

Help

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#include "hes1d_stda.h"
#include "enums.h"
#include "error_msg.h"

#if defined(PremiaCurrentVersion) && PremiaCurrentVersion < (2015+2) //The "#els
static int CHK_OPT(AP_FOURIERCOSINE_GMDB_HES)(void *Opt, void *Mod)
{
    return NONACTIVE;
}
int CALC(AP_FOURIERCOSINE_GMDB_HES)(void *Opt, void *Mod, PricingMethod *Met)
{
    return AVAILABLE_IN_FULL_PREMIA;
}
#else

static void Valomega(double a_global, double b_global, int N, PnlVect *omega)
{
    int i;
    for (i=0;i<N;i++)

pnl_vect_set(omega,i,((double)i)*M_PI/(b_global-a_global));

}
static void Valcf(double t,double thetav, double T, double a_global,double b_glo
{
    dcomplex D, G, temp1, temp2, temp3, temp4;
    double omegaj,a,TN;
    int j;

    TN=T/1000;
    a = a_global - fee*t;

    for (j=0;j<N;j++)
    {
        omegaj=pnl_vect_get(omega,j);
        D=Cpow_real(Cadd(Cpow_real(RCsub(kappav,Complex(0,rho*sigmav*omegaj)),2),CRmul
        G=Cdiv(Csub(Complex(kappav,-rho*sigmav*omegaj),D),Cadd(Complex(kappav,-rho*sig

        temp1=RCsub(1,Cexp(CRmul(D,-TN)));
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temp2=RCsub(1,Cmul(G,Cexp(CRmul(D,-TN))));
temp3=Csub(Complex(kappav,-rho*sigmav*omegaj),D);
temp4=RCsub(1,G);

pnl_vect_complex_set(cf,j,Cmul(Cmul(Cexp(Cadd(Complex(0,omegaj*(r-fee)*TN),CRm
    }
}

static void cf0(PnlVectComplex *cf)
{
    pnl_vect_complex_set_real(cf,0,0.5*pnl_vect_complex_get_real(cf,0));
    pnl_vect_complex_set_imag(cf,0,0.5*pnl_vect_complex_get_imag(cf,0));
}

static void Valvt(double a_global,double b_global,double alphav, double P, doubl
{
    int j;

    double omegaj, a, b;

    a = a_global - fee*T;
    b = b_global - fee*T;

    for (j=0;j<N;j++)
    {
        omegaj=pnl_vect_get(omega,j);

        if (j==0)
        {
            pnl_vect_set(V,0,(exp(a)-1.0-a)*(2.0/(b-a))*alphav*P*M);
        }
        else
        {
            pnl_vect_set(V,j,(-pow((1+pow(omegaj,2)),-1)*(cos((-a)*omegaj)-exp(a)+omegaj*s
        }
    }
}

static double Valgt(double d, double A0, double rollup_rate, double thetav, doub
{

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PnlVect *gtt;

double Vi,gt,t,result,L,c1,c2,x,M,a_global,b_global;

int i,j;

L=20;
result = 0;
t=T/1000;

gtt = pnl_vect_create(N);

for (j=0;j<1000;j++)
{
c1=r*t+(1-exp(-kappav*t))*(thetav-v0)/(2.0*kappav)-0.5*thetav*t;
c2=(1.0/(8.0*pow(kappav,3)))*(sigmav*t*kappav*exp(-kappav*t)*(v0-thetav)*(8.0*
a_global=c1-L*pow(fabs(c2),0.5);
b_global=c1+L*pow(fabs(c2),0.5);

M=exp(rollup_rate*t);

x=log(A0/(alphav*P*M));

Valomega(a_global, b_global, N,omega);

Valcf(t,thetav,T,a_global,b_global,r,N,sigmav,kappav,rho,x,fee,q,v0,omega,cf);

cf0(cf);

Valvt(a_global,b_global,alphav,P,M,omega,V,N,fee,t);

for (i=0;i<N;i++)
{

Vi=pnl_vect_get(V,i);

pnl_vect_set(gtt,i,exp(-r*t)*Vi*pnl_vect_complex_get_real(cf,i));

}

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    gt=pnl_vect_sum(gtt);
    result += gt * d * exp(-d*t)*T/1000;
    t +=T/1000;

    }
    pnl_vect_free(&gtt);
    return result;
}

static double Valft(double A0,double d, double r,double sigmav,double rho,double
{
    double ft,D,G;

    D=pow(pow(kappav-rho*sigmav,2),0.5);
    G=(kappav-rho*sigmav-D)/(kappav-rho*sigmav+D);

    ft = (d*fee*A0*exp(T/1000*(r-fee)+v0/pow(sigmav,2)*(1-exp(-D*T/1000)))/(1-G*exp

    return ft;
}

static double fee(double d,double rollup_rate,double A0, int maximum_number_of_1
{
    double fee1=0.00;
    double fee2=0.1;
    double valueg1;
    double valueg2;
    double valuef1;
    double valuef2;
    double feexx;
    double step;
    int number_of_loop;

    number_of_loop=0;
    step=tolerance*2.;

    while( (fabs(step) > tolerance) && (number_of_loop < maximum_number_of_loop))
    {
        number_of_loop++;

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    valueg1=Valgt(d,A0,rollup_rate,thetav, T, alphav, P, r, N, sigmav, kappav, rho
    valueg2=Valgt(d,A0,rollup_rate,thetav, T, alphav, P, r, N, sigmav, kappav, rho
    valuef1=Valft(A0,d,r,sigmav, rho, thetav, kappav, fee1, v0, T);
    valuef2=Valft(A0,d,r,sigmav, rho, thetav, kappav, fee2, v0, T);
    step = (valueg1-valuef1)/((valueg1-valueg2)/(fee1-fee2)-(valuef1-valuef2)/(fee
    feexx=fee1-step;
    fee2=fee1;
    fee1=feexx;
    }
    return feexx;
}

/*Compute Price Option*/
int AP_FourierCosine_GMDB_Hes(double A0, double maturity, double r, double divi
{

    double premium;
    PnlVect *V,*omega, *gt;
    PnlVectComplex *cf;

    premium=A0;
    omega = pnl_vect_create (N);
    V= pnl_vect_create (N);
    cf =pnl_vect_complex_create (N);
    gt = pnl_vect_create(N);

    *ptprice = fee(d,rollup_rate,A0,100,0.000001,maturity,alpha,theta,premium,r,N,

    pnl_vect_free(&omega);
    pnl_vect_free(&V);
    pnl_vect_complex_free(&cf);
    pnl_vect_free(&gt);
    return OK;
}

int CALC(AP_FOURIERCOSINE_GMDB_HES)(void *Opt, void *Mod, PricingMethod *Met)
{
    TYPEOPT *ptOpt = (TYPEOPT *)Opt;
    TYPEMOD *ptMod = (TYPEMOD *)Mod;

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double r, divid;

r = log(1. + ptMod->R.Val.V_DOUBLE / 100.);
divid = log(1. + ptMod->Divid.Val.V_DOUBLE / 100.);

return AP_FourierCosine_GMDB_Hes(ptMod->S0.Val.V_PDOUBLE,
                                ptOpt->Maturity.Val.V_DATE - ptMod->T.Val.V_D
                                ptMod->MeanReversion.Val.V_PDOUBLE,
                                ptMod->LongRunVariance.Val.V_PDOUBLE,
                                ptMod->Sigma.Val.V_PDOUBLE,
                                ptMod->Rho.Val.V_PDOUBLE,
                                Met->Par[0].Val.V_PINT,
                                &(Met->Res[0].Val.V_DOUBLE));
}

static int CHK_OPT(AP_FOURIERCOSINE_GMDB_HES)(void *Opt, void *Mod)
{
    if ((strcmp(((Option *)Opt)->Name, "GMDB") == 0))
        return OK;
    else
        return WRONG;
}
#endif //PremiaCurrentVersion

static int MET(Init)(PricingMethod *Met, Option *Opt)
{
    if (Met->init == 0)
    {
        Met->init = 1;
        Met->Par[0].Val.V_INT = 256;
    }

    return OK;
}

PricingMethod MET(AP_FOURIERCOSINE_GMDB_HES) =
{
    "AP_FOURIERCOSINE_GMDB_HES",
    {
        {"SpaceStepNumber", INT2, {100}, ALLOW},
        {" ", PREMIA_NULLTYPE, {0}, FORBID}
    }
}

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    },  
    CALC(AP_FOURIERCOSINE_GMDB_HES),  
    { {"Fair Fee", DOUBLE, {100}, FORBID},  
      {" ", PREMIA_NULLTYPE, {0}, FORBID}  
    },  
    CHK_OPT(AP_FOURIERCOSINE_GMDB_HES),  
    CHK_ok,  
    MET(Init)  
};
```