Pricing of IRS under no-risk.

Under conditions of no counterparty risk, the present value of each leg of the IRS is the sum of discounted cash flows. For the fixed leg, the PV of the payments are:

(1a) $$PV_{\text{fixed leg}} = \sum_{i=0}^{T} \frac{CF}{(1+r_i)^{t_i}}$$

where: $PV_{\text{fixed leg}}$ is the present value of fixed leg

CF is the fixed cash flow

r_i is the discount rate

t_i is the time at which CF is received.

The present value of the floating leg is similarly given by:

(1b) $$PV_{\text{floating leg}} = \sum_{i=0}^{T} \frac{CF_i}{(1+r_i)^{t_i}}$$

where CF_i is the floating rate cash flow variables and all other ~~values~~ are same as (1a)

The PV of the contract for the party paying fixed leg and receiving floting leg is:

(2) $$PV = PV_{\text{floating leg}} - PV_{\text{fixed leg}}$$

(The signs for the counterparty are reverse)

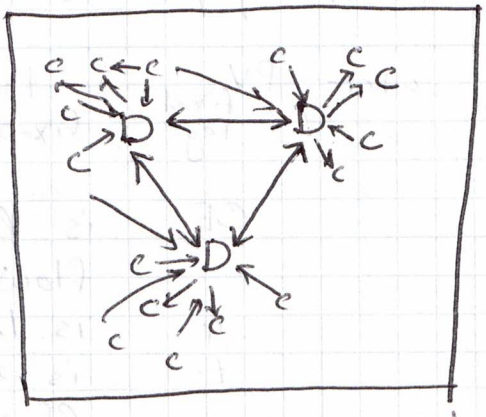
The payments for the floating leg are not known in advance but are estimated using the mkt. yield curve. The yld curve is obtained by interpolating short term deposit rates, ~~futo~~ medium term interest rate futures and long term interest rate instruments such as Forward Rate Agreements (FRA) and existing interest rate swaps.

At the inception of the contract, the value of the contract is zero for both parties. Thus, given the estimated floating rate payments, the present value of the floating leg payments can be estimated using and the fixed rate payment is set to equal the

present value of the ~~fixed rate~~ floating leg.

Counterparty Risk and central clearing

In The interest rate swaps market, trading is dominated by few large swap dealers (SD) and Major swaps Participants (MSP) rather than ~~the~~ bilateral trading. Fig 1 illustrates ~~the~~ a hypothetical network structure of such a market.



Key
D: Dealer/Major swap participant
C: Customer

Fig. 1 hypothecial IRS market

Note: Arrows indicate direction of floating rate payments. The counterparty makes the "opposite" fixed rate payments which are not visualized

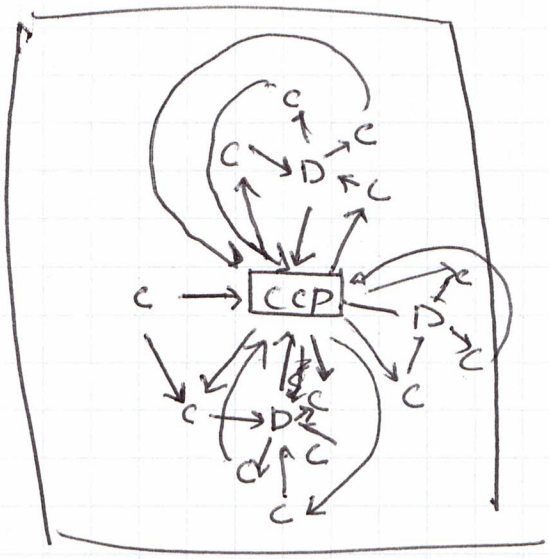
Dealers engage in interdealer trading as well as participation in "bulk" futures markets to manage cash flows/risk. Customers might trade w/ multiple dealers or with each other (small volume). It is believed that the dealer-dominated network structure reduces search costs over a customer-customer (bilateral mkt).

In the real world customers (or dealers) ~~might~~ need to worry about their counterparty not meeting their obligation. ~~Consider the case~~ (counterparty risk). ~~In such cases dealers who have businesses~~ The cash flows in (10, 20) need to be adjusted for the counterparty actually making the payment at time i. If S_i is the survival probability of the counterparty at time i, the PV of the cash flows become:

$$PV = \sum_{i=0}^{I} \frac{CF_i \cdot S_i}{(1+r)^{t_i}}$$

(Note: The adjustment can be to either/both parties depending on the credit risk of either party).

Given the dealer-dominated network structure, the failure of a dealer (perhaps driven by the failure of its customers) could ~~the~~ ripple to other dealers or to the other customers. In order to address this, regulation now requires trades to be centrally cleared. Fig 2 shows this mkt structure



Key

D : Dealer

C: Customer

CCP: central counter Party / Clearing h

Fig 2: Mkt. w/ central counterparty