

[Help](#)

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

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

static int wh_kou_bar(int am, int upordown, int ifCall, double Spot, double sigm
                        double r, double divid,
                        double T, double h, double Strike1,
                        double bar, double rebate,
                        double er, long int step,
                        double *ptprice, double *ptdelta)
{

    double cp, cm, ptprice1, ptdelta1, mu, qu, omega, sig2, lp, lm;

    lp = lambdam;
    lm = -lambdap;

    if (upordown == 0)    /*DOWN*/
    {
        omega = lm < -2. ? 2. : (-lm + 1.) / 2.;
    }
    else                  /*UP*/
    {
        omega = lp > 1. ? -1. : -lp / 2.;
    }
}

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cp = (1 - P) * lambda;
cm = P * lambda;

sig2 = sigma * sigma;

mu = r - divid + cp / (lp + 1.0) + cm / (lm + 1.0) - sig2 / 2.0;

qu = r - mu * omega - sig2 * omega * omega / 2 + cp + cm - cp * lp / (lp + omega)

fastwienerhopf(4, mu, qu, omega, am, upordown, ifCall, Spot, lm, lp,
                2.0, sigma, 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_kou)(void *Opt, void *Mod, PricingMethod *Met)
{
    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);

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

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

res = wh_kou_bar(ptOpt->EuOrAm.Val.V_BOOL, upordown, ifCall, spot, ptMod->Sigm
    r, divid,
    ptOpt->Maturity.Val.V_DATE - ptMod->T.Val.V_DATE, Met->Par[1]
    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_kou)(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)
            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;
    }
}

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Met->Par[2].Val.V_INT2 = 100;

    first = 0;
}
return OK;
}

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