```
Sub Main_Model()
Dim T_Expiry As Double: Dim sig As Double: Dim Drift As Double: Dim Gmft_c2 As Double: Dim Value_c As Double: Dim
CBfinal As Double: Dim CBlife As Double: Dim CBret As Double
Dim r_rate As Double: Dim S_Max As Double: Dim S_max2 As Double: Dim S_min1 As Double: Dim S_Min2 As Double: Dim
Sinitial As Double: Dim Convprice As Double
Dim CBStart As Double: Dim Logmean As Double: Dim S_mid_Fract As Double: Dim n_of_Alter_fract As Double
Dim u As Double: Dim pu As Double: Dim pd As Double: Dim pm As Double: Dim delt As Double: Dim S_mid As Double
Dim StartTime As Double: Dim SecondsElapsed As Double
Dim mput As Integer
Dim Tv_c As Double: Dim Tv_b As Double: Dim TV_c2 As Double: Dim Tv As Double: Dim Value_b As Double
Dim i As Integer: Dim j As Integer: Dim k As Integer: Dim n As Integer: Dim m1 As Integer: Dim m2 As Integer: Dim m As
Integer
Dim Pr2_out As Variant: Dim H2 As Variant
Dim n_of_Alter As Integer
Dim T_call As Double: Dim T_put As Double: Dim PutPrice As Double: Dim N_of_Coupons As Integer
Dim Pr_c2 As Double: Dim Value_c2 As Double: Dim Pr_c As Double: Dim Pr_b As Double

Call Clean_Up_Macro
Call Read_Up_Inputs(Sinitial, sig, Drift, r_rate, S_Max, S_min1, S_mid, S_max2, S_Min2, T_Expiry, T_call, T_put, PutPrice,
Convprice, CBStart _
, n_of_Alter_fract, N_of_Coupons, m)

Call Fractional_Alter(S_mid, S_min1, n_of_Alter_fract, S_mid_Fract, n_of_Alter)

ReDim S(m) As Variant: ReDim cb(m) As Variant: ReDim Pr2_in(2, m)

'Remember time when macro starts
StartTime = Timer

Logmean = Drift - 0.5 * sig * sig

If (S_Min2 > S_min1) Then S_Min2 = 0.8 * S_min1
Dim m0 As Integer
Call H2_Construct(Sinitial, S_Max, S_mid, S_mid_Fract, S_min1, T_Expiry, Drift, sig, m, n_of_Alter, Logmean, S_Min2, S,
Pr2_in, H2, u, delt, pu, pm, pd, n, m0, m1, mput)

Dim H2_end As Variant
ReDim H2_end(m, m)

'######  Here is matrix multiplication
H2_end = WorksheetFunction.MMult(H2, H2)
'######  End of matrix multiplication

'######  Here is matrix multiplication (n-1) times
For i = 1 To (n - 1)
    H2_end = WorksheetFunction.MMult(H2_end, H2_end)
Next i
'######  End of matrix multiplication

'######  Here is matrix multiplication
Pr2_out = WorksheetFunction.MMult(Pr2_in, H2_end)
'######  End of matrix multiplication


Pr_c2 = Pr2_out(1, m)
Value_c2 = Pr_c2 * S_Max

For i = 1 To m:    cb(i) = Application.Max(S(i), Convprice): Next i

Call MeanFirstTimeCall(delt, m, (2 ^ n), H2, H2_end, Pr2_in, Gmft_c2)

CBfinal = 0#
```

Clears up screen

Reads up input parameters

Constructs large H2 matrix from all input parameters

$\Rightarrow$ H2_end = H2 x H2

$\Rightarrow$ H2_end = H2_end x H2_end

$\Rightarrow$ Pr2_out = Pr2_in x H2_end

Routine that uses matrix inversion

```
For i = 1 To (m - 1):    CBfinal = CBfinal + Pr2_out(1, i) * cb(i): Next i
CBfinal = CBfinal + Pr_c2 * S_Max

Value_c = 0#: Value_b = 0#: Pr_c = 0#: Pr_b = 0#
For i = 1 To (m - 1)
   If (S(i) >= Convprice) Then
      Value_c = Value_c + cb(i) * Pr2_out(1, i)
      Pr_c = Pr_c + Pr2_out(1, i)
   Else
      Value_b = Value_b + cb(i) * Pr2_out(1, i)
      Pr_b = Pr_b + Pr2_out(1, i)
   End If
Next i

'################  Coupon section  ##########################################
Dim Value_Coup As Double
Dim Tv_Coup As Double
Dim Coup_Size(30) As Double
Dim Coup_Time(30)  As Double
Dim Coup_Zone(30)  As Double
Value_Coup = 0#: Tv_Coup = 0#
'################ End of coupon section  ###################################
CBfinal = CBfinal
CBlife = Pr_c2 * Gmft_c2 + (1# - Pr_c2) * T_Expiry
CBret = ((CBfinal / CBStart) ^ (1 / CBlife)) - 1#

Tv_c = Value_c * Exp(-Drift * T_Expiry)
Tv_b = Value_b * Exp(-r_rate * T_Expiry)
TV_c2 = S_Max * Pr2_out(1, m) * Exp(-Drift * Gmft_c2)
Tv = Tv_c + Tv_b + TV_c2 + Tv_Coup


   Sheets("Dashboard").Cells(6, 8) = Pr_c2
   Sheets("Dashboard").Cells(10, 8) = Pr_c
   Sheets("Dashboard").Cells(11, 8) = Pr_b

   Sheets("Dashboard").Cells(6, 9) = Value_c2
   Sheets("Dashboard").Cells(10, 9) = Value_c
   Sheets("Dashboard").Cells(11, 9) = Value_b
   If (N_of_Coupons > 0) Then Sheets("Dashboard").Cells(12, 9) = Value_Coup

   Sheets("Dashboard").Cells(6, 10) = Gmft_c2
   Sheets("Dashboard").Cells(10, 10) = T_Expiry
   Sheets("Dashboard").Cells(11, 10) = T_Expiry

   Sheets("Dashboard").Cells(6, 11) = TV_c2
   Sheets("Dashboard").Cells(10, 11) = Tv_c
   Sheets("Dashboard").Cells(11, 11) = Tv_b
   Sheets("Dashboard").Cells(14, 11) = Tv
   If (N_of_Coupons > 0) Then Sheets("Dashboard").Cells(12, 11) = Tv_Coup

   Sheets("Dashboard").Cells(14, 10) = CBlife
   Sheets("Dashboard").Cells(14, 9) = CBfinal
   Sheets("Dashboard").Cells(16, 8) = CBret

   Sheets("Dashboard").Cells(20, 8) = m
   Sheets("Dashboard").Cells(20, 10) = m0
   Sheets("Dashboard").Cells(21, 10) = m1 + 1
   Sheets("Dashboard").Cells(21, 8) = n
   Sheets("Dashboard").Cells(22, 8) = delt * 250
   Sheets("Dashboard").Cells(23, 8) = u
   Sheets("Dashboard").Cells(24, 8) = pu
   Sheets("Dashboard").Cells(25, 8) = pm
   Sheets("Dashboard").Cells(26, 8) = pd
```

```
'Determine how many seconds code took to run
 SecondsElapsed = Round(Timer - StartTime, 2)
 Sheets("Dashboard").Cells(19, 8) = SecondsElapsed

End Sub
```