

[Help](#)

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#include <stdlib.h>
#include "variancegamma1d_lim.h"
#include "pnl/pnl_vector.h"
#include "pnl/pnl_fft.h"
#include "pnl/pnl_cdf.h"
#include "math/wienerhopf.h"

#if defined(PremiaCurrentVersion) && PremiaCurrentVersion < (2009+2) //The "#els
static int CHK_OPT(AP_fastwhdownout_vg)(void *Opt, void *Mod)
{
    return NONACTIVE;
}
int CALC(AP_fastwhdownout_vg)(void *Opt, void *Mod, PricingMethod *Met)
{
    return AVAILABLE_IN_FULL_PREMIA;
}
#else

static int wh_vg_downout(int am, int upordown, int ifCall,
                        double Spot, double sigma,
                        double theta, double kappa,
                        double r, double divid,
                        double T, double h, double Strike1,
                        double bar, double rebate,
                        double er, long int step,
                        double *ptprice, double *ptdelta)
{
    double ptprice1, ptdelta1, mu, qu, om;
    double lm1, lp1, num, nup, cm, cp;

    double alfa, beta;
    double sig2 = sigma * sigma;

    alfa = sqrt(theta * theta + 2.0 * sig2 / kappa) / sig2;
    beta = theta / sig2;
    cp = 1.0 / kappa;
    cm = cp;
    lp1 = alfa + beta;
    lm1 = beta - alfa;
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    if (upordown == 0)
    {
        om = lm1 < -2. ? 2. : (-lm1 + 1.) / 2.;
    }
    else
    {
        om = lp1 > 1. ? -1. : -lp1 / 2.;
    }

    mu = r - divid + cp * (log(alfa * alfa - (beta + 1) * (beta + 1)) - log(alfa *

    if (mu < 0.0)
    {
        nup = 1;
        num = 0;
    }
    else
    {
        nup = 0;
        num = 1;
    }

    qu = r + cp * (log(alfa * alfa - (beta + om) * (beta + om)) - log(alfa * alfa

    fastwienerhopf(3, mu, qu, om, am, upordown, ifCall, Spot, lm1, lp1,
                    num, nup, cm, cp, r, divid,
                    T, h, Strike1, bar, rebate,
                    er, step, &ptprice1, &ptdelta1);

    //Price
    *ptprice = ptprice1;
    //Delta
    *ptdelta = ptdelta1;

    return OK;
}

//=====
int CALC(AP_fastwhdownout_vg)(void *Opt, void *Mod, PricingMethod *Met)
{

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TYPEOPT *ptOpt = (TYPEOPT *)Opt;
TYPEMOD *ptMod = (TYPEMOD *)Mod;
double r, divid, limit, strike, spot, rebate;

NumFunc_1 *p;
int res;
int upordown;
int ifCall;

r = log(1. + ptMod->R.Val.V_DOUBLE / 100.);
divid = log(1. + ptMod->Divid.Val.V_DOUBLE / 100.);
limit = ((ptOpt->Limit.Val.V_NUMFUNC_1)->Compute)((ptOpt->Limit.Val.V_NUMFUNC_1)->Compute);
p = ptOpt->PayOff.Val.V_NUMFUNC_1;
strike = p->Par[0].Val.V_DOUBLE;
spot = ptMod->S0.Val.V_DOUBLE;
ifCall = ((p->Compute) == &Call);

rebate = ((ptOpt->Rebate.Val.V_NUMFUNC_1)->Compute)((ptOpt->Rebate.Val.V_NUMFUNC_1)->Compute);

if ((ptOpt->DownOrUp).Val.V_BOOL == DOWN)
    upordown = 0;
else upordown = 1;

res = wh_vg_downout(ptOpt->EuOrAm.Val.V_BOOL, upordown, ifCall, spot, ptMod->S0,
                    r, divid,
                    ptOpt->Maturity.Val.V_DATE - ptMod->T.Val.V_DATE, Met->Par[0].Val.V_DOUBLE,
                    limit, rebate,
                    Met->Par[0].Val.V_DOUBLE, Met->Par[2].Val.V_INT2,
                    &(Met->Res[0].Val.V_DOUBLE), &(Met->Res[1].Val.V_DOUBLE));

return res;
}

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

    if ((opt->OutOrIn).Val.V_BOOL == OUT)
        if ((opt->Parisian).Val.V_BOOL == FALSE)

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        if ((opt->EuOrAm).Val.V_BOOL == EURO)
            return OK;

    return WRONG;
}

#endif //PremiaCurrentVersion
static int MET(Init)(PricingMethod *Met, Option *Opt)
{
    static int first = 1;

    if (first)
    {
        Met->Par[0].Val.V_PDOUBLE = 2.0;
        Met->Par[1].Val.V_PDOUBLE = 0.001;
        Met->Par[2].Val.V_INT2 = 100;

        first = 0;
    }
    return OK;
}

PricingMethod MET(AP_fastwhdownout_vg) =
{
    "AP_FastWHBar_VG",
    { {"Scale of logprice range", DOUBLE, {100}, ALLOW},
      {"Space Discretization Step", DOUBLE, {500}, ALLOW},
      {"TimeStepNumber", INT2, {100}, ALLOW},
      {" ", PREMIA_NULLTYPE, {0}, FORBID}
    },
    CALC(AP_fastwhdownout_vg),
    { {"Price", DOUBLE, {100}, FORBID},
      {"Delta", DOUBLE, {100}, FORBID},
      {" ", PREMIA_NULLTYPE, {0}, FORBID}
    },
    CHK_OPT(AP_fastwhdownout_vg),
    CHK_split,
    MET(Init)
};

```