

Help

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#include <stdlib.h>
#include "bs1d_doublim.h"
#include "error_msg.h"

static int Cryer_Out(double s, NumFunc_1 *L, NumFunc_1 *U, NumFunc_1 *Rebate,
{
    int      Index, PriceIndex, TimeIndex, ssl;
    double   k, vv, h, z, alpha, beta, gamma, y, down, u, l, rebate, up, upwind_al
    double   *Obst, *A, *B, *C, *P, *S, *Q, *Z, pricenh, pricen2h, priceph;

    /*Memory Allocation*/
    Obst = malloc((N + 1) * sizeof(double));
    if (Obst == NULL)
        return MEMORY_ALLOCATION_FAILURE;
    A = malloc((N + 1) * sizeof(double));
    if (A == NULL)
        return MEMORY_ALLOCATION_FAILURE;
    B = malloc((N + 1) * sizeof(double));
    if (B == NULL)
        return MEMORY_ALLOCATION_FAILURE;
    C = malloc((N + 1) * sizeof(double));
    if (C == NULL)
        return MEMORY_ALLOCATION_FAILURE;
    P = malloc((N + 1) * sizeof(double));
    if (P == NULL)
        return MEMORY_ALLOCATION_FAILURE;
    S = malloc((N + 1) * sizeof(double));
    if (S == NULL)
        return MEMORY_ALLOCATION_FAILURE;
    Z = malloc((N + 1) * sizeof(double));
    if (Z == NULL)
        return MEMORY_ALLOCATION_FAILURE;
    Q = malloc((N + 1) * sizeof(double));
    if (Q == NULL)
        return MEMORY_ALLOCATION_FAILURE;

    /*Time Step*/
    k = t / (double)M;
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/*Space Step*/
u = (U->Compute)(U->Par, 0);
l = (L->Compute)(L->Par, 0);
rebate = (Rebate->Compute)(Rebate->Par, 0);
y = log(s);
down = log(l);
up = log(u);
h = (up - down) / (double)(N);

/*Peclet Condition-Coefficient of diffusion augmented */
vv = 0.5 * SQR(sigma);
z = (r - divid) - vv;
if ((h * fabs(z)) <= vv)
    upwind_alphacoef = 0.5;
else
{
    if (z > 0.) upwind_alphacoef = 0.0;
    else upwind_alphacoef = 1.0;
}
vv -= z * h * (upwind_alphacoef - 0.5);

/*Lhs Factor of theta-schema*/
alpha = k * (-vv / (h * h) + z / (2.0 * h));
beta = 1.0 + k * (r + 2.*vv / (h * h));
gamma = k * (-vv / (h * h) - z / (2.0 * h));

for (PriceIndex = 0; PriceIndex <= N - 2; PriceIndex++)
{
    A[PriceIndex] = alpha;
    B[PriceIndex] = beta;
    C[PriceIndex] = gamma;
}

/*Terminal Values*/
y = log(s);
for (PriceIndex = 1; PriceIndex < N; PriceIndex++)
    Obst[PriceIndex - 1] = (p->Compute)(p->Par, exp(down + PriceIndex * h));

for (PriceIndex = 2; PriceIndex <= N - 2; PriceIndex++)
{
    P[PriceIndex - 1] = alpha * Obst[PriceIndex - 2] +

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        beta * Obst[PriceIndex - 1] + gamma * Obst[PriceIndex]
    }

    P[0] = beta * Obst[0] + gamma * Obst[1];
    P[N - 2] = alpha * Obst[N - 3] + beta * Obst[N - 2];

    for (PriceIndex = 0; PriceIndex <= N - 2; PriceIndex++)
    {
        S[PriceIndex] = 0.0;
        Z[PriceIndex] = 0.0;
    }
    ssl = false;

    /*Finite Difference Cycle*/
    for (TimeIndex = 1; TimeIndex <= M; TimeIndex++)
    {
        for (PriceIndex = 0; PriceIndex <= N - 2; PriceIndex++)
            Z[PriceIndex] = Z[PriceIndex] + Obst[PriceIndex];

        for (PriceIndex = 0; PriceIndex <= N - 2; PriceIndex++)
            Q[PriceIndex] = P[PriceIndex] - Z[PriceIndex];
        Q[0] += alpha * rebate;
        Q[N - 2] += gamma * rebate;

        AlgCrayner(N, Z, ssl, A, B, C, Q, S);

        for (PriceIndex = 0; PriceIndex <= N - 2; PriceIndex++)
            S[PriceIndex] = Z[PriceIndex];

        ssl = true;
    }

    for (PriceIndex = 0; PriceIndex <= N - 2; PriceIndex++)
        P[PriceIndex] = Z[PriceIndex] + Obst[PriceIndex];

    Index = (int)floor((y - down) / h) - 1;

    /*Price*/
    if ((y == up) && (y == down))
        *ptprice = P[0];
    else

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    *ptprice = P[Index] + (P[Index + 1] - P[Index]) * (exp(y) - exp(down + h + I

/*Delta*/
if ((y == up) && (y == down))
    *ptdelta = 0.0;
else
{
    pricenh = P[Index + 1] + (P[Index + 2] - P[Index + 1]) * (exp(y + h) - exp
    if (Index > 0)
    {
        priceph = P[Index - 1] + (P[Index] - P[Index - 1]) * (exp(y - h) - exp
        *ptdelta = (pricenh - priceph) / (2 * s * h);
    }
    else
    {
        pricen2h = P[Index + 2] + (P[Index + 3] - P[Index + 2]) * (exp(y + 2 *
        *ptdelta = (4 * pricenh - pricen2h - 3 * (*ptprice)) / (2 * s * h);
    }
}

/*Memory Desallocation*/
free(Obst);
free(A);
free(B);
free(C);
free(P);
free(S);
free(Z);
free(Q);

return OK;
}

int CALC(FD_Cryer_Out)(void *Opt, void *Mod, PricingMethod *Met)
{
    TYPEOPT *ptOpt = (TYPEOPT *)Opt;
    TYPEMOD *ptMod = (TYPEMOD *)Mod;
    double r, divid;

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

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return Cryer_Out(ptMod->S0.Val.V_PDOUBLE,
                 ptOpt->LowerLimit.Val.V_NUMFUNC_1, ptOpt->UpperLimit.Val.V_NUMFUNC_1,
                 ptOpt->Maturity.Val.V_DATE - ptMod->T.Val.V_DATE, r, divid, p,
                 Met->Par[0].Val.V_INT, Met->Par[1].Val.V_INT,
                 &(Met->Res[0].Val.V_DOUBLE), &(Met->Res[1].Val.V_DOUBLE));
}

static int CHK_OPT(FD_Cryer_Out)(void *Opt, void *Mod)
{
    Option *ptOpt = (Option *)Opt;
    TYPEOPT *opt = (TYPEOPT *) (ptOpt->TypeOpt);

    if ((opt->Parisian).Val.V_BOOL == FALSE)
        if ((strcmp(((Option *)Opt)->Name, "DoubleCallOutAmer") == 0) || (strcmp(((Option *)Opt)->Name, "DoubleCallOutEur") == 0))
            return OK;
        return WRONG;

    return WRONG;
}

static int MET(Init)(PricingMethod *Met, Option *Opt)
{
    if (Met->init == 0)
    {
        Met->init = 1;

        Met->Par[0].Val.V_INT2 = 100;
        Met->Par[1].Val.V_INT2 = 100;

    }

    return OK;
}

PricingMethod MET(FD_Cryer_Out) =
{
    "FD_Cryer_Out",
    {"SpaceStepNumber", INT2, {100}, ALLOW}, {"TimeStepNumber", INT2, {100}, ALLOW}, {"Calculation", CALC(FD_Cryer_Out)},
}

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{{"Price", DOUBLE, {100}, FORBID}, {"Delta", DOUBLE, {100}, FORBID} , {" ", PR  
CHK_OPT(FD_Cryer_Out),  
CHK_split,  
MET(Init)  
};
```