# Connecting theory section with empirical section/identification

## Prices

Consider the risk-free fixed leg of a swap. As discussed previously (see theory), the fixed leg payments are set such the present value of the fixed and floating legs are equal at the start of the contract:

where:

is the floating rate payment in period (forecasted using the appropriate yield curve)

is the appropriate discount rate for period (also forecasted using the appropriate yield curve)

is the time at which the payment will be made

is the fixed-rate payment to be solved for

In the case where counterparties can default, the fixed rate must be adjusted:

where and are the probabilities of counterparty 1 and 2 surviving up to period

Let be the ideal (i.e. risk-free) fixed rate payments and be the risky fixed-rate payment. Then the difference between the risk-free and risky case is:

The discount might be affected by other contract characteristics such as tenor, size (notional value) and time of trade. Thus, I model :

where:

is an indicator variable for whether the contract is cleared or not

is a vector of control variables and

is an error term

## Liquidity

As noted previously, the ask price quoted by dealer in a counterparty risk-free market is:

and the bid price is:

The observed bid-ask spread is the difference between the best bid and ask price:

When there is counterparty risk, the terms in the above become:

Where is an additional volatility to the asset price due to counterparty default.

Thus we should expect the bid-ask spread to increase in the presence of counterparty risk.

## Volatility

As discussed previously, the volatility without counterparty risk is:

The volatility with counterparty risk is:

Thus we should expect an increase in volatility if there is counterparty risk.