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#include "bs1d_doublim.h"

static int Call_KunitomoIkeda_91(double s,
    NumFunc_1 *L,NumFunc_1 *U,NumFunc_1 *Rebate,NumFunc_1
    *PayOff,double t,double r,double divid,double si
    gma,double *ptprice,double *ptdelta){
    int dummy;
    double out_price,out_delta,price_plus,price_
    minus;

    dummy=CallOut_KunitomoIkeda_91(s,L,U,Rebate,
    PayOff,t,r,divid,sigma,&out_price,&out_delta);

    /*Price*/
    *ptprice=out_price;

    dummy=CallOut_KunitomoIkeda_91(s*(1.+INC),L,U
    ,Rebate,PayOff,t,r,divid,sigma,&out_price,&out_
    delta);
    price_plus=out_price;
    dummy=CallOut_KunitomoIkeda_91(s*(1.-INC),L,U
    ,Rebate,PayOff,t,r,divid,sigma,&out_price,&out_
    delta);
    price_minus=out_price;

    /*Delta*/
    *ptdelta=(price_plus-price_minus)/(2.*s*INC);

    return OK;
}

int CALC(CF_CallOut_KunitomoIkeda)(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 Call_KunitomoIkeda_91(ptMod->S0.Val.
    V_PDOUBLE,ptOpt->LowerLimit.Val.V_NUMFUNC_1, pt
    Opt->UpperLimit.Val.V_NUMFUNC_1,
        ptOpt->Rebate.Val.V_NUMFUNC_1,ptOpt->Pay
    Off.Val.V_NUMFUNC_1,ptOpt->Maturity.Val.V_DATE-pt
    Mod->T.Val.V_DATE,
        r,divid,ptMod->Sigma.Val.V_PDOUBLE,&(Met-
    >Res[0].Val.V_DOUBLE),&(Met->Res[1].Val.V_
    DOUBLE));
}

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

    if ((opt->Parisian).Val.V_BOOL==WRONG)
        if((opt->RebOrNo).Val.V_BOOL==NOREBATE)
            return strcmp( ((Option*)Opt)->Name,"
            DoubleCallOutEuro");
    return WRONG;
}

static int MET(Init)(PricingMethod *Met)
{
    return OK;
}

PricingMethod MET(CF_CallOut_KunitomoIkeda)=
{
    "CF_CallOut_KunitomoIkeda",
    {" ",END,0,FORBID}},
    CALC(CF_CallOut_KunitomoIkeda),
    {"Price",DOUBLE,100,FORBID},{"Delta",DOUBLE,
    100,FORBID} ,{" ",END,0,FORBID}},
    CHK_OPT(CF_CallOut_KunitomoIkeda),
    CHK_ok,
    MET(Init)
} ;

```

References