

A guide to GUIDE

S Subramanian
Dept. of Management Studies
Sri Sathya Sai Institute of Higher Learning
Prasanthi Nilayam, A.P. INDIA. 515134.
Email: ssubramanian@sssihl.edu.in

March 10, 2013

Abstract

This paper is a guide to the R package GUIDE, short for GUI for DERivatives. The installation of package is described followed by a listing of the menus and depiction of select screenshots.

1 Introduction

GUIDE is an acronym for GUI for DERivatives. The package provides neat UIs like calculators for pricing various financial derivatives as well as rich interactive 2D and 3D plots to understand their behavior. It is a useful resource for classroom teaching as well as computer assisted self-learning.

2 Installation

Installation is easy and can be done by calling the command line function

```
> install.packages("GUIDE")
```

Alternatively, one can also install it from the R console package installation menu. To start using the package, enter

```
> library("GUIDE")
```

You can also load the package from the console menu.

To start using the package, enter

```
> GUIDE()
```

You should then see the main menu of the package as in Figure 1.

3 Menus

GUIDE has 55 functions. A complete list of functions (in menu-wise order) along with a short description is provided in Table 1

Table 1: List of Functions in GUIDE

Name of Function	Description
Forwards	
forwardcommodity	Calculate the forward value of a commodity
forwardcurrency	Calculate the forward value of a currency
forwardstock	Calculate the forward value of a stock
fra	Calculate the forward rate
fravalue	Calculate the value of a forward rate agreement
Futures	
futurescommodity	Calculate the value of a commodity futures
futurescurrency	Calculate the value of a currency futures
futuresstock	Calculate the value of a stock futures
eurodollar	Calculate the value of a eurodollar futures contract
cashprice	Calculate the Cash price of a T Bond Futures
Options	
basicpayoffs	Plot payoffs / profit and loss of European Call/Put
Premium3D	Option premium as a function of stock price/strike and time
BinomTree	Plot a CRR stock / Option Tree
blackscholes	Calculate the Black scholes formula value of a European Call/Put
impvol	Calculate the Black scholes implied volatility of a European Call/Put
calcgreeks	Calculate the greeks for a European Call/Put
stockTimeGreeks	Plot of option greeks as a function of stock price and time
greekneutrality	Calculate the hedge positions for European Call/Put
bullspreadcalls	Profit & Loss plot of bull spread with calls
bearspreadputs	Profit & Loss plot of bear spread with puts
butterfly	Profit & Loss plot of butterfly
reversebutterfly	Profit & Loss plot of reverse butterfly
straddle	Profit & Loss plot of straddle
reversestraddle	Profit & Loss plot of reverse straddle
strangle	Profit & Loss plot of strangle
reversestrangle	Profit & Loss plot of reverse strangle
strip	Profit & Loss plot of strip
strap	Profit & Loss plot of strap
Swaps	
irswapvalue	Calculate the value of an interest rate swap
curswapvalue	Calculate the value of a fixed-fixed currency swap

Continued on next page

Table 1 – *Continued from previous page*

Name of Function	Description
cdswap	Calculate the spread in a credit default swap
Stochastic Processes	
ABMPaths	Simulate and plot Arithmetic Brownian Motion path(s)
GBMPaths	Simulate and plot Geometric Brownian Motion path(s)
JDPaths	Simulate and plot Jump Diffusion path(s)
Value at Risk	
var1stock	Calculate the value at risk of a single stock
var2stocks	Calculate the value at risk of two stocks
varbehavior	Plot the value at risk as a function of its determinants
Bonds	
bondprice	Calculate the price of a bond
priceyield	Plot the relationship between price and yield of a bond
pricematurity	Plot the relationship between price and maturity of a bond
bondddur	Calculate the duration of a bond
durmaturity	Plot the relationship between duration and maturity of a bond
durcoupon	Plot the relationship between duration and coupon rate of a bond
duryield	Plot the relationship between duration and yield of a bond
bondconv	Calculate the convexity of a bond
bondchange	Calculate the DV01 based on the duration and convexity
Utilities	
pv	Calculate the Present value of an amount
fv	Calculate the Future value of an amount
pvann	Calculate the Present value of an annuity
fvann	Calculate the Future value of an annuity
rate	Calculate rate in the desired frequency
pval	Calculate the p value for a z value from a normal distribution
zval	Calculate the z value for a p value from a normal distribution

Each of the functions can be accessed from sub menus of the main menu. Sub menu of the Options menu is shown in Figure 2. You can fully explore all the functions through the package's GUI and do not need to write any command on the R console. Figures 3 and 4 show calculators for the Black Scholes price of Options, and the price of Bonds respectively. Each function depicts initial values where user inputs are needed, thereby making it easier for the user to enter inputs in the correct format. For e.g. in Figure 3 (b), the Black Scholes pricer takes the following inputs: i) the spot price ii) the strike price iii) the risk

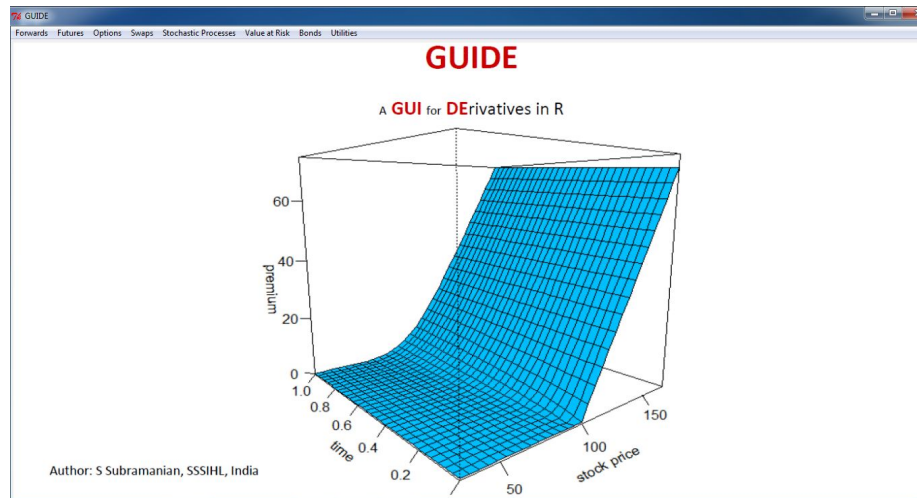


Figure 1: The Main menu of GUIDE.

free rate iv) maturity, v) sigma, vii) dividend yield- all of which are text boxes and viii) Type of option, which is a radio button. The documentation provides details of the format for each of the user inputs for each function. Figure 5 shows the relationship between price and yield. Figure 6 shows the behavior of option delta.

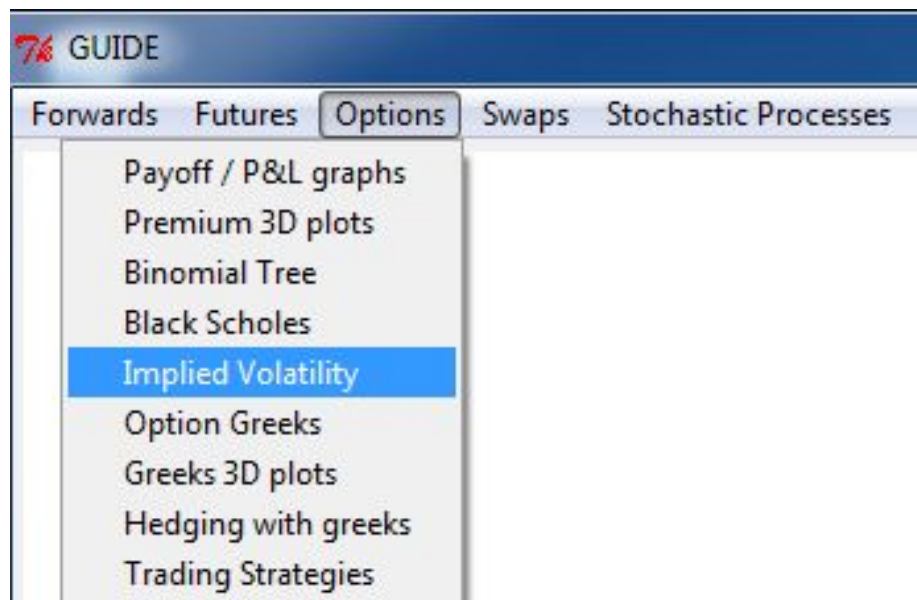
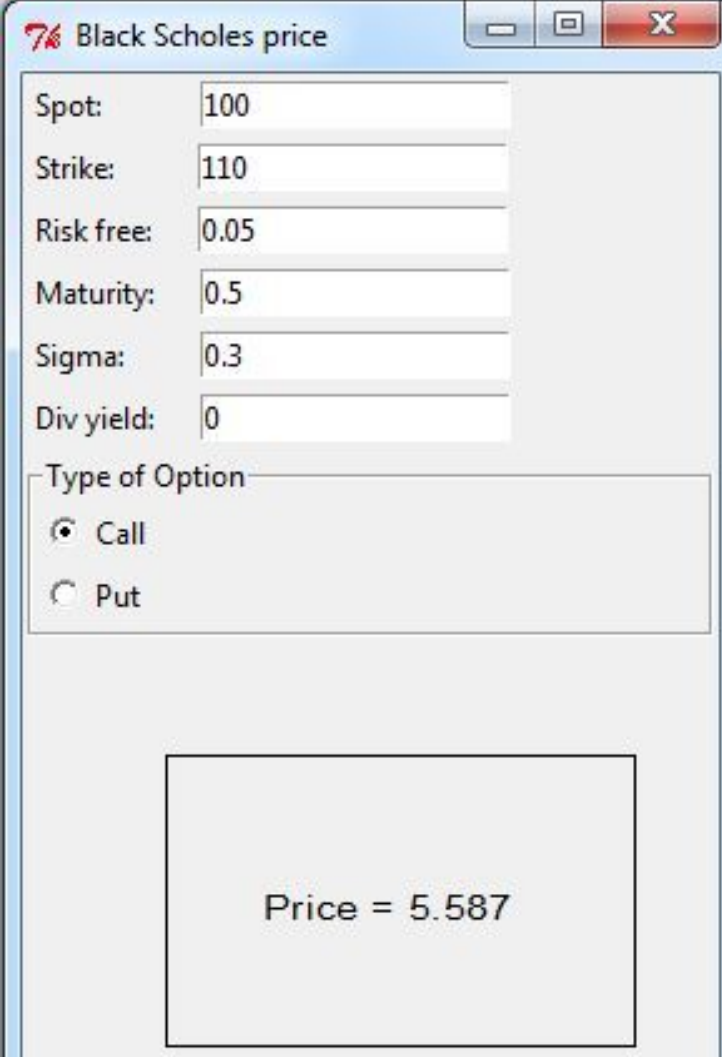


Figure 2: The sub-menu of Options.



A screenshot of a software window titled "Black Scholes price" with a red icon and standard window controls. The window contains input fields for Spot (100), Strike (110), Risk free (0.05), Maturity (0.5), Sigma (0.3), and Div yield (0). Below these is a "Type of Option" section with radio buttons for "Call" (selected) and "Put". At the bottom, a large box displays the calculated price: "Price = 5.587".

Parameter	Value
Spot	100
Strike	110
Risk free	0.05
Maturity	0.5
Sigma	0.3
Div yield	0

Type of Option

☒ Call
☐ Put

Price = 5.587

Figure 3: UI for Black Scholes price.

7% Bond Price

Face Value: 1000

- 8 + Coupon (% p.a.)

- 10 + Discount Rate(% p.a.)

- 10 + Maturity(Yrs)

Coupon payments

☒ quarterly

☐ semi-annual

☐ annual

Frequency of discount rate

☒ continuous comp

☐ same as coupon freq

☐ annual comp

Price: 867.28

Figure 4: UI for bond price.

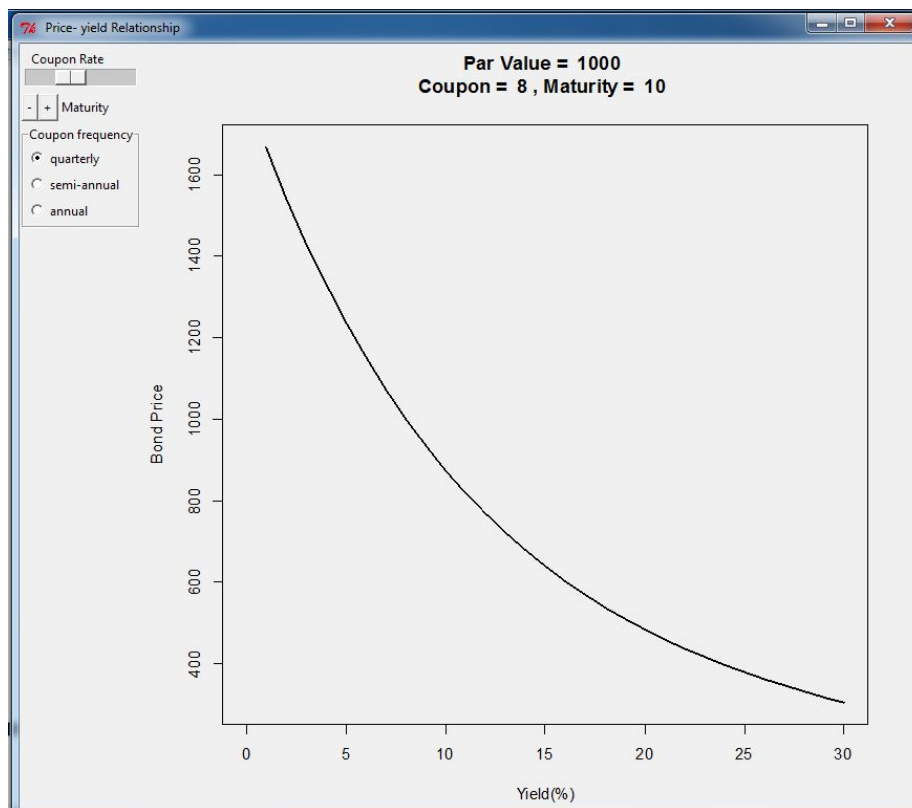


Figure 5: Price yield relationship plot.

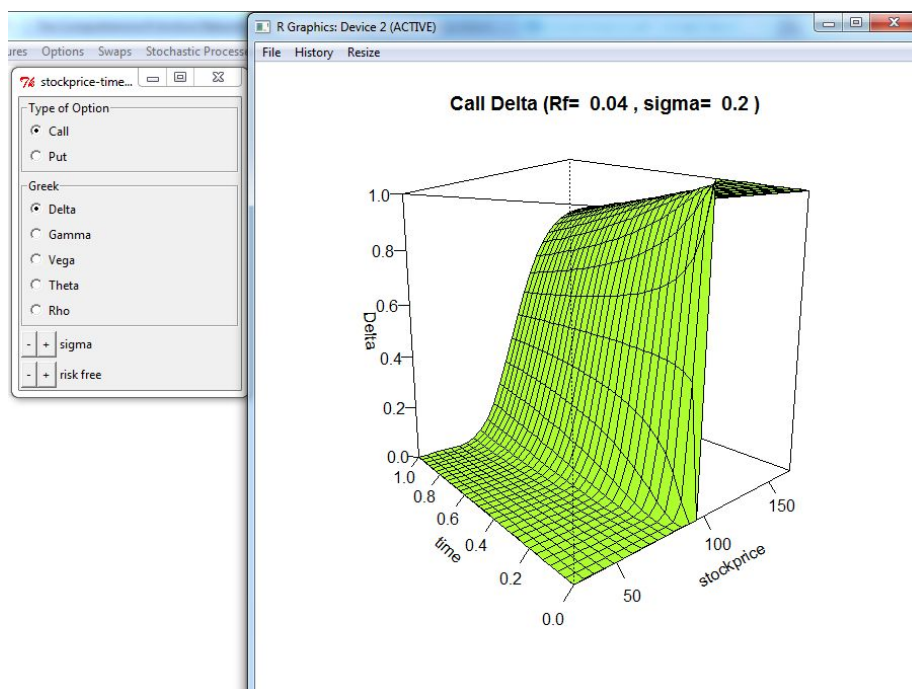


Figure 6: Behavior of Option delta.