_1yr_1mth_2_delta_return_ttest.tstat decile_1yr_1mth_3_delta_return_ttest.tstat↲
decile_1yr_1mth_4_delta_return_ttest.tstat decile_1yr_1mth_5_delta_return_ttest.↲
tstat...
2536     decile_1yr_1mth_6_delta_return_ttest.tstat↲
decile_1yr_1mth_7_delta_return_ttest.tstat decile_1yr_1mth_8_delta_return_ttest.tstat↲
decile_1yr_1mth_9_delta_return_ttest.tstat decile_1yr_1mth_10_delta_return_ttest.tstat↲
decile101_1yr_1mth_delta_return_ttest.tstat;...
2537     decile_1yr_1mth_1_delta_std decile_1yr_1mth_2_delta_std↲
decile_1yr_1mth_3_delta_std decile_1yr_1mth_4_delta_std decile_1yr_1mth_5_delta_std...
2538     decile_1yr_1mth_6_delta_std decile_1yr_1mth_7_delta_std↲
decile_1yr_1mth_8_delta_std decile_1yr_1mth_9_delta_std decile_1yr_1mth_10_delta_std↲
decile101_1yr_1mth_delta_std;...
2539     decile_1yr_1mth_1_delta_min decile_1yr_1mth_2_delta_min↲
decile_1yr_1mth_3_delta_min decile_1yr_1mth_4_delta_min decile_1yr_1mth_5_delta_min...
2540     decile_1yr_1mth_6_delta_min decile_1yr_1mth_7_delta_min↲
decile_1yr_1mth_8_delta_min decile_1yr_1mth_9_delta_min decile_1yr_1mth_10_delta_min↲
decile101_1yr_1mth_delta_min;...
2541     decile_1yr_1mth_1_delta_max decile_1yr_1mth_2_delta_max↲
decile_1yr_1mth_3_delta_max decile_1yr_1mth_4_delta_max decile_1yr_1mth_5_delta_max...
2542     decile_1yr_1mth_6_delta_max decile_1yr_1mth_7_delta_max↲
decile_1yr_1mth_8_delta_max decile_1yr_1mth_9_delta_max decile_1yr_1mth_10_delta_max↲
decile101_1yr_1mth_delta_max;...
2543     decile_1yr_1mth_1_delta_SR decile_1yr_1mth_2_delta_SR↲
decile_1yr_1mth_3_delta_SR decile_1yr_1mth_4_delta_SR decile_1yr_1mth_5_delta_SR...
2544     decile_1yr_1mth_6_delta_SR decile_1yr_1mth_7_delta_SR↲
decile_1yr_1mth_8_delta_SR decile_1yr_1mth_9_delta_SR decile_1yr_1mth_10_delta_SR↲
decile101_1yr_1mth_delta_SR];
2545
2546 %Table 5: 1mth HPRR of 1mth-to-expiry Portfolios Sorted on the Difference
2547 %Between 2YR HV and IV
2548 %Panel A: Call Returns
2549 table5_2yr_1mth_call_return = [decile_2yr_1mth_1_call_return↲
decile_2yr_1mth_2_call_return decile_2yr_1mth_3_call_return↲
decile_2yr_1mth_4_call_return decile_2yr_1mth_5_call_return...
2550     decile_2yr_1mth_6_call_return decile_2yr_1mth_7_call_return↲
decile_2yr_1mth_8_call_return decile_2yr_1mth_9_call_return↲
decile_2yr_1mth_10_call_return decile101_2yr_1mth_call_return;...
2551     decile_2yr_1mth_1_call_return_ttest.tstat↲
decile_2yr_1mth_2_call_return_ttest.tstat decile_2yr_1mth_3_call_return_ttest.tstat↲
decile_2yr_1mth_4_call_return_ttest.tstat decile_2yr_1mth_5_call_return_ttest.tstat...
2552     decile_2yr_1mth_6_call_return_ttest.tstat↲
decile_2yr_1mth_7_call_return_ttest.tstat decile_2yr_1mth_8_call_return_ttest.tstat↲
decile_2yr_1mth_9_call_return_ttest.tstat decile_2yr_1mth_10_call_return_ttest.tstat↲
decile101_2yr_1mth_call_return_ttest.tstat;...
2553     decile_2yr_1mth_1_call_return_std decile_2yr_1mth_2_call_return_std↲
```

```
decile_2yr_1mth_3_call_return_std decile_2yr_1mth_4_call_return_std↙
decile_2yr_1mth_5_call_return_std...
2554      decile_2yr_1mth_6_call_return_std decile_2yr_1mth_7_call_return_std↙
decile_2yr_1mth_8_call_return_std decile_2yr_1mth_9_call_return_std↙
decile_2yr_1mth_10_call_return_std decile101_2yr_1mth_call_return_std;...
2555      decile_2yr_1mth_1_call_return_min decile_2yr_1mth_2_call_return_min↙
decile_2yr_1mth_3_call_return_min decile_2yr_1mth_4_call_return_min↙
decile_2yr_1mth_5_call_return_min...
2556      decile_2yr_1mth_6_call_return_min decile_2yr_1mth_7_call_return_min↙
decile_2yr_1mth_8_call_return_min decile_2yr_1mth_9_call_return_min↙
decile_2yr_1mth_10_call_return_min decile101_2yr_1mth_call_return_min;...
2557      decile_2yr_1mth_1_call_return_max decile_2yr_1mth_2_call_return_max↙
decile_2yr_1mth_3_call_return_max decile_2yr_1mth_4_call_return_max↙
decile_2yr_1mth_5_call_return_max...
2558      decile_2yr_1mth_6_call_return_max decile_2yr_1mth_7_call_return_max↙
decile_2yr_1mth_8_call_return_max decile_2yr_1mth_9_call_return_max↙
decile_2yr_1mth_10_call_return_max decile101_2yr_1mth_call_return_max;...
2559      decile_2yr_1mth_1_call_SR decile_2yr_1mth_2_call_SR decile_2yr_1mth_3_call_SR↙
decile_2yr_1mth_4_call_SR decile_2yr_1mth_5_call_SR...
2560      decile_2yr_1mth_6_call_SR decile_2yr_1mth_7_call_SR decile_2yr_1mth_8_call_SR↙
decile_2yr_1mth_9_call_SR decile_2yr_1mth_10_call_SR decile101_2yr_1mth_call_SR];
2561
2562 %Panel B: Stock Returns
2563 table5_2yr_1mth_stock_return = [decile_2yr_1mth_1_stock_return↙
decile_2yr_1mth_2_stock_return decile_2yr_1mth_3_stock_return↙
decile_2yr_1mth_4_stock_return decile_2yr_1mth_5_stock_return...
2564      decile_2yr_1mth_6_stock_return decile_2yr_1mth_7_stock_return↙
decile_2yr_1mth_8_stock_return decile_2yr_1mth_9_stock_return↙
decile_2yr_1mth_10_stock_return decile101_2yr_1mth_stock_return;...
2565      decile_2yr_1mth_1_stock_return_ttest.tstat↙
decile_2yr_1mth_2_stock_return_ttest.tstat decile_2yr_1mth_3_stock_return_ttest.tstat↙
decile_2yr_1mth_4_stock_return_ttest.tstat decile_2yr_1mth_5_stock_return_ttest.↙
tstat...
2566      decile_2yr_1mth_6_stock_return_ttest.tstat↙
decile_2yr_1mth_7_stock_return_ttest.tstat decile_2yr_1mth_8_stock_return_ttest.tstat↙
decile_2yr_1mth_9_stock_return_ttest.tstat decile_2yr_1mth_10_stock_return_ttest.tstat↙
decile101_2yr_1mth_stock_return_ttest.tstat;...
2567      decile_2yr_1mth_1_stock_return_std decile_2yr_1mth_2_stock_return_std↙
decile_2yr_1mth_3_stock_return_std decile_2yr_1mth_4_stock_return_std↙
decile_2yr_1mth_5_stock_return_std...
2568      decile_2yr_1mth_6_stock_return_std decile_2yr_1mth_7_stock_return_std↙
decile_2yr_1mth_8_stock_return_std decile_2yr_1mth_9_stock_return_std↙
decile_2yr_1mth_10_stock_return_std decile101_2yr_1mth_stock_return_std;...
2569      decile_2yr_1mth_1_stock_return_min decile_2yr_1mth_2_stock_return_min↙
decile_2yr_1mth_3_stock_return_min decile_2yr_1mth_4_stock_return_min↙
decile_2yr_1mth_5_stock_return_min...
2570      decile_2yr_1mth_6_stock_return_min decile_2yr_1mth_7_stock_return_min↙
decile_2yr_1mth_8_stock_return_min decile_2yr_1mth_9_stock_return_min↙
decile_2yr_1mth_10_stock_return_min decile101_2yr_1mth_stock_return_min;...
2571      decile_2yr_1mth_1_stock_return_max decile_2yr_1mth_2_stock_return_max↙
decile_2yr_1mth_3_stock_return_max decile_2yr_1mth_4_stock_return_max↙
decile_2yr_1mth_5_stock_return_max...
2572      decile_2yr_1mth_6_stock_return_max decile_2yr_1mth_7_stock_return_max↙
decile_2yr_1mth_8_stock_return_max decile_2yr_1mth_9_stock_return_max↙
```

```matlab
decile_2yr_1mth_10_stock_return_max decile101_2yr_1mth_stock_return_max;...
2573     decile_2yr_1mth_1_stock_SR decile_2yr_1mth_2_stock_SR↵
decile_2yr_1mth_3_stock_SR decile_2yr_1mth_4_stock_SR decile_2yr_1mth_5_stock_SR...
2574     decile_2yr_1mth_6_stock_SR decile_2yr_1mth_7_stock_SR↵
decile_2yr_1mth_8_stock_SR decile_2yr_1mth_9_stock_SR decile_2yr_1mth_10_stock_SR↵
decile101_2yr_1mth_stock_SR];
2575
2576 %Panel C: Delta-Hedged Call Returns
2577 table5_2yr_1mth_delta = [decile_2yr_1mth_1_delta_return↵
decile_2yr_1mth_2_delta_return decile_2yr_1mth_3_delta_return↵
decile_2yr_1mth_4_delta_return decile_2yr_1mth_5_delta_return...
2578     decile_2yr_1mth_6_delta_return decile_2yr_1mth_7_delta_return↵
decile_2yr_1mth_8_delta_return decile_2yr_1mth_9_delta_return↵
decile_2yr_1mth_10_delta_return decile101_2yr_1mth_delta_return;...
2579     decile_2yr_1mth_1_delta_return_ttest.tstat↵
decile_2yr_1mth_2_delta_return_ttest.tstat decile_2yr_1mth_3_delta_return_ttest.tstat↵
decile_2yr_1mth_4_delta_return_ttest.tstat decile_2yr_1mth_5_delta_return_ttest.↵
tstat...
2580     decile_2yr_1mth_6_delta_return_ttest.tstat↵
decile_2yr_1mth_7_delta_return_ttest.tstat decile_2yr_1mth_8_delta_return_ttest.tstat↵
decile_2yr_1mth_9_delta_return_ttest.tstat decile_2yr_1mth_10_delta_return_ttest.tstat↵
decile101_2yr_1mth_delta_return_ttest.tstat;...
2581     decile_2yr_1mth_1_delta_std decile_2yr_1mth_2_delta_std↵
decile_2yr_1mth_3_delta_std decile_2yr_1mth_4_delta_std decile_2yr_1mth_5_delta_std...
2582     decile_2yr_1mth_6_delta_std decile_2yr_1mth_7_delta_std↵
decile_2yr_1mth_8_delta_std decile_2yr_1mth_9_delta_std decile_2yr_1mth_10_delta_std↵
decile101_2yr_1mth_delta_std;...
2583     decile_2yr_1mth_1_delta_min decile_2yr_1mth_2_delta_min↵
decile_2yr_1mth_3_delta_min decile_2yr_1mth_4_delta_min decile_2yr_1mth_5_delta_min...
2584     decile_2yr_1mth_6_delta_min decile_2yr_1mth_7_delta_min↵
decile_2yr_1mth_8_delta_min decile_2yr_1mth_9_delta_min decile_2yr_1mth_10_delta_min↵
decile101_2yr_1mth_delta_min;...
2585     decile_2yr_1mth_1_delta_max decile_2yr_1mth_2_delta_max↵
decile_2yr_1mth_3_delta_max decile_2yr_1mth_4_delta_max decile_2yr_1mth_5_delta_max...
2586     decile_2yr_1mth_6_delta_max decile_2yr_1mth_7_delta_max↵
decile_2yr_1mth_8_delta_max decile_2yr_1mth_9_delta_max decile_2yr_1mth_10_delta_max↵
decile101_2yr_1mth_delta_max;...
2587     decile_2yr_1mth_1_delta_SR decile_2yr_1mth_2_delta_SR↵
decile_2yr_1mth_3_delta_SR decile_2yr_1mth_4_delta_SR decile_2yr_1mth_5_delta_SR...
2588     decile_2yr_1mth_6_delta_SR decile_2yr_1mth_7_delta_SR↵
decile_2yr_1mth_8_delta_SR decile_2yr_1mth_9_delta_SR decile_2yr_1mth_10_delta_SR↵
decile101_2yr_1mth_delta_SR];
2589
2590
2591 %Table 6: 2mth HPRR of 2mth-to-expiry Portfolios Sorted on the Difference Between↵
1YR HV and IV
2592 %Panel A: Call Returns
2593 table6_1yr_2mth_call_return = [decile_1yr_2mth_1_call_return↵
decile_1yr_2mth_2_call_return decile_1yr_2mth_3_call_return↵
decile_1yr_2mth_4_call_return decile_1yr_2mth_5_call_return...
2594     decile_1yr_2mth_6_call_return decile_1yr_2mth_7_call_return↵
decile_1yr_2mth_8_call_return decile_1yr_2mth_9_call_return↵
decile_1yr_2mth_10_call_return decile101_1yr_2mth_call_return;...
2595     decile_1yr_2mth_1_call_return_ttest.tstat↵
```

```
      decile_1yr_2mth_2_call_return_ttest.tstat decile_1yr_2mth_3_call_return_ttest.tstat↵
      decile_1yr_2mth_4_call_return_ttest.tstat decile_1yr_2mth_5_call_return_ttest.tstat...
2596      decile_1yr_2mth_6_call_return_ttest.tstat↵
      decile_1yr_2mth_7_call_return_ttest.tstat decile_1yr_2mth_8_call_return_ttest.tstat↵
      decile_1yr_2mth_9_call_return_ttest.tstat decile_1yr_2mth_10_call_return_ttest.tstat↵
      decile101_1yr_2mth_call_return_ttest.tstat;...
2597      decile_1yr_2mth_1_call_return_std decile_1yr_2mth_2_call_return_std↵
      decile_1yr_2mth_3_call_return_std decile_1yr_2mth_4_call_return_std↵
      decile_1yr_2mth_5_call_return_std...
2598      decile_1yr_2mth_6_call_return_std decile_1yr_2mth_7_call_return_std↵
      decile_1yr_2mth_8_call_return_std decile_1yr_2mth_9_call_return_std↵
      decile_1yr_2mth_10_call_return_std decile101_1yr_2mth_call_return_std;...
2599      decile_1yr_2mth_1_call_return_min decile_1yr_2mth_2_call_return_min↵
      decile_1yr_2mth_3_call_return_min decile_1yr_2mth_4_call_return_min↵
      decile_1yr_2mth_5_call_return_min...
2600      decile_1yr_2mth_6_call_return_min decile_1yr_2mth_7_call_return_min↵
      decile_1yr_2mth_8_call_return_min decile_1yr_2mth_9_call_return_min↵
      decile_1yr_2mth_10_call_return_min decile101_1yr_2mth_call_return_min;...
2601      decile_1yr_2mth_1_call_return_max decile_1yr_2mth_2_call_return_max↵
      decile_1yr_2mth_3_call_return_max decile_1yr_2mth_4_call_return_max↵
      decile_1yr_2mth_5_call_return_max...
2602      decile_1yr_2mth_6_call_return_max decile_1yr_2mth_7_call_return_max↵
      decile_1yr_2mth_8_call_return_max decile_1yr_2mth_9_call_return_max↵
      decile_1yr_2mth_10_call_return_max decile101_1yr_2mth_call_return_max;...
2603      decile_1yr_2mth_1_call_SR decile_1yr_2mth_2_call_SR decile_1yr_2mth_3_call_SR↵
      decile_1yr_2mth_4_call_SR decile_1yr_2mth_5_call_SR...
2604      decile_1yr_2mth_6_call_SR decile_1yr_2mth_7_call_SR decile_1yr_2mth_8_call_SR↵
      decile_1yr_2mth_9_call_SR decile_1yr_2mth_10_call_SR decile101_1yr_2mth_call_SR];
2605
2606 %Panel B: Stock Returns
2607 table6_1yr_2mth_stock_return = [decile_1yr_2mth_1_stock_return↵
      decile_1yr_2mth_2_stock_return decile_1yr_2mth_3_stock_return↵
      decile_1yr_2mth_4_stock_return decile_1yr_2mth_5_stock_return...
2608      decile_1yr_2mth_6_stock_return decile_1yr_2mth_7_stock_return↵
      decile_1yr_2mth_8_stock_return decile_1yr_2mth_9_stock_return↵
      decile_1yr_2mth_10_stock_return decile101_1yr_2mth_stock_return;...
2609      decile_1yr_2mth_1_stock_return_ttest.tstat↵
      decile_1yr_2mth_2_stock_return_ttest.tstat decile_1yr_2mth_3_stock_return_ttest.tstat↵
      decile_1yr_2mth_4_stock_return_ttest.tstat decile_1yr_2mth_5_stock_return_ttest.↵
      tstat...
2610      decile_1yr_2mth_6_stock_return_ttest.tstat↵
      decile_1yr_2mth_7_stock_return_ttest.tstat decile_1yr_2mth_8_stock_return_ttest.tstat↵
      decile_1yr_2mth_9_stock_return_ttest.tstat decile_1yr_2mth_10_stock_return_ttest.tstat↵
      decile101_1yr_2mth_stock_return_ttest.tstat;...
2611      decile_1yr_2mth_1_stock_return_std decile_1yr_2mth_2_stock_return_std↵
      decile_1yr_2mth_3_stock_return_std decile_1yr_2mth_4_stock_return_std↵
      decile_1yr_2mth_5_stock_return_std...
2612      decile_1yr_2mth_6_stock_return_std decile_1yr_2mth_7_stock_return_std↵
      decile_1yr_2mth_8_stock_return_std decile_1yr_2mth_9_stock_return_std↵
      decile_1yr_2mth_10_stock_return_std decile101_1yr_2mth_stock_return_std;...
2613      decile_1yr_2mth_1_stock_return_min decile_1yr_2mth_2_stock_return_min↵
      decile_1yr_2mth_3_stock_return_min decile_1yr_2mth_4_stock_return_min↵
      decile_1yr_2mth_5_stock_return_min...
2614      decile_1yr_2mth_6_stock_return_min decile_1yr_2mth_7_stock_return_min↵
```

```
       decile_1yr_2mth_8_stock_return_min decile_1yr_2mth_9_stock_return_min↙
decile_1yr_2mth_10_stock_return_min decile101_1yr_2mth_stock_return_min;...
2615     decile_1yr_2mth_1_stock_return_max decile_1yr_2mth_2_stock_return_max↙
decile_1yr_2mth_3_stock_return_max decile_1yr_2mth_4_stock_return_max↙
decile_1yr_2mth_5_stock_return_max...
2616     decile_1yr_2mth_6_stock_return_max decile_1yr_2mth_7_stock_return_max↙
decile_1yr_2mth_8_stock_return_max decile_1yr_2mth_9_stock_return_max↙
decile_1yr_2mth_10_stock_return_max decile101_1yr_2mth_stock_return_max;...
2617     decile_1yr_2mth_1_stock_SR decile_1yr_2mth_2_stock_SR↙
decile_1yr_2mth_3_stock_SR decile_1yr_2mth_4_stock_SR decile_1yr_2mth_5_stock_SR...
2618     decile_1yr_2mth_6_stock_SR decile_1yr_2mth_7_stock_SR↙
decile_1yr_2mth_8_stock_SR decile_1yr_2mth_9_stock_SR decile_1yr_2mth_10_stock_SR↙
decile101_1yr_2mth_stock_SR];
2619
2620 %Panel C: Delta-Hedged Call Returns
2621 table6_1yr_2mth_delta = [decile_1yr_2mth_1_delta_return↙
decile_1yr_2mth_2_delta_return decile_1yr_2mth_3_delta_return↙
decile_1yr_2mth_4_delta_return decile_1yr_2mth_5_delta_return...
2622     decile_1yr_2mth_6_delta_return decile_1yr_2mth_7_delta_return↙
decile_1yr_2mth_8_delta_return decile_1yr_2mth_9_delta_return↙
decile_1yr_2mth_10_delta_return decile101_1yr_2mth_delta_return;...
2623     decile_1yr_2mth_1_delta_return_ttest.tstat↙
decile_1yr_2mth_2_delta_return_ttest.tstat decile_1yr_2mth_3_delta_return_ttest.tstat↙
decile_1yr_2mth_4_delta_return_ttest.tstat decile_1yr_2mth_5_delta_return_ttest.↙
tstat...
2624     decile_1yr_2mth_6_delta_return_ttest.tstat↙
decile_1yr_2mth_7_delta_return_ttest.tstat decile_1yr_2mth_8_delta_return_ttest.tstat↙
decile_1yr_2mth_9_delta_return_ttest.tstat decile_1yr_2mth_10_delta_return_ttest.tstat↙
decile101_1yr_2mth_delta_return_ttest.tstat;...
2625     decile_1yr_2mth_1_delta_std decile_1yr_2mth_2_delta_std↙
decile_1yr_2mth_3_delta_std decile_1yr_2mth_4_delta_std decile_1yr_2mth_5_delta_std...
2626     decile_1yr_2mth_6_delta_std decile_1yr_2mth_7_delta_std↙
decile_1yr_2mth_8_delta_std decile_1yr_2mth_9_delta_std decile_1yr_2mth_10_delta_std↙
decile101_1yr_2mth_delta_std;...
2627     decile_1yr_2mth_1_delta_min decile_1yr_2mth_2_delta_min↙
decile_1yr_2mth_3_delta_min decile_1yr_2mth_4_delta_min decile_1yr_2mth_5_delta_min...
2628     decile_1yr_2mth_6_delta_min decile_1yr_2mth_7_delta_min↙
decile_1yr_2mth_8_delta_min decile_1yr_2mth_9_delta_min decile_1yr_2mth_10_delta_min↙
decile101_1yr_2mth_delta_min;...
2629     decile_1yr_2mth_1_delta_max decile_1yr_2mth_2_delta_max↙
decile_1yr_2mth_3_delta_max decile_1yr_2mth_4_delta_max decile_1yr_2mth_5_delta_max...
2630     decile_1yr_2mth_6_delta_max decile_1yr_2mth_7_delta_max↙
decile_1yr_2mth_8_delta_max decile_1yr_2mth_9_delta_max decile_1yr_2mth_10_delta_max↙
decile101_1yr_2mth_delta_max;...
2631     decile_1yr_2mth_1_delta_SR decile_1yr_2mth_2_delta_SR↙
decile_1yr_2mth_3_delta_SR decile_1yr_2mth_4_delta_SR decile_1yr_2mth_5_delta_SR...
2632     decile_1yr_2mth_6_delta_SR decile_1yr_2mth_7_delta_SR↙
decile_1yr_2mth_8_delta_SR decile_1yr_2mth_9_delta_SR decile_1yr_2mth_10_delta_SR↙
decile101_1yr_2mth_delta_SR];
2633
2634
2635 %Table 7: 2mth HPRR of 2mth-to-expiry Portfolios Sorted on the Difference Between↙
2YR HV and IV
2636 %Panel A: Call Returns
```

```
2637 table7_2yr_2mth_call_return = [decile_2yr_2mth_1_call_return↙
decile_2yr_2mth_2_call_return decile_2yr_2mth_3_call_return↙
decile_2yr_2mth_4_call_return decile_2yr_2mth_5_call_return...
2638     decile_2yr_2mth_6_call_return decile_2yr_2mth_7_call_return↙
decile_2yr_2mth_8_call_return decile_2yr_2mth_9_call_return↙
decile_2yr_2mth_10_call_return decile101_2yr_2mth_call_return;...
2639     decile_2yr_2mth_1_call_return_ttest.tstat↙
decile_2yr_2mth_2_call_return_ttest.tstat decile_2yr_2mth_3_call_return_ttest.tstat↙
decile_2yr_2mth_4_call_return_ttest.tstat decile_2yr_2mth_5_call_return_ttest.tstat...
2640     decile_2yr_2mth_6_call_return_ttest.tstat↙
decile_2yr_2mth_7_call_return_ttest.tstat decile_2yr_2mth_8_call_return_ttest.tstat↙
decile_2yr_2mth_9_call_return_ttest.tstat decile_2yr_2mth_10_call_return_ttest.tstat↙
decile101_2yr_2mth_call_return_ttest.tstat;...
2641     decile_2yr_2mth_1_call_return_std decile_2yr_2mth_2_call_return_std↙
decile_2yr_2mth_3_call_return_std decile_2yr_2mth_4_call_return_std↙
decile_2yr_2mth_5_call_return_std...
2642     decile_2yr_2mth_6_call_return_std decile_2yr_2mth_7_call_return_std↙
decile_2yr_2mth_8_call_return_std decile_2yr_2mth_9_call_return_std↙
decile_2yr_2mth_10_call_return_std decile101_2yr_2mth_call_return_std;...
2643     decile_2yr_2mth_1_call_return_min decile_2yr_2mth_2_call_return_min↙
decile_2yr_2mth_3_call_return_min decile_2yr_2mth_4_call_return_min↙
decile_2yr_2mth_5_call_return_min...
2644     decile_2yr_2mth_6_call_return_min decile_2yr_2mth_7_call_return_min↙
decile_2yr_2mth_8_call_return_min decile_2yr_2mth_9_call_return_min↙
decile_2yr_2mth_10_call_return_min decile101_2yr_2mth_call_return_min;...
2645     decile_2yr_2mth_1_call_return_max decile_2yr_2mth_2_call_return_max↙
decile_2yr_2mth_3_call_return_max decile_2yr_2mth_4_call_return_max↙
decile_2yr_2mth_5_call_return_max...
2646     decile_2yr_2mth_6_call_return_max decile_2yr_2mth_7_call_return_max↙
decile_2yr_2mth_8_call_return_max decile_2yr_2mth_9_call_return_max↙
decile_2yr_2mth_10_call_return_max decile101_2yr_2mth_call_return_max;...
2647     decile_2yr_2mth_1_call_SR decile_2yr_2mth_2_call_SR decile_2yr_2mth_3_call_SR↙
decile_2yr_2mth_4_call_SR decile_2yr_2mth_5_call_SR ...
2648     decile_2yr_2mth_6_call_SR decile_2yr_2mth_7_call_SR decile_2yr_2mth_8_call_SR↙
decile_2yr_2mth_9_call_SR decile_2yr_2mth_10_call_SR decile101_2yr_2mth_call_SR];
2649
2650 %Panel B: Stock Returns
2651 table7_2yr_2mth_stock_return = [decile_2yr_2mth_1_stock_return↙
decile_2yr_2mth_2_stock_return decile_2yr_2mth_3_stock_return↙
decile_2yr_2mth_4_stock_return decile_2yr_2mth_5_stock_return...
2652     decile_2yr_2mth_6_stock_return decile_2yr_2mth_7_stock_return↙
decile_2yr_2mth_8_stock_return decile_2yr_2mth_9_stock_return↙
decile_2yr_2mth_10_stock_return decile101_2yr_2mth_stock_return;...
2653     decile_2yr_2mth_1_stock_return_ttest.tstat↙
decile_2yr_2mth_2_stock_return_ttest.tstat decile_2yr_2mth_3_stock_return_ttest.tstat↙
decile_2yr_2mth_4_stock_return_ttest.tstat decile_2yr_2mth_5_stock_return_ttest.↙
tstat...
2654     decile_2yr_2mth_6_stock_return_ttest.tstat↙
decile_2yr_2mth_7_stock_return_ttest.tstat decile_2yr_2mth_8_stock_return_ttest.tstat↙
decile_2yr_2mth_9_stock_return_ttest.tstat decile_2yr_2mth_10_stock_return_ttest.tstat↙
decile101_2yr_2mth_stock_return_ttest.tstat;...
2655     decile_2yr_2mth_1_stock_return_std decile_2yr_2mth_2_stock_return_std↙
decile_2yr_2mth_3_stock_return_std decile_2yr_2mth_4_stock_return_std↙
decile_2yr_2mth_5_stock_return_std...
```

```
2656     decile_2yr_2mth_6_stock_return_std decile_2yr_2mth_7_stock_return_std↵
decile_2yr_2mth_8_stock_return_std decile_2yr_2mth_9_stock_return_std↵
decile_2yr_2mth_10_stock_return_std decile101_2yr_2mth_stock_return_std;...
2657     decile_2yr_2mth_1_stock_return_min decile_2yr_2mth_2_stock_return_min↵
decile_2yr_2mth_3_stock_return_min decile_2yr_2mth_4_stock_return_min↵
decile_2yr_2mth_5_stock_return_min...
2658     decile_2yr_2mth_6_stock_return_min decile_2yr_2mth_7_stock_return_min↵
decile_2yr_2mth_8_stock_return_min decile_2yr_2mth_9_stock_return_min↵
decile_2yr_2mth_10_stock_return_min decile101_2yr_2mth_stock_return_min;...
2659     decile_2yr_2mth_1_stock_return_max decile_2yr_2mth_2_stock_return_max↵
decile_2yr_2mth_3_stock_return_max decile_2yr_2mth_4_stock_return_max↵
decile_2yr_2mth_5_stock_return_max...
2660     decile_2yr_2mth_6_stock_return_max decile_2yr_2mth_7_stock_return_max↵
decile_2yr_2mth_8_stock_return_max decile_2yr_2mth_9_stock_return_max↵
decile_2yr_2mth_10_stock_return_max decile101_2yr_2mth_stock_return_max;...
2661     decile_2yr_2mth_1_stock_SR decile_2yr_2mth_2_stock_SR↵
decile_2yr_2mth_3_stock_SR decile_2yr_2mth_4_stock_SR decile_2yr_2mth_5_stock_SR...
2662     decile_2yr_2mth_6_stock_SR decile_2yr_2mth_7_stock_SR↵
decile_2yr_2mth_8_stock_SR decile_2yr_2mth_9_stock_SR decile_2yr_2mth_10_stock_SR↵
decile101_2yr_2mth_stock_SR];
2663
2664 %Panel C: Delta-Hedged Call Returns
2665 table7_2yr_2mth_delta = [decile_2yr_2mth_1_delta_return↵
decile_2yr_2mth_2_delta_return decile_2yr_2mth_3_delta_return↵
decile_2yr_2mth_4_delta_return decile_2yr_2mth_5_delta_return...
2666     decile_2yr_2mth_6_delta_return decile_2yr_2mth_7_delta_return↵
decile_2yr_2mth_8_delta_return decile_2yr_2mth_9_delta_return↵
decile_2yr_2mth_10_delta_return decile101_2yr_2mth_delta_return;...
2667     decile_2yr_2mth_1_delta_return_ttest.tstat↵
decile_2yr_2mth_2_delta_return_ttest.tstat decile_2yr_2mth_3_delta_return_ttest.tstat↵
decile_2yr_2mth_4_delta_return_ttest.tstat decile_2yr_2mth_5_delta_return_ttest.↵
tstat...
2668     decile_2yr_2mth_6_delta_return_ttest.tstat↵
decile_2yr_2mth_7_delta_return_ttest.tstat decile_2yr_2mth_8_delta_return_ttest.tstat↵
decile_2yr_2mth_9_delta_return_ttest.tstat decile_2yr_2mth_10_delta_return_ttest.tstat↵
decile101_2yr_2mth_delta_return_ttest.tstat;...
2669     decile_2yr_2mth_1_delta_std decile_2yr_2mth_2_delta_std↵
decile_2yr_2mth_3_delta_std decile_2yr_2mth_4_delta_std decile_2yr_2mth_5_delta_std...
2670     decile_2yr_2mth_6_delta_std decile_2yr_2mth_7_delta_std↵
decile_2yr_2mth_8_delta_std decile_2yr_2mth_9_delta_std decile_2yr_2mth_10_delta_std↵
decile101_2yr_2mth_delta_std;...
2671     decile_2yr_2mth_1_delta_min decile_2yr_2mth_2_delta_min↵
decile_2yr_2mth_3_delta_min decile_2yr_2mth_4_delta_min decile_2yr_2mth_5_delta_min...
2672     decile_2yr_2mth_6_delta_min decile_2yr_2mth_7_delta_min↵
decile_2yr_2mth_8_delta_min decile_2yr_2mth_9_delta_min decile_2yr_2mth_10_delta_min↵
decile101_2yr_2mth_delta_min;...
2673     decile_2yr_2mth_1_delta_max decile_2yr_2mth_2_delta_max↵
decile_2yr_2mth_3_delta_max decile_2yr_2mth_4_delta_max decile_2yr_2mth_5_delta_max...
2674     decile_2yr_2mth_6_delta_max decile_2yr_2mth_7_delta_max↵
decile_2yr_2mth_8_delta_max decile_2yr_2mth_9_delta_max decile_2yr_2mth_10_delta_max↵
decile101_2yr_2mth_delta_max;...
2675     decile_2yr_2mth_1_delta_SR decile_2yr_2mth_2_delta_SR↵
decile_2yr_2mth_3_delta_SR decile_2yr_2mth_4_delta_SR decile_2yr_2mth_5_delta_SR...
2676     decile_2yr_2mth_6_delta_SR decile_2yr_2mth_7_delta_SR↵
```

```
decile_2yr_2mth_8_delta_SR decile_2yr_2mth_9_delta_SR decile_2yr_2mth_10_delta_SR↵
decile101_2yr_2mth_delta_SR];
2677
2678 %Conducting ANOVA for all returns
2679 callreturn_1yr_1mth = [opt_percentage_return_1mth_1(decile_1yr_1mth_1)↵
opt_percentage_return_1mth_1(decile_1yr_1mth_2) opt_percentage_return_1mth_1↵
(decile_1yr_1mth_3) opt_percentage_return_1mth_1(decile_1yr_1mth_4)↵
opt_percentage_return_1mth_1(decile_1yr_1mth_5) opt_percentage_return_1mth_1↵
(decile_1yr_1mth_6) opt_percentage_return_1mth_1(decile_1yr_1mth_7)↵
opt_percentage_return_1mth_1(decile_1yr_1mth_8) opt_percentage_return_1mth_1↵
(decile_1yr_1mth_9) opt_percentage_return_1mth_1(decile_1yr_1mth_10)];
2680
2681 call_anova_1yr_1mth = anova1(callreturn_1yr_1mth);
2682
2683 stockreturn_1yr_1mth = [stock_percentage_return_1mth_1(decile_1yr_1mth_1)↵
stock_percentage_return_1mth_1(decile_1yr_1mth_2) stock_percentage_return_1mth_1↵
(decile_1yr_1mth_3) stock_percentage_return_1mth_1(decile_1yr_1mth_4)↵
stock_percentage_return_1mth_1(decile_1yr_1mth_5) stock_percentage_return_1mth_1↵
(decile_1yr_1mth_6) stock_percentage_return_1mth_1(decile_1yr_1mth_7)↵
stock_percentage_return_1mth_1(decile_1yr_1mth_8) stock_percentage_return_1mth_1↵
(decile_1yr_1mth_9) stock_percentage_return_1mth_1(decile_1yr_1mth_10)];
2684
2685 stockreturn_anova_1yr_1mth = anova1(stockreturn_1yr_1mth);
2686
2687 deltareturn_1yr_1mth = [(decile_1yr_1mth_1_opt_ex_price-↵
decile_1yr_1mth_1_call_price+(decile_1yr_1mth_1_stock_price.↵
*decile_1yr_1mth_1_calldelta)-(decile_1yr_1mth_1_stock_close.↵
*decile_1yr_1mth_1_calldelta))./((-decile_1yr_1mth_1_stock_price.↵
*decile_1yr_1mth_1_calldelta)+decile_1yr_1mth_1_call_price)...
2688     (decile_1yr_1mth_2_opt_ex_price-decile_1yr_1mth_2_call_price+↵
(decile_1yr_1mth_2_stock_price.*decile_1yr_1mth_2_calldelta)-↵
(decile_1yr_1mth_2_stock_close.*decile_1yr_1mth_2_calldelta))./((-↵
decile_1yr_1mth_2_stock_price.*decile_1yr_1mth_2_calldelta)↵
+decile_1yr_1mth_2_call_price)...
2689     (decile_1yr_1mth_3_opt_ex_price-decile_1yr_1mth_3_call_price+↵
(decile_1yr_1mth_3_stock_price.*decile_1yr_1mth_3_calldelta)-↵
(decile_1yr_1mth_3_stock_close.*decile_1yr_1mth_3_calldelta))./((-↵
decile_1yr_1mth_3_stock_price.*decile_1yr_1mth_3_calldelta)↵
+decile_1yr_1mth_3_call_price)...
2690     (decile_1yr_1mth_4_opt_ex_price-decile_1yr_1mth_4_call_price+↵
(decile_1yr_1mth_4_stock_price.*decile_1yr_1mth_4_calldelta)-↵
(decile_1yr_1mth_4_stock_close.*decile_1yr_1mth_4_calldelta))./((-↵
decile_1yr_1mth_4_stock_price.*decile_1yr_1mth_4_calldelta)↵
+decile_1yr_1mth_4_call_price)...
2691     (decile_1yr_1mth_5_opt_ex_price-decile_1yr_1mth_5_call_price+↵
(decile_1yr_1mth_5_stock_price.*decile_1yr_1mth_5_calldelta)-↵
(decile_1yr_1mth_5_stock_close.*decile_1yr_1mth_5_calldelta))./((-↵
decile_1yr_1mth_5_stock_price.*decile_1yr_1mth_5_calldelta)↵
+decile_1yr_1mth_5_call_price)...
2692     (decile_1yr_1mth_6_opt_ex_price-decile_1yr_1mth_6_call_price+↵
(decile_1yr_1mth_6_stock_price.*decile_1yr_1mth_6_calldelta)-↵
(decile_1yr_1mth_6_stock_close.*decile_1yr_1mth_6_calldelta))./((-↵
decile_1yr_1mth_6_stock_price.*decile_1yr_1mth_6_calldelta)↵
+decile_1yr_1mth_6_call_price)...
```

```
2693       (decile_1yr_1mth_7_opt_ex_price-decile_1yr_1mth_7_call_price+↵
(decile_1yr_1mth_7_stock_price.*decile_1yr_1mth_7_calldelta)-↵
(decile_1yr_1mth_7_stock_close.*decile_1yr_1mth_7_calldelta))./((-↵
decile_1yr_1mth_7_stock_price.*decile_1yr_1mth_7_calldelta)↵
+decile_1yr_1mth_7_call_price)...
2694       (decile_1yr_1mth_8_opt_ex_price-decile_1yr_1mth_8_call_price+↵
(decile_1yr_1mth_8_stock_price.*decile_1yr_1mth_8_calldelta)-↵
(decile_1yr_1mth_8_stock_close.*decile_1yr_1mth_8_calldelta))./((-↵
decile_1yr_1mth_8_stock_price.*decile_1yr_1mth_8_calldelta)↵
+decile_1yr_1mth_8_call_price)...
2695       (decile_1yr_1mth_9_opt_ex_price-decile_1yr_1mth_9_call_price+↵
(decile_1yr_1mth_9_stock_price.*decile_1yr_1mth_9_calldelta)-↵
(decile_1yr_1mth_9_stock_close.*decile_1yr_1mth_9_calldelta))./((-↵
decile_1yr_1mth_9_stock_price.*decile_1yr_1mth_9_calldelta)↵
+decile_1yr_1mth_9_call_price)...
2696       (decile_1yr_1mth_10_opt_ex_price-decile_1yr_1mth_10_call_price+↵
(decile_1yr_1mth_10_stock_price.*decile_1yr_1mth_10_calldelta)-↵
(decile_1yr_1mth_10_stock_close.*decile_1yr_1mth_10_calldelta))./((-↵
decile_1yr_1mth_10_stock_price.*decile_1yr_1mth_10_calldelta)↵
+decile_1yr_1mth_10_call_price)];
2697
2698 deltareturn_anova_1yr_1mth = anova1(deltareturn_1yr_1mth);
2699
2700
2701 callreturn_2yr_1mth = [opt_percentage_return_1mth_1(decile_2yr_1mth_1)↵
opt_percentage_return_1mth_1(decile_2yr_1mth_2) opt_percentage_return_1mth_1↵
(decile_2yr_1mth_3) opt_percentage_return_1mth_1(decile_2yr_1mth_4)↵
opt_percentage_return_1mth_1(decile_2yr_1mth_5) opt_percentage_return_1mth_1↵
(decile_2yr_1mth_6) opt_percentage_return_1mth_1(decile_2yr_1mth_7)↵
opt_percentage_return_1mth_1(decile_2yr_1mth_8) opt_percentage_return_1mth_1↵
(decile_2yr_1mth_9) opt_percentage_return_1mth_1(decile_2yr_1mth_10)];
2702
2703 call_anova_2yr_1mth = anova1(callreturn_2yr_1mth);
2704
2705 stockreturn_2yr_1mth = [stock_percentage_return_1mth_1(decile_2yr_1mth_1)↵
stock_percentage_return_1mth_1(decile_2yr_1mth_2) stock_percentage_return_1mth_1↵
(decile_2yr_1mth_3) stock_percentage_return_1mth_1(decile_2yr_1mth_4)↵
stock_percentage_return_1mth_1(decile_2yr_1mth_5) stock_percentage_return_1mth_1↵
(decile_2yr_1mth_6) stock_percentage_return_1mth_1(decile_2yr_1mth_7)↵
stock_percentage_return_1mth_1(decile_2yr_1mth_8) stock_percentage_return_1mth_1↵
(decile_2yr_1mth_9) stock_percentage_return_1mth_1(decile_2yr_1mth_10)];
2706
2707 stockreturn_anova_2yr_1mth = anova1(stockreturn_2yr_1mth);
2708
2709 deltareturn_2yr_1mth = [(decile_2yr_1mth_1_opt_ex_price-↵
decile_2yr_1mth_1_call_price+(decile_2yr_1mth_1_stock_price.↵
*decile_2yr_1mth_1_calldelta)-(decile_2yr_1mth_1_stock_close.↵
*decile_2yr_1mth_1_calldelta))./((-decile_2yr_1mth_1_stock_price.↵
*decile_2yr_1mth_1_calldelta)+decile_2yr_1mth_1_call_price)...
2710       (decile_2yr_1mth_2_opt_ex_price-decile_2yr_1mth_2_call_price+↵
(decile_2yr_1mth_2_stock_price.*decile_2yr_1mth_2_calldelta)-↵
(decile_2yr_1mth_2_stock_close.*decile_2yr_1mth_2_calldelta))./((-↵
decile_2yr_1mth_2_stock_price.*decile_2yr_1mth_2_calldelta)↵
+decile_2yr_1mth_2_call_price)...
```

```
2711      (decile_2yr_1mth_3_opt_ex_price-decile_2yr_1mth_3_call_price+↵
(decile_2yr_1mth_3_stock_price.*decile_2yr_1mth_3_calldelta)-↵
(decile_2yr_1mth_3_stock_close.*decile_2yr_1mth_3_calldelta))./((-↵
decile_2yr_1mth_3_stock_price.*decile_2yr_1mth_3_calldelta)↵
+decile_2yr_1mth_3_call_price)...
2712      (decile_2yr_1mth_4_opt_ex_price-decile_2yr_1mth_4_call_price+↵
(decile_2yr_1mth_4_stock_price.*decile_2yr_1mth_4_calldelta)-↵
(decile_2yr_1mth_4_stock_close.*decile_2yr_1mth_4_calldelta))./((-↵
decile_2yr_1mth_4_stock_price.*decile_2yr_1mth_4_calldelta)↵
+decile_2yr_1mth_4_call_price)...
2713      (decile_2yr_1mth_5_opt_ex_price-decile_2yr_1mth_5_call_price+↵
(decile_2yr_1mth_5_stock_price.*decile_2yr_1mth_5_calldelta)-↵
(decile_2yr_1mth_5_stock_close.*decile_2yr_1mth_5_calldelta))./((-↵
decile_2yr_1mth_5_stock_price.*decile_2yr_1mth_5_calldelta)↵
+decile_2yr_1mth_5_call_price)...
2714      (decile_2yr_1mth_6_opt_ex_price-decile_2yr_1mth_6_call_price+↵
(decile_2yr_1mth_6_stock_price.*decile_2yr_1mth_6_calldelta)-↵
(decile_2yr_1mth_6_stock_close.*decile_2yr_1mth_6_calldelta))./((-↵
decile_2yr_1mth_6_stock_price.*decile_2yr_1mth_6_calldelta)↵
+decile_2yr_1mth_6_call_price)...
2715      (decile_2yr_1mth_7_opt_ex_price-decile_2yr_1mth_7_call_price+↵
(decile_2yr_1mth_7_stock_price.*decile_2yr_1mth_7_calldelta)-↵
(decile_2yr_1mth_7_stock_close.*decile_2yr_1mth_7_calldelta))./((-↵
decile_2yr_1mth_7_stock_price.*decile_2yr_1mth_7_calldelta)↵
+decile_2yr_1mth_7_call_price)...
2716      (decile_2yr_1mth_8_opt_ex_price-decile_2yr_1mth_8_call_price+↵
(decile_2yr_1mth_8_stock_price.*decile_2yr_1mth_8_calldelta)-↵
(decile_2yr_1mth_8_stock_close.*decile_2yr_1mth_8_calldelta))./((-↵
decile_2yr_1mth_8_stock_price.*decile_2yr_1mth_8_calldelta)↵
+decile_2yr_1mth_8_call_price)...
2717      (decile_2yr_1mth_9_opt_ex_price-decile_2yr_1mth_9_call_price+↵
(decile_2yr_1mth_9_stock_price.*decile_2yr_1mth_9_calldelta)-↵
(decile_2yr_1mth_9_stock_close.*decile_2yr_1mth_9_calldelta))./((-↵
decile_2yr_1mth_9_stock_price.*decile_2yr_1mth_9_calldelta)↵
+decile_2yr_1mth_9_call_price)...
2718      (decile_2yr_1mth_10_opt_ex_price-decile_2yr_1mth_10_call_price+↵
(decile_2yr_1mth_10_stock_price.*decile_2yr_1mth_10_calldelta)-↵
(decile_2yr_1mth_10_stock_close.*decile_2yr_1mth_10_calldelta))./((-↵
decile_2yr_1mth_10_stock_price.*decile_2yr_1mth_10_calldelta)↵
+decile_2yr_1mth_10_call_price)];
2719
2720 deltareturn_anova_2yr_1mth = anova1(deltareturn_2yr_1mth);
2721
2722
2723 callreturn_1yr_2mth = [opt_percentage_return_2mth_1(decile_1yr_2mth_1(1:(end-4)))↵
opt_percentage_return_2mth_1(decile_1yr_2mth_2(1:(end-4)))↵
opt_percentage_return_2mth_1(decile_1yr_2mth_3(1:(end-4)))↵
opt_percentage_return_2mth_1(decile_1yr_2mth_4(1:(end-4)))↵
opt_percentage_return_2mth_1(decile_1yr_2mth_5(1:(end-4)))↵
opt_percentage_return_2mth_1(decile_1yr_2mth_6(1:(end-4)))↵
opt_percentage_return_2mth_1(decile_1yr_2mth_7(1:(end-4)))↵
opt_percentage_return_2mth_1(decile_1yr_2mth_8(1:(end-4)))↵
opt_percentage_return_2mth_1(decile_1yr_2mth_9(1:(end-4)))↵
opt_percentage_return_2mth_1(decile_1yr_2mth_10)];
```

```matlab
2724
2725 call_anova_1yr_2mth = anova1(callreturn_1yr_2mth);
2726
2727 stockreturn_1yr_2mth = [stock_percentage_return_2mth_1(decile_1yr_2mth_1(1:(end-
4))) stock_percentage_return_2mth_1(decile_1yr_2mth_2(1:(end-4)))
stock_percentage_return_2mth_1(decile_1yr_2mth_3(1:(end-4)))
stock_percentage_return_2mth_1(decile_1yr_2mth_4(1:(end-4)))
stock_percentage_return_2mth_1(decile_1yr_2mth_5(1:(end-4)))
stock_percentage_return_2mth_1(decile_1yr_2mth_6(1:(end-4)))
stock_percentage_return_2mth_1(decile_1yr_2mth_7(1:(end-4)))
stock_percentage_return_2mth_1(decile_1yr_2mth_8(1:(end-4)))
stock_percentage_return_2mth_1(decile_1yr_2mth_9(1:(end-4)))
stock_percentage_return_2mth_1(decile_1yr_2mth_10)];
2728
2729 stockreturn_anova_1yr_2mth = anova1(stockreturn_1yr_2mth);
2730
2731 deltareturn_1yr_2mth = [(decile_1yr_2mth_1_opt_ex_price(1:(end-4))-
decile_1yr_2mth_1_call_price(1:(end-4))+(decile_1yr_2mth_1_stock_price(1:(end-4)).
*decile_1yr_2mth_1_calldelta(1:(end-4)))-(decile_1yr_2mth_1_stock_close(1:(end-4)).
*decile_1yr_2mth_1_calldelta(1:(end-4))))./((-decile_1yr_2mth_1_stock_price(1:(end-
4)).*decile_1yr_2mth_1_calldelta(1:(end-4)))+decile_1yr_2mth_1_call_price(1:(end-
4)))...
2732     (decile_1yr_2mth_2_opt_ex_price(1:(end-4))-decile_1yr_2mth_2_call_price(1:
(end-4))+(decile_1yr_2mth_2_stock_price(1:(end-4)).*decile_1yr_2mth_2_calldelta(1:
(end-4)))-(decile_1yr_2mth_2_stock_close(1:(end-4)).*decile_1yr_2mth_2_calldelta(1:
(end-4))))./((-decile_1yr_2mth_2_stock_price(1:(end-4)).*decile_1yr_2mth_2_calldelta
(1:(end-4)))+decile_1yr_2mth_2_call_price(1:(end-4)))...
2733     (decile_1yr_2mth_3_opt_ex_price(1:(end-4))-decile_1yr_2mth_3_call_price(1:
(end-4))+(decile_1yr_2mth_3_stock_price(1:(end-4)).*decile_1yr_2mth_3_calldelta(1:
(end-4)))-(decile_1yr_2mth_3_stock_close(1:(end-4)).*decile_1yr_2mth_3_calldelta(1:
(end-4))))./((-decile_1yr_2mth_3_stock_price(1:(end-4)).*decile_1yr_2mth_3_calldelta
(1:(end-4)))+decile_1yr_2mth_3_call_price(1:(end-4)))...
2734     (decile_1yr_2mth_4_opt_ex_price(1:(end-4))-decile_1yr_2mth_4_call_price(1:
(end-4))+(decile_1yr_2mth_4_stock_price(1:(end-4)).*decile_1yr_2mth_4_calldelta(1:
(end-4)))-(decile_1yr_2mth_4_stock_close(1:(end-4)).*decile_1yr_2mth_4_calldelta(1:
(end-4))))./((-decile_1yr_2mth_4_stock_price(1:(end-4)).*decile_1yr_2mth_4_calldelta
(1:(end-4)))+decile_1yr_2mth_4_call_price(1:(end-4)))...
2735     (decile_1yr_2mth_5_opt_ex_price(1:(end-4))-decile_1yr_2mth_5_call_price(1:
(end-4))+(decile_1yr_2mth_5_stock_price(1:(end-4)).*decile_1yr_2mth_5_calldelta(1:
(end-4)))-(decile_1yr_2mth_5_stock_close(1:(end-4)).*decile_1yr_2mth_5_calldelta(1:
(end-4))))./((-decile_1yr_2mth_5_stock_price(1:(end-4)).*decile_1yr_2mth_5_calldelta
(1:(end-4)))+decile_1yr_2mth_5_call_price(1:(end-4)))...
2736     (decile_1yr_2mth_6_opt_ex_price(1:(end-4))-decile_1yr_2mth_6_call_price(1:
(end-4))+(decile_1yr_2mth_6_stock_price(1:(end-4)).*decile_1yr_2mth_6_calldelta(1:
(end-4)))-(decile_1yr_2mth_6_stock_close(1:(end-4)).*decile_1yr_2mth_6_calldelta(1:
(end-4))))./((-decile_1yr_2mth_6_stock_price(1:(end-4)).*decile_1yr_2mth_6_calldelta
(1:(end-4)))+decile_1yr_2mth_6_call_price(1:(end-4)))...
2737     (decile_1yr_2mth_7_opt_ex_price(1:(end-4))-decile_1yr_2mth_7_call_price(1:
(end-4))+(decile_1yr_2mth_7_stock_price(1:(end-4)).*decile_1yr_2mth_7_calldelta(1:
(end-4)))-(decile_1yr_2mth_7_stock_close(1:(end-4)).*decile_1yr_2mth_7_calldelta(1:
(end-4))))./((-decile_1yr_2mth_7_stock_price(1:(end-4)).*decile_1yr_2mth_7_calldelta
(1:(end-4)))+decile_1yr_2mth_7_call_price(1:(end-4)))...
2738     (decile_1yr_2mth_8_opt_ex_price(1:(end-4))-decile_1yr_2mth_8_call_price(1:
(end-4))+(decile_1yr_2mth_8_stock_price(1:(end-4)).*decile_1yr_2mth_8_calldelta(1:
```

```
       (end-4)))-(decile_1yr_2mth_8_stock_close(1:(end-4)).*decile_1yr_2mth_8_calldelta(1:↵
       (end-4)))))./((-decile_1yr_2mth_8_stock_price(1:(end-4)).*decile_1yr_2mth_8_calldelta↵
       (1:(end-4)))+decile_1yr_2mth_8_call_price(1:(end-4)))...
2739       (decile_1yr_2mth_9_opt_ex_price(1:(end-4))-decile_1yr_2mth_9_call_price(1:↵
       (end-4))+(decile_1yr_2mth_9_stock_price(1:(end-4)).*decile_1yr_2mth_9_calldelta(1:↵
       (end-4)))-(decile_1yr_2mth_9_stock_close(1:(end-4)).*decile_1yr_2mth_9_calldelta(1:↵
       (end-4))))./((-decile_1yr_2mth_9_stock_price(1:(end-4)).*decile_1yr_2mth_9_calldelta↵
       (1:(end-4)))+decile_1yr_2mth_9_call_price(1:(end-4)))...
2740       (decile_1yr_2mth_10_opt_ex_price-decile_1yr_2mth_10_call_price+↵
       (decile_1yr_2mth_10_stock_price.*decile_1yr_2mth_10_calldelta)-↵
       (decile_1yr_2mth_10_stock_close.*decile_1yr_2mth_10_calldelta))./((-↵
       decile_1yr_2mth_10_stock_price.*decile_1yr_2mth_10_calldelta)↵
       +decile_1yr_2mth_10_call_price)];
2741
2742 deltareturn_anova_1yr_2mth = anova1(deltareturn_1yr_2mth);
2743
2744 callreturn_2yr_2mth = [opt_percentage_return_2mth_1(decile_2yr_2mth_1(1:(end-4)))↵
       opt_percentage_return_2mth_1(decile_2yr_2mth_2(1:(end-4)))↵
       opt_percentage_return_2mth_1(decile_2yr_2mth_3(1:(end-4)))↵
       opt_percentage_return_2mth_1(decile_2yr_2mth_4(1:(end-4)))↵
       opt_percentage_return_2mth_1(decile_2yr_2mth_5(1:(end-4)))↵
       opt_percentage_return_2mth_1(decile_2yr_2mth_6(1:(end-4)))↵
       opt_percentage_return_2mth_1(decile_2yr_2mth_7(1:(end-4)))↵
       opt_percentage_return_2mth_1(decile_2yr_2mth_8(1:(end-4)))↵
       opt_percentage_return_2mth_1(decile_2yr_2mth_9(1:(end-4)))↵
       opt_percentage_return_2mth_1(decile_2yr_2mth_10)];
2745
2746 call_anova_2yr_2mth = anova1(callreturn_2yr_2mth);
2747
2748 stockreturn_2yr_2mth = [stock_percentage_return_2mth_1(decile_2yr_2mth_1(1:(end-↵
       4))) stock_percentage_return_2mth_1(decile_2yr_2mth_2(1:(end-4)))↵
       stock_percentage_return_2mth_1(decile_2yr_2mth_3(1:(end-4)))↵
       stock_percentage_return_2mth_1(decile_2yr_2mth_4(1:(end-4)))↵
       stock_percentage_return_2mth_1(decile_2yr_2mth_5(1:(end-4)))↵
       stock_percentage_return_2mth_1(decile_2yr_2mth_6(1:(end-4)))↵
       stock_percentage_return_2mth_1(decile_2yr_2mth_7(1:(end-4)))↵
       stock_percentage_return_2mth_1(decile_2yr_2mth_8(1:(end-4)))↵
       stock_percentage_return_2mth_1(decile_2yr_2mth_9(1:(end-4)))↵
       stock_percentage_return_2mth_1(decile_2yr_2mth_10)];
2749
2750 stockreturn_anova_2yr_2mth = anova1(stockreturn_2yr_2mth);
2751
2752 deltareturn_2yr_2mth = [(decile_2yr_2mth_1_opt_ex_price(1:(end-4))-↵
       decile_2yr_2mth_1_call_price(1:(end-4))+(decile_2yr_2mth_1_stock_price(1:(end-4)).↵
       *decile_2yr_2mth_1_calldelta(1:(end-4)))-(decile_2yr_2mth_1_stock_close(1:(end-4)).↵
       *decile_2yr_2mth_1_calldelta(1:(end-4))))./((-decile_2yr_2mth_1_stock_price(1:(end-↵
       4)).*decile_2yr_2mth_1_calldelta(1:(end-4)))+decile_2yr_2mth_1_call_price(1:(end-↵
       4)))...
2753       (decile_2yr_2mth_2_opt_ex_price(1:(end-4))-decile_2yr_2mth_2_call_price(1:↵
       (end-4))+(decile_2yr_2mth_2_stock_price(1:(end-4)).*decile_2yr_2mth_2_calldelta(1:↵
       (end-4)))-(decile_2yr_2mth_2_stock_close(1:(end-4)).*decile_2yr_2mth_2_calldelta(1:↵
       (end-4))))./((-decile_2yr_2mth_2_stock_price(1:(end-4)).*decile_2yr_2mth_2_calldelta↵
       (1:(end-4)))+decile_2yr_2mth_2_call_price(1:(end-4)))...
2754       (decile_2yr_2mth_3_opt_ex_price(1:(end-4))-decile_2yr_2mth_3_call_price(1:↵
```

```
     (end-4))+(decile_2yr_2mth_3_stock_price(1:(end-4)).*decile_2yr_2mth_3_calldelta(1:↵
     (end-4)))-(decile_2yr_2mth_3_stock_close(1:(end-4)).*decile_2yr_2mth_3_calldelta(1:↵
     (end-4))))./((-decile_2yr_2mth_3_stock_price(1:(end-4)).*decile_2yr_2mth_3_calldelta↵
     (1:(end-4)))+decile_2yr_2mth_3_call_price(1:(end-4)))...
2755     (decile_2yr_2mth_4_opt_ex_price(1:(end-4))-decile_2yr_2mth_4_call_price(1:↵
     (end-4))+(decile_2yr_2mth_4_stock_price(1:(end-4)).*decile_2yr_2mth_4_calldelta(1:↵
     (end-4)))-(decile_2yr_2mth_4_stock_close(1:(end-4)).*decile_2yr_2mth_4_calldelta(1:↵
     (end-4))))./((-decile_2yr_2mth_4_stock_price(1:(end-4)).*decile_2yr_2mth_4_calldelta↵
     (1:(end-4)))+decile_2yr_2mth_4_call_price(1:(end-4)))...
2756     (decile_2yr_2mth_5_opt_ex_price(1:(end-4))-decile_2yr_2mth_5_call_price(1:↵
     (end-4))+(decile_2yr_2mth_5_stock_price(1:(end-4)).*decile_2yr_2mth_5_calldelta(1:↵
     (end-4)))-(decile_2yr_2mth_5_stock_close(1:(end-4)).*decile_2yr_2mth_5_calldelta(1:↵
     (end-4))))./((-decile_2yr_2mth_5_stock_price(1:(end-4)).*decile_2yr_2mth_5_calldelta↵
     (1:(end-4)))+decile_2yr_2mth_5_call_price(1:(end-4)))...
2757     (decile_2yr_2mth_6_opt_ex_price(1:(end-4))-decile_2yr_2mth_6_call_price(1:↵
     (end-4))+(decile_2yr_2mth_6_stock_price(1:(end-4)).*decile_2yr_2mth_6_calldelta(1:↵
     (end-4)))-(decile_2yr_2mth_6_stock_close(1:(end-4)).*decile_2yr_2mth_6_calldelta(1:↵
     (end-4))))./((-decile_2yr_2mth_6_stock_price(1:(end-4)).*decile_2yr_2mth_6_calldelta↵
     (1:(end-4)))+decile_2yr_2mth_6_call_price(1:(end-4)))...
2758     (decile_2yr_2mth_7_opt_ex_price(1:(end-4))-decile_2yr_2mth_7_call_price(1:↵
     (end-4))+(decile_2yr_2mth_7_stock_price(1:(end-4)).*decile_2yr_2mth_7_calldelta(1:↵
     (end-4)))-(decile_2yr_2mth_7_stock_close(1:(end-4)).*decile_2yr_2mth_7_calldelta(1:↵
     (end-4))))./((-decile_2yr_2mth_7_stock_price(1:(end-4)).*decile_2yr_2mth_7_calldelta↵
     (1:(end-4)))+decile_2yr_2mth_7_call_price(1:(end-4)))...
2759     (decile_2yr_2mth_8_opt_ex_price(1:(end-4))-decile_2yr_2mth_8_call_price(1:↵
     (end-4))+(decile_2yr_2mth_8_stock_price(1:(end-4)).*decile_2yr_2mth_8_calldelta(1:↵
     (end-4)))-(decile_2yr_2mth_8_stock_close(1:(end-4)).*decile_2yr_2mth_8_calldelta(1:↵
     (end-4))))./((-decile_2yr_2mth_8_stock_price(1:(end-4)).*decile_2yr_2mth_8_calldelta↵
     (1:(end-4)))+decile_2yr_2mth_8_call_price(1:(end-4)))...
2760     (decile_2yr_2mth_9_opt_ex_price(1:(end-4))-decile_2yr_2mth_9_call_price(1:↵
     (end-4))+(decile_2yr_2mth_9_stock_price(1:(end-4)).*decile_2yr_2mth_9_calldelta(1:↵
     (end-4)))-(decile_2yr_2mth_9_stock_close(1:(end-4)).*decile_2yr_2mth_9_calldelta(1:↵
     (end-4))))./((-decile_2yr_2mth_9_stock_price(1:(end-4)).*decile_2yr_2mth_9_calldelta↵
     (1:(end-4)))+decile_2yr_2mth_9_call_price(1:(end-4)))...
2761     (decile_2yr_2mth_10_opt_ex_price-decile_2yr_2mth_10_call_price+↵
     (decile_2yr_2mth_10_stock_price.*decile_2yr_2mth_10_calldelta)-↵
     (decile_2yr_2mth_10_stock_close.*decile_2yr_2mth_10_calldelta))./((-↵
     decile_2yr_2mth_10_stock_price.*decile_2yr_2mth_10_calldelta)↵
     +decile_2yr_2mth_10_call_price)];
2762
2763 deltareturn_anova_2yr_2mth = anova1(deltareturn_2yr_2mth);
2764
2765 save 7_results_deciles
2766 doc
2767
2768 disp('Stage 11 - Status: Calculating 2mth-to-expiry Statistics at Interim...')
2769
2770 %------Calculating Interim Period of 2mth-to-expiry Statistics------
2771
2772 %Matching underlying stock prices at Interim Period of 2mth-to-expiry by
2773 %SECID and date of interim which is option expiry date minus 26 days
2774 underlying_1mth2mth = nan(length(secid_op_2mth_4),1);
2775 D_op_1mth2mth = nan(length(secid_op_2mth_4),1);
2776 for ii = 1:length(secid_op_2mth_4);
```

```matlab
2777        for jj = 1:length(secid_stock);
2778            if (secid_stock(jj) == secid_op_2mth_4(ii)) && ...
2779                    (D_stock(jj) == (D_op_ex_2mth_4(ii)-26));
2780                underlying_1mth2mth(ii) = close_stock1(jj);
2781            end
2782        end
2783 end
2784
2785 %Obtaining Interim otpion prices of 2mth-to-expiry by
2786 %matching SECID, date of interim and strike price of 2mth-to-expiry
2787 %to original 1mth-to-expiry database
2788 call_price_1mth2mth = nan(length(secid_op_2mth_4),1);
2789
2790 for g = 1:length(secid_op_2mth_4);
2791     for h = 1:length(secid_op_1mth);
2792         if (secid_op_2mth_4(g) == secid_op_1mth(h)) && (D_op_ex_2mth_4(g) ==↵
D_op_ex_1mth(h)) && (strike_price_2mth_4(g) == (strike_price_1mth(h)/1000));
2793             call_price_1mth2mth(g) = 0.5*(best_bid_1mth(h)+best_offer_1mth(h));
2794         end
2795     end
2796 end
2797
2798 %Calculating interim rates of return on options
2799 call_return_percentage_1mth2mth = (call_price_1mth2mth-call_price_2mth_2).↵
/call_price_2mth_2;
2800
2801 call_return_percentage_1mth2mth_2nd = (opt_ex_payoff_2mth_1-call_price_1mth2mth).↵
/call_price_1mth2mth;
2802
2803
2804 %Matching interim risk-free rates to options
2805 rates_1mth2mth = nan(length(secid_op_2mth_4),1);
2806 for k = 1:length(secid_op_2mth_4);
2807     for l = 1:length(D_qdate27);
2808         %the risk-free rate should be the quoted rate on the previous
2809         %friday before the option trading date. if the rate is not
2810         %avilable, take the 10-day-ago rate
2811         if (D_op_ex_2mth_4(k)-26-3) == D_qdate27(l);
2812             rates_1mth2mth(k) = exp(26*(log(yield_27(l)/100+1)/365))-1;
2813         elseif (D_op_ex_2mth_4(k)-26-10) == D_qdate27(l);
2814             rates_1mth2mth(k) = exp(26*(log(yield_27(l)/100+1)/365))-1;
2815         end
2816     end
2817 end
2818
2819 rates_annual_1mth2mth = exp((log(rates_1mth2mth + 1)/26)*365) -1;
2820
2821
2822 %Matching both 1YR and 2yr historical volatilities to 2mth-to-expiry
2823 %options at interim by SECUD of the security and interim date
2824 Hist_Vol_1yr_1mth2mth = nan(length(secid_op_2mth_4),1);
2825
2826 for gg = 1:length(secid_op_2mth_4);
2827     for hh = 1:length(secid_RV_1yr);
```

```matlab
2828          if (secid_RV_1yr(hh) == secid_op_2mth_4(gg)) && (D_RV_1yr(hh) == ↵
(D_op_ex_2mth_4(gg)-26));
2829              Hist_Vol_1yr_1mth2mth(gg) = volatility_1yr(hh-1);
2830          end
2831      end
2832 end
2833
2834 Hist_Vol_2yr_1mth2mth = nan(length(secid_op_2mth_4),1);
2835
2836 for kk = 1:length(secid_op_2mth_4);
2837      for ll = 1:length(secid_RV_2yr);
2838          if (secid_RV_2yr(ll) == secid_op_2mth_4(kk)) && (D_RV_2yr(ll) == ↵
(D_op_ex_2mth_4(kk)-26));
2839              Hist_Vol_2yr_1mth2mth(kk) = volatility_2yr(ll-1);
2840          end
2841      end
2842 end
2843
2844 %Calculating Black-Schole implied volatilities at interim
2845 bsvolatility_1mth2mth = blsimpv(underlying_1mth2mth, strike_price_2mth_4, ↵
rates_annual_1mth2mth, 26/365, call_price_1mth2mth);
2846
2847 save 8_interim_matched
2848
2849 %Finding the differece of Historical Volatilites and Implied Volatilities
2850 diff_1yrRV_1mth2mth = Hist_Vol_1yr_1mth2mth-bsvolatility_1mth2mth;
2851 diff_2yrRV_1mth2mth = Hist_Vol_2yr_1mth2mth-bsvolatility_1mth2mth;
2852
2853 %Applying the same decile index created previously onto the interim
2854 %meansurements that have just been calculated above. Note: Any variable's
2855 %name contains "total" are the meansures for the entire 2mth-to-expiry
2856 %holding period
2857 decile_1yr_1_call_1mth2mth_return =...
2858      call_return_percentage_1mth2mth(decile_1yr_2mth_1);
2859 decile_1yr_2_call_1mth2mth_return =...
2860       call_return_percentage_1mth2mth(decile_1yr_2mth_2);
2861 decile_1yr_3_call_1mth2mth_return =...
2862       call_return_percentage_1mth2mth(decile_1yr_2mth_3);
2863 decile_1yr_4_call_1mth2mth_return =...
2864       call_return_percentage_1mth2mth(decile_1yr_2mth_4);
2865 decile_1yr_5_call_1mth2mth_return =...
2866       call_return_percentage_1mth2mth(decile_1yr_2mth_5);
2867 decile_1yr_6_call_1mth2mth_return =...
2868       call_return_percentage_1mth2mth(decile_1yr_2mth_6);
2869 decile_1yr_7_call_1mth2mth_return =...
2870       call_return_percentage_1mth2mth(decile_1yr_2mth_7);
2871 decile_1yr_8_call_1mth2mth_return =...
2872       call_return_percentage_1mth2mth(decile_1yr_2mth_8);
2873 decile_1yr_9_call_1mth2mth_return =...
2874       call_return_percentage_1mth2mth(decile_1yr_2mth_9);
2875 decile_1yr_10_call_1mth2mth_return =...
2876       call_return_percentage_1mth2mth(decile_1yr_2mth_10);
2877
2878
```

```
2879 decile_1yr_1_call_1mth2mth_total_return = opt_percentage_return_2mth_1↵
(decile_1yr_2mth_1);
2880 decile_1yr_2_call_1mth2mth_total_return = opt_percentage_return_2mth_1↵
(decile_1yr_2mth_2);
2881 decile_1yr_3_call_1mth2mth_total_return = opt_percentage_return_2mth_1↵
(decile_1yr_2mth_3);
2882 decile_1yr_4_call_1mth2mth_total_return = opt_percentage_return_2mth_1↵
(decile_1yr_2mth_4);
2883 decile_1yr_5_call_1mth2mth_total_return = opt_percentage_return_2mth_1↵
(decile_1yr_2mth_5);
2884 decile_1yr_6_call_1mth2mth_total_return = opt_percentage_return_2mth_1↵
(decile_1yr_2mth_6);
2885 decile_1yr_7_call_1mth2mth_total_return = opt_percentage_return_2mth_1↵
(decile_1yr_2mth_7);
2886 decile_1yr_8_call_1mth2mth_total_return = opt_percentage_return_2mth_1↵
(decile_1yr_2mth_8);
2887 decile_1yr_9_call_1mth2mth_total_return = opt_percentage_return_2mth_1↵
(decile_1yr_2mth_9);
2888 decile_1yr_10_call_1mth2mth_total_return = opt_percentage_return_2mth_1↵
(decile_1yr_2mth_10);
2889
2890 decile_1yr_1_call_diff_RV_1mth2mth = diff_1yrRV_1mth2mth(decile_1yr_2mth_1);
2891 decile_1yr_2_call_diff_RV_1mth2mth = diff_1yrRV_1mth2mth(decile_1yr_2mth_2);
2892 decile_1yr_3_call_diff_RV_1mth2mth = diff_1yrRV_1mth2mth(decile_1yr_2mth_3);
2893 decile_1yr_4_call_diff_RV_1mth2mth = diff_1yrRV_1mth2mth(decile_1yr_2mth_4);
2894 decile_1yr_5_call_diff_RV_1mth2mth = diff_1yrRV_1mth2mth(decile_1yr_2mth_5);
2895 decile_1yr_6_call_diff_RV_1mth2mth = diff_1yrRV_1mth2mth(decile_1yr_2mth_6);
2896 decile_1yr_7_call_diff_RV_1mth2mth = diff_1yrRV_1mth2mth(decile_1yr_2mth_7);
2897 decile_1yr_8_call_diff_RV_1mth2mth = diff_1yrRV_1mth2mth(decile_1yr_2mth_8);
2898 decile_1yr_9_call_diff_RV_1mth2mth = diff_1yrRV_1mth2mth(decile_1yr_2mth_9);
2899 decile_1yr_10_call_diff_RV_1mth2mth = diff_1yrRV_1mth2mth(decile_1yr_2mth_10);
2900
2901 decile_1yr_1_RV_1mth2mth = Hist_Vol_1yr_1mth2mth(decile_1yr_2mth_1);
2902 decile_1yr_2_RV_1mth2mth = Hist_Vol_1yr_1mth2mth(decile_1yr_2mth_2);
2903 decile_1yr_3_RV_1mth2mth = Hist_Vol_1yr_1mth2mth(decile_1yr_2mth_3);
2904 decile_1yr_4_RV_1mth2mth = Hist_Vol_1yr_1mth2mth(decile_1yr_2mth_4);
2905 decile_1yr_5_RV_1mth2mth = Hist_Vol_1yr_1mth2mth(decile_1yr_2mth_5);
2906 decile_1yr_6_RV_1mth2mth = Hist_Vol_1yr_1mth2mth(decile_1yr_2mth_6);
2907 decile_1yr_7_RV_1mth2mth = Hist_Vol_1yr_1mth2mth(decile_1yr_2mth_7);
2908 decile_1yr_8_RV_1mth2mth = Hist_Vol_1yr_1mth2mth(decile_1yr_2mth_8);
2909 decile_1yr_9_RV_1mth2mth = Hist_Vol_1yr_1mth2mth(decile_1yr_2mth_9);
2910 decile_1yr_10_RV_1mth2mth = Hist_Vol_1yr_1mth2mth(decile_1yr_2mth_10);
2911
2912 decile_1yr_1_IV_1mth2mth = bsvolatility_1mth2mth(decile_1yr_2mth_1);
2913 decile_1yr_2_IV_1mth2mth = bsvolatility_1mth2mth(decile_1yr_2mth_2);
2914 decile_1yr_3_IV_1mth2mth = bsvolatility_1mth2mth(decile_1yr_2mth_3);
2915 decile_1yr_4_IV_1mth2mth = bsvolatility_1mth2mth(decile_1yr_2mth_4);
2916 decile_1yr_5_IV_1mth2mth = bsvolatility_1mth2mth(decile_1yr_2mth_5);
2917 decile_1yr_6_IV_1mth2mth = bsvolatility_1mth2mth(decile_1yr_2mth_6);
2918 decile_1yr_7_IV_1mth2mth = bsvolatility_1mth2mth(decile_1yr_2mth_7);
2919 decile_1yr_8_IV_1mth2mth = bsvolatility_1mth2mth(decile_1yr_2mth_8);
2920 decile_1yr_9_IV_1mth2mth = bsvolatility_1mth2mth(decile_1yr_2mth_9);
2921 decile_1yr_10_IV_1mth2mth = bsvolatility_1mth2mth(decile_1yr_2mth_10);
2922
```

```
2923
2924 decile_1yr_1_call_diff_RV_1mth2mth_total = diff_1yrRV_2mth(decile_1yr_2mth_1);
2925 decile_1yr_2_call_diff_RV_1mth2mth_total = diff_1yrRV_2mth(decile_1yr_2mth_2);
2926 decile_1yr_3_call_diff_RV_1mth2mth_total = diff_1yrRV_2mth(decile_1yr_2mth_3);
2927 decile_1yr_4_call_diff_RV_1mth2mth_total = diff_1yrRV_2mth(decile_1yr_2mth_4);
2928 decile_1yr_5_call_diff_RV_1mth2mth_total = diff_1yrRV_2mth(decile_1yr_2mth_5);
2929 decile_1yr_6_call_diff_RV_1mth2mth_total = diff_1yrRV_2mth(decile_1yr_2mth_6);
2930 decile_1yr_7_call_diff_RV_1mth2mth_total = diff_1yrRV_2mth(decile_1yr_2mth_7);
2931 decile_1yr_8_call_diff_RV_1mth2mth_total = diff_1yrRV_2mth(decile_1yr_2mth_8);
2932 decile_1yr_9_call_diff_RV_1mth2mth_total = diff_1yrRV_2mth(decile_1yr_2mth_9);
2933 decile_1yr_10_call_diff_RV_1mth2mth_total = diff_1yrRV_2mth(decile_1yr_2mth_10);
2934
2935 decile_1yr_1_RV_1mth2mth_total = Hist_Vol_1yr_2mth_1(decile_1yr_2mth_1);
2936 decile_1yr_2_RV_1mth2mth_total = Hist_Vol_1yr_2mth_1(decile_1yr_2mth_2);
2937 decile_1yr_3_RV_1mth2mth_total = Hist_Vol_1yr_2mth_1(decile_1yr_2mth_3);
2938 decile_1yr_4_RV_1mth2mth_total = Hist_Vol_1yr_2mth_1(decile_1yr_2mth_4);
2939 decile_1yr_5_RV_1mth2mth_total = Hist_Vol_1yr_2mth_1(decile_1yr_2mth_5);
2940 decile_1yr_6_RV_1mth2mth_total = Hist_Vol_1yr_2mth_1(decile_1yr_2mth_6);
2941 decile_1yr_7_RV_1mth2mth_total = Hist_Vol_1yr_2mth_1(decile_1yr_2mth_7);
2942 decile_1yr_8_RV_1mth2mth_total = Hist_Vol_1yr_2mth_1(decile_1yr_2mth_8);
2943 decile_1yr_9_RV_1mth2mth_total = Hist_Vol_1yr_2mth_1(decile_1yr_2mth_9);
2944 decile_1yr_10_RV_1mth2mth_total = Hist_Vol_1yr_2mth_1(decile_1yr_2mth_10);
2945
2946 decile_1yr_1_IV_1mth2mth_total = bsvolatility_2mth_1(decile_1yr_2mth_1);
2947 decile_1yr_2_IV_1mth2mth_total = bsvolatility_2mth_1(decile_1yr_2mth_2);
2948 decile_1yr_3_IV_1mth2mth_total = bsvolatility_2mth_1(decile_1yr_2mth_3);
2949 decile_1yr_4_IV_1mth2mth_total = bsvolatility_2mth_1(decile_1yr_2mth_4);
2950 decile_1yr_5_IV_1mth2mth_total = bsvolatility_2mth_1(decile_1yr_2mth_5);
2951 decile_1yr_6_IV_1mth2mth_total = bsvolatility_2mth_1(decile_1yr_2mth_6);
2952 decile_1yr_7_IV_1mth2mth_total = bsvolatility_2mth_1(decile_1yr_2mth_7);
2953 decile_1yr_8_IV_1mth2mth_total = bsvolatility_2mth_1(decile_1yr_2mth_8);
2954 decile_1yr_9_IV_1mth2mth_total = bsvolatility_2mth_1(decile_1yr_2mth_9);
2955 decile_1yr_10_IV_1mth2mth_total = bsvolatility_2mth_1(decile_1yr_2mth_10);
2956
2957 %Using logical statement to delet 2mth-to-expiry options that don't have
2958 %matched call option return or HV-IV spread at interim with in each decile.
2959 logic_1yr_1_1mth2mth=(isnan(decile_1yr_1_call_1mth2mth_return)|isnan↵
(decile_1yr_1_call_diff_RV_1mth2mth));
2960 decile_1yr_1_call_1mth2mth_return_1=decile_1yr_1_call_1mth2mth_return;
2961 decile_1yr_1_call_1mth2mth_return_1(logic_1yr_1_1mth2mth)=[];
2962↵
decile_1yr_1_call_1mth2mth_total_return_1=decile_1yr_1_call_1mth2mth_total_return;
2963 decile_1yr_1_call_1mth2mth_total_return_1(logic_1yr_1_1mth2mth)=[];
2964 decile_1yr_1_call_diff_RV_1mth2mth_1=decile_1yr_1_call_diff_RV_1mth2mth;
2965 decile_1yr_1_call_diff_RV_1mth2mth_1(logic_1yr_1_1mth2mth)=[];
2966 decile_1yr_1_RV_1mth2mth_1=decile_1yr_1_RV_1mth2mth;
2967 decile_1yr_1_RV_1mth2mth_1(logic_1yr_1_1mth2mth)=[];
2968 decile_1yr_1_IV_1mth2mth_1=decile_1yr_1_IV_1mth2mth;
2969 decile_1yr_1_IV_1mth2mth_1(logic_1yr_1_1mth2mth)=[];
2970↵
decile_1yr_1_call_diff_RV_1mth2mth_total_1=decile_1yr_1_call_diff_RV_1mth2mth_total;
2971 decile_1yr_1_call_diff_RV_1mth2mth_total_1(logic_1yr_1_1mth2mth)=[];
2972 decile_1yr_1_RV_1mth2mth_total_1=decile_1yr_1_RV_1mth2mth_total;
2973 decile_1yr_1_RV_1mth2mth_total_1(logic_1yr_1_1mth2mth)=[];
```

```
2974 decile_1yr_1_IV_1mth2mth_total_1=decile_1yr_1_IV_1mth2mth_total;
2975 decile_1yr_1_IV_1mth2mth_total_1(logic_1yr_1_1mth2mth)=[];
2976
2977
2978 logic_1yr_2_1mth2mth=(isnan(decile_1yr_2_call_1mth2mth_return)|isnan↵
(decile_1yr_2_call_diff_RV_1mth2mth));
2979 decile_1yr_2_call_1mth2mth_return_1=decile_1yr_2_call_1mth2mth_return;
2980 decile_1yr_2_call_1mth2mth_return_1(logic_1yr_2_1mth2mth)=[];
2981↵
decile_1yr_2_call_1mth2mth_total_return_1=decile_1yr_2_call_1mth2mth_total_return;
2982 decile_1yr_2_call_1mth2mth_total_return_1(logic_1yr_2_1mth2mth)=[];
2983 decile_1yr_2_call_diff_RV_1mth2mth_1=decile_1yr_2_call_diff_RV_1mth2mth;
2984 decile_1yr_2_call_diff_RV_1mth2mth_1(logic_1yr_2_1mth2mth)=[];
2985 decile_1yr_2_RV_1mth2mth_1=decile_1yr_2_RV_1mth2mth;
2986 decile_1yr_2_RV_1mth2mth_1(logic_1yr_2_1mth2mth)=[];
2987 decile_1yr_2_IV_1mth2mth_1=decile_1yr_2_IV_1mth2mth;
2988 decile_1yr_2_IV_1mth2mth_1(logic_1yr_2_1mth2mth)=[];
2989↵
decile_1yr_2_call_diff_RV_1mth2mth_total_1=decile_1yr_2_call_diff_RV_1mth2mth_total;
2990 decile_1yr_2_call_diff_RV_1mth2mth_total_1(logic_1yr_2_1mth2mth)=[];
2991 decile_1yr_2_RV_1mth2mth_total_1=decile_1yr_2_RV_1mth2mth_total;
2992 decile_1yr_2_RV_1mth2mth_total_1(logic_1yr_2_1mth2mth)=[];
2993 decile_1yr_2_IV_1mth2mth_total_1=decile_1yr_2_IV_1mth2mth_total;
2994 decile_1yr_2_IV_1mth2mth_total_1(logic_1yr_2_1mth2mth)=[];
2995
2996 logic_1yr_3_1mth2mth=(isnan(decile_1yr_3_call_1mth2mth_return)|isnan↵
(decile_1yr_3_call_diff_RV_1mth2mth));
2997 decile_1yr_3_call_1mth2mth_return_1=decile_1yr_3_call_1mth2mth_return;
2998 decile_1yr_3_call_1mth2mth_return_1(logic_1yr_3_1mth2mth)=[];
2999↵
decile_1yr_3_call_1mth2mth_total_return_1=decile_1yr_3_call_1mth2mth_total_return;
3000 decile_1yr_3_call_1mth2mth_total_return_1(logic_1yr_3_1mth2mth)=[];
3001 decile_1yr_3_call_diff_RV_1mth2mth_1=decile_1yr_3_call_diff_RV_1mth2mth;
3002 decile_1yr_3_call_diff_RV_1mth2mth_1(logic_1yr_3_1mth2mth)=[];
3003 decile_1yr_3_RV_1mth2mth_1=decile_1yr_3_RV_1mth2mth;
3004 decile_1yr_3_RV_1mth2mth_1(logic_1yr_3_1mth2mth)=[];
3005 decile_1yr_3_IV_1mth2mth_1=decile_1yr_3_IV_1mth2mth;
3006 decile_1yr_3_IV_1mth2mth_1(logic_1yr_3_1mth2mth)=[];
3007↵
decile_1yr_3_call_diff_RV_1mth2mth_total_1=decile_1yr_3_call_diff_RV_1mth2mth_total;
3008 decile_1yr_3_call_diff_RV_1mth2mth_total_1(logic_1yr_3_1mth2mth)=[];
3009 decile_1yr_3_RV_1mth2mth_total_1=decile_1yr_3_RV_1mth2mth_total;
3010 decile_1yr_3_RV_1mth2mth_total_1(logic_1yr_3_1mth2mth)=[];
3011 decile_1yr_3_IV_1mth2mth_total_1=decile_1yr_3_IV_1mth2mth_total;
3012 decile_1yr_3_IV_1mth2mth_total_1(logic_1yr_3_1mth2mth)=[];
3013
3014 logic_1yr_4_1mth2mth=(isnan(decile_1yr_4_call_1mth2mth_return)|isnan↵
(decile_1yr_4_call_diff_RV_1mth2mth));
3015 decile_1yr_4_call_1mth2mth_return_1=decile_1yr_4_call_1mth2mth_return;
3016 decile_1yr_4_call_1mth2mth_return_1(logic_1yr_4_1mth2mth)=[];
3017↵
decile_1yr_4_call_1mth2mth_total_return_1=decile_1yr_4_call_1mth2mth_total_return;
3018 decile_1yr_4_call_1mth2mth_total_return_1(logic_1yr_4_1mth2mth)=[];
3019 decile_1yr_4_call_diff_RV_1mth2mth_1=decile_1yr_4_call_diff_RV_1mth2mth;
```

```
3020 decile_1yr_4_call_diff_RV_1mth2mth_1(logic_1yr_4_1mth2mth)=[];
3021 decile_1yr_4_RV_1mth2mth_1=decile_1yr_4_RV_1mth2mth;
3022 decile_1yr_4_RV_1mth2mth_1(logic_1yr_4_1mth2mth)=[];
3023 decile_1yr_4_IV_1mth2mth_1=decile_1yr_4_IV_1mth2mth;
3024 decile_1yr_4_IV_1mth2mth_1(logic_1yr_4_1mth2mth)=[];
3025↵
decile_1yr_4_call_diff_RV_1mth2mth_total_1=decile_1yr_4_call_diff_RV_1mth2mth_total;
3026 decile_1yr_4_call_diff_RV_1mth2mth_total_1(logic_1yr_4_1mth2mth)=[];
3027 decile_1yr_4_RV_1mth2mth_total_1=decile_1yr_4_RV_1mth2mth_total;
3028 decile_1yr_4_RV_1mth2mth_total_1(logic_1yr_4_1mth2mth)=[];
3029 decile_1yr_4_IV_1mth2mth_total_1=decile_1yr_4_IV_1mth2mth_total;
3030 decile_1yr_4_IV_1mth2mth_total_1(logic_1yr_4_1mth2mth)=[];
3031
3032 logic_1yr_5_1mth2mth=(isnan(decile_1yr_5_call_1mth2mth_return)|isnan↵
(decile_1yr_5_call_diff_RV_1mth2mth));
3033 decile_1yr_5_call_1mth2mth_return_1=decile_1yr_5_call_1mth2mth_return;
3034 decile_1yr_5_call_1mth2mth_return_1(logic_1yr_5_1mth2mth)=[];
3035↵
decile_1yr_5_call_1mth2mth_total_return_1=decile_1yr_5_call_1mth2mth_total_return;
3036 decile_1yr_5_call_1mth2mth_total_return_1(logic_1yr_5_1mth2mth)=[];
3037 decile_1yr_5_call_diff_RV_1mth2mth_1=decile_1yr_5_call_diff_RV_1mth2mth;
3038 decile_1yr_5_call_diff_RV_1mth2mth_1(logic_1yr_5_1mth2mth)=[];
3039 decile_1yr_5_RV_1mth2mth_1=decile_1yr_5_RV_1mth2mth;
3040 decile_1yr_5_RV_1mth2mth_1(logic_1yr_5_1mth2mth)=[];
3041 decile_1yr_5_IV_1mth2mth_1=decile_1yr_5_IV_1mth2mth;
3042 decile_1yr_5_IV_1mth2mth_1(logic_1yr_5_1mth2mth)=[];
3043↵
decile_1yr_5_call_diff_RV_1mth2mth_total_1=decile_1yr_5_call_diff_RV_1mth2mth_total;
3044 decile_1yr_5_call_diff_RV_1mth2mth_total_1(logic_1yr_5_1mth2mth)=[];
3045 decile_1yr_5_RV_1mth2mth_total_1=decile_1yr_5_RV_1mth2mth_total;
3046 decile_1yr_5_RV_1mth2mth_total_1(logic_1yr_5_1mth2mth)=[];
3047 decile_1yr_5_IV_1mth2mth_total_1=decile_1yr_5_IV_1mth2mth_total;
3048 decile_1yr_5_IV_1mth2mth_total_1(logic_1yr_5_1mth2mth)=[];
3049
3050 logic_1yr_6_1mth2mth=(isnan(decile_1yr_6_call_1mth2mth_return)|isnan↵
(decile_1yr_6_call_diff_RV_1mth2mth));
3051 decile_1yr_6_call_1mth2mth_return_1=decile_1yr_6_call_1mth2mth_return;
3052 decile_1yr_6_call_1mth2mth_return_1(logic_1yr_6_1mth2mth)=[];
3053↵
decile_1yr_6_call_1mth2mth_total_return_1=decile_1yr_6_call_1mth2mth_total_return;
3054 decile_1yr_6_call_1mth2mth_total_return_1(logic_1yr_6_1mth2mth)=[];
3055 decile_1yr_6_call_diff_RV_1mth2mth_1=decile_1yr_6_call_diff_RV_1mth2mth;
3056 decile_1yr_6_call_diff_RV_1mth2mth_1(logic_1yr_6_1mth2mth)=[];
3057 decile_1yr_6_RV_1mth2mth_1=decile_1yr_6_RV_1mth2mth;
3058 decile_1yr_6_RV_1mth2mth_1(logic_1yr_6_1mth2mth)=[];
3059 decile_1yr_6_IV_1mth2mth_1=decile_1yr_6_IV_1mth2mth;
3060 decile_1yr_6_IV_1mth2mth_1(logic_1yr_6_1mth2mth)=[];
3061↵
decile_1yr_6_call_diff_RV_1mth2mth_total_1=decile_1yr_6_call_diff_RV_1mth2mth_total;
3062 decile_1yr_6_call_diff_RV_1mth2mth_total_1(logic_1yr_6_1mth2mth)=[];
3063 decile_1yr_6_RV_1mth2mth_total_1=decile_1yr_6_RV_1mth2mth_total;
3064 decile_1yr_6_RV_1mth2mth_total_1(logic_1yr_6_1mth2mth)=[];
3065 decile_1yr_6_IV_1mth2mth_total_1=decile_1yr_6_IV_1mth2mth_total;
3066 decile_1yr_6_IV_1mth2mth_total_1(logic_1yr_6_1mth2mth)=[];
```

```
3067
3068 logic_1yr_7_1mth2mth=(isnan(decile_1yr_7_call_1mth2mth_return)|isnan↙
(decile_1yr_7_call_diff_RV_1mth2mth));
3069 decile_1yr_7_call_1mth2mth_return_1=decile_1yr_7_call_1mth2mth_return;
3070↙
decile_1yr_7_call_1mth2mth_total_return_1=decile_1yr_7_call_1mth2mth_total_return;
3071 decile_1yr_7_call_1mth2mth_total_return_1(logic_1yr_7_1mth2mth)=[];
3072 decile_1yr_7_call_1mth2mth_return_1(logic_1yr_7_1mth2mth)=[];
3073 decile_1yr_7_call_diff_RV_1mth2mth_1=decile_1yr_7_call_diff_RV_1mth2mth;
3074 decile_1yr_7_call_diff_RV_1mth2mth_1(logic_1yr_7_1mth2mth)=[];
3075 decile_1yr_7_RV_1mth2mth_1=decile_1yr_7_RV_1mth2mth;
3076 decile_1yr_7_RV_1mth2mth_1(logic_1yr_7_1mth2mth)=[];
3077 decile_1yr_7_IV_1mth2mth_1=decile_1yr_7_IV_1mth2mth;
3078 decile_1yr_7_IV_1mth2mth_1(logic_1yr_7_1mth2mth)=[];
3079↙
decile_1yr_7_call_diff_RV_1mth2mth_total_1=decile_1yr_7_call_diff_RV_1mth2mth_total;
3080 decile_1yr_7_call_diff_RV_1mth2mth_total_1(logic_1yr_7_1mth2mth)=[];
3081 decile_1yr_7_RV_1mth2mth_total_1=decile_1yr_7_RV_1mth2mth_total;
3082 decile_1yr_7_RV_1mth2mth_total_1(logic_1yr_7_1mth2mth)=[];
3083 decile_1yr_7_IV_1mth2mth_total_1=decile_1yr_7_IV_1mth2mth_total;
3084 decile_1yr_7_IV_1mth2mth_total_1(logic_1yr_7_1mth2mth)=[];
3085
3086 logic_1yr_8_1mth2mth=(isnan(decile_1yr_8_call_1mth2mth_return)|isnan↙
(decile_1yr_8_call_diff_RV_1mth2mth));
3087 decile_1yr_8_call_1mth2mth_return_1=decile_1yr_8_call_1mth2mth_return;
3088↙
decile_1yr_8_call_1mth2mth_total_return_1=decile_1yr_8_call_1mth2mth_total_return;
3089 decile_1yr_8_call_1mth2mth_total_return_1(logic_1yr_8_1mth2mth)=[];
3090 decile_1yr_8_call_1mth2mth_return_1(logic_1yr_8_1mth2mth)=[];
3091 decile_1yr_8_call_diff_RV_1mth2mth_1=decile_1yr_8_call_diff_RV_1mth2mth;
3092 decile_1yr_8_call_diff_RV_1mth2mth_1(logic_1yr_8_1mth2mth)=[];
3093 decile_1yr_8_RV_1mth2mth_1=decile_1yr_8_RV_1mth2mth;
3094 decile_1yr_8_RV_1mth2mth_1(logic_1yr_8_1mth2mth)=[];
3095 decile_1yr_8_IV_1mth2mth_1=decile_1yr_8_IV_1mth2mth;
3096 decile_1yr_8_IV_1mth2mth_1(logic_1yr_8_1mth2mth)=[];
3097↙
decile_1yr_8_call_diff_RV_1mth2mth_total_1=decile_1yr_8_call_diff_RV_1mth2mth_total;
3098 decile_1yr_8_call_diff_RV_1mth2mth_total_1(logic_1yr_8_1mth2mth)=[];
3099 decile_1yr_8_RV_1mth2mth_total_1=decile_1yr_8_RV_1mth2mth_total;
3100 decile_1yr_8_RV_1mth2mth_total_1(logic_1yr_8_1mth2mth)=[];
3101 decile_1yr_8_IV_1mth2mth_total_1=decile_1yr_8_IV_1mth2mth_total;
3102 decile_1yr_8_IV_1mth2mth_total_1(logic_1yr_8_1mth2mth)=[];
3103
3104 logic_1yr_9_1mth2mth=(isnan(decile_1yr_9_call_1mth2mth_return)|isnan↙
(decile_1yr_9_call_diff_RV_1mth2mth));
3105 decile_1yr_9_call_1mth2mth_return_1=decile_1yr_9_call_1mth2mth_return;
3106 decile_1yr_9_call_1mth2mth_return_1(logic_1yr_9_1mth2mth)=[];
3107↙
decile_1yr_9_call_1mth2mth_total_return_1=decile_1yr_9_call_1mth2mth_total_return;
3108 decile_1yr_9_call_1mth2mth_total_return_1(logic_1yr_9_1mth2mth)=[];
3109 decile_1yr_9_call_diff_RV_1mth2mth_1=decile_1yr_9_call_diff_RV_1mth2mth;
3110 decile_1yr_9_call_diff_RV_1mth2mth_1(logic_1yr_9_1mth2mth)=[];
3111 decile_1yr_9_RV_1mth2mth_1=decile_1yr_9_RV_1mth2mth;
3112 decile_1yr_9_RV_1mth2mth_1(logic_1yr_9_1mth2mth)=[];
```

```matlab
3113 decile_1yr_9_IV_1mth2mth_1=decile_1yr_9_IV_1mth2mth;
3114 decile_1yr_9_IV_1mth2mth_1(logic_1yr_9_1mth2mth)=[];
3115↙
decile_1yr_9_call_diff_RV_1mth2mth_total_1=decile_1yr_9_call_diff_RV_1mth2mth_total;
3116 decile_1yr_9_call_diff_RV_1mth2mth_total_1(logic_1yr_9_1mth2mth)=[];
3117 decile_1yr_9_RV_1mth2mth_total_1=decile_1yr_9_RV_1mth2mth_total;
3118 decile_1yr_9_RV_1mth2mth_total_1(logic_1yr_9_1mth2mth)=[];
3119 decile_1yr_9_IV_1mth2mth_total_1=decile_1yr_9_IV_1mth2mth_total;
3120 decile_1yr_9_IV_1mth2mth_total_1(logic_1yr_9_1mth2mth)=[];
3121
3122 logic_1yr_10_1mth2mth=(isnan(decile_1yr_10_call_1mth2mth_return)|isnan↙
(decile_1yr_10_call_diff_RV_1mth2mth));
3123 decile_1yr_10_call_1mth2mth_return_1=decile_1yr_10_call_1mth2mth_return;
3124 decile_1yr_10_call_1mth2mth_return_1(logic_1yr_10_1mth2mth)=[];
3125↙
decile_1yr_10_call_1mth2mth_total_return_1=decile_1yr_10_call_1mth2mth_total_return;
3126 decile_1yr_10_call_1mth2mth_total_return_1(logic_1yr_10_1mth2mth)=[];
3127 decile_1yr_10_call_diff_RV_1mth2mth_1=decile_1yr_10_call_diff_RV_1mth2mth;
3128 decile_1yr_10_call_diff_RV_1mth2mth_1(logic_1yr_10_1mth2mth)=[];
3129 decile_1yr_10_RV_1mth2mth_1=decile_1yr_10_RV_1mth2mth;
3130 decile_1yr_10_RV_1mth2mth_1(logic_1yr_10_1mth2mth)=[];
3131 decile_1yr_10_IV_1mth2mth_1=decile_1yr_10_IV_1mth2mth;
3132 decile_1yr_10_IV_1mth2mth_1(logic_1yr_10_1mth2mth)=[];
3133↙
decile_1yr_10_call_diff_RV_1mth2mth_total_1=decile_1yr_10_call_diff_RV_1mth2mth_total;
3134 decile_1yr_10_call_diff_RV_1mth2mth_total_1(logic_1yr_10_1mth2mth)=[];
3135 decile_1yr_10_RV_1mth2mth_total_1=decile_1yr_10_RV_1mth2mth_total;
3136 decile_1yr_10_RV_1mth2mth_total_1(logic_1yr_10_1mth2mth)=[];
3137 decile_1yr_10_IV_1mth2mth_total_1=decile_1yr_10_IV_1mth2mth_total;
3138 decile_1yr_10_IV_1mth2mth_total_1(logic_1yr_10_1mth2mth)=[];
3139
3140 %Summarizing interm statistics of each decile
3141 mean_1yr_1_call_1mth2mth_return_1 = mean(decile_1yr_1_call_1mth2mth_return_1);
3142 mean_1yr_2_call_1mth2mth_return_1 = mean(decile_1yr_2_call_1mth2mth_return_1);
3143 mean_1yr_3_call_1mth2mth_return_1 = mean(decile_1yr_3_call_1mth2mth_return_1);
3144 mean_1yr_4_call_1mth2mth_return_1 = mean(decile_1yr_4_call_1mth2mth_return_1);
3145 mean_1yr_5_call_1mth2mth_return_1 = mean(decile_1yr_5_call_1mth2mth_return_1);
3146 mean_1yr_6_call_1mth2mth_return_1 = mean(decile_1yr_6_call_1mth2mth_return_1);
3147 mean_1yr_7_call_1mth2mth_return_1 = mean(decile_1yr_7_call_1mth2mth_return_1);
3148 mean_1yr_8_call_1mth2mth_return_1 = mean(decile_1yr_8_call_1mth2mth_return_1);
3149 mean_1yr_9_call_1mth2mth_return_1 = mean(decile_1yr_9_call_1mth2mth_return_1);
3150 mean_1yr_10_call_1mth2mth_return_1 = mean(decile_1yr_10_call_1mth2mth_return_1);
3151
3152 mean_1yr_1_call_1mth2mth_total_return_1 = mean↙
(decile_1yr_1_call_1mth2mth_total_return_1);
3153 mean_1yr_2_call_1mth2mth_total_return_1 = mean↙
(decile_1yr_2_call_1mth2mth_total_return_1);
3154 mean_1yr_3_call_1mth2mth_total_return_1 = mean↙
(decile_1yr_3_call_1mth2mth_total_return_1);
3155 mean_1yr_4_call_1mth2mth_total_return_1 = mean↙
(decile_1yr_4_call_1mth2mth_total_return_1);
3156 mean_1yr_5_call_1mth2mth_total_return_1 = mean↙
(decile_1yr_5_call_1mth2mth_total_return_1);
3157 mean_1yr_6_call_1mth2mth_total_return_1 = mean↙
```

```
(decile_1yr_6_call_1mth2mth_total_return_1);
3158 mean_1yr_7_call_1mth2mth_total_return_1 = mean↵
(decile_1yr_7_call_1mth2mth_total_return_1);
3159 mean_1yr_8_call_1mth2mth_total_return_1 = mean↵
(decile_1yr_8_call_1mth2mth_total_return_1);
3160 mean_1yr_9_call_1mth2mth_total_return_1 = mean↵
(decile_1yr_9_call_1mth2mth_total_return_1);
3161 mean_1yr_10_call_1mth2mth_total_return_1 = mean↵
(decile_1yr_10_call_1mth2mth_total_return_1);
3162
3163 mean_1yr_1_call_diff_RV_1mth2mth_1 = mean(decile_1yr_1_call_diff_RV_1mth2mth_1);
3164 mean_1yr_2_call_diff_RV_1mth2mth_1 = mean(decile_1yr_2_call_diff_RV_1mth2mth_1);
3165 mean_1yr_3_call_diff_RV_1mth2mth_1 = mean(decile_1yr_3_call_diff_RV_1mth2mth_1);
3166 mean_1yr_4_call_diff_RV_1mth2mth_1 = mean(decile_1yr_4_call_diff_RV_1mth2mth_1);
3167 mean_1yr_5_call_diff_RV_1mth2mth_1 = mean(decile_1yr_5_call_diff_RV_1mth2mth_1);
3168 mean_1yr_6_call_diff_RV_1mth2mth_1 = mean(decile_1yr_6_call_diff_RV_1mth2mth_1);
3169 mean_1yr_7_call_diff_RV_1mth2mth_1 = mean(decile_1yr_7_call_diff_RV_1mth2mth_1);
3170 mean_1yr_8_call_diff_RV_1mth2mth_1 = mean(decile_1yr_8_call_diff_RV_1mth2mth_1);
3171 mean_1yr_9_call_diff_RV_1mth2mth_1 = mean(decile_1yr_9_call_diff_RV_1mth2mth_1);
3172 mean_1yr_10_call_diff_RV_1mth2mth_1 = mean↵
(decile_1yr_10_call_diff_RV_1mth2mth_1);
3173
3174 std_1yr_1_call_diff_RV_1mth2mth_1 = std(decile_1yr_1_call_diff_RV_1mth2mth_1);
3175 std_1yr_2_call_diff_RV_1mth2mth_1 = std(decile_1yr_2_call_diff_RV_1mth2mth_1);
3176 std_1yr_3_call_diff_RV_1mth2mth_1 = std(decile_1yr_3_call_diff_RV_1mth2mth_1);
3177 std_1yr_4_call_diff_RV_1mth2mth_1 = std(decile_1yr_4_call_diff_RV_1mth2mth_1);
3178 std_1yr_5_call_diff_RV_1mth2mth_1 = std(decile_1yr_5_call_diff_RV_1mth2mth_1);
3179 std_1yr_6_call_diff_RV_1mth2mth_1 = std(decile_1yr_6_call_diff_RV_1mth2mth_1);
3180 std_1yr_7_call_diff_RV_1mth2mth_1 = std(decile_1yr_7_call_diff_RV_1mth2mth_1);
3181 std_1yr_8_call_diff_RV_1mth2mth_1 = std(decile_1yr_8_call_diff_RV_1mth2mth_1);
3182 std_1yr_9_call_diff_RV_1mth2mth_1 = std(decile_1yr_9_call_diff_RV_1mth2mth_1);
3183 std_1yr_10_call_diff_RV_1mth2mth_1 = std(decile_1yr_10_call_diff_RV_1mth2mth_1);
3184
3185 mean_1yr_1_RV_1mth2mth_1 = mean(decile_1yr_1_RV_1mth2mth_1);
3186 mean_1yr_2_RV_1mth2mth_1 = mean(decile_1yr_2_RV_1mth2mth_1);
3187 mean_1yr_3_RV_1mth2mth_1 = mean(decile_1yr_3_RV_1mth2mth_1);
3188 mean_1yr_4_RV_1mth2mth_1 = mean(decile_1yr_4_RV_1mth2mth_1);
3189 mean_1yr_5_RV_1mth2mth_1 = mean(decile_1yr_5_RV_1mth2mth_1);
3190 mean_1yr_6_RV_1mth2mth_1 = mean(decile_1yr_6_RV_1mth2mth_1);
3191 mean_1yr_7_RV_1mth2mth_1 = mean(decile_1yr_7_RV_1mth2mth_1);
3192 mean_1yr_8_RV_1mth2mth_1 = mean(decile_1yr_8_RV_1mth2mth_1);
3193 mean_1yr_9_RV_1mth2mth_1 = mean(decile_1yr_9_RV_1mth2mth_1);
3194 mean_1yr_10_RV_1mth2mth_1 = mean(decile_1yr_10_RV_1mth2mth_1);
3195
3196 mean_1yr_1_IV_1mth2mth_1 = mean(decile_1yr_1_IV_1mth2mth_1);
3197 mean_1yr_2_IV_1mth2mth_1 = mean(decile_1yr_2_IV_1mth2mth_1);
3198 mean_1yr_3_IV_1mth2mth_1 = mean(decile_1yr_3_IV_1mth2mth_1);
3199 mean_1yr_4_IV_1mth2mth_1 = mean(decile_1yr_4_IV_1mth2mth_1);
3200 mean_1yr_5_IV_1mth2mth_1 = mean(decile_1yr_5_IV_1mth2mth_1);
3201 mean_1yr_6_IV_1mth2mth_1 = mean(decile_1yr_6_IV_1mth2mth_1);
3202 mean_1yr_7_IV_1mth2mth_1 = mean(decile_1yr_7_IV_1mth2mth_1);
3203 mean_1yr_8_IV_1mth2mth_1 = mean(decile_1yr_8_IV_1mth2mth_1);
3204 mean_1yr_9_IV_1mth2mth_1 = mean(decile_1yr_9_IV_1mth2mth_1);
3205 mean_1yr_10_IV_1mth2mth_1 = mean(decile_1yr_10_IV_1mth2mth_1);
```

```
3206
3207 mean_1yr_1_call_diff_RV_1mth2mth_total_1 = mean↙
(decile_1yr_1_call_diff_RV_1mth2mth_total_1);
3208 mean_1yr_2_call_diff_RV_1mth2mth_total_1 = mean↙
(decile_1yr_2_call_diff_RV_1mth2mth_total_1);
3209 mean_1yr_3_call_diff_RV_1mth2mth_total_1 = mean↙
(decile_1yr_3_call_diff_RV_1mth2mth_total_1);
3210 mean_1yr_4_call_diff_RV_1mth2mth_total_1 = mean↙
(decile_1yr_4_call_diff_RV_1mth2mth_total_1);
3211 mean_1yr_5_call_diff_RV_1mth2mth_total_1 = mean↙
(decile_1yr_5_call_diff_RV_1mth2mth_total_1);
3212 mean_1yr_6_call_diff_RV_1mth2mth_total_1 = mean↙
(decile_1yr_6_call_diff_RV_1mth2mth_total_1);
3213 mean_1yr_7_call_diff_RV_1mth2mth_total_1 = mean↙
(decile_1yr_7_call_diff_RV_1mth2mth_total_1);
3214 mean_1yr_8_call_diff_RV_1mth2mth_total_1 = mean↙
(decile_1yr_8_call_diff_RV_1mth2mth_total_1);
3215 mean_1yr_9_call_diff_RV_1mth2mth_total_1 = mean↙
(decile_1yr_9_call_diff_RV_1mth2mth_total_1);
3216 mean_1yr_10_call_diff_RV_1mth2mth_total_1 = mean↙
(decile_1yr_10_call_diff_RV_1mth2mth_total_1);
3217
3218 std_1yr_1_call_diff_RV_1mth2mth_total_1 = std↙
(decile_1yr_1_call_diff_RV_1mth2mth_total_1);
3219 std_1yr_2_call_diff_RV_1mth2mth_total_1 = std↙
(decile_1yr_2_call_diff_RV_1mth2mth_total_1);
3220 std_1yr_3_call_diff_RV_1mth2mth_total_1 = std↙
(decile_1yr_3_call_diff_RV_1mth2mth_total_1);
3221 std_1yr_4_call_diff_RV_1mth2mth_total_1 = std↙
(decile_1yr_4_call_diff_RV_1mth2mth_total_1);
3222 std_1yr_5_call_diff_RV_1mth2mth_total_1 = std↙
(decile_1yr_5_call_diff_RV_1mth2mth_total_1);
3223 std_1yr_6_call_diff_RV_1mth2mth_total_1 = std↙
(decile_1yr_6_call_diff_RV_1mth2mth_total_1);
3224 std_1yr_7_call_diff_RV_1mth2mth_total_1 = std↙
(decile_1yr_7_call_diff_RV_1mth2mth_total_1);
3225 std_1yr_8_call_diff_RV_1mth2mth_total_1 = std↙
(decile_1yr_8_call_diff_RV_1mth2mth_total_1);
3226 std_1yr_9_call_diff_RV_1mth2mth_total_1 = std↙
(decile_1yr_9_call_diff_RV_1mth2mth_total_1);
3227 std_1yr_10_call_diff_RV_1mth2mth_total_1 = std↙
(decile_1yr_10_call_diff_RV_1mth2mth_total_1);
3228
3229 mean_1yr_1_RV_1mth2mth_total_1 = mean(decile_1yr_1_RV_1mth2mth_total_1);
3230 mean_1yr_2_RV_1mth2mth_total_1 = mean(decile_1yr_2_RV_1mth2mth_total_1);
3231 mean_1yr_3_RV_1mth2mth_total_1 = mean(decile_1yr_3_RV_1mth2mth_total_1);
3232 mean_1yr_4_RV_1mth2mth_total_1 = mean(decile_1yr_4_RV_1mth2mth_total_1);
3233 mean_1yr_5_RV_1mth2mth_total_1 = mean(decile_1yr_5_RV_1mth2mth_total_1);
3234 mean_1yr_6_RV_1mth2mth_total_1 = mean(decile_1yr_6_RV_1mth2mth_total_1);
3235 mean_1yr_7_RV_1mth2mth_total_1 = mean(decile_1yr_7_RV_1mth2mth_total_1);
3236 mean_1yr_8_RV_1mth2mth_total_1 = mean(decile_1yr_8_RV_1mth2mth_total_1);
3237 mean_1yr_9_RV_1mth2mth_total_1 = mean(decile_1yr_9_RV_1mth2mth_total_1);
3238 mean_1yr_10_RV_1mth2mth_total_1 = mean(decile_1yr_10_RV_1mth2mth_total_1);
3239
```

```
3240 mean_1yr_1_IV_1mth2mth_total_1 = mean(decile_1yr_1_IV_1mth2mth_total_1);
3241 mean_1yr_2_IV_1mth2mth_total_1 = mean(decile_1yr_2_IV_1mth2mth_total_1);
3242 mean_1yr_3_IV_1mth2mth_total_1 = mean(decile_1yr_3_IV_1mth2mth_total_1);
3243 mean_1yr_4_IV_1mth2mth_total_1 = mean(decile_1yr_4_IV_1mth2mth_total_1);
3244 mean_1yr_5_IV_1mth2mth_total_1 = mean(decile_1yr_5_IV_1mth2mth_total_1);
3245 mean_1yr_6_IV_1mth2mth_total_1 = mean(decile_1yr_6_IV_1mth2mth_total_1);
3246 mean_1yr_7_IV_1mth2mth_total_1 = mean(decile_1yr_7_IV_1mth2mth_total_1);
3247 mean_1yr_8_IV_1mth2mth_total_1 = mean(decile_1yr_8_IV_1mth2mth_total_1);
3248 mean_1yr_9_IV_1mth2mth_total_1 = mean(decile_1yr_9_IV_1mth2mth_total_1);
3249 mean_1yr_10_IV_1mth2mth_total_1 = mean(decile_1yr_10_IV_1mth2mth_total_1);
3250
3251
3252 [h1_1yr,p1_1yr,ci1_1yr,stats1_1yr] = ttest(decile_1yr_1_call_1mth2mth_return_1,↵
0);
3253 [h2_1yr,p2_1yr,ci2_1yr,stats2_1yr] = ttest(decile_1yr_2_call_1mth2mth_return_1,↵
0);
3254 [h3_1yr,p3_1yr,ci3_1yr,stats3_1yr] = ttest(decile_1yr_3_call_1mth2mth_return_1,↵
0);
3255 [h4_1yr,p4_1yr,ci4_1yr,stats4_1yr] = ttest(decile_1yr_4_call_1mth2mth_return_1,↵
0);
3256 [h5_1yr,p5_1yr,ci5_1yr,stats5_1yr] = ttest(decile_1yr_5_call_1mth2mth_return_1,↵
0);
3257 [h6_1yr,p6_1yr,ci6_1yr,stats6_1yr] = ttest(decile_1yr_6_call_1mth2mth_return_1,↵
0);
3258 [h7_1yr,p7_1yr,ci7_1yr,stats7_1yr] = ttest(decile_1yr_7_call_1mth2mth_return_1,↵
0);
3259 [h8_1yr,p8_1yr,ci8_1yr,stats8_1yr] = ttest(decile_1yr_8_call_1mth2mth_return_1,↵
0);
3260 [h9_1yr,p9_1yr,ci9_1yr,stats9_1yr] = ttest(decile_1yr_9_call_1mth2mth_return_1,↵
0);
3261 [h10_1yr,p10_1yr,ci10_1yr,stats10_1yr] = ttest↵
(decile_1yr_10_call_1mth2mth_return_1,0);
3262
3263
3264 [ h1_total_1yr,p1_total_1yr,ci1_total_1yr,stats1_total_1yr] = ttest↵
(decile_1yr_1_call_1mth2mth_total_return_1,0);
3265 [h2_total_1yr,p2_total_1yr,ci2_total_1yr,stats2_total_1yr] = ttest↵
(decile_1yr_2_call_1mth2mth_total_return_1,0);
3266 [h3_total_1yr,p3_total_1yr,ci3_total_1yr,stats3_total_1yr] = ttest↵
(decile_1yr_3_call_1mth2mth_total_return_1,0);
3267 [h4_total_1yr,p4_total_1yr,ci4_total_1yr,stats4_total_1yr] = ttest↵
(decile_1yr_4_call_1mth2mth_total_return_1,0);
3268 [h5_total_1yr,p5_total_1yr,ci5_total_1yr,stats5_total_1yr] = ttest↵
(decile_1yr_5_call_1mth2mth_total_return_1,0);
3269 [h6_total_1yr,p6_total_1yr,ci6_total_1yr,stats6_total_1yr] = ttest↵
(decile_1yr_6_call_1mth2mth_total_return_1,0);
3270 [h7_total_1yr,p7_total_1yr,ci7_total_1yr,stats7_total_1yr] = ttest↵
(decile_1yr_7_call_1mth2mth_total_return_1,0);
3271 [h8_total_1yr,p8_total_1yr,ci8_total_1yr,stats8_total_1yr] = ttest↵
(decile_1yr_8_call_1mth2mth_total_return_1,0);
3272 [h9_total_1yr,p9_total_1yr,ci9_total_1yr,stats9_total_1yr] = ttest↵
(decile_1yr_9_call_1mth2mth_total_return_1,0);
3273 [h10_total_1yr,p10_total_1yr,ci10_total_1yr,stats10_total_1yr] = ttest↵
(decile_1yr_10_call_1mth2mth_total_return_1,0);
```

```matlab
3274
3275 %Output statistic to Table 9: Call Returns of 2mth-To-Expiry Sort on the
3276 %Difference Between HV and IV
3277 table9_1yr_1mth2mth = [mean_1yr_1_call_1mth2mth_return_1
mean_1yr_2_call_1mth2mth_return_1 mean_1yr_3_call_1mth2mth_return_1
mean_1yr_4_call_1mth2mth_return_1 mean_1yr_5_call_1mth2mth_return_1...
3278        mean_1yr_6_call_1mth2mth_return_1 mean_1yr_7_call_1mth2mth_return_1
mean_1yr_8_call_1mth2mth_return_1 mean_1yr_9_call_1mth2mth_return_1
mean_1yr_10_call_1mth2mth_return_1;...
3279        stats1_1yr.tstat stats2_1yr.tstat stats3_1yr.tstat stats4_1yr.tstat
stats5_1yr.tstat stats6_1yr.tstat stats7_1yr.tstat stats8_1yr.tstat stats9_1yr.tstat
stats10_1yr.tstat];
3280
3281 table9_1yr_total_1mth2mth = [mean_1yr_1_call_1mth2mth_total_return_1
mean_1yr_2_call_1mth2mth_total_return_1 mean_1yr_3_call_1mth2mth_total_return_1
mean_1yr_4_call_1mth2mth_total_return_1 mean_1yr_5_call_1mth2mth_total_return_1...
3282        mean_1yr_6_call_1mth2mth_total_return_1
mean_1yr_7_call_1mth2mth_total_return_1 mean_1yr_8_call_1mth2mth_total_return_1
mean_1yr_9_call_1mth2mth_total_return_1 mean_1yr_10_call_1mth2mth_total_return_1;...
3283        stats1_total_1yr.tstat stats2_total_1yr.tstat stats3_total_1yr.tstat
stats4_total_1yr.tstat stats5_total_1yr.tstat stats6_total_1yr.tstat stats7_total_1yr.
tstat stats8_total_1yr.tstat stats9_total_1yr.tstat stats10_total_1yr.tstat];
3284
3285 %Output statistic Table 8: Volatility Statistics of 2mth-To-Expiry
3286 %Portfolios Sort on the Difference Between HV and IV
3287 table8_1yr_1mth2mth = [mean_1yr_1_call_diff_RV_1mth2mth_1
mean_1yr_2_call_diff_RV_1mth2mth_1 mean_1yr_3_call_diff_RV_1mth2mth_1
mean_1yr_4_call_diff_RV_1mth2mth_1 mean_1yr_5_call_diff_RV_1mth2mth_1...
3288     mean_1yr_6_call_diff_RV_1mth2mth_1 mean_1yr_7_call_diff_RV_1mth2mth_1
mean_1yr_8_call_diff_RV_1mth2mth_1 mean_1yr_9_call_diff_RV_1mth2mth_1
mean_1yr_10_call_diff_RV_1mth2mth_1;...
3289     std_1yr_1_call_diff_RV_1mth2mth_1 std_1yr_2_call_diff_RV_1mth2mth_1
std_1yr_3_call_diff_RV_1mth2mth_1 std_1yr_4_call_diff_RV_1mth2mth_1
std_1yr_5_call_diff_RV_1mth2mth_1...
3290     std_1yr_6_call_diff_RV_1mth2mth_1 std_1yr_7_call_diff_RV_1mth2mth_1
std_1yr_8_call_diff_RV_1mth2mth_1 std_1yr_9_call_diff_RV_1mth2mth_1
std_1yr_10_call_diff_RV_1mth2mth_1;...
3291     mean_1yr_1_RV_1mth2mth_1 mean_1yr_2_RV_1mth2mth_1 mean_1yr_3_RV_1mth2mth_1
mean_1yr_4_RV_1mth2mth_1 mean_1yr_5_RV_1mth2mth_1...
3292     mean_1yr_6_RV_1mth2mth_1 mean_1yr_7_RV_1mth2mth_1 mean_1yr_8_RV_1mth2mth_1
mean_1yr_9_RV_1mth2mth_1 mean_1yr_10_RV_1mth2mth_1;...
3293     mean_1yr_1_IV_1mth2mth_1 mean_1yr_2_IV_1mth2mth_1 mean_1yr_3_IV_1mth2mth_1
mean_1yr_4_IV_1mth2mth_1 mean_1yr_5_IV_1mth2mth_1...
3294     mean_1yr_6_IV_1mth2mth_1 mean_1yr_7_IV_1mth2mth_1 mean_1yr_8_IV_1mth2mth_1
mean_1yr_9_IV_1mth2mth_1 mean_1yr_10_IV_1mth2mth_1];
3295
3296 table8_1yr_1mth2mth_total = [mean_1yr_1_call_diff_RV_1mth2mth_total_1
mean_1yr_2_call_diff_RV_1mth2mth_total_1 mean_1yr_3_call_diff_RV_1mth2mth_total_1
mean_1yr_4_call_diff_RV_1mth2mth_total_1 mean_1yr_5_call_diff_RV_1mth2mth_total_1...
3297     mean_1yr_6_call_diff_RV_1mth2mth_total_1
mean_1yr_7_call_diff_RV_1mth2mth_total_1 mean_1yr_8_call_diff_RV_1mth2mth_total_1
mean_1yr_9_call_diff_RV_1mth2mth_total_1 mean_1yr_10_call_diff_RV_1mth2mth_total_1;...
3298     std_1yr_1_call_diff_RV_1mth2mth_total_1
std_1yr_2_call_diff_RV_1mth2mth_total_1 std_1yr_3_call_diff_RV_1mth2mth_total_1
```

```matlab
     std_1yr_4_call_diff_RV_1mth2mth_total_1 std_1yr_5_call_diff_RV_1mth2mth_total_1...
3299     std_1yr_6_call_diff_RV_1mth2mth_total_1↵
     std_1yr_7_call_diff_RV_1mth2mth_total_1 std_1yr_8_call_diff_RV_1mth2mth_total_1↵
     std_1yr_9_call_diff_RV_1mth2mth_total_1 std_1yr_10_call_diff_RV_1mth2mth_total_1;...
3300     mean_1yr_1_RV_1mth2mth_total_1 mean_1yr_2_RV_1mth2mth_total_1↵
     mean_1yr_3_RV_1mth2mth_total_1 mean_1yr_4_RV_1mth2mth_total_1↵
     mean_1yr_5_RV_1mth2mth_total_1...
3301     mean_1yr_6_RV_1mth2mth_total_1 mean_1yr_7_RV_1mth2mth_total_1↵
     mean_1yr_8_RV_1mth2mth_total_1 mean_1yr_9_RV_1mth2mth_total_1↵
     mean_1yr_10_RV_1mth2mth_total_1;...
3302     mean_1yr_1_IV_1mth2mth_total_1 mean_1yr_2_IV_1mth2mth_total_1↵
     mean_1yr_3_IV_1mth2mth_total_1 mean_1yr_4_IV_1mth2mth_total_1↵
     mean_1yr_5_IV_1mth2mth_total_1...
3303     mean_1yr_6_IV_1mth2mth_total_1 mean_1yr_7_IV_1mth2mth_total_1↵
     mean_1yr_8_IV_1mth2mth_total_1 mean_1yr_9_IV_1mth2mth_total_1↵
     mean_1yr_10_IV_1mth2mth_total_1];
3304
3305 %Repeat the same processes as above using 2yr historical volatilites
3306 decile_2yr_1_call_1mth2mth_return = call_return_percentage_1mth2mth↵
     (decile_2yr_2mth_1);
3307 decile_2yr_2_call_1mth2mth_return = call_return_percentage_1mth2mth↵
     (decile_2yr_2mth_2);
3308 decile_2yr_3_call_1mth2mth_return = call_return_percentage_1mth2mth↵
     (decile_2yr_2mth_3);
3309 decile_2yr_4_call_1mth2mth_return = call_return_percentage_1mth2mth↵
     (decile_2yr_2mth_4);
3310 decile_2yr_5_call_1mth2mth_return = call_return_percentage_1mth2mth↵
     (decile_2yr_2mth_5);
3311 decile_2yr_6_call_1mth2mth_return = call_return_percentage_1mth2mth↵
     (decile_2yr_2mth_6);
3312 decile_2yr_7_call_1mth2mth_return = call_return_percentage_1mth2mth↵
     (decile_2yr_2mth_7);
3313 decile_2yr_8_call_1mth2mth_return = call_return_percentage_1mth2mth↵
     (decile_2yr_2mth_8);
3314 decile_2yr_9_call_1mth2mth_return = call_return_percentage_1mth2mth↵
     (decile_2yr_2mth_9);
3315 decile_2yr_10_call_1mth2mth_return = call_return_percentage_1mth2mth↵
     (decile_2yr_2mth_10);
3316
3317
3318 decile_2yr_1_call_1mth2mth_total_return = opt_percentage_return_2mth_1↵
     (decile_2yr_2mth_1);
3319 decile_2yr_2_call_1mth2mth_total_return = opt_percentage_return_2mth_1↵
     (decile_2yr_2mth_2);
3320 decile_2yr_3_call_1mth2mth_total_return = opt_percentage_return_2mth_1↵
     (decile_2yr_2mth_3);
3321 decile_2yr_4_call_1mth2mth_total_return = opt_percentage_return_2mth_1↵
     (decile_2yr_2mth_4);
3322 decile_2yr_5_call_1mth2mth_total_return = opt_percentage_return_2mth_1↵
     (decile_2yr_2mth_5);
3323 decile_2yr_6_call_1mth2mth_total_return = opt_percentage_return_2mth_1↵
     (decile_2yr_2mth_6);
3324 decile_2yr_7_call_1mth2mth_total_return = opt_percentage_return_2mth_1↵
     (decile_2yr_2mth_7);
```

```
3325 decile_2yr_8_call_1mth2mth_total_return = opt_percentage_return_2mth_1↵
(decile_2yr_2mth_8);
3326 decile_2yr_9_call_1mth2mth_total_return = opt_percentage_return_2mth_1↵
(decile_2yr_2mth_9);
3327 decile_2yr_10_call_1mth2mth_total_return = opt_percentage_return_2mth_1↵
(decile_2yr_2mth_10);
3328
3329 decile_2yr_1_call_diff_RV_1mth2mth = diff_2yrRV_1mth2mth(decile_2yr_2mth_1);
3330 decile_2yr_2_call_diff_RV_1mth2mth = diff_2yrRV_1mth2mth(decile_2yr_2mth_2);
3331 decile_2yr_3_call_diff_RV_1mth2mth = diff_2yrRV_1mth2mth(decile_2yr_2mth_3);
3332 decile_2yr_4_call_diff_RV_1mth2mth = diff_2yrRV_1mth2mth(decile_2yr_2mth_4);
3333 decile_2yr_5_call_diff_RV_1mth2mth = diff_2yrRV_1mth2mth(decile_2yr_2mth_5);
3334 decile_2yr_6_call_diff_RV_1mth2mth = diff_2yrRV_1mth2mth(decile_2yr_2mth_6);
3335 decile_2yr_7_call_diff_RV_1mth2mth = diff_2yrRV_1mth2mth(decile_2yr_2mth_7);
3336 decile_2yr_8_call_diff_RV_1mth2mth = diff_2yrRV_1mth2mth(decile_2yr_2mth_8);
3337 decile_2yr_9_call_diff_RV_1mth2mth = diff_2yrRV_1mth2mth(decile_2yr_2mth_9);
3338 decile_2yr_10_call_diff_RV_1mth2mth = diff_2yrRV_1mth2mth(decile_2yr_2mth_10);
3339
3340 decile_2yr_1_RV_1mth2mth = Hist_Vol_2yr_1mth2mth(decile_2yr_2mth_1);
3341 decile_2yr_2_RV_1mth2mth = Hist_Vol_2yr_1mth2mth(decile_2yr_2mth_2);
3342 decile_2yr_3_RV_1mth2mth = Hist_Vol_2yr_1mth2mth(decile_2yr_2mth_3);
3343 decile_2yr_4_RV_1mth2mth = Hist_Vol_2yr_1mth2mth(decile_2yr_2mth_4);
3344 decile_2yr_5_RV_1mth2mth = Hist_Vol_2yr_1mth2mth(decile_2yr_2mth_5);
3345 decile_2yr_6_RV_1mth2mth = Hist_Vol_2yr_1mth2mth(decile_2yr_2mth_6);
3346 decile_2yr_7_RV_1mth2mth = Hist_Vol_2yr_1mth2mth(decile_2yr_2mth_7);
3347 decile_2yr_8_RV_1mth2mth = Hist_Vol_2yr_1mth2mth(decile_2yr_2mth_8);
3348 decile_2yr_9_RV_1mth2mth = Hist_Vol_2yr_1mth2mth(decile_2yr_2mth_9);
3349 decile_2yr_10_RV_1mth2mth = Hist_Vol_2yr_1mth2mth(decile_2yr_2mth_10);
3350
3351 decile_2yr_1_IV_1mth2mth = bsvolatility_1mth2mth(decile_2yr_2mth_1);
3352 decile_2yr_2_IV_1mth2mth = bsvolatility_1mth2mth(decile_2yr_2mth_2);
3353 decile_2yr_3_IV_1mth2mth = bsvolatility_1mth2mth(decile_2yr_2mth_3);
3354 decile_2yr_4_IV_1mth2mth = bsvolatility_1mth2mth(decile_2yr_2mth_4);
3355 decile_2yr_5_IV_1mth2mth = bsvolatility_1mth2mth(decile_2yr_2mth_5);
3356 decile_2yr_6_IV_1mth2mth = bsvolatility_1mth2mth(decile_2yr_2mth_6);
3357 decile_2yr_7_IV_1mth2mth = bsvolatility_1mth2mth(decile_2yr_2mth_7);
3358 decile_2yr_8_IV_1mth2mth = bsvolatility_1mth2mth(decile_2yr_2mth_8);
3359 decile_2yr_9_IV_1mth2mth = bsvolatility_1mth2mth(decile_2yr_2mth_9);
3360 decile_2yr_10_IV_1mth2mth = bsvolatility_1mth2mth(decile_2yr_2mth_10);
3361
3362
3363 decile_2yr_1_call_diff_RV_1mth2mth_total = diff_2yrRV_2mth(decile_2yr_2mth_1);
3364 decile_2yr_2_call_diff_RV_1mth2mth_total = diff_2yrRV_2mth(decile_2yr_2mth_2);
3365 decile_2yr_3_call_diff_RV_1mth2mth_total = diff_2yrRV_2mth(decile_2yr_2mth_3);
3366 decile_2yr_4_call_diff_RV_1mth2mth_total = diff_2yrRV_2mth(decile_2yr_2mth_4);
3367 decile_2yr_5_call_diff_RV_1mth2mth_total = diff_2yrRV_2mth(decile_2yr_2mth_5);
3368 decile_2yr_6_call_diff_RV_1mth2mth_total = diff_2yrRV_2mth(decile_2yr_2mth_6);
3369 decile_2yr_7_call_diff_RV_1mth2mth_total = diff_2yrRV_2mth(decile_2yr_2mth_7);
3370 decile_2yr_8_call_diff_RV_1mth2mth_total = diff_2yrRV_2mth(decile_2yr_2mth_8);
3371 decile_2yr_9_call_diff_RV_1mth2mth_total = diff_2yrRV_2mth(decile_2yr_2mth_9);
3372 decile_2yr_10_call_diff_RV_1mth2mth_total = diff_2yrRV_2mth(decile_2yr_2mth_10);
3373
3374 decile_2yr_1_RV_1mth2mth_total = Hist_Vol_2yr_2mth_1(decile_2yr_2mth_1);
3375 decile_2yr_2_RV_1mth2mth_total = Hist_Vol_2yr_2mth_1(decile_2yr_2mth_2);
```

```
3376 decile_2yr_3_RV_1mth2mth_total = Hist_Vol_2yr_2mth_1(decile_2yr_2mth_3);
3377 decile_2yr_4_RV_1mth2mth_total = Hist_Vol_2yr_2mth_1(decile_2yr_2mth_4);
3378 decile_2yr_5_RV_1mth2mth_total = Hist_Vol_2yr_2mth_1(decile_2yr_2mth_5);
3379 decile_2yr_6_RV_1mth2mth_total = Hist_Vol_2yr_2mth_1(decile_2yr_2mth_6);
3380 decile_2yr_7_RV_1mth2mth_total = Hist_Vol_2yr_2mth_1(decile_2yr_2mth_7);
3381 decile_2yr_8_RV_1mth2mth_total = Hist_Vol_2yr_2mth_1(decile_2yr_2mth_8);
3382 decile_2yr_9_RV_1mth2mth_total = Hist_Vol_2yr_2mth_1(decile_2yr_2mth_9);
3383 decile_2yr_10_RV_1mth2mth_total = Hist_Vol_2yr_2mth_1(decile_2yr_2mth_10);
3384
3385 decile_2yr_1_IV_1mth2mth_total = bsvolatility_2mth_1(decile_2yr_2mth_1);
3386 decile_2yr_2_IV_1mth2mth_total = bsvolatility_2mth_1(decile_2yr_2mth_2);
3387 decile_2yr_3_IV_1mth2mth_total = bsvolatility_2mth_1(decile_2yr_2mth_3);
3388 decile_2yr_4_IV_1mth2mth_total = bsvolatility_2mth_1(decile_2yr_2mth_4);
3389 decile_2yr_5_IV_1mth2mth_total = bsvolatility_2mth_1(decile_2yr_2mth_5);
3390 decile_2yr_6_IV_1mth2mth_total = bsvolatility_2mth_1(decile_2yr_2mth_6);
3391 decile_2yr_7_IV_1mth2mth_total = bsvolatility_2mth_1(decile_2yr_2mth_7);
3392 decile_2yr_8_IV_1mth2mth_total = bsvolatility_2mth_1(decile_2yr_2mth_8);
3393 decile_2yr_9_IV_1mth2mth_total = bsvolatility_2mth_1(decile_2yr_2mth_9);
3394 decile_2yr_10_IV_1mth2mth_total = bsvolatility_2mth_1(decile_2yr_2mth_10);
3395
3396
3397 logic_2yr_1_1mth2mth=(isnan(decile_2yr_1_call_1mth2mth_return)|isnan↵
(decile_2yr_1_call_diff_RV_1mth2mth));
3398 decile_2yr_1_call_1mth2mth_return_1=decile_2yr_1_call_1mth2mth_return;
3399 decile_2yr_1_call_1mth2mth_return_1(logic_2yr_1_1mth2mth)=[];
3400↵
decile_2yr_1_call_1mth2mth_total_return_1=decile_2yr_1_call_1mth2mth_total_return;
3401 decile_2yr_1_call_1mth2mth_total_return_1(logic_2yr_1_1mth2mth)=[];
3402 decile_2yr_1_call_diff_RV_1mth2mth_1=decile_2yr_1_call_diff_RV_1mth2mth;
3403 decile_2yr_1_call_diff_RV_1mth2mth_1(logic_2yr_1_1mth2mth)=[];
3404 decile_2yr_1_RV_1mth2mth_1=decile_2yr_1_RV_1mth2mth;
3405 decile_2yr_1_RV_1mth2mth_1(logic_2yr_1_1mth2mth)=[];
3406 decile_2yr_1_IV_1mth2mth_1=decile_2yr_1_IV_1mth2mth;
3407 decile_2yr_1_IV_1mth2mth_1(logic_2yr_1_1mth2mth)=[];
3408↵
decile_2yr_1_call_diff_RV_1mth2mth_total_1=decile_2yr_1_call_diff_RV_1mth2mth_total;
3409 decile_2yr_1_call_diff_RV_1mth2mth_total_1(logic_2yr_1_1mth2mth)=[];
3410 decile_2yr_1_RV_1mth2mth_total_1=decile_2yr_1_RV_1mth2mth_total;
3411 decile_2yr_1_RV_1mth2mth_total_1(logic_2yr_1_1mth2mth)=[];
3412 decile_2yr_1_IV_1mth2mth_total_1=decile_2yr_1_IV_1mth2mth_total;
3413 decile_2yr_1_IV_1mth2mth_total_1(logic_2yr_1_1mth2mth)=[];
3414
3415
3416 logic_2yr_2_1mth2mth=(isnan(decile_2yr_2_call_1mth2mth_return)|isnan↵
(decile_2yr_2_call_diff_RV_1mth2mth));
3417 decile_2yr_2_call_1mth2mth_return_1=decile_2yr_2_call_1mth2mth_return;
3418 decile_2yr_2_call_1mth2mth_return_1(logic_2yr_2_1mth2mth)=[];
3419↵
decile_2yr_2_call_1mth2mth_total_return_1=decile_2yr_2_call_1mth2mth_total_return;
3420 decile_2yr_2_call_1mth2mth_total_return_1(logic_2yr_2_1mth2mth)=[];
3421 decile_2yr_2_call_diff_RV_1mth2mth_1=decile_2yr_2_call_diff_RV_1mth2mth;
3422 decile_2yr_2_call_diff_RV_1mth2mth_1(logic_2yr_2_1mth2mth)=[];
3423 decile_2yr_2_RV_1mth2mth_1=decile_2yr_2_RV_1mth2mth;
3424 decile_2yr_2_RV_1mth2mth_1(logic_2yr_2_1mth2mth)=[];
```

```
3425 decile_2yr_2_IV_1mth2mth_1=decile_2yr_2_IV_1mth2mth;
3426 decile_2yr_2_IV_1mth2mth_1(logic_2yr_2_1mth2mth)=[];
3427↙
decile_2yr_2_call_diff_RV_1mth2mth_total_1=decile_2yr_2_call_diff_RV_1mth2mth_total;
3428 decile_2yr_2_call_diff_RV_1mth2mth_total_1(logic_2yr_2_1mth2mth)=[];
3429 decile_2yr_2_RV_1mth2mth_total_1=decile_2yr_2_RV_1mth2mth_total;
3430 decile_2yr_2_RV_1mth2mth_total_1(logic_2yr_2_1mth2mth)=[];
3431 decile_2yr_2_IV_1mth2mth_total_1=decile_2yr_2_IV_1mth2mth_total;
3432 decile_2yr_2_IV_1mth2mth_total_1(logic_2yr_2_1mth2mth)=[];
3433
3434 logic_2yr_3_1mth2mth=(isnan(decile_2yr_3_call_1mth2mth_return)|isnan↙
(decile_2yr_3_call_diff_RV_1mth2mth));
3435 decile_2yr_3_call_1mth2mth_return_1=decile_2yr_3_call_1mth2mth_return;
3436 decile_2yr_3_call_1mth2mth_return_1(logic_2yr_3_1mth2mth)=[];
3437↙
decile_2yr_3_call_1mth2mth_total_return_1=decile_2yr_3_call_1mth2mth_total_return;
3438 decile_2yr_3_call_1mth2mth_total_return_1(logic_2yr_3_1mth2mth)=[];
3439 decile_2yr_3_call_diff_RV_1mth2mth_1=decile_2yr_3_call_diff_RV_1mth2mth;
3440 decile_2yr_3_call_diff_RV_1mth2mth_1(logic_2yr_3_1mth2mth)=[];
3441 decile_2yr_3_RV_1mth2mth_1=decile_2yr_3_RV_1mth2mth;
3442 decile_2yr_3_RV_1mth2mth_1(logic_2yr_3_1mth2mth)=[];
3443 decile_2yr_3_IV_1mth2mth_1=decile_2yr_3_IV_1mth2mth;
3444 decile_2yr_3_IV_1mth2mth_1(logic_2yr_3_1mth2mth)=[];
3445↙
decile_2yr_3_call_diff_RV_1mth2mth_total_1=decile_2yr_3_call_diff_RV_1mth2mth_total;
3446 decile_2yr_3_call_diff_RV_1mth2mth_total_1(logic_2yr_3_1mth2mth)=[];
3447 decile_2yr_3_RV_1mth2mth_total_1=decile_2yr_3_RV_1mth2mth_total;
3448 decile_2yr_3_RV_1mth2mth_total_1(logic_2yr_3_1mth2mth)=[];
3449 decile_2yr_3_IV_1mth2mth_total_1=decile_2yr_3_IV_1mth2mth_total;
3450 decile_2yr_3_IV_1mth2mth_total_1(logic_2yr_3_1mth2mth)=[];
3451
3452 logic_2yr_4_1mth2mth=(isnan(decile_2yr_4_call_1mth2mth_return)|isnan↙
(decile_2yr_4_call_diff_RV_1mth2mth));
3453 decile_2yr_4_call_1mth2mth_return_1=decile_2yr_4_call_1mth2mth_return;
3454 decile_2yr_4_call_1mth2mth_return_1(logic_2yr_4_1mth2mth)=[];
3455↙
decile_2yr_4_call_1mth2mth_total_return_1=decile_2yr_4_call_1mth2mth_total_return;
3456 decile_2yr_4_call_1mth2mth_total_return_1(logic_2yr_4_1mth2mth)=[];
3457 decile_2yr_4_call_diff_RV_1mth2mth_1=decile_2yr_4_call_diff_RV_1mth2mth;
3458 decile_2yr_4_call_diff_RV_1mth2mth_1(logic_2yr_4_1mth2mth)=[];
3459 decile_2yr_4_RV_1mth2mth_1=decile_2yr_4_RV_1mth2mth;
3460 decile_2yr_4_RV_1mth2mth_1(logic_2yr_4_1mth2mth)=[];
3461 decile_2yr_4_IV_1mth2mth_1=decile_2yr_4_IV_1mth2mth;
3462 decile_2yr_4_IV_1mth2mth_1(logic_2yr_4_1mth2mth)=[];
3463↙
decile_2yr_4_call_diff_RV_1mth2mth_total_1=decile_2yr_4_call_diff_RV_1mth2mth_total;
3464 decile_2yr_4_call_diff_RV_1mth2mth_total_1(logic_2yr_4_1mth2mth)=[];
3465 decile_2yr_4_RV_1mth2mth_total_1=decile_2yr_4_RV_1mth2mth_total;
3466 decile_2yr_4_RV_1mth2mth_total_1(logic_2yr_4_1mth2mth)=[];
3467 decile_2yr_4_IV_1mth2mth_total_1=decile_2yr_4_IV_1mth2mth_total;
3468 decile_2yr_4_IV_1mth2mth_total_1(logic_2yr_4_1mth2mth)=[];
3469
3470 logic_2yr_5_1mth2mth=(isnan(decile_2yr_5_call_1mth2mth_return)|isnan↙
(decile_2yr_5_call_diff_RV_1mth2mth));
```

```
3471 decile_2yr_5_call_1mth2mth_return_1=decile_2yr_5_call_1mth2mth_return;
3472 decile_2yr_5_call_1mth2mth_return_1(logic_2yr_5_1mth2mth)=[];
3473↙
decile_2yr_5_call_1mth2mth_total_return_1=decile_2yr_5_call_1mth2mth_total_return;
3474 decile_2yr_5_call_1mth2mth_total_return_1(logic_2yr_5_1mth2mth)=[];
3475 decile_2yr_5_call_diff_RV_1mth2mth_1=decile_2yr_5_call_diff_RV_1mth2mth;
3476 decile_2yr_5_call_diff_RV_1mth2mth_1(logic_2yr_5_1mth2mth)=[];
3477 decile_2yr_5_RV_1mth2mth_1=decile_2yr_5_RV_1mth2mth;
3478 decile_2yr_5_RV_1mth2mth_1(logic_2yr_5_1mth2mth)=[];
3479 decile_2yr_5_IV_1mth2mth_1=decile_2yr_5_IV_1mth2mth;
3480 decile_2yr_5_IV_1mth2mth_1(logic_2yr_5_1mth2mth)=[];
3481↙
decile_2yr_5_call_diff_RV_1mth2mth_total_1=decile_2yr_5_call_diff_RV_1mth2mth_total;
3482 decile_2yr_5_call_diff_RV_1mth2mth_total_1(logic_2yr_5_1mth2mth)=[];
3483 decile_2yr_5_RV_1mth2mth_total_1=decile_2yr_5_RV_1mth2mth_total;
3484 decile_2yr_5_RV_1mth2mth_total_1(logic_2yr_5_1mth2mth)=[];
3485 decile_2yr_5_IV_1mth2mth_total_1=decile_2yr_5_IV_1mth2mth_total;
3486 decile_2yr_5_IV_1mth2mth_total_1(logic_2yr_5_1mth2mth)=[];
3487
3488 logic_2yr_6_1mth2mth=(isnan(decile_2yr_6_call_1mth2mth_return)|isnan↙
(decile_2yr_6_call_diff_RV_1mth2mth));
3489 decile_2yr_6_call_1mth2mth_return_1=decile_2yr_6_call_1mth2mth_return;
3490 decile_2yr_6_call_1mth2mth_return_1(logic_2yr_6_1mth2mth)=[];
3491↙
decile_2yr_6_call_1mth2mth_total_return_1=decile_2yr_6_call_1mth2mth_total_return;
3492 decile_2yr_6_call_1mth2mth_total_return_1(logic_2yr_6_1mth2mth)=[];
3493 decile_2yr_6_call_diff_RV_1mth2mth_1=decile_2yr_6_call_diff_RV_1mth2mth;
3494 decile_2yr_6_call_diff_RV_1mth2mth_1(logic_2yr_6_1mth2mth)=[];
3495 decile_2yr_6_RV_1mth2mth_1=decile_2yr_6_RV_1mth2mth;
3496 decile_2yr_6_RV_1mth2mth_1(logic_2yr_6_1mth2mth)=[];
3497 decile_2yr_6_IV_1mth2mth_1=decile_2yr_6_IV_1mth2mth;
3498 decile_2yr_6_IV_1mth2mth_1(logic_2yr_6_1mth2mth)=[];
3499↙
decile_2yr_6_call_diff_RV_1mth2mth_total_1=decile_2yr_6_call_diff_RV_1mth2mth_total;
3500 decile_2yr_6_call_diff_RV_1mth2mth_total_1(logic_2yr_6_1mth2mth)=[];
3501 decile_2yr_6_RV_1mth2mth_total_1=decile_2yr_6_RV_1mth2mth_total;
3502 decile_2yr_6_RV_1mth2mth_total_1(logic_2yr_6_1mth2mth)=[];
3503 decile_2yr_6_IV_1mth2mth_total_1=decile_2yr_6_IV_1mth2mth_total;
3504 decile_2yr_6_IV_1mth2mth_total_1(logic_2yr_6_1mth2mth)=[];
3505
3506 logic_2yr_7_1mth2mth=(isnan(decile_2yr_7_call_1mth2mth_return)|isnan↙
(decile_2yr_7_call_diff_RV_1mth2mth));
3507 decile_2yr_7_call_1mth2mth_return_1=decile_2yr_7_call_1mth2mth_return;
3508↙
decile_2yr_7_call_1mth2mth_total_return_1=decile_2yr_7_call_1mth2mth_total_return;
3509 decile_2yr_7_call_1mth2mth_total_return_1(logic_2yr_7_1mth2mth)=[];
3510 decile_2yr_7_call_1mth2mth_return_1(logic_2yr_7_1mth2mth)=[];
3511 decile_2yr_7_call_diff_RV_1mth2mth_1=decile_2yr_7_call_diff_RV_1mth2mth;
3512 decile_2yr_7_call_diff_RV_1mth2mth_1(logic_2yr_7_1mth2mth)=[];
3513 decile_2yr_7_RV_1mth2mth_1=decile_2yr_7_RV_1mth2mth;
3514 decile_2yr_7_RV_1mth2mth_1(logic_2yr_7_1mth2mth)=[];
3515 decile_2yr_7_IV_1mth2mth_1=decile_2yr_7_IV_1mth2mth;
3516 decile_2yr_7_IV_1mth2mth_1(logic_2yr_7_1mth2mth)=[];
3517↙
```

```
decile_2yr_7_call_diff_RV_1mth2mth_total_1=decile_2yr_7_call_diff_RV_1mth2mth_total;
3518 decile_2yr_7_call_diff_RV_1mth2mth_total_1(logic_2yr_7_1mth2mth)=[];
3519 decile_2yr_7_RV_1mth2mth_total_1=decile_2yr_7_RV_1mth2mth_total;
3520 decile_2yr_7_RV_1mth2mth_total_1(logic_2yr_7_1mth2mth)=[];
3521 decile_2yr_7_IV_1mth2mth_total_1=decile_2yr_7_IV_1mth2mth_total;
3522 decile_2yr_7_IV_1mth2mth_total_1(logic_2yr_7_1mth2mth)=[];
3523
3524 logic_2yr_8_1mth2mth=(isnan(decile_2yr_8_call_1mth2mth_return)|isnan↙
(decile_2yr_8_call_diff_RV_1mth2mth));
3525 decile_2yr_8_call_1mth2mth_return_1=decile_2yr_8_call_1mth2mth_return;
3526↙
decile_2yr_8_call_1mth2mth_total_return_1=decile_2yr_8_call_1mth2mth_total_return;
3527 decile_2yr_8_call_1mth2mth_total_return_1(logic_2yr_8_1mth2mth)=[];
3528 decile_2yr_8_call_1mth2mth_return_1(logic_2yr_8_1mth2mth)=[];
3529 decile_2yr_8_call_diff_RV_1mth2mth_1=decile_2yr_8_call_diff_RV_1mth2mth;
3530 decile_2yr_8_call_diff_RV_1mth2mth_1(logic_2yr_8_1mth2mth)=[];
3531 decile_2yr_8_RV_1mth2mth_1=decile_2yr_8_RV_1mth2mth;
3532 decile_2yr_8_RV_1mth2mth_1(logic_2yr_8_1mth2mth)=[];
3533 decile_2yr_8_IV_1mth2mth_1=decile_2yr_8_IV_1mth2mth;
3534 decile_2yr_8_IV_1mth2mth_1(logic_2yr_8_1mth2mth)=[];
3535↙
decile_2yr_8_call_diff_RV_1mth2mth_total_1=decile_2yr_8_call_diff_RV_1mth2mth_total;
3536 decile_2yr_8_call_diff_RV_1mth2mth_total_1(logic_2yr_8_1mth2mth)=[];
3537 decile_2yr_8_RV_1mth2mth_total_1=decile_2yr_8_RV_1mth2mth_total;
3538 decile_2yr_8_RV_1mth2mth_total_1(logic_2yr_8_1mth2mth)=[];
3539 decile_2yr_8_IV_1mth2mth_total_1=decile_2yr_8_IV_1mth2mth_total;
3540 decile_2yr_8_IV_1mth2mth_total_1(logic_2yr_8_1mth2mth)=[];
3541
3542 logic_2yr_9_1mth2mth=(isnan(decile_2yr_9_call_1mth2mth_return)|isnan↙
(decile_2yr_9_call_diff_RV_1mth2mth));
3543 decile_2yr_9_call_1mth2mth_return_1=decile_2yr_9_call_1mth2mth_return;
3544 decile_2yr_9_call_1mth2mth_return_1(logic_2yr_9_1mth2mth)=[];
3545↙
decile_2yr_9_call_1mth2mth_total_return_1=decile_2yr_9_call_1mth2mth_total_return;
3546 decile_2yr_9_call_1mth2mth_total_return_1(logic_2yr_9_1mth2mth)=[];
3547 decile_2yr_9_call_diff_RV_1mth2mth_1=decile_2yr_9_call_diff_RV_1mth2mth;
3548 decile_2yr_9_call_diff_RV_1mth2mth_1(logic_2yr_9_1mth2mth)=[];
3549 decile_2yr_9_RV_1mth2mth_1=decile_2yr_9_RV_1mth2mth;
3550 decile_2yr_9_RV_1mth2mth_1(logic_2yr_9_1mth2mth)=[];
3551 decile_2yr_9_IV_1mth2mth_1=decile_2yr_9_IV_1mth2mth;
3552 decile_2yr_9_IV_1mth2mth_1(logic_2yr_9_1mth2mth)=[];
3553↙
decile_2yr_9_call_diff_RV_1mth2mth_total_1=decile_2yr_9_call_diff_RV_1mth2mth_total;
3554 decile_2yr_9_call_diff_RV_1mth2mth_total_1(logic_2yr_9_1mth2mth)=[];
3555 decile_2yr_9_RV_1mth2mth_total_1=decile_2yr_9_RV_1mth2mth_total;
3556 decile_2yr_9_RV_1mth2mth_total_1(logic_2yr_9_1mth2mth)=[];
3557 decile_2yr_9_IV_1mth2mth_total_1=decile_2yr_9_IV_1mth2mth_total;
3558 decile_2yr_9_IV_1mth2mth_total_1(logic_2yr_9_1mth2mth)=[];
3559
3560 logic_2yr_10_1mth2mth=(isnan(decile_2yr_10_call_1mth2mth_return)|isnan↙
(decile_2yr_10_call_diff_RV_1mth2mth));
3561 decile_2yr_10_call_1mth2mth_return_1=decile_2yr_10_call_1mth2mth_return;
3562 decile_2yr_10_call_1mth2mth_return_1(logic_2yr_10_1mth2mth)=[];
3563↙
```

```
decile_2yr_10_call_1mth2mth_total_return_1=decile_2yr_10_call_1mth2mth_total_return;
3564 decile_2yr_10_call_1mth2mth_total_return_1(logic_2yr_10_1mth2mth)=[];
3565 decile_2yr_10_call_diff_RV_1mth2mth_1=decile_2yr_10_call_diff_RV_1mth2mth;
3566 decile_2yr_10_call_diff_RV_1mth2mth_1(logic_2yr_10_1mth2mth)=[];
3567 decile_2yr_10_RV_1mth2mth_1=decile_2yr_10_RV_1mth2mth;
3568 decile_2yr_10_RV_1mth2mth_1(logic_2yr_10_1mth2mth)=[];
3569 decile_2yr_10_IV_1mth2mth_1=decile_2yr_10_IV_1mth2mth;
3570 decile_2yr_10_IV_1mth2mth_1(logic_2yr_10_1mth2mth)=[];
3571↵
decile_2yr_10_call_diff_RV_1mth2mth_total_1=decile_2yr_10_call_diff_RV_1mth2mth_total;
3572 decile_2yr_10_call_diff_RV_1mth2mth_total_1(logic_2yr_10_1mth2mth)=[];
3573 decile_2yr_10_RV_1mth2mth_total_1=decile_2yr_10_RV_1mth2mth_total;
3574 decile_2yr_10_RV_1mth2mth_total_1(logic_2yr_10_1mth2mth)=[];
3575 decile_2yr_10_IV_1mth2mth_total_1=decile_2yr_10_IV_1mth2mth_total;
3576 decile_2yr_10_IV_1mth2mth_total_1(logic_2yr_10_1mth2mth)=[];
3577
3578
3579 mean_2yr_1_call_1mth2mth_return_1 = mean(decile_2yr_1_call_1mth2mth_return_1);
3580 mean_2yr_2_call_1mth2mth_return_1 = mean(decile_2yr_2_call_1mth2mth_return_1);
3581 mean_2yr_3_call_1mth2mth_return_1 = mean(decile_2yr_3_call_1mth2mth_return_1);
3582 mean_2yr_4_call_1mth2mth_return_1 = mean(decile_2yr_4_call_1mth2mth_return_1);
3583 mean_2yr_5_call_1mth2mth_return_1 = mean(decile_2yr_5_call_1mth2mth_return_1);
3584 mean_2yr_6_call_1mth2mth_return_1 = mean(decile_2yr_6_call_1mth2mth_return_1);
3585 mean_2yr_7_call_1mth2mth_return_1 = mean(decile_2yr_7_call_1mth2mth_return_1);
3586 mean_2yr_8_call_1mth2mth_return_1 = mean(decile_2yr_8_call_1mth2mth_return_1);
3587 mean_2yr_9_call_1mth2mth_return_1 = mean(decile_2yr_9_call_1mth2mth_return_1);
3588 mean_2yr_10_call_1mth2mth_return_1 = mean(decile_2yr_10_call_1mth2mth_return_1);
3589
3590 mean_2yr_1_call_1mth2mth_total_return_1 = mean↵
(decile_2yr_1_call_1mth2mth_total_return_1);
3591 mean_2yr_2_call_1mth2mth_total_return_1 = mean↵
(decile_2yr_2_call_1mth2mth_total_return_1);
3592 mean_2yr_3_call_1mth2mth_total_return_1 = mean↵
(decile_2yr_3_call_1mth2mth_total_return_1);
3593 mean_2yr_4_call_1mth2mth_total_return_1 = mean↵
(decile_2yr_4_call_1mth2mth_total_return_1);
3594 mean_2yr_5_call_1mth2mth_total_return_1 = mean↵
(decile_2yr_5_call_1mth2mth_total_return_1);
3595 mean_2yr_6_call_1mth2mth_total_return_1 = mean↵
(decile_2yr_6_call_1mth2mth_total_return_1);
3596 mean_2yr_7_call_1mth2mth_total_return_1 = mean↵
(decile_2yr_7_call_1mth2mth_total_return_1);
3597 mean_2yr_8_call_1mth2mth_total_return_1 = mean↵
(decile_2yr_8_call_1mth2mth_total_return_1);
3598 mean_2yr_9_call_1mth2mth_total_return_1 = mean↵
(decile_2yr_9_call_1mth2mth_total_return_1);
3599 mean_2yr_10_call_1mth2mth_total_return_1 = mean↵
(decile_2yr_10_call_1mth2mth_total_return_1);
3600
3601 mean_2yr_1_call_diff_RV_1mth2mth_1 = mean(decile_2yr_1_call_diff_RV_1mth2mth_1);
3602 mean_2yr_2_call_diff_RV_1mth2mth_1 = mean(decile_2yr_2_call_diff_RV_1mth2mth_1);
3603 mean_2yr_3_call_diff_RV_1mth2mth_1 = mean(decile_2yr_3_call_diff_RV_1mth2mth_1);
3604 mean_2yr_4_call_diff_RV_1mth2mth_1 = mean(decile_2yr_4_call_diff_RV_1mth2mth_1);
3605 mean_2yr_5_call_diff_RV_1mth2mth_1 = mean(decile_2yr_5_call_diff_RV_1mth2mth_1);
```

```
3606 mean_2yr_6_call_diff_RV_1mth2mth_1 = mean(decile_2yr_6_call_diff_RV_1mth2mth_1);
3607 mean_2yr_7_call_diff_RV_1mth2mth_1 = mean(decile_2yr_7_call_diff_RV_1mth2mth_1);
3608 mean_2yr_8_call_diff_RV_1mth2mth_1 = mean(decile_2yr_8_call_diff_RV_1mth2mth_1);
3609 mean_2yr_9_call_diff_RV_1mth2mth_1 = mean(decile_2yr_9_call_diff_RV_1mth2mth_1);
3610 mean_2yr_10_call_diff_RV_1mth2mth_1 = mean↵
(decile_2yr_10_call_diff_RV_1mth2mth_1);
3611
3612 std_2yr_1_call_diff_RV_1mth2mth_1 = std(decile_2yr_1_call_diff_RV_1mth2mth_1);
3613 std_2yr_2_call_diff_RV_1mth2mth_1 = std(decile_2yr_2_call_diff_RV_1mth2mth_1);
3614 std_2yr_3_call_diff_RV_1mth2mth_1 = std(decile_2yr_3_call_diff_RV_1mth2mth_1);
3615 std_2yr_4_call_diff_RV_1mth2mth_1 = std(decile_2yr_4_call_diff_RV_1mth2mth_1);
3616 std_2yr_5_call_diff_RV_1mth2mth_1 = std(decile_2yr_5_call_diff_RV_1mth2mth_1);
3617 std_2yr_6_call_diff_RV_1mth2mth_1 = std(decile_2yr_6_call_diff_RV_1mth2mth_1);
3618 std_2yr_7_call_diff_RV_1mth2mth_1 = std(decile_2yr_7_call_diff_RV_1mth2mth_1);
3619 std_2yr_8_call_diff_RV_1mth2mth_1 = std(decile_2yr_8_call_diff_RV_1mth2mth_1);
3620 std_2yr_9_call_diff_RV_1mth2mth_1 = std(decile_2yr_9_call_diff_RV_1mth2mth_1);
3621 std_2yr_10_call_diff_RV_1mth2mth_1 = std(decile_2yr_10_call_diff_RV_1mth2mth_1);
3622
3623 mean_2yr_1_RV_1mth2mth_1 = mean(decile_2yr_1_RV_1mth2mth_1);
3624 mean_2yr_2_RV_1mth2mth_1 = mean(decile_2yr_2_RV_1mth2mth_1);
3625 mean_2yr_3_RV_1mth2mth_1 = mean(decile_2yr_3_RV_1mth2mth_1);
3626 mean_2yr_4_RV_1mth2mth_1 = mean(decile_2yr_4_RV_1mth2mth_1);
3627 mean_2yr_5_RV_1mth2mth_1 = mean(decile_2yr_5_RV_1mth2mth_1);
3628 mean_2yr_6_RV_1mth2mth_1 = mean(decile_2yr_6_RV_1mth2mth_1);
3629 mean_2yr_7_RV_1mth2mth_1 = mean(decile_2yr_7_RV_1mth2mth_1);
3630 mean_2yr_8_RV_1mth2mth_1 = mean(decile_2yr_8_RV_1mth2mth_1);
3631 mean_2yr_9_RV_1mth2mth_1 = mean(decile_2yr_9_RV_1mth2mth_1);
3632 mean_2yr_10_RV_1mth2mth_1 = mean(decile_2yr_10_RV_1mth2mth_1);
3633
3634 mean_2yr_1_IV_1mth2mth_1 = mean(decile_2yr_1_IV_1mth2mth_1);
3635 mean_2yr_2_IV_1mth2mth_1 = mean(decile_2yr_2_IV_1mth2mth_1);
3636 mean_2yr_3_IV_1mth2mth_1 = mean(decile_2yr_3_IV_1mth2mth_1);
3637 mean_2yr_4_IV_1mth2mth_1 = mean(decile_2yr_4_IV_1mth2mth_1);
3638 mean_2yr_5_IV_1mth2mth_1 = mean(decile_2yr_5_IV_1mth2mth_1);
3639 mean_2yr_6_IV_1mth2mth_1 = mean(decile_2yr_6_IV_1mth2mth_1);
3640 mean_2yr_7_IV_1mth2mth_1 = mean(decile_2yr_7_IV_1mth2mth_1);
3641 mean_2yr_8_IV_1mth2mth_1 = mean(decile_2yr_8_IV_1mth2mth_1);
3642 mean_2yr_9_IV_1mth2mth_1 = mean(decile_2yr_9_IV_1mth2mth_1);
3643 mean_2yr_10_IV_1mth2mth_1 = mean(decile_2yr_10_IV_1mth2mth_1);
3644
3645 mean_2yr_1_call_diff_RV_1mth2mth_total_1 = mean↵
(decile_2yr_1_call_diff_RV_1mth2mth_total_1);
3646 mean_2yr_2_call_diff_RV_1mth2mth_total_1 = mean↵
(decile_2yr_2_call_diff_RV_1mth2mth_total_1);
3647 mean_2yr_3_call_diff_RV_1mth2mth_total_1 = mean↵
(decile_2yr_3_call_diff_RV_1mth2mth_total_1);
3648 mean_2yr_4_call_diff_RV_1mth2mth_total_1 = mean↵
(decile_2yr_4_call_diff_RV_1mth2mth_total_1);
3649 mean_2yr_5_call_diff_RV_1mth2mth_total_1 = mean↵
(decile_2yr_5_call_diff_RV_1mth2mth_total_1);
3650 mean_2yr_6_call_diff_RV_1mth2mth_total_1 = mean↵
(decile_2yr_6_call_diff_RV_1mth2mth_total_1);
3651 mean_2yr_7_call_diff_RV_1mth2mth_total_1 = mean↵
(decile_2yr_7_call_diff_RV_1mth2mth_total_1);
```

```
3652 mean_2yr_8_call_diff_RV_1mth2mth_total_1 = mean↙
(decile_2yr_8_call_diff_RV_1mth2mth_total_1);
3653 mean_2yr_9_call_diff_RV_1mth2mth_total_1 = mean↙
(decile_2yr_9_call_diff_RV_1mth2mth_total_1);
3654 mean_2yr_10_call_diff_RV_1mth2mth_total_1 = mean↙
(decile_2yr_10_call_diff_RV_1mth2mth_total_1);
3655
3656 std_2yr_1_call_diff_RV_1mth2mth_total_1 = std↙
(decile_2yr_1_call_diff_RV_1mth2mth_total_1);
3657 std_2yr_2_call_diff_RV_1mth2mth_total_1 = std↙
(decile_2yr_2_call_diff_RV_1mth2mth_total_1);
3658 std_2yr_3_call_diff_RV_1mth2mth_total_1 = std↙
(decile_2yr_3_call_diff_RV_1mth2mth_total_1);
3659 std_2yr_4_call_diff_RV_1mth2mth_total_1 = std↙
(decile_2yr_4_call_diff_RV_1mth2mth_total_1);
3660 std_2yr_5_call_diff_RV_1mth2mth_total_1 = std↙
(decile_2yr_5_call_diff_RV_1mth2mth_total_1);
3661 std_2yr_6_call_diff_RV_1mth2mth_total_1 = std↙
(decile_2yr_6_call_diff_RV_1mth2mth_total_1);
3662 std_2yr_7_call_diff_RV_1mth2mth_total_1 = std↙
(decile_2yr_7_call_diff_RV_1mth2mth_total_1);
3663 std_2yr_8_call_diff_RV_1mth2mth_total_1 = std↙
(decile_2yr_8_call_diff_RV_1mth2mth_total_1);
3664 std_2yr_9_call_diff_RV_1mth2mth_total_1 = std↙
(decile_2yr_9_call_diff_RV_1mth2mth_total_1);
3665 std_2yr_10_call_diff_RV_1mth2mth_total_1 = std↙
(decile_2yr_10_call_diff_RV_1mth2mth_total_1);
3666
3667 mean_2yr_1_RV_1mth2mth_total_1 = mean(decile_2yr_1_RV_1mth2mth_total_1);
3668 mean_2yr_2_RV_1mth2mth_total_1 = mean(decile_2yr_2_RV_1mth2mth_total_1);
3669 mean_2yr_3_RV_1mth2mth_total_1 = mean(decile_2yr_3_RV_1mth2mth_total_1);
3670 mean_2yr_4_RV_1mth2mth_total_1 = mean(decile_2yr_4_RV_1mth2mth_total_1);
3671 mean_2yr_5_RV_1mth2mth_total_1 = mean(decile_2yr_5_RV_1mth2mth_total_1);
3672 mean_2yr_6_RV_1mth2mth_total_1 = mean(decile_2yr_6_RV_1mth2mth_total_1);
3673 mean_2yr_7_RV_1mth2mth_total_1 = mean(decile_2yr_7_RV_1mth2mth_total_1);
3674 mean_2yr_8_RV_1mth2mth_total_1 = mean(decile_2yr_8_RV_1mth2mth_total_1);
3675 mean_2yr_9_RV_1mth2mth_total_1 = mean(decile_2yr_9_RV_1mth2mth_total_1);
3676 mean_2yr_10_RV_1mth2mth_total_1 = mean(decile_2yr_10_RV_1mth2mth_total_1);
3677
3678 mean_2yr_1_IV_1mth2mth_total_1 = mean(decile_2yr_1_IV_1mth2mth_total_1);
3679 mean_2yr_2_IV_1mth2mth_total_1 = mean(decile_2yr_2_IV_1mth2mth_total_1);
3680 mean_2yr_3_IV_1mth2mth_total_1 = mean(decile_2yr_3_IV_1mth2mth_total_1);
3681 mean_2yr_4_IV_1mth2mth_total_1 = mean(decile_2yr_4_IV_1mth2mth_total_1);
3682 mean_2yr_5_IV_1mth2mth_total_1 = mean(decile_2yr_5_IV_1mth2mth_total_1);
3683 mean_2yr_6_IV_1mth2mth_total_1 = mean(decile_2yr_6_IV_1mth2mth_total_1);
3684 mean_2yr_7_IV_1mth2mth_total_1 = mean(decile_2yr_7_IV_1mth2mth_total_1);
3685 mean_2yr_8_IV_1mth2mth_total_1 = mean(decile_2yr_8_IV_1mth2mth_total_1);
3686 mean_2yr_9_IV_1mth2mth_total_1 = mean(decile_2yr_9_IV_1mth2mth_total_1);
3687 mean_2yr_10_IV_1mth2mth_total_1 = mean(decile_2yr_10_IV_1mth2mth_total_1);
3688
3689
3690 [h1_2yr,p1_2yr,ci1_2yr,stats1_2yr] = ttest(decile_2yr_1_call_1mth2mth_return_1,↙
0);
3691 [h2_2yr,p2_2yr,ci2_2yr,stats2_2yr] = ttest(decile_2yr_2_call_1mth2mth_return_1,↙
```

```
     0);
3692 [h3_2yr,p3_2yr,ci3_2yr,stats3_2yr] = ttest(decile_2yr_3_call_1mth2mth_return_1, ↵
     0);
3693 [h4_2yr,p4_2yr,ci4_2yr,stats4_2yr] = ttest(decile_2yr_4_call_1mth2mth_return_1, ↵
     0);
3694 [h5_2yr,p5_2yr,ci5_2yr,stats5_2yr] = ttest(decile_2yr_5_call_1mth2mth_return_1, ↵
     0);
3695 [h6_2yr,p6_2yr,ci6_2yr,stats6_2yr] = ttest(decile_2yr_6_call_1mth2mth_return_1, ↵
     0);
3696 [h7_2yr,p7_2yr,ci7_2yr,stats7_2yr] = ttest(decile_2yr_7_call_1mth2mth_return_1, ↵
     0);
3697 [h8_2yr,p8_2yr,ci8_2yr,stats8_2yr] = ttest(decile_2yr_8_call_1mth2mth_return_1, ↵
     0);
3698 [h9_2yr,p9_2yr,ci9_2yr,stats9_2yr] = ttest(decile_2yr_9_call_1mth2mth_return_1, ↵
     0);
3699 [h10_2yr,p10_2yr,ci10_2yr,stats10_2yr] = ttest ↵
     (decile_2yr_10_call_1mth2mth_return_1,0);
3700
3701
3702 [h1_total_2yr,p1_total_2yr,ci1_total_2yr,stats1_total_2yr] = ttest ↵
     (decile_2yr_1_call_1mth2mth_total_return_1,0);
3703 [h2_total_2yr,p2_total_2yr,ci2_total_2yr,stats2_total_2yr] = ttest ↵
     (decile_2yr_2_call_1mth2mth_total_return_1,0);
3704 [h3_total_2yr,p3_total_2yr,ci3_total_2yr,stats3_total_2yr] = ttest ↵
     (decile_2yr_3_call_1mth2mth_total_return_1,0);
3705 [h4_total_2yr,p4_total_2yr,ci4_total_2yr,stats4_total_2yr] = ttest ↵
     (decile_2yr_4_call_1mth2mth_total_return_1,0);
3706 [h5_total_2yr,p5_total_2yr,ci5_total_2yr,stats5_total_2yr] = ttest ↵
     (decile_2yr_5_call_1mth2mth_total_return_1,0);
3707 [h6_total_2yr,p6_total_2yr,ci6_total_2yr,stats6_total_2yr] = ttest ↵
     (decile_2yr_6_call_1mth2mth_total_return_1,0);
3708 [h7_total_2yr,p7_total_2yr,ci7_total_2yr,stats7_total_2yr] = ttest ↵
     (decile_2yr_7_call_1mth2mth_total_return_1,0);
3709 [h8_total_2yr,p8_total_2yr,ci8_total_2yr,stats8_total_2yr] = ttest ↵
     (decile_2yr_8_call_1mth2mth_total_return_1,0);
3710 [h9_total_2yr,p9_total_2yr,ci9_total_2yr,stats9_total_2yr] = ttest ↵
     (decile_2yr_9_call_1mth2mth_total_return_1,0);
3711 [h10_total_2yr,p10_total_2yr,ci10_total_2yr,stats10_total_2yr] = ttest ↵
     (decile_2yr_10_call_1mth2mth_total_return_1,0);
3712
3713
3714 table9_2yr_1mth2mth = [mean_2yr_1_call_1mth2mth_return_1 ↵
     mean_2yr_2_call_1mth2mth_return_1 mean_2yr_3_call_1mth2mth_return_1 ↵
     mean_2yr_4_call_1mth2mth_return_1 mean_2yr_5_call_1mth2mth_return_1...
3715         mean_2yr_6_call_1mth2mth_return_1 mean_2yr_7_call_1mth2mth_return_1 ↵
     mean_2yr_8_call_1mth2mth_return_1 mean_2yr_9_call_1mth2mth_return_1 ↵
     mean_2yr_10_call_1mth2mth_return_1; ...
3716         stats1_2yr.tstat stats2_2yr.tstat stats3_2yr.tstat stats4_2yr.tstat ↵
     stats5_2yr.tstat stats6_2yr.tstat stats7_2yr.tstat stats8_2yr.tstat stats9_2yr.tstat ↵
     stats10_2yr.tstat];
3717
3718 table9_2yr_total_1mth2mth = [mean_2yr_1_call_1mth2mth_total_return_1 ↵
     mean_2yr_2_call_1mth2mth_total_return_1 mean_2yr_3_call_1mth2mth_total_return_1 ↵
     mean_2yr_4_call_1mth2mth_total_return_1 mean_2yr_5_call_1mth2mth_total_return_1...
```

```
3719          mean_2yr_6_call_1mth2mth_total_return_1↙
mean_2yr_7_call_1mth2mth_total_return_1 mean_2yr_8_call_1mth2mth_total_return_1↙
mean_2yr_9_call_1mth2mth_total_return_1 mean_2yr_10_call_1mth2mth_total_return_1;...
3720          stats1_total_2yr.tstat stats2_total_2yr.tstat stats3_total_2yr.tstat↙
stats4_total_2yr.tstat stats5_total_2yr.tstat stats6_total_2yr.tstat stats7_total_2yr.↙
tstat stats8_total_2yr.tstat stats9_total_2yr.tstat stats10_total_2yr.tstat];
3721
3722
3723
3724 table8_2yr_1mth2mth = [mean_2yr_1_call_diff_RV_1mth2mth_1↙
mean_2yr_2_call_diff_RV_1mth2mth_1 mean_2yr_3_call_diff_RV_1mth2mth_1↙
mean_2yr_4_call_diff_RV_1mth2mth_1 mean_2yr_5_call_diff_RV_1mth2mth_1...
3725     mean_2yr_6_call_diff_RV_1mth2mth_1 mean_2yr_7_call_diff_RV_1mth2mth_1↙
mean_2yr_8_call_diff_RV_1mth2mth_1 mean_2yr_9_call_diff_RV_1mth2mth_1↙
mean_2yr_10_call_diff_RV_1mth2mth_1;...
3726     std_2yr_1_call_diff_RV_1mth2mth_1 std_2yr_2_call_diff_RV_1mth2mth_1↙
std_2yr_3_call_diff_RV_1mth2mth_1 std_2yr_4_call_diff_RV_1mth2mth_1↙
std_2yr_5_call_diff_RV_1mth2mth_1...
3727     std_2yr_6_call_diff_RV_1mth2mth_1 std_2yr_7_call_diff_RV_1mth2mth_1↙
std_2yr_8_call_diff_RV_1mth2mth_1 std_2yr_9_call_diff_RV_1mth2mth_1↙
std_2yr_10_call_diff_RV_1mth2mth_1;...
3728     mean_2yr_1_RV_1mth2mth_1 mean_2yr_2_RV_1mth2mth_1 mean_2yr_3_RV_1mth2mth_1↙
mean_2yr_4_RV_1mth2mth_1 mean_2yr_5_RV_1mth2mth_1...
3729     mean_2yr_6_RV_1mth2mth_1 mean_2yr_7_RV_1mth2mth_1 mean_2yr_8_RV_1mth2mth_1↙
mean_2yr_9_RV_1mth2mth_1 mean_2yr_10_RV_1mth2mth_1;...
3730     mean_2yr_1_IV_1mth2mth_1 mean_2yr_2_IV_1mth2mth_1 mean_2yr_3_IV_1mth2mth_1↙
mean_2yr_4_IV_1mth2mth_1 mean_2yr_5_IV_1mth2mth_1...
3731     mean_2yr_6_IV_1mth2mth_1 mean_2yr_7_IV_1mth2mth_1 mean_2yr_8_IV_1mth2mth_1↙
mean_2yr_9_IV_1mth2mth_1 mean_2yr_10_IV_1mth2mth_1];
3732
3733 table8_2yr_1mth2mth_total = [mean_2yr_1_call_diff_RV_1mth2mth_total_1↙
mean_2yr_2_call_diff_RV_1mth2mth_total_1 mean_2yr_3_call_diff_RV_1mth2mth_total_1↙
mean_2yr_4_call_diff_RV_1mth2mth_total_1 mean_2yr_5_call_diff_RV_1mth2mth_total_1...
3734     mean_2yr_6_call_diff_RV_1mth2mth_total_1↙
mean_2yr_7_call_diff_RV_1mth2mth_total_1 mean_2yr_8_call_diff_RV_1mth2mth_total_1↙
mean_2yr_9_call_diff_RV_1mth2mth_total_1 mean_2yr_10_call_diff_RV_1mth2mth_total_1;...
3735     std_2yr_1_call_diff_RV_1mth2mth_total_1↙
std_2yr_2_call_diff_RV_1mth2mth_total_1 std_2yr_3_call_diff_RV_1mth2mth_total_1↙
std_2yr_4_call_diff_RV_1mth2mth_total_1 std_2yr_5_call_diff_RV_1mth2mth_total_1...
3736     std_2yr_6_call_diff_RV_1mth2mth_total_1↙
std_2yr_7_call_diff_RV_1mth2mth_total_1 std_2yr_8_call_diff_RV_1mth2mth_total_1↙
std_2yr_9_call_diff_RV_1mth2mth_total_1 std_2yr_10_call_diff_RV_1mth2mth_total_1;...
3737     mean_2yr_1_RV_1mth2mth_total_1 mean_2yr_2_RV_1mth2mth_total_1↙
mean_2yr_3_RV_1mth2mth_total_1 mean_2yr_4_RV_1mth2mth_total_1↙
mean_2yr_5_RV_1mth2mth_total_1...
3738     mean_2yr_6_RV_1mth2mth_total_1 mean_2yr_7_RV_1mth2mth_total_1↙
mean_2yr_8_RV_1mth2mth_total_1 mean_2yr_9_RV_1mth2mth_total_1↙
mean_2yr_10_RV_1mth2mth_total_1;...
3739     mean_2yr_1_IV_1mth2mth_total_1 mean_2yr_2_IV_1mth2mth_total_1↙
mean_2yr_3_IV_1mth2mth_total_1 mean_2yr_4_IV_1mth2mth_total_1↙
mean_2yr_5_IV_1mth2mth_total_1...
3740     mean_2yr_6_IV_1mth2mth_total_1 mean_2yr_7_IV_1mth2mth_total_1↙
mean_2yr_8_IV_1mth2mth_total_1 mean_2yr_9_IV_1mth2mth_total_1↙
mean_2yr_10_IV_1mth2mth_total_1];
```

```
3741
3742
3743
3744
3745 decile_1yr_1_call_1mth2mth_2nd_return = call_return_percentage_1mth2mth_2nd↵
(decile_1yr_2mth_1);
3746 decile_1yr_2_call_1mth2mth_2nd_return = call_return_percentage_1mth2mth_2nd↵
(decile_1yr_2mth_2);
3747 decile_1yr_3_call_1mth2mth_2nd_return = call_return_percentage_1mth2mth_2nd↵
(decile_1yr_2mth_3);
3748 decile_1yr_4_call_1mth2mth_2nd_return = call_return_percentage_1mth2mth_2nd↵
(decile_1yr_2mth_4);
3749 decile_1yr_5_call_1mth2mth_2nd_return = call_return_percentage_1mth2mth_2nd↵
(decile_1yr_2mth_5);
3750 decile_1yr_6_call_1mth2mth_2nd_return = call_return_percentage_1mth2mth_2nd↵
(decile_1yr_2mth_6);
3751 decile_1yr_7_call_1mth2mth_2nd_return = call_return_percentage_1mth2mth_2nd↵
(decile_1yr_2mth_7);
3752 decile_1yr_8_call_1mth2mth_2nd_return = call_return_percentage_1mth2mth_2nd↵
(decile_1yr_2mth_8);
3753 decile_1yr_9_call_1mth2mth_2nd_return = call_return_percentage_1mth2mth_2nd↵
(decile_1yr_2mth_9);
3754 decile_1yr_10_call_1mth2mth_2nd_return = call_return_percentage_1mth2mth_2nd↵
(decile_1yr_2mth_10);
3755
3756
3757 logic_1yr_1_call_1mth2mth_2nd_return_1=(isnan↵
(decile_1yr_1_call_1mth2mth_2nd_return)|isnan(decile_1yr_1_call_diff_RV_1mth2mth));
3758 decile_1yr_1_call_1mth2mth_2nd_return_1=decile_1yr_1_call_1mth2mth_2nd_return;
3759 decile_1yr_1_call_1mth2mth_2nd_return_1(logic_1yr_1_call_1mth2mth_2nd_return_1)=↵
[];
3760
3761 logic_1yr_2_call_1mth2mth_2nd_return_1=(isnan↵
(decile_1yr_2_call_1mth2mth_2nd_return)|isnan(decile_1yr_2_call_diff_RV_1mth2mth));
3762 decile_1yr_2_call_1mth2mth_2nd_return_1=decile_1yr_2_call_1mth2mth_2nd_return;
3763 decile_1yr_2_call_1mth2mth_2nd_return_1(logic_1yr_2_call_1mth2mth_2nd_return_1)=↵
[];
3764
3765 logic_1yr_3_call_1mth2mth_2nd_return_1=(isnan↵
(decile_1yr_3_call_1mth2mth_2nd_return)|isnan(decile_1yr_3_call_diff_RV_1mth2mth));
3766 decile_1yr_3_call_1mth2mth_2nd_return_1=decile_1yr_3_call_1mth2mth_2nd_return;
3767 decile_1yr_3_call_1mth2mth_2nd_return_1(logic_1yr_3_call_1mth2mth_2nd_return_1)=↵
[];
3768
3769 logic_1yr_4_call_1mth2mth_2nd_return_1=(isnan↵
(decile_1yr_4_call_1mth2mth_2nd_return)|isnan(decile_1yr_4_call_diff_RV_1mth2mth));
3770 decile_1yr_4_call_1mth2mth_2nd_return_1=decile_1yr_4_call_1mth2mth_2nd_return;
3771 decile_1yr_4_call_1mth2mth_2nd_return_1(logic_1yr_4_call_1mth2mth_2nd_return_1)=↵
[];
3772
3773 logic_1yr_5_call_1mth2mth_2nd_return_1=(isnan↵
(decile_1yr_5_call_1mth2mth_2nd_return)|isnan(decile_1yr_5_call_diff_RV_1mth2mth));
3774 decile_1yr_5_call_1mth2mth_2nd_return_1=decile_1yr_5_call_1mth2mth_2nd_return;
3775 decile_1yr_5_call_1mth2mth_2nd_return_1(logic_1yr_5_call_1mth2mth_2nd_return_1)=↵
```

```
[];
3776
3777 logic_1yr_6_call_1mth2mth_2nd_return_1=(isnan↵
(decile_1yr_6_call_1mth2mth_2nd_return)|isnan(decile_1yr_6_call_diff_RV_1mth2mth));
3778 decile_1yr_6_call_1mth2mth_2nd_return_1=decile_1yr_6_call_1mth2mth_2nd_return;
3779 decile_1yr_6_call_1mth2mth_2nd_return_1(logic_1yr_6_call_1mth2mth_2nd_return_1)=↵
[];
3780
3781 logic_1yr_7_call_1mth2mth_2nd_return_1=(isnan↵
(decile_1yr_7_call_1mth2mth_2nd_return)|isnan(decile_1yr_7_call_diff_RV_1mth2mth));
3782 decile_1yr_7_call_1mth2mth_2nd_return_1=decile_1yr_7_call_1mth2mth_2nd_return;
3783 decile_1yr_7_call_1mth2mth_2nd_return_1(logic_1yr_7_call_1mth2mth_2nd_return_1)=↵
[];
3784
3785 logic_1yr_8_call_1mth2mth_2nd_return_1=(isnan↵
(decile_1yr_8_call_1mth2mth_2nd_return)|isnan(decile_1yr_8_call_diff_RV_1mth2mth));
3786 decile_1yr_8_call_1mth2mth_2nd_return_1=decile_1yr_8_call_1mth2mth_2nd_return;
3787 decile_1yr_8_call_1mth2mth_2nd_return_1(logic_1yr_8_call_1mth2mth_2nd_return_1)=↵
[];
3788
3789 logic_1yr_9_call_1mth2mth_2nd_return_1=(isnan↵
(decile_1yr_9_call_1mth2mth_2nd_return)|isnan(decile_1yr_9_call_diff_RV_1mth2mth));
3790 decile_1yr_9_call_1mth2mth_2nd_return_1=decile_1yr_9_call_1mth2mth_2nd_return;
3791 decile_1yr_9_call_1mth2mth_2nd_return_1(logic_1yr_9_call_1mth2mth_2nd_return_1)=↵
[];
3792
3793 logic_1yr_10_call_1mth2mth_2nd_return_1=(isnan↵
(decile_1yr_10_call_1mth2mth_2nd_return)|isnan(decile_1yr_10_call_diff_RV_1mth2mth));
3794 decile_1yr_10_call_1mth2mth_2nd_return_1=decile_1yr_10_call_1mth2mth_2nd_return;
3795 decile_1yr_10_call_1mth2mth_2nd_return_1(logic_1yr_10_call_1mth2mth_2nd_return_1)↵
=[];
3796
3797 mean_1yr_1_call_1mth2mth_2nd_return_1 = mean↵
(decile_1yr_1_call_1mth2mth_2nd_return_1);
3798 mean_1yr_2_call_1mth2mth_2nd_return_1 = mean↵
(decile_1yr_2_call_1mth2mth_2nd_return_1);
3799 mean_1yr_3_call_1mth2mth_2nd_return_1 = mean↵
(decile_1yr_3_call_1mth2mth_2nd_return_1);
3800 mean_1yr_4_call_1mth2mth_2nd_return_1 = mean↵
(decile_1yr_4_call_1mth2mth_2nd_return_1);
3801 mean_1yr_5_call_1mth2mth_2nd_return_1 = mean↵
(decile_1yr_5_call_1mth2mth_2nd_return_1);
3802 mean_1yr_6_call_1mth2mth_2nd_return_1 = mean↵
(decile_1yr_6_call_1mth2mth_2nd_return_1);
3803 mean_1yr_7_call_1mth2mth_2nd_return_1 = mean↵
(decile_1yr_7_call_1mth2mth_2nd_return_1);
3804 mean_1yr_8_call_1mth2mth_2nd_return_1 = mean↵
(decile_1yr_8_call_1mth2mth_2nd_return_1);
3805 mean_1yr_9_call_1mth2mth_2nd_return_1 = mean↵
(decile_1yr_9_call_1mth2mth_2nd_return_1);
3806 mean_1yr_10_call_1mth2mth_2nd_return_1 = mean↵
(decile_1yr_10_call_1mth2mth_2nd_return_1);
3807
3808 [h1_2nd_1yr,p1_2nd_1yr,ci1_2nd_1yr,stats1_2nd_1yr] = ttest↵
```

```
     (decile_1yr_1_call_1mth2mth_2nd_return_1,0);
3809 [h2_2nd_1yr,p2_2nd_1yr,ci2_2nd_1yr,stats2_2nd_1yr] = ttest↵
     (decile_1yr_2_call_1mth2mth_2nd_return_1,0);
3810 [h3_2nd_1yr,p3_2nd_1yr,ci3_2nd_1yr,stats3_2nd_1yr] = ttest↵
     (decile_1yr_3_call_1mth2mth_2nd_return_1,0);
3811 [h4_2nd_1yr,p4_2nd_1yr,ci4_2nd_1yr,stats4_2nd_1yr] = ttest↵
     (decile_1yr_4_call_1mth2mth_2nd_return_1,0);
3812 [h5_2nd_1yr,p5_2nd_1yr,ci5_2nd_1yr,stats5_2nd_1yr] = ttest↵
     (decile_1yr_5_call_1mth2mth_2nd_return_1,0);
3813 [h6_2nd_1yr,p6_2nd_1yr,ci6_2nd_1yr,stats6_2nd_1yr] = ttest↵
     (decile_1yr_6_call_1mth2mth_2nd_return_1,0);
3814 [h7_2nd_1yr,p7_2nd_1yr,ci7_2nd_1yr,stats7_2nd_1yr] = ttest↵
     (decile_1yr_7_call_1mth2mth_2nd_return_1,0);
3815 [h8_2nd_1yr,p8_2nd_1yr,ci8_2nd_1yr,stats8_2nd_1yr] = ttest↵
     (decile_1yr_8_call_1mth2mth_2nd_return_1,0);
3816 [h9_2nd_1yr,p9_2nd_1yr,ci9_2nd_1yr,stats9_2nd_1yr] = ttest↵
     (decile_1yr_9_call_1mth2mth_2nd_return_1,0);
3817 [h10_2nd_1yr,p10_2nd_1yr,ci10_2nd_1yr,stats10_2nd_1yr] = ttest↵
     (decile_1yr_10_call_1mth2mth_2nd_return_1,0);
3818
3819 table9_2nd_1yr_1mth2mth = [mean_1yr_1_call_1mth2mth_2nd_return_1↵
     mean_1yr_2_call_1mth2mth_2nd_return_1 mean_1yr_3_call_1mth2mth_2nd_return_1↵
     mean_1yr_4_call_1mth2mth_2nd_return_1 mean_1yr_5_call_1mth2mth_2nd_return_1...
3820      mean_1yr_6_call_1mth2mth_2nd_return_1↵
     mean_1yr_7_call_1mth2mth_2nd_return_1 mean_1yr_8_call_1mth2mth_2nd_return_1↵
     mean_1yr_9_call_1mth2mth_2nd_return_1 mean_1yr_10_call_1mth2mth_2nd_return_1;...
3821      stats1_2nd_1yr.tstat stats2_2nd_1yr.tstat stats3_2nd_1yr.tstat↵
     stats4_2nd_1yr.tstat stats5_2nd_1yr.tstat stats6_2nd_1yr.tstat stats7_2nd_1yr.tstat↵
     stats8_2nd_1yr.tstat stats9_2nd_1yr.tstat stats10_2nd_1yr.tstat];
3822
3823
3824 decile_2yr_1_call_1mth2mth_2nd_return = call_return_percentage_1mth2mth_2nd↵
     (decile_2yr_2mth_1);
3825 decile_2yr_2_call_1mth2mth_2nd_return = call_return_percentage_1mth2mth_2nd↵
     (decile_2yr_2mth_2);
3826 decile_2yr_3_call_1mth2mth_2nd_return = call_return_percentage_1mth2mth_2nd↵
     (decile_2yr_2mth_3);
3827 decile_2yr_4_call_1mth2mth_2nd_return = call_return_percentage_1mth2mth_2nd↵
     (decile_2yr_2mth_4);
3828 decile_2yr_5_call_1mth2mth_2nd_return = call_return_percentage_1mth2mth_2nd↵
     (decile_2yr_2mth_5);
3829 decile_2yr_6_call_1mth2mth_2nd_return = call_return_percentage_1mth2mth_2nd↵
     (decile_2yr_2mth_6);
3830 decile_2yr_7_call_1mth2mth_2nd_return = call_return_percentage_1mth2mth_2nd↵
     (decile_2yr_2mth_7);
3831 decile_2yr_8_call_1mth2mth_2nd_return = call_return_percentage_1mth2mth_2nd↵
     (decile_2yr_2mth_8);
3832 decile_2yr_9_call_1mth2mth_2nd_return = call_return_percentage_1mth2mth_2nd↵
     (decile_2yr_2mth_9);
3833 decile_2yr_10_call_1mth2mth_2nd_return = call_return_percentage_1mth2mth_2nd↵
     (decile_2yr_2mth_10);
3834
3835
3836 logic_2yr_1_call_1mth2mth_2nd_return_1=(isnan↵
```

```
(decile_2yr_1_call_1mth2mth_2nd_return)|isnan(decile_2yr_1_call_diff_RV_1mth2mth));
3837 decile_2yr_1_call_1mth2mth_2nd_return_1=decile_2yr_1_call_1mth2mth_2nd_return;
3838 decile_2yr_1_call_1mth2mth_2nd_return_1(logic_2yr_1_call_1mth2mth_2nd_return_1)=↵
[];
3839
3840 logic_2yr_2_call_1mth2mth_2nd_return_1=(isnan↵
(decile_2yr_2_call_1mth2mth_2nd_return)|isnan(decile_2yr_2_call_diff_RV_1mth2mth));
3841 decile_2yr_2_call_1mth2mth_2nd_return_1=decile_2yr_2_call_1mth2mth_2nd_return;
3842 decile_2yr_2_call_1mth2mth_2nd_return_1(logic_2yr_2_call_1mth2mth_2nd_return_1)=↵
[];
3843
3844 logic_2yr_3_call_1mth2mth_2nd_return_1=(isnan↵
(decile_2yr_3_call_1mth2mth_2nd_return)|isnan(decile_2yr_3_call_diff_RV_1mth2mth));
3845 decile_2yr_3_call_1mth2mth_2nd_return_1=decile_2yr_3_call_1mth2mth_2nd_return;
3846 decile_2yr_3_call_1mth2mth_2nd_return_1(logic_2yr_3_call_1mth2mth_2nd_return_1)=↵
[];
3847
3848 logic_2yr_4_call_1mth2mth_2nd_return_1=(isnan↵
(decile_2yr_4_call_1mth2mth_2nd_return)|isnan(decile_2yr_4_call_diff_RV_1mth2mth));
3849 decile_2yr_4_call_1mth2mth_2nd_return_1=decile_2yr_4_call_1mth2mth_2nd_return;
3850 decile_2yr_4_call_1mth2mth_2nd_return_1(logic_2yr_4_call_1mth2mth_2nd_return_1)=↵
[];
3851
3852 logic_2yr_5_call_1mth2mth_2nd_return_1=(isnan↵
(decile_2yr_5_call_1mth2mth_2nd_return)|isnan(decile_2yr_5_call_diff_RV_1mth2mth));
3853 decile_2yr_5_call_1mth2mth_2nd_return_1=decile_2yr_5_call_1mth2mth_2nd_return;
3854 decile_2yr_5_call_1mth2mth_2nd_return_1(logic_2yr_5_call_1mth2mth_2nd_return_1)=↵
[];
3855
3856 logic_2yr_6_call_1mth2mth_2nd_return_1=(isnan↵
(decile_2yr_6_call_1mth2mth_2nd_return)|isnan(decile_2yr_6_call_diff_RV_1mth2mth));
3857 decile_2yr_6_call_1mth2mth_2nd_return_1=decile_2yr_6_call_1mth2mth_2nd_return;
3858 decile_2yr_6_call_1mth2mth_2nd_return_1(logic_2yr_6_call_1mth2mth_2nd_return_1)=↵
[];
3859
3860 logic_2yr_7_call_1mth2mth_2nd_return_1=(isnan↵
(decile_2yr_7_call_1mth2mth_2nd_return)|isnan(decile_2yr_7_call_diff_RV_1mth2mth));
3861 decile_2yr_7_call_1mth2mth_2nd_return_1=decile_2yr_7_call_1mth2mth_2nd_return;
3862 decile_2yr_7_call_1mth2mth_2nd_return_1(logic_2yr_7_call_1mth2mth_2nd_return_1)=↵
[];
3863
3864 logic_2yr_8_call_1mth2mth_2nd_return_1=(isnan↵
(decile_2yr_8_call_1mth2mth_2nd_return)|isnan(decile_2yr_8_call_diff_RV_1mth2mth));
3865 decile_2yr_8_call_1mth2mth_2nd_return_1=decile_2yr_8_call_1mth2mth_2nd_return;
3866 decile_2yr_8_call_1mth2mth_2nd_return_1(logic_2yr_8_call_1mth2mth_2nd_return_1)=↵
[];
3867
3868 logic_2yr_9_call_1mth2mth_2nd_return_1=(isnan↵
(decile_2yr_9_call_1mth2mth_2nd_return)|isnan(decile_2yr_9_call_diff_RV_1mth2mth));
3869 decile_2yr_9_call_1mth2mth_2nd_return_1=decile_2yr_9_call_1mth2mth_2nd_return;
3870 decile_2yr_9_call_1mth2mth_2nd_return_1(logic_2yr_9_call_1mth2mth_2nd_return_1)=↵
[];
3871
3872 logic_2yr_10_call_1mth2mth_2nd_return_1=(isnan↵
```

```
    (decile_2yr_10_call_1mth2mth_2nd_return)|isnan(decile_2yr_10_call_diff_RV_1mth2mth));
3873 decile_2yr_10_call_1mth2mth_2nd_return_1=decile_2yr_10_call_1mth2mth_2nd_return;
3874 decile_2yr_10_call_1mth2mth_2nd_return_1(logic_2yr_10_call_1mth2mth_2nd_return_1)↙
=[];
3875
3876 mean_2yr_1_call_1mth2mth_2nd_return_1 = mean↙
(decile_2yr_1_call_1mth2mth_2nd_return_1);
3877 mean_2yr_2_call_1mth2mth_2nd_return_1 = mean↙
(decile_2yr_2_call_1mth2mth_2nd_return_1);
3878 mean_2yr_3_call_1mth2mth_2nd_return_1 = mean↙
(decile_2yr_3_call_1mth2mth_2nd_return_1);
3879 mean_2yr_4_call_1mth2mth_2nd_return_1 = mean↙
(decile_2yr_4_call_1mth2mth_2nd_return_1);
3880 mean_2yr_5_call_1mth2mth_2nd_return_1 = mean↙
(decile_2yr_5_call_1mth2mth_2nd_return_1);
3881 mean_2yr_6_call_1mth2mth_2nd_return_1 = mean↙
(decile_2yr_6_call_1mth2mth_2nd_return_1);
3882 mean_2yr_7_call_1mth2mth_2nd_return_1 = mean↙
(decile_2yr_7_call_1mth2mth_2nd_return_1);
3883 mean_2yr_8_call_1mth2mth_2nd_return_1 = mean↙
(decile_2yr_8_call_1mth2mth_2nd_return_1);
3884 mean_2yr_9_call_1mth2mth_2nd_return_1 = mean↙
(decile_2yr_9_call_1mth2mth_2nd_return_1);
3885 mean_2yr_10_call_1mth2mth_2nd_return_1 = mean↙
(decile_2yr_10_call_1mth2mth_2nd_return_1);
3886
3887 [h1_2nd_2yr,p1_2nd_2yr,ci1_2nd_2yr,stats1_2nd_2yr] = ttest↙
(decile_2yr_1_call_1mth2mth_2nd_return_1,0);
3888 [h2_2nd_2yr,p2_2nd_2yr,ci2_2nd_2yr,stats2_2nd_2yr] = ttest↙
(decile_2yr_2_call_1mth2mth_2nd_return_1,0);
3889 [h3_2nd_2yr,p3_2nd_2yr,ci3_2nd_2yr,stats3_2nd_2yr] = ttest↙
(decile_2yr_3_call_1mth2mth_2nd_return_1,0);
3890 [h4_2nd_2yr,p4_2nd_2yr,ci4_2nd_2yr,stats4_2nd_2yr] = ttest↙
(decile_2yr_4_call_1mth2mth_2nd_return_1,0);
3891 [h5_2nd_2yr,p5_2nd_2yr,ci5_2nd_2yr,stats5_2nd_2yr] = ttest↙
(decile_2yr_5_call_1mth2mth_2nd_return_1,0);
3892 [h6_2nd_2yr,p6_2nd_2yr,ci6_2nd_2yr,stats6_2nd_2yr] = ttest↙
(decile_2yr_6_call_1mth2mth_2nd_return_1,0);
3893 [h7_2nd_2yr,p7_2nd_2yr,ci7_2nd_2yr,stats7_2nd_2yr] = ttest↙
(decile_2yr_7_call_1mth2mth_2nd_return_1,0);
3894 [h8_2nd_2yr,p8_2nd_2yr,ci8_2nd_2yr,stats8_2nd_2yr] = ttest↙
(decile_2yr_8_call_1mth2mth_2nd_return_1,0);
3895 [h9_2nd_2yr,p9_2nd_2yr,ci9_2nd_2yr,stats9_2nd_2yr] = ttest↙
(decile_2yr_9_call_1mth2mth_2nd_return_1,0);
3896 [h10_2nd_2yr,p10_2nd_2yr,ci10_2nd_2yr,stats10_2nd_2yr] = ttest↙
(decile_2yr_10_call_1mth2mth_2nd_return_1,0);
3897
3898
3899 table9_2nd_2yr_1mth2mth = [mean_2yr_1_call_1mth2mth_2nd_return_1↙
mean_2yr_2_call_1mth2mth_2nd_return_1 mean_2yr_3_call_1mth2mth_2nd_return_1↙
mean_2yr_4_call_1mth2mth_2nd_return_1 mean_2yr_5_call_1mth2mth_2nd_return_1...
3900        mean_2yr_6_call_1mth2mth_2nd_return_1↙
mean_2yr_7_call_1mth2mth_2nd_return_1 mean_2yr_8_call_1mth2mth_2nd_return_1↙
mean_2yr_9_call_1mth2mth_2nd_return_1 mean_2yr_10_call_1mth2mth_2nd_return_1;...
```

```
3901        stats1_2nd_2yr.tstat stats2_2nd_2yr.tstat stats3_2nd_2yr.tstat↵
stats4_2nd_2yr.tstat stats5_2nd_2yr.tstat stats6_2nd_2yr.tstat stats7_2nd_2yr.tstat↵
stats8_2nd_2yr.tstat stats9_2nd_2yr.tstat stats10_2nd_2yr.tstat];
3902
3903 %Saving final output
3904 save 9_complete
3905 disp('Completed!')
3906 toc
```