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#include "bs1d_std.h"

static int CallSpread_BlackScholes_73(double s, double k1, double k2, double t,
{
    double sigmasqrt, d1, d2, delta;

    sigmasqrt = sigma * sqrt(t);
    d1 = (log(s / k1) + (r - divid) * t) / sigmasqrt + sigmasqrt / 2.;
    d2 = d1 - sigmasqrt;
    delta = exp(-divid * t) * cdf_nor(d1);

    *ptprice = s * delta - exp(-r * t) * k1 * cdf_nor(d2);
    *ptdelta = delta;

    d1 = (log(s / k2) + (r - divid) * t) / sigmasqrt + sigmasqrt / 2.;
    d2 = d1 - sigmasqrt;
    delta = exp(-divid * t) * cdf_nor(d1);

    /*Price*/
    *ptprice -= s * delta - exp(-r * t) * k2 * cdf_nor(d2);

    /*Delta*/
    *ptdelta -= delta;

    return OK;
}

int CALC(CF_CallSpread)(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.);

    return CallSpread_BlackScholes_73(ptMod->S0.Val.V_PDOUBLE,
                                      (ptOpt->PayOff.Val.V_NUMFUNC_1)->Par[0].Val.
                                      ptOpt->Maturity.Val.V_DATE - ptMod->T.Val.V_
```

