

[Help](#)

```

#include <stdlib.h>
#include "variancegamma1d_std.h"
#include "math/wienerhopf.h"

#if defined(PremiaCurrentVersion) && PremiaCurrentVersion < (2011+2) //The "#els
static int CHK_OPT(AP_backwardfourieramer_vg)(void *Opt, void *Mod)
{
    return NONACTIVE;
}
int CALC(AP_backwardfourieramer_vg)(void *Opt, void *Mod, PricingMethod *Met)
{
    return AVAILABLE_IN_FULL_PREMIA;
}
#else

/*////////////////////////////////////*/
static int backwardfourier_vg_american(int ifCall, double Spot, double sigma, do
double r, double divid,
double T, double h, double Strike1,
double er, long int step,
double *ptprice, double *ptdelta)
{
    double ptprice1, ptdelta1, mu, qu, om;
    double lm1, lp1, num = 1., nup = 1., 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;

    if (ifCall == 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 if (mu >= 0.0)
{
    nup = 0;
    num = 1;
}

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

bi_american(mu, qu, om, ifCall, Spot, lm1, lp1,
            num, nup, cm, cp, r, divid,
            T, h, Strike1,
            er, step, &ptprice1, &ptdelta1);

//Price
*ptprice = ptprice1;
//Delta
*ptdelta = ptdelta1;
return OK;
}

//=====
int CALC(AP_backwardfourieramer_vg)(void *Opt, void *Mod, PricingMethod *Met)
{
    TYPEOPT *ptOpt = (TYPEOPT *)Opt;
    TYPEMOD *ptMod = (TYPEMOD *)Mod;
    double r, divid, strike, spot;

    NumFunc_1 *p;

```

```

    int res;

    int ifCall;

    r = log(1. + ptMod->R.Val.V_DOUBLE / 100.);
    divid = log(1. + ptMod->Divid.Val.V_DOUBLE / 100.);

    p = ptOpt->PayOff.Val.V_NUMFUNC_1;
    strike = p->Par[0].Val.V_DOUBLE;
    spot = ptMod->S0.Val.V_DOUBLE;
    ifCall = ((p->Compute) == &Call);

    res = backwardfourier_vg_american(ifCall, spot, ptMod->Sigma.Val.V_PDOUBLE, pt
                                     r, divid,
                                     ptOpt->Maturity.Val.V_DATE - ptMod->T.Val.V_
                                     Met->Par[0].Val.V_DOUBLE, Met->Par[2].Val.V_
                                     &(Met->Res[0].Val.V_DOUBLE), &(Met->Res[1].V

    return res;

}

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

    if ((strcmp(((Option *)Opt)->Name, "PutAmer") == 0) || (strcmp(((Option *)Opt)
        return OK;

    return WRONG;
}

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

    if (first)

```

```

    {
        Met->HelpFilenameHint = "AP_backwardfourier_vg";
        Met->Par[0].Val.V_PDOUBLE = 2.0;
        Met->Par[1].Val.V_PDOUBLE = 0.01;
        Met->Par[2].Val.V_INT2 = 600;

        first = 0;
    }

    return OK;
}

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

```