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#if defined(PremiaCurrentVersion) && PremiaCurrentVersion < (2007+2) //The "#els
#else

/// \ file cdscirppmc.h
/// \ brief CDS_CIRpp_MC class
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#ifndef _CDS_CIRPP_MC_H
#define _CDS_CIRPP_MC_H

#include "
href../../../../common/math/credit_cds/cdscirpp_h_src.pdfcirpp.h"

// This class is made to compute Rf, the CDS Rate, by Monte-Carlo.
// The default intensity and interest rates may be correlated.
class CDS_CIRpp_MC
{
public:
    CDS_CIRpp_MC(int generator, double k, double theta, double sigma, double x0, d
        string inputCDS,
        double k_r, double theta_r, double sigma_r, double x0_r,
        string inputShortRate,
        double rho,
        vector<double> &timesT, double Z,
        double precision = 1.e-04,
        int noTau_Sim = 10000
    ):
        _tau(generator, k, theta, sigma, x0,
            timesT[timesT.size() - 1], barrier, inputCDS, precision),
        _shortRate(generator, k_r, theta_r, sigma_r, x0_r,
            timesT[timesT.size() - 1], rho, inputShortRate, precision),
        _timesT(timesT),
        _Z(Z),
        _noTau_Sim(noTau_Sim),
        _b(0.),
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    _c(0.)
{
    std::cout << "nMc : " << _noTau_Sim << endl;
}

CDS_CIRpp_MC(int generator, double mrIntensity, double thetaIntensity,
              double sigmaIntensity, double y0,
              vector<double> &intensityMat,
              vector<double> &intensityRates,
              double mrRate, double thetaRate, double sigmaRate,
              double x0_r,
              vector<double> &RatesMat,
              vector<double> &Rates,
              double correlation, double maturity, double period,
              double recovery,
              int Nsim,
              double precision = 1.e-04,
              double barrier = 1.0
              );

void WriteCharacteristics();

double CdsRate();
double CdsRate(double &DefaultLeg, double &PaymentLeg,
               double &std_dev_DefaultLeg, double &std_dev_PaymentLeg);
int MonteCarlo(double &sumI1, double &sumI2, double &sumS, int nS = 100);
int MonteCarlo(double &DefaultLeg, double &PaymentLeg,
               double &std_dev_DefaultLeg, double &std_dev_PaymentLeg, int nS);
double CdsRate_ControlVariate(double &DefaultLeg, double &PaymentLeg,
                              double &std_dev_DefaultLeg, double &std_dev_PaymentLeg);
double CdsRate_ControlVariate();

void Compute_b_and_c(double &b, double &c, double meanI, double meanJ, double meanS,
                    int N)
{
    Estimate_b_and_c(meanI, meanJ, meanS, N);
    //std::cout << "b: " << _b << ", c: " << _c << endl;
    b = _b;
    c = _c;
}

void Set_b_and_c(double b, double c)
{

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        _b = b;
        _c = c;
    }

    double DefaultableZC_MC(double t);
    double DefaultableZC_Mkt(double t);

protected:
    DefaultTimeCIRpp _tau;
    CIRppSR_Explicit0_Correlated _shortRate;
    vector<double> _timesT;
    double _Z;
    int _noTau_Sim;

private:
    double _b;
    double _c;
    bool Generate_Yi(double &sumI1, double &sumI2, double &sumS, bool &reset);
    bool Generate_Yi(double &sumI1, double &sumI2, double &sumS,
                    double &sumI1_sqr, double &sumI2_sqr, double &sumS_sqr, bool
    void Estimate_b_and_c(double meanI, double meanJ, double meanS, int N);
};

#endif

#endif //PremiaCurrentVersion

```