

[Help](#)

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

#include"
href../../../../common/math/lmm/lmm_header_h_src.pdf lmm_header.h"
#include "pnl/pnl_vector.h"

int mallocLibor(Libor **ptLib, int numOfMat, double tenorVal, double l0)
{
    int i;

    Libor *pt;
    pt = (Libor *)malloc(sizeof(Libor));

    pt->numberOfMaturities = numOfMat;
    pt->tenor = tenorVal;

    pt->libor = pnl_vect_create(numOfMat);
    pt->maturity = pnl_vect_create(numOfMat);

    for (i = 0; i < numOfMat; i++)
    {
        LET(pt->maturity, i) = i * tenorVal;
        LET(pt->libor, i) = l0;
    }

    *ptLib = pt;

    return (EXIT_SUCCESS);
}

void freeLibor(Libor **ptLib)
{
    pnl_vect_free(&((*ptLib)->libor));
    pnl_vect_free(&((*ptLib)->maturity));
    free(*ptLib);
    ptLib = NULL;
}
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int initLibor(Libor *ptLib, double l0)
{
    int i;

    for (i = 0; i < ptLib->numberOfMaturities; i++)
    {
        LET(ptLib->libor, i) = l0;
    }
    return (1);
};

void Libor_To_ZeroCoupon(Libor *ptLib, PnlVect *zc) // Compute P(0, Ti) i=0:N
{
    int i, N;

    N = ptLib->numberOfMaturities;

    pnl_vect_resize(zc, N + 1);

    LET(zc, 0) = 1;

    for (i = 0; i < N; i++)
    {
        LET(zc, i + 1) = GET(zc, i) / (1. + (ptLib->tenor) * GET(ptLib->libor, i))
    }
}

double Sum_ZC(Libor *ptLib, int i_first, int i_last) // Compute "sum P(0, T_i)"
{
    int i;
    double zc, sum_zc;

    zc = 1.;
    for (i = 0; i < i_first; i++)
    {
        zc /= (1. + (ptLib->tenor) * GET(ptLib->libor, i));
    }

    sum_zc = zc; // P(0, T(i_first))
    for (i = i_first; i < i_last; i++)
    {

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        zc /= (1. + (ptLib->tenor) * GET(ptLib->libor, i)); // P(0, T(i+1))
        sum_zc += zc;
    }

    return sum_zc;
}

int readLiborFromFile(Libor **ptLib, char *fileName)
{
    /*lie les donnees des libors initiaux et leurs maturités, les donnees lues pre
    int i, n;
    char ligne[20];
    char *pligne;
    double t, l, Tprev, delta, deltaprev;
    FILE *datas;
    double *L;
    double *T;

    datas = fopen(fileName, "r");

    if (datas == NULL)
    {
        printf("Le FICHER N'A PU ETRE OUVERT. VERIFIER LE CHEMIN\ n");
        exit(1);
    }

    n = 0;
    Tprev = 0;
    deltaprev = 0;

    pligne = ligne;
    T = (double *)malloc(100 * sizeof(double));
    L = (double *)malloc(100 * sizeof(double));
    /* printf("OUVERTURE\ n");*/

    while (1)
    {
        pligne = fgets(ligne, sizeof(ligne), datas);
        if (pligne == NULL)

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        break;
    else
    {
        sscanf(ligne, "%lf t=%lf", &t, &l);

        T[n] = t;
        L[n] = t;

        delta = t - Tprev;
        Tprev = t;
        if (delta != deltaprev && n > 0)
        {
            printf("WARNING, NO CONSTANT TENOR IN LIBOR LIST!\ n");
        }
        deltaprev = delta;

        n++;
    }
}
fclose(datas);

(*ptLib)->maturity = pnl_vect_create(n);
(*ptLib)->libor = pnl_vect_create(n);

for (i = 0; i < n; i++)
{
    LET((*ptLib)->maturity, i) = T[i];
    LET((*ptLib)->libor, i) = L[i];
}
(*ptLib)->numberOfMaturities = n;
(*ptLib)->tenor = T[2] - T[1];

free(T);
free(L);

return (1);
}

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int putLiborToZero(Libor *ptLib, int index)

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{
    LET(ptLib->libor, index) = 0.0;
    return (1);
};

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int copyLibor(Libor *ptLibSrc , Libor *ptLibDest)
{
    int i ;

    ptLibDest->numberOfMaturities = ptLibSrc->numberOfMaturities;
    ptLibDest->tenor = ptLibSrc->tenor;

    for (i = 0; i < ptLibSrc->numberOfMaturities; i++)
    {
        LET(ptLibDest->libor, i) = GET(ptLibSrc->libor, i);
        LET(ptLibDest->maturity, i) = GET(ptLibSrc->maturity, i);
    }
    return (1);
};

```

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int printLibor(Libor *ptLib)
{
    int i;
    for (i = 0; i < ptLib->numberOfMaturities; i++)
    {
        printf("%lf %lf \ n", GET(ptLib->maturity, i), GET(ptLib->libor, i));

    }
    printf("\ n");
    return (1);
}

```

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double computeSwapRate(Libor *ptLib, int o, int s, int m)
{
    // compute (B(T_o,T_s)-B(T_o,T_m))/( sum_{i=s+1}^m \ tau B(T_o,T_i) )=S(T_o,T_s,T_m)
    int k, l;
    double val = 1.;
    double sum = 0.0;

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double vald;

for (k = s + 1; k <= m; k++)
{
    val = 1.;
    for (l = o ; l < k ; l++)
    {
        val *= 1. / (1. + ptLib->tenor * GET(ptLib->libor, l));
    }
    sum += ptLib->tenor * val;
}

val = 1.;
for (k = o; k < m; k++)
{
    val *= 1. / (1. + ptLib->tenor * GET(ptLib->libor, k));
}

if (o != s)
{
    vald = 1.;
    for (k = o; k <= (s - 1); k++)
    {
        vald *= 1. / (1. + ptLib->tenor * GET(ptLib->libor, k));
    }
    return ((vald - val) / sum);
}
else
{
    return ((1. - val) / sum);
}
}

double computeSwapPrice(Libor *ptLib, Swaption *ptSwp, int o, int s, int m)
{
    // compute  $B(T_o, T_s) - B(T_o, T_m) - K \sum_{i=s+1}^m \tau B(T_o, T_i)$ 
    // price at time  $T_o$  of a swap on  $T_s, \dots, T_m$ 
    int k, l;
    double val = 1.;
    double sum = 0.0;
    double vald;

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```

double price;

//sum_{k=s+1}^m \ tau B(T_o,T_k)
for (k = s + 1; k <= m; k++)
{
    val = 1.;
    //B(T_o,T_k)
    for (l = o ; l < k ; l++)
    {
        val *= 1. / (1. + ptLib->tenor * GET(ptLib->libor, l));
    }
    sum += ptLib->tenor * val;
}

val = 1.;
//B(T_o,T_m)
for (k = o; k < m; k++)
{
    val *= 1. / (1. + ptLib->tenor * GET(ptLib->libor, k));
}

if (o != s)
{
    vald = 1.;
    //B(T_o,T_s)
    for (k = o; k < s; k++)
    {
        vald *= 1. / (1. + ptLib->tenor * GET(ptLib->libor, k));
    }
    price = vald - val - ptSwp->strike * sum;
}
else //B(T_o,T_s)=1
{
    price = 1. - val - ptSwp->strike * sum;
}
return (price);
}

double computeZeroCouponSum(Libor *ptLib, int o, int s, int m)
{
    // compute    sum_{i=s}^m \ tau B(T_o,T_i)

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    int j, k;
    double val = 1.;
    double sum = 0.0;

    for (j = s; j <= m; j++)
    {
        val = 1.;
        for (k = o; k < j; k++)
        {
            val *= 1. / (1. + ptLib->tenor * GET(ptLib->libor, k));
        }
        sum += ptLib->tenor * val;
    }

    return (sum);
}

double computeZeroCoupon(Libor *ptLib, int o, int s)
{
    // compute B(T_o,T_s)
    if (o == s)
    {
        return (1);
    }
    else
    {
        return (computeZeroCouponSum(ptLib, o, s, s) / ptLib->tenor);
    }
}

#endif //PremiaCurrentVersion

```