

# What is funding liquidity risk and how can a bank manage it?

Iain Ritchie Actuarial Research Centre 16 September









northern rock



















# Depositors



#### Run on the bank!



# Managing Liquidity

Purpose:       To measure the net funding requirement (or surplus) per maturity         Measure:       Measures the net cash flow for each maturity bucket.         Malaysis:       In the short-term, when commitments (cash outflows) exceed assets (cash inflows) the Money Markets desk need to raise diditional the appropriate funding strategy.       Purpose:       To measure the gap between funding and lending in exposure to the risk that FX swap markets become assets (cash inflows) the Money Markets desk need to raise diditional the appropriate funding strategy.         Mutury Mumach Leder       Image: State diageneration of the display to the appropriate funding strategy.       To measure the asset liquidity and likely stickiness of liabilities to the asset liquidity and likely stickiness of liabilities.         Namesure:       Asset / liability liquidity and likely stickiness, yield, cost to contractual maturity, behavioural stickiness, yield, cost to contractual maturity, behavioural stickiness, yield, cost to funding concentration of each funding source per maturity funding concentration is at alloyse:         Native::       A detailed understanding of the attributes and behaviour of the balances sheet allows ALCO to make better informed strategies.         Native::       A detailed understanding of the attributes and behaviour of the balances heet allows ALCO to make better informed strategies.         Native::       A detailed understanding of the attributes and behaviour of the balances sheet allows ALCO to make better informed strategies.         Native::       A detailed understanding of the attributes and behaviour of the balances sheet allows ALCO to make better	<ul> <li>To measure the net funding requirement (or surplus) per maturity. This is the main regulatory requirement for liquidity measurement.</li> <li>Measures the net cash flow for each maturity bucket.</li> <li>In the short-term, when commitments (cash outflows) exceed assets (cash inflows) the Money Markets desk need to raise funding. In the longer-term, structural imbalances, ALCO will</li> <li>To measure the appropriate funding strategy.</li> </ul> <b>Purpose:</b> To measure the gap between funding and lend to the appropriate funding strategy. <b>Purpose:</b> To measure the gap between funding and lend to the appropriate funding strategy. <b>Purpose:</b> To measure the gap between funding and lend to the appropriate funding strategy. <b>Purpose:</b> To measure the gap between funding and lend to the appropriate funding strategy. <b>Purpose:</b> To measure the gap between funding and lend to the appropriate funding strategy. <b>Purpose:</b> To measure the relative concentration of each funding source per measure the asset liquidity and likely stickiness of liabilities. <b>Asset / liability liquidity and likely stickiness of liabilities Contractual maturity, behavioural stickiness, yield, cost to funding downer strategies. <b>A detailed understanding of the attributes and behaviour of the balance sheet allows ALCO to make better informed strategie. <b>I quid for allow and the difference of the strategy of the difference of the strategy of the difference of the difference of the difference of the difference of the strategy. <b>Sight – 8 days 1 month Custore allows Custore allows</b> </b></b></b>				Ma	aturit	y mis	mato	h			USTRATT
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Source: M.Choudry, Bank Liquidity Risk Management, John Wiley & Sons, 2012









#### Bank's Balance Sheet

• Either be deposit rich or poor as shown in the graphs.

 Liquid Bonds
 Liquid Bonds
 Wholesale<br/>Borrowing

 Wholesale<br/>Lending
 Deposits
 Loans
 Deposits

 Loans
 Liabilities
 Assets
 Liabilities

**Deposit Rich Bank** 

Deposit Poor Bank

Want to Maximise Profit from the following equation:

 $P = Li_L + M_L W_O + Bi_B - Di_D - M_B W_B$ \_\_\_\_\_

Assets multiplied by asset return

Liabilities multiplied by rate of return

#### Comments

Comments on Profit Maximisation Formula Bank sets  $i_L$ ,  $i_D$ :  $L \equiv L(i_L)$  $D \equiv D(i_D)$ 

Wholesale market: Borrowing or Lending Normally  $M_B > 0, M_L = 0$ or  $M_B = 0, M_L > 0$ 

Want to Maximise Profit from the following equation:

 $P = \underline{Li}_{L} + M_{L}W_{O} + Bi_{B} - Di_{D} - M_{B}W_{B}$ \_\_\_\_\_ J

Assets multiplied by asset return

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Liabilities multiplied by rate of return

#### **FTP Results**

Deposit Rich ( $M_B$ =0):

$$P = L(i_L)(i_L - W_O) + D(i_D)((1 - \alpha)W_O + \alpha i_B - i_D)$$

FTP Rate when bank is Deposit Rich: For Loan Unit, FTP Rate is  $W_0$ For Deposit Unit, FTP Rate is  $(1 - \alpha)W_0 + \alpha i_B$ 

#### **FTP Results**

- Similarly:
- FTP Rate when bank is Deposit Poor ( $M_L$ =0):
- For Loan Unit, FTP Rate is  $\frac{W_B}{1-\beta} + \frac{\beta i_B}{1-\beta}$

For Deposit Unit, FTP Rate is

$$(1-\alpha)\left(\frac{W_B}{1-\beta}+\frac{\beta i_B}{1-\beta}\right)+\alpha i_B$$

#### FTP: What we have learned

- FTP can be separated independently between business units
- FTP rates are independent of demand and supply functions
- FTP can be used to maximise overall profits of the bank
- Liquidity constraints can be incorporated within the FTP system

# $P = L(i_L)i_L + M_L W_O + Bi_B$ $-D(i_D)i_D - M_B W_B$



#### Profits



#### **Deposit Poor**



# Multi-Period Model

- So far we have only looked at one time period
- Loans and deposits are often granted for multiple time periods
- There is uncertainty on when loans may be repaid due to the option of prepayment
- Customers have the right to withdraw their money anytime
- These options have a cost for the business and need to be reflected in the FTP

# Conclusion

- FTP can be separated independently between business units
- FTP rates are independent of demand and supply functions
- FTP can be used to maximise overall profits of the bank
- Liquidity constraints can be incorporated within the FTP system
- More work needs to be done to estimate the appropriate  $\alpha$  and  $\beta$  in the FTP system