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```

#ifndef _IMPLIED_BS_H
#define _IMPLIED_BS_H

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

#include "pnl/pnl_matrix.h"
#include "pnl/pnl_cdf.h"

/* Compute delta forward because this quantity is sold/bought to hedge option
extern double pnl_forward_price(double Spot, double r, double divid, double Maturity);
extern double pnl_bs_impli_call(double Vol, double Bond, double Forward, double Strike, double Maturity);
extern double pnl_bs_impli_put(double Vol, double Bond, double Forward, double Strike, double Maturity);
extern double pnl_bs_impli_call_delta_forward(double Vol, double Bond, double Forward, double Strike, double Maturity);
extern double pnl_bs_impli_put_delta_forward(double Vol, double Bond, double Forward, double Strike, double Maturity);
extern double pnl_bs_impli_call_put(int Is_Call, double Vol, double Bond, double Forward, double Strike, double Maturity);
extern double pnl_bs_impli_call_put_delta_forward(int Is_Call, double Vol, double Bond, double Forward, double Strike, double Maturity);
extern double pnl_bs_impli_vega(double Vol, double Bond, double Forward, double Strike, double Maturity);
extern double pnl_bs_impli_gamma(double Vol, double Bond, double Forward, double Strike, double Maturity);
extern double pnl_bs_impli_s_square_gamma(double Vol, double Bond, double Forward, double Strike, double Maturity);
extern double pnl_bs_impli_implicit_vol(int Is_Call, double Price, double Bond, double Forward, double Strike, double Maturity);
extern int pnl_bs_impli_matrix_implicit_vol(const PnlMatInt *Is_Call, const PnlMatInt *Bond, const PnlMatInt *Forward,
double spot, double rate, double divid,
const PnlVect *Strike, const PnlVect *Maturity, PnlMat *Vol);

#ifdef __cplusplus
}
#endif /* __cplusplus */

#endif

```