A guide to GUIDE

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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 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 64 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
bondforwardtreegui	Calculate the forward value of a bond using a tree
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
bondfuturestreegui	Calculate the futures value of a bond using a tree
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	Plot Option premium as a function of stock price/strike and time
stockoptiontreegui	Plot a Stock Option Tree
bondoptiontreegui	Plot a Bond 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
captreegui	Plot a Cap tree
floortreegui	Plot a Floor tree
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

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Table 1 – *Continued from previous page*

Name of Function	Description
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
cdswap	Calculate the spread in a credit default swap
swaptreegui	Plot an interest rate swap tree
swaptiontreegui	Plot an interest rate swaption tree
	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
ratetreegui	Plot a interest rate tree
bondtreegui	Plot a bond price tree
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
bonddur	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

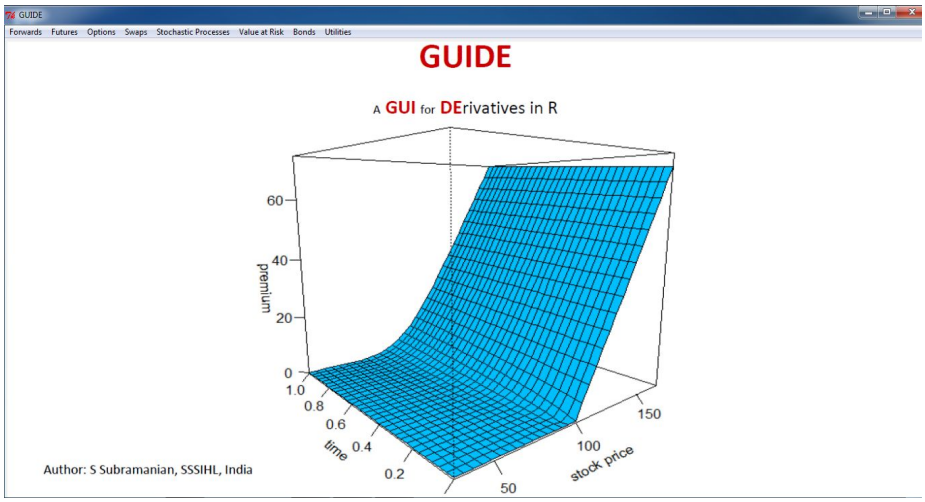

Figure 1: The Main menu of GUIDE.

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 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.

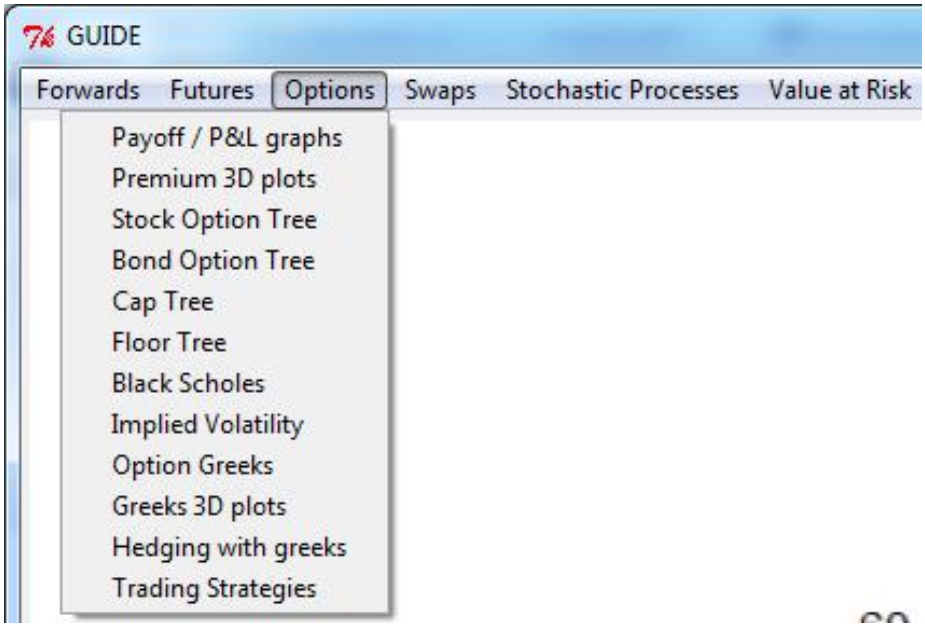

Figure 2: The sub-menu of Options.

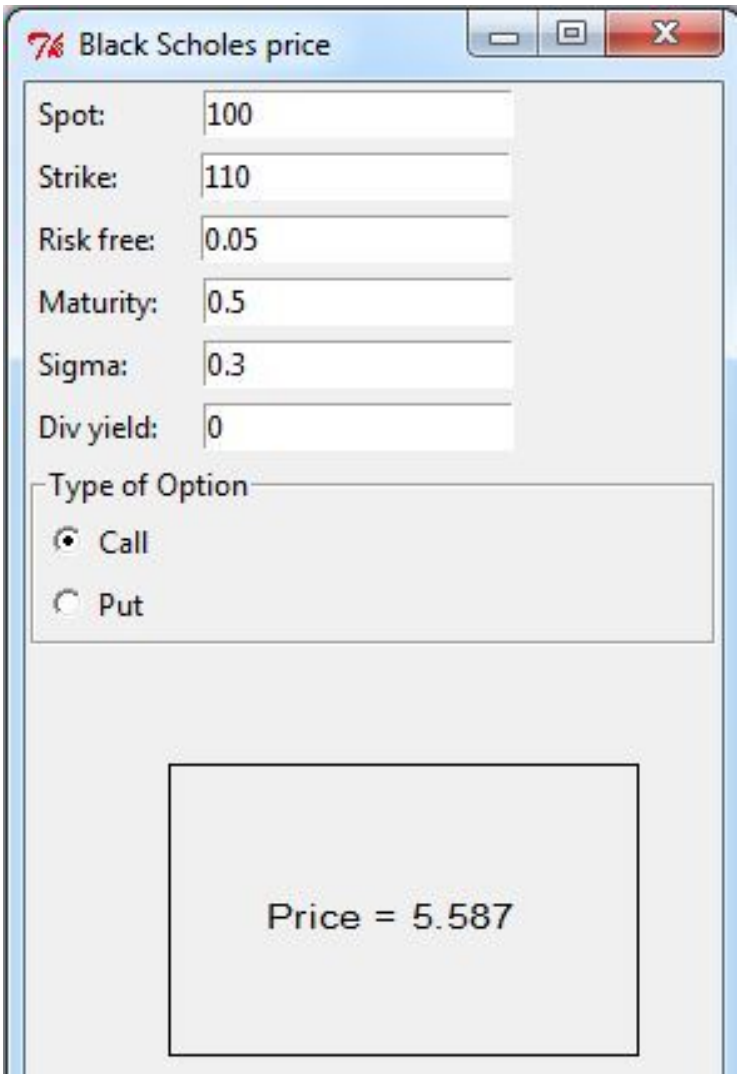

Figure 3: UI for Black Scholes price.

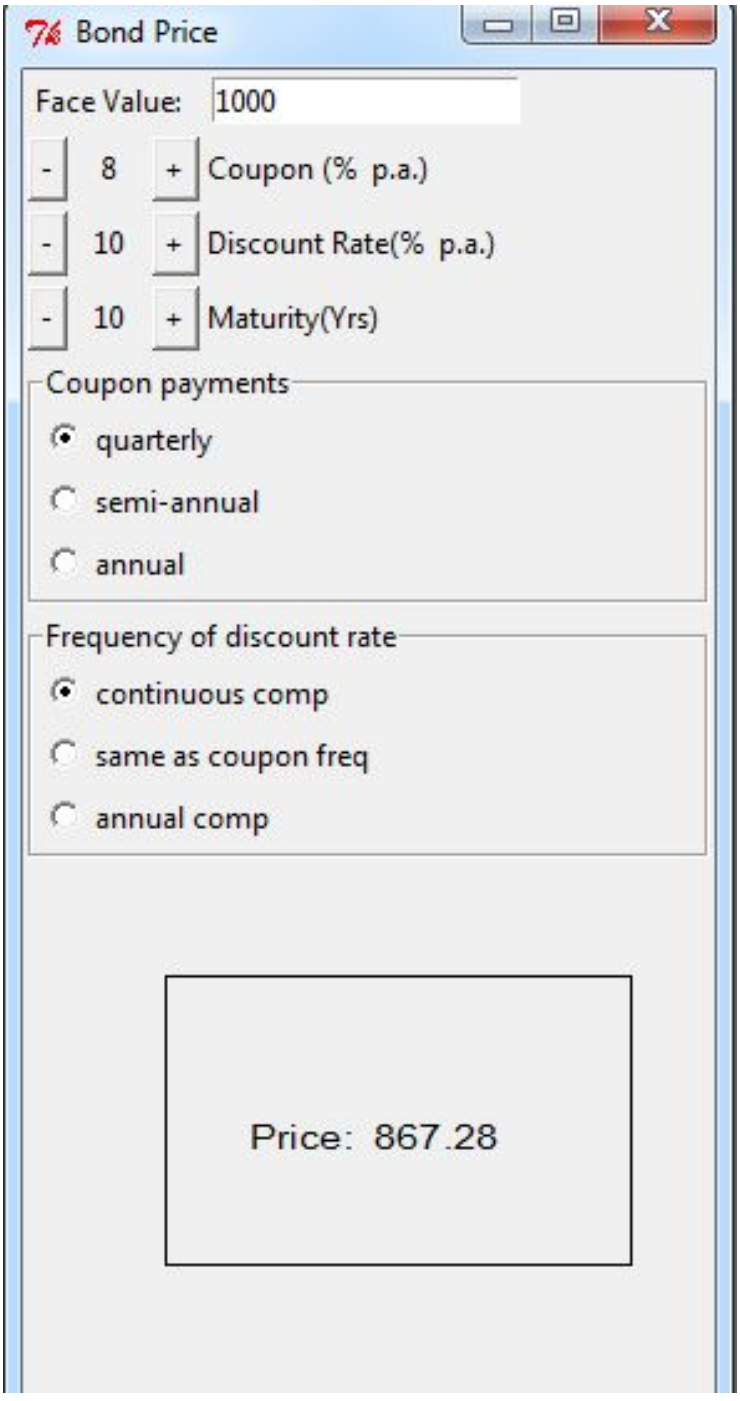

Figure 4: UI for bond price.

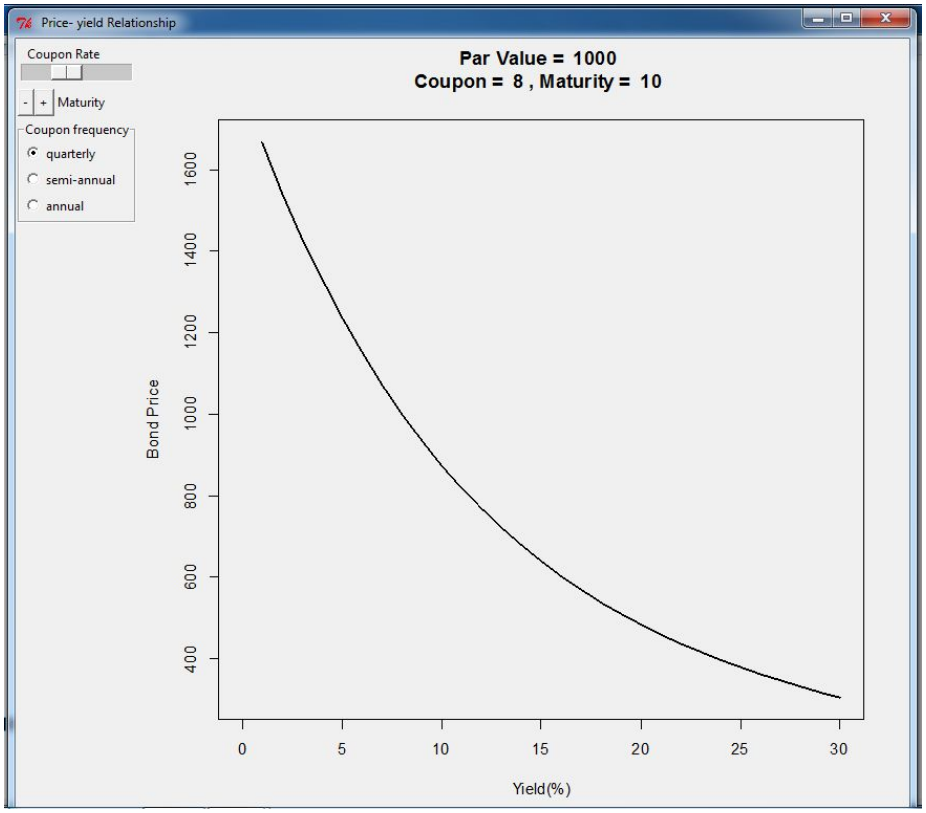

Figure 5: Price yield relationship plot.

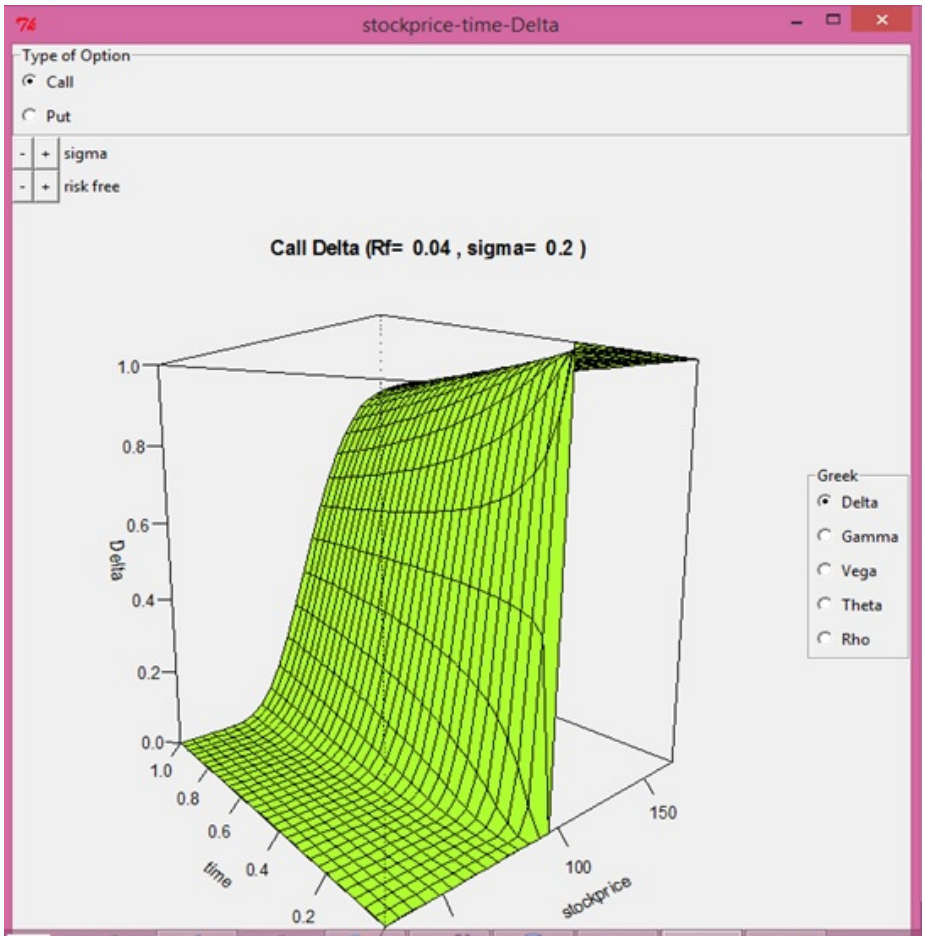

Figure 6: Behavior of Option delta.