

[Help](#)

```
#include "bs1d_pad.h"

int Fixed_PutLookback_ConzeWiswanathan(double s,
    double s_min, double k, double t,
    double r, double divid, double sigma,
    double *ptprice, double *ptdelta)
{
    double b, sigmasqrt, a1, a2, esp, disc;

    if (s_min > s)
    {
        *ptprice=0.;
        *ptdelta=0.;
    }
    else
    {
        b=r-divid;
        sigmasqrt=sigma*sqrt(t);
        esp=2.*b/SQR(sigma);
        disc=exp(-r*t);

        if (k<s_min)
        {
            a1=(log(s/k)+ (b+SQR(sigma)/2.)*t)/sigmasq
            rt;
            a2=a1-sigmasqrt;
            if (b ==0)
            {
                *ptprice = k*disc*N(-a2) - s*disc*N(-a1
            ) +
                s*disc*sigmasqrt*nd(a1) - s*disc*N(-a1)*(
            SQR(sigma)*t/2.+log(s/k));

                *ptdelta = -(k/s)*disc*nd(a2)/sigmasqrt
            + nd(a1)*disc*(sigmasqrt+1./sigmasqrt)
                -disc*N(-a1)*(2.+SQR(sig
            ma)*t/2.+log(s/k));
            }
            else
            {
```

```

        *ptprice=k*exp(-r*t)*N(-a2)-s*exp(-div
id*t)*N(-a1)+
        s*exp(-r*t)*(SQR(sigma)/(2.*b))*
        (pow(s/k,-esp)*N(-a1+(2.*b/sigma)*sqrt(t)
)-exp(b*t)*N(-a1));

        *ptdelta=exp(-divid*t)*N(a1)*(1.+SQR(si
gma)/(2.*b))+
        exp(-divid*t)*nd(a1)/(sigma*sqrt(t))-
        exp(-r*t)*(k/s)*nd(a2)/sigmasqrt+
        exp(-r*t)*pow(s/k,-esp)*N(-a1+2.*(b/sig
ma)*sqrt(t))*(SQR(sigma)/(2*b)-1.)-
        exp(-divid*t)*(SQR(sigma)/(2*b)+1.);
    }
}
else
{
    a1=(log(s/s_min) + (b+SQR(sigma)/2.)*t)/sig
masqrt;
    a2=a1-sigmasqrt;
    if (b == 0)
    {
        *ptprice = disc*(k-s_min) - s*disc*N(-
a1) + s_min*disc*N(-a2) +
        s*disc*sigmasqrt*nd(a1) - s*dis
c*N(-a1)*(SQR(sigma)*t/2.+log(s/s_min));

        *ptdelta = -(s_min/s)*disc*nd(a2)/sig
masqrt + nd(a1)*disc*(sigmasqrt+1./sigmasqrt)
        -disc*N(-a1)*(2.+SQR(sig
ma)*t/2.+log(s/s_min));
    }
    else
    {
        *ptprice=exp(-r*t)*(k-s_min)-s*exp(-div
id*t)*N(-a1)+s_min*exp(-r*t)*N(-a2)+
        s*exp(-r*t)*(SQR(sigma)/(2.*b))*
        (pow(s/s_min,-esp)*N(-a1+(2.*b/sigma)*sq
rt(t))-exp(b*t)*N(-a1));

        *ptdelta=exp(-divid*t)*(1.+SQR(sigma)/(

```

```

        2.*b))*(N(a1)-1.)+
            exp(-divid*t)*nd(a1)/(sigma*sqrt(t))
            -exp(-r*t)*(s_min/s)*nd(a2)/sigmasqrt+
            exp(-r*t)*pow(s/s_min,-esp)*N(-a1+2.*(b/
sigma)*sqrt(t))*(SQR(sigma)/(2*b)-1.);
        }
    }
}

return OK;
}

int CALC(CF_Fixed_PutLookBack)(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 Fixed_PutLookback_ConzeWiswanathan(ptMod
->S0.Val.V_PDOUBLE,(ptOpt->PathDep.Val.V_
NUMFUNC_2)->Par[4].Val.V_PDOUBLE,
            (ptOpt->PayOff.Val.V_
NUMFUNC_2)->Par[0].Val.V_PDOUBLE,
            ptOpt->Maturity.Val.V_DATE-pt
Mod->T.Val.V_DATE,
            r,divid,ptMod->Sigma.Val.V_PDOU
BLE,&(Met->Res[0].Val.V_DOUBLE),&(Met->Res[1].Val
.V_DOUBLE));
}

int CHK_OPT(CF_Fixed_PutLookBack)(void *Opt, void
*Mod)
{
    return strcmp( ((Option*)Opt)->Name,"
LookBackPutFixedEuro");
}

```

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

PricingMethod MET(CF_Fixed_PutLookBack)=
{
    "CF_Fixed_PutLookBack",
    {{" ",END,0,FORBID}},
    CALC(CF_Fixed_PutLookBack),
    {{"Price",DOUBLE,100,FORBID},{ "Delta",DOUBLE,10
        0,FORBID} ,{" ",END,0,FORBID}},
    CHK_OPT(CF_Fixed_PutLookBack),
    CHK_ok,
    MET(Init)
};
```

References