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Anexo 1– Códigos em VBA utilizados

Cálculo do preço justo de uma opção pelo modelo de Black e Scholes Generalizado

```
Function GBlackScholes(CallPutFlag As String, S As Double, X As Double, T As Double, r As Double, b As Double, v
 As Double) As Double
Dim d1 As Double, d2 As Double
d1 = (Math.Log(S / X) + (b + v ^ 2 / 2) * T) / (v * Math.Sqr(T))
d2 = d1 - v * Math.Sqr(T)
If CallPutFlag = "c" Then
   GBlackScholes = S * Math.Exp((b - r) * T) * WorksheetFunction.NormSDist(d1) - X * Math.Exp(-r * T) * WorksheetFunction.NormSDist(d2)
ElseIf CallPutFlag = "p" Then
   GBlackScholes = X * Math.Exp(-r * T) * WorksheetFunction.NormSDist(-d2) - S * Math.Exp((b - r) * T) * WorksheetFunction.NormSDist(-d1)
End If
End Function
```

Cálculo da volatilidade implícita pelo modelo de Black e Scholes Generalizado

```
Function GImpliedVolatilityBisection(CallPutFlag As String, S As Double, X As Double, T As Double, r As Double, b As Double, cm As Double) As Variant
Dim vLow As Double, vHigh As Double, vi As Double
Dim cLow As Double, cHigh As Double, epsilon As Double
Dim counter As Integer
vLow = 0.005
vHigh = 4
epsilon = 0.00000001
```

```
cLow = GBlackScholes(CallPutFlag, S, X, T, r, b, vLow)
cHigh = GBlackScholes(CallPutFlag, S, X, T, r, b, vHigh)
counter = 0
vi = vLow + (cm - cLow) * (vHigh - vLow) / (cHigh - cLow)
While Abs(cm - GBlackScholes(CallPutFlag, S, X, T, r, b, vi)) > epsilon
   counter = counter + 1
   If counter = 100 Then
      GImpliedVolatilityBisection = "NA"
      Exit Function
   End If
   If GBlackScholes(CallPutFlag, S, X, T, r, b, vi) < cm Then
      vLow = vi
   Else
      vHigh = vi
   End If
   cLow = GBlackScholes(CallPutFlag, S, X, T, r, b, vLow)
   cHigh = GBlackScholes(CallPutFlag, S, X, T, r, b, vHigh)
   vi = vLow + (cm - cLow) * (vHigh - vLow) / (cHigh - cLow)
Wend
GImpliedVolatilityBisection = vi
End Function
```


Cálculo do preço justo de uma opção pelo modelo de Corrado e Su

```
Function SkewKurtCorradoSu(CallPutFlag As String, S As Double, X As Double, T As Double, r As Double, b As Double, v As Double, Skew As Double, Kurt As Double) As Double
Dim Q3 As Double, Q4 As Double
Dim d1 As Double, d2 As Double
Dim CallValue As Double
d1 = (Math.Log(S / X) + (b + v ^ 2 / 2) * T) / (v * Math.Sqr(T))
d2 = d1 - v * Math.Sqr(T)
```

```
Q4 = 1 / 24 * S * v * Math.Sqr(T) * ((d1 ^ 2 - 1 - 3 * v * Math.Sqr(T) * d2) * (1 / Math.Sqr(2 * 3.14159265) * Math.Exp(-d1 ^ 2 / 2)) + v ^ 3 * T ^ 1.5 * WorksheetFunction.NormSDist(d1))
Q3 = 1 / 6 * S * v * Math.Sqr(T) * ((2 * v * Math.Sqr(T) - d1) * (1 / Math.Sqr(2 * 3.14159265) * Math.Exp(-d1 ^ 2 / 2)) + v ^ 2 * T * WorksheetFunction.NormSDist(d1))
CallValue = GBlackScholes("c", S, X, T, r, b, v) + Skew * Q3 + (Kurt - 3) * Q4
If CallPutFlag = "c" Then
   SkewKurtCorradoSu = CallValue
Else
   SkewKurtCorradoSu = CallValue - S * Math.Exp((b - r) * T) + X * Math.Exp(-r * T)
End If
End Function
```

Cálculo da volatilidade implícita pelo modelo de Corrado e Su

```
Function CSImpliedVolatilityBisection(CallPutFlag As String, S As Double, X As Double, T As Double, r As Double, b As Double, Skew As Double, Kurt As Double, cm As Double) As Variant
Dim vLow As Double, vHigh As Double, vi As Double
Dim cLow As Double, cHigh As Double, epsilon As Double
Dim counter As Integer
vLow = 0.005
vHigh = 4
epsilon = 0.001
cLow = SkewKurtCorradoSu(CallPutFlag, S, X, T, r, b, vLow, Skew, Kurt)
cHigh = SkewKurtCorradoSu(CallPutFlag, S, X, T, r, b, vHigh, Skew, Kurt)
counter = 0
vi = vLow + (cm - cLow) * (vHigh - vLow) / (cHigh - cLow)
While Abs(cm - SkewKurtCorradoSu(CallPutFlag, S, X, T, r, b, vi, Skew, Kurt)) > epsilon
   counter = counter + 1
```

```
        If counter = 1000 Then
            CSImpliedVolatilityBisection = "NA"
            Exit Function
        End If
        If SkewKurtCorradoSu(CallPutFlag, S, X, T, r, b, vi, Skew, Kurt) < cm
Then
            vLow = vi
        Else
            vHigh = vi
        End If
        cLow = SkewKurtCorradoSu(CallPutFlag, S, X, T, r, b, vLow, Skew,
Kurt)
        cHigh = SkewKurtCorradoSu(CallPutFlag, S, X, T, r, b, vHigh, Skew,
Kurt)
        vi = vLow + (cm - cLow) * (vHigh - vLow) / (cHigh - cLow)
    Wend
    CSImpliedVolatilityBisection = vi
    End Function
```