Managing liquidity risk under regulatory pressure

Kunghehian Nicolas
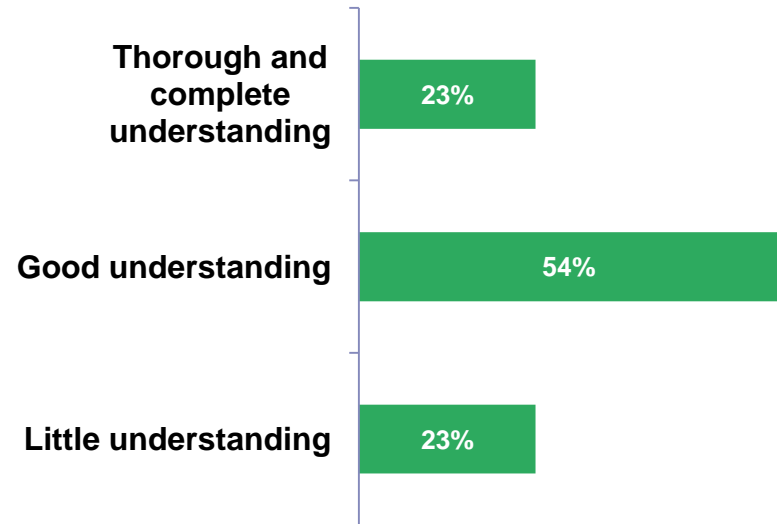
May 2012

Impact of the new Basel III regulation on the liquidity framework

Liquidity and business strategy alignment

79% of respondents felt that the new regulatory rules for liquidity are expected to have a strong impact on business operations and strategy of organisations
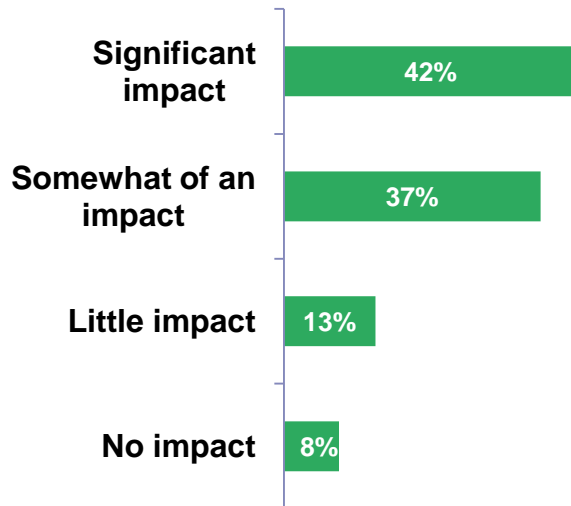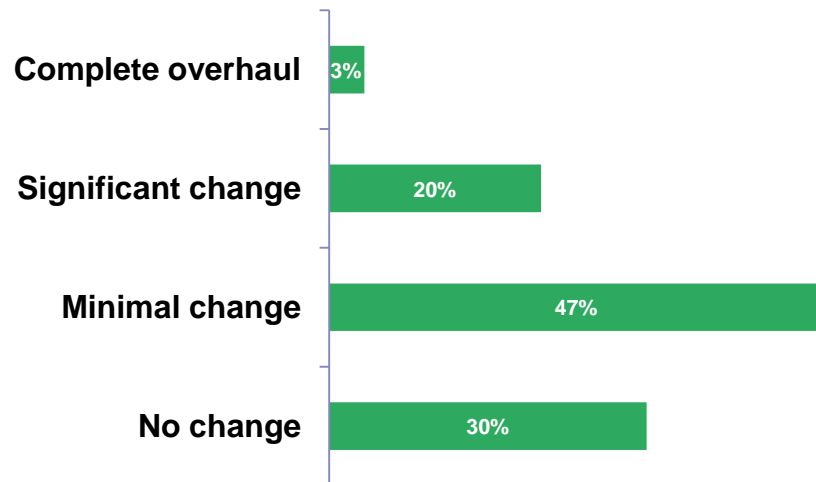
77% of respondents felt that the board & senior management have a thorough understanding of the roles of liquidity and funding risks in shaping the business strategy

Significant impact	42%
Somewhat of an impact	37%
Little impact	13%
No impact	8%

Thorough and complete understanding	23%
Good understanding	54%
Little understanding	23%

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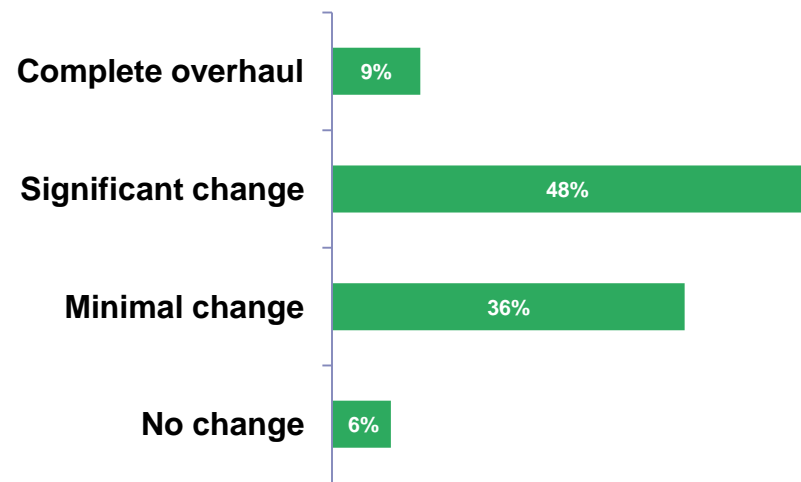# Liquidity and business strategy alignment: going forward

70% of organisations have seen changes implemented to their liquidity risk tolerance due to Basel III requirements

94% expect their liquidity risk tolerance to change further as a result of Basel III requirements

Thus far:

Complete overhaul	3%
Significant change	20%
Minimal change	47%
No change	30%

Going forward:

|	
Complete overhaul	9%
Significant change	48%
Minimal change	36%
No change	6%

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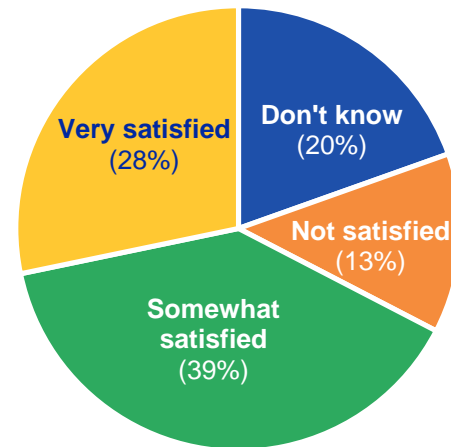# And yet, the alignment between strategy and processes is unclear

76% of respondents are unclear how the new rules have been incorporated into their organisation's key business processes and pricing

Has the impact of the new liquidity rules on profitability been factored into key business processes and pricing?
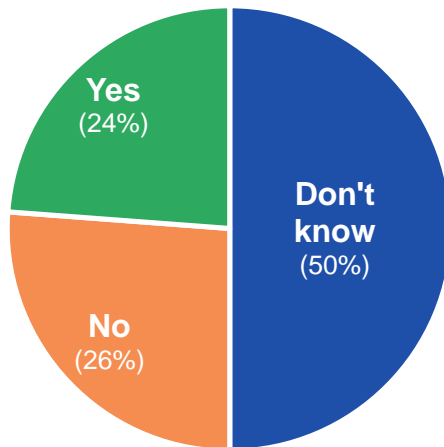
**72%** of respondents do not feel fully confident that their organisation's liquidity position is well understood

Are you satisfied that your organisation currently understands its liquidity position in sufficient detail and knows where the stress points are?

Yes (24%)

Don't know (50%)

No (26%)

Very satisfied (28%)

Don't know (20%)

Not satisfied (13%)

Somewhat satisfied (39%)

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Liquidity: seeing the full picture

61% of respondents are unsure whether the new liquidity measures are sufficient in providing a holistic view of liquidity

Is the liquidity regulation is too simplistic as only two key ratios are being introduced?

Don't know (26%)

Yes (35%)

No (40%)
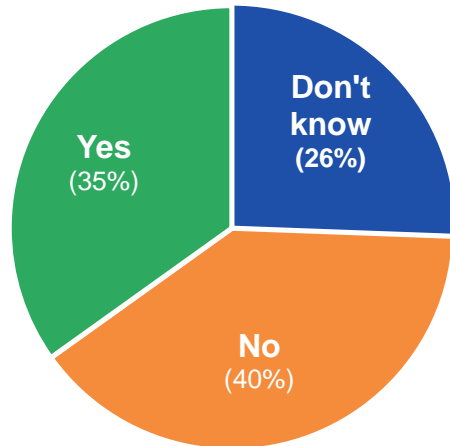
» Compliment regulatory requirements with additional measures to give a full picture of liquidity and funding positions

» Ensure that there is a close dialogue between strategy / risk / treasury / finance

» Understand the impact of strategy on day-to-day operations and processes and focus on top-down / bottom-up communication

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Modeling and data/infrastructure are recurrent pain points

Validation (between 2→3, 4→5, 5→6, 6→7)

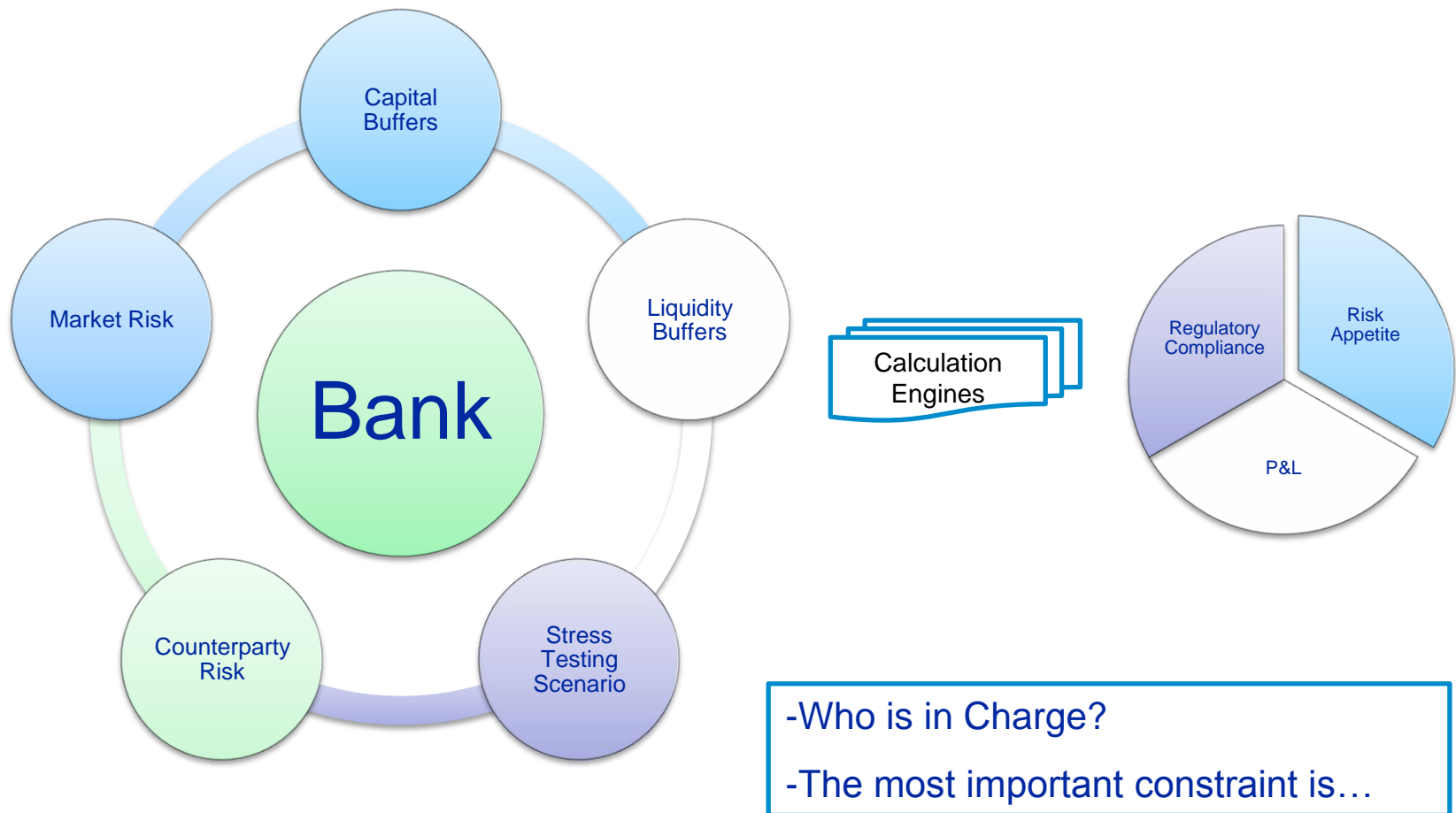|	1 Define scope and governance	2 Define Scenarios	3 Data and Infrastructure	4 Model the impact of scenarios on key risk parameters	5 Calculate Stressed KPI	6 Reporting	7 Management actions
Description of Activities	• **Scope of stress testing** • Regulatory only • Business-specific: Group/LOB ST ; • Risks to stress: credit, liquidity, interest rates/FX, performance.. • Define the risk factors : credit (PD, LGD, rating, EAD), liquidity[1], ALM[2], operational.. • **Governance of stress testing** (ownership, contributions, frequency of tests, reporting process, reporting lines..)	• **Shock selection:** • Regulatory (given) • Business-specific: macroeconomic (GDP, unemployment, interest rates..); budgeting/ planning; financial markets, liquidity-related (concentration, reputation risk..) • **Type of scenario to test:** • Sensitivity analysis • Scenario analysis • Reverse ST • **Validation of severity, duration of shocks and risk transmission channels**	• **Define data and data granularity requirements** (financial internal, macro/ default /market data...) • **Define infrastructure requirements** • **Data sourcing:** (financial internal, macro/ default /market data...) • **Compilation and data formatting** • **Data audit**	*Credit risk* • **Model the impact of the scenarios on the incidence of default by borrowers** (by individual balance sheets and by portfolios) • **Model the incidence of default to losses on single obligors and on loan portfolios** (via specific models for retail, corporate, CRE, SME..) *Liquidity risk* • **Model the impact of scenarios on key liquidity risk parameters** *Market risk* • **Model market risk to estimate the impact on P&L**	• **Enter stressed inputs into software and run the calculations to obtain:** *Credit (capital)* • Regulatory capital ratio (total RWA, RWA ratio) • Stressed net income • Economic capital ratio • "Book" capital ratio *Liquidity (cash-flows)* • Liquidity gap and liquidity ratios (buffer) *Market* • Stressed VAR • Leverage ratio • **Aggregate and validate results**	• **Consolidation** of ST results (capital and liquidity) • **Formatting and auditing** • **Internal reporting to management** (within Risk /Treasury/ALM) • **Periodic reporting** to Board, ALCO, and other Committees • **Public disclosures** to local regulator or other bodies (EBA, FMI…) • **ICAAP & ILAA** reporting	• Calculate risk exposure and compare with **risk appetite** (modify planning and limits, reduce concentration..) • **Liquidity planning and asset growth limits** adjustments • Contribute to **contingency funding plan**
Frequency	• **Yearly**	• **Yearly / Quarterly**	• **Market and macro-data**: ongoing • **Internal financial data and liquidity** positions : monthly	• **Stressed PD, EAD, LGD**: from quarterly to yearly • **Stressed liquidity risk parameters, stressed cash-flows and financials**: monthly	• **Stressed capital and leverage ratio:** quarterly to yearly • **Stressed cash-flows:** monthly [2] • **Stressed VaR:** daily	• **Internal reporting:** quarterly to yearly • Reporting to **Board/ Committees and disclosures:** quarterly, ad-hoc	• **Yearly / Quarterly** or ad-hoc
Output	• **Scope and governance rules of ST programme**	• **Scenarios (regulator's and/or idiosyncratic)**	• **Data input into models and/or platforms**	• **Stressed PD, EAD, LGD** • **Stressed cash-flows** • **Stressed financials** (loan loss provisions, interest income, refinancing costs..)	• **Stressed EcCap / RegCap** • **Liquidity gap and ratios** • **Stressed VaR**	• **Reporting and disclosed information** (internally and externally)	• **Risk appetite and limit management process**

1 Sources of Liquidity Risk (FSA): Wholesale secured and unsecured funding risk, Retail funding risk, Intra-day liquidity risk, Intra-group liquidity risk, Cross-currency liquidity risk, Off-balance sheet liquidity risk, Franchise viability risk, Marketable assets risk, Non-marketable assets risk, and Funding concentration risk

2 Sources of risk from ALM perspective: client's behavior, funding risk, facility utilization, prepayments, runoff

Basel III and best practices for Asset & Liability Management

ALM within a regulatory framework


-Who is in Charge?

-The most important constraint is…

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# ALM/Liquidity risk and Stress Testing
Contingency Funding Plans

➢ The ALM/Treasury point of view

  ➢ Different sources of funding are available

  ➢ Which one is the less expensive?

➢ Stress tests for ALM

  ➢ Data is available in the Bank

  ➢ Scenarios and behaviors

➢ How to

  ➢ Build plausible scenarios

  ➢ Link all the liquidity risk drivers
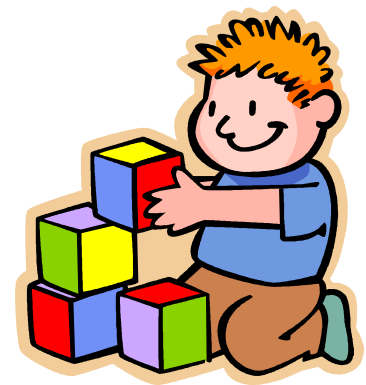
Liquidity management and liquidity risk
ALM scenarios are not Stress Tests
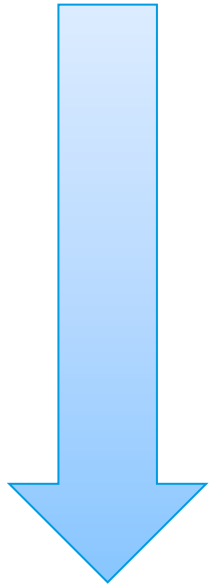
- ➤ Stress test calculation for Liquidity
  - ➤ Stressing market data
  - ➤ Behavioral models (data is needed)
  - ➤ Cash flow generation

- ➤ Adding the impact of the Contingency Funding Plan
  - ➤ See how the Bank will behave during the crisis
  - ➤ Estimate the cost

"THEN A MIRACLE OCCURS..."
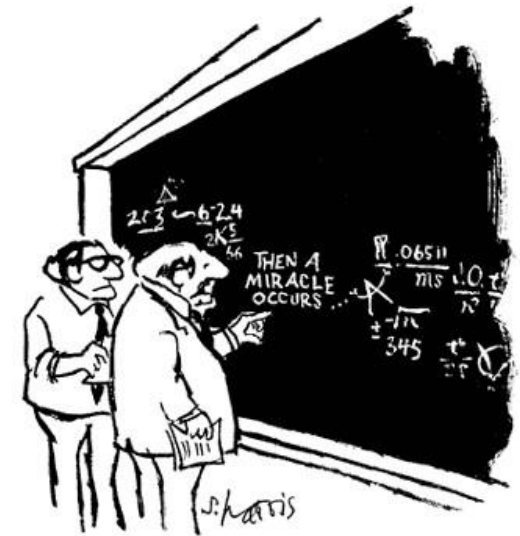
"I think you should be more explicit here in step two."

Stress Test for liquidity management		Stress Test for liquidity **RISK** management		**Best practices**
sensitivity analysis	➕	**Crisis scenario**	=	

Economic scenario generation and calculation techniques

Overall Roadmap

Global Macro Scenarios
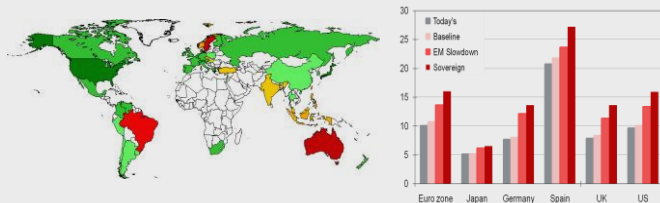
Financial Inputs: FX, IR and Yields
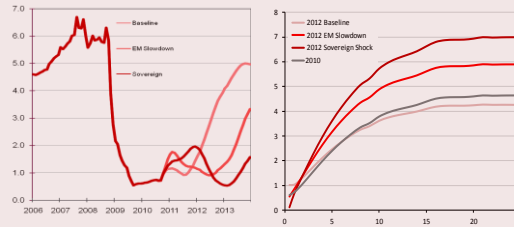
Credit Inputs: Rating Migrations, PDs LGDs and Correlations

Average One Year Rating Migration Rates for Sovereigns (All Available Years - Duration Based Approach)									
	AAA	AA	A	BAA	BA	B	CAA-C	D	WR
AAA	97.42%	2.56%	0.01%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%
AA	4.48%	94.02%	0.58%	0.03%	0.56%	0.02%	0.00%	0.00%	0.30%
A	0.40%	3.46%	93.32%	2.75%	0.06%	0.00%	0.00%	0.00%	0.01%
BAA	0.02%	0.45%	6.72%	89.30%	3.38%	0.12%	0.00%	0.01%	0.00%
BA	0.00%	0.02%	0.26%	6.99%	86.23%	5.93%	0.12%	0.45%	0.00%
B	0.00%	0.00%	0.00%	0.19%	4.84%	89.04%	3.41%	2.47%	0.05%
CAA-C	0.00%	0.00%	0.00%	0.01%	0.24%	8.39%	75.65%	13.49%	2.23%
D	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%
NR	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%

Portfolio Composition
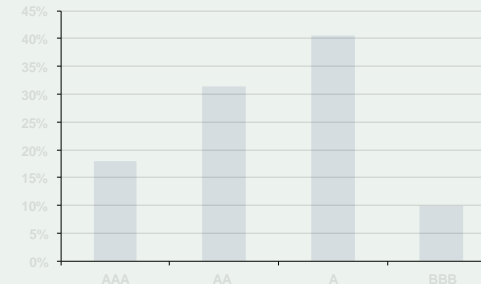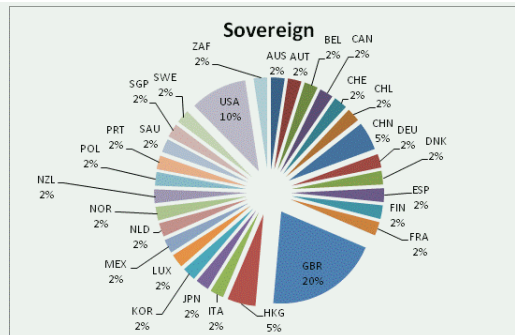
Simulations

Portfolio Values
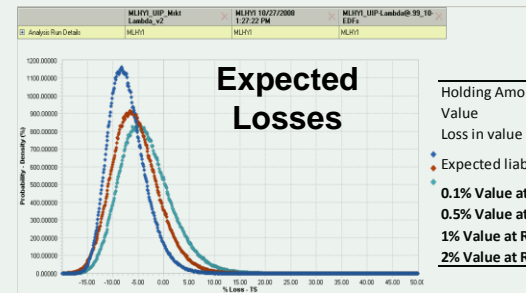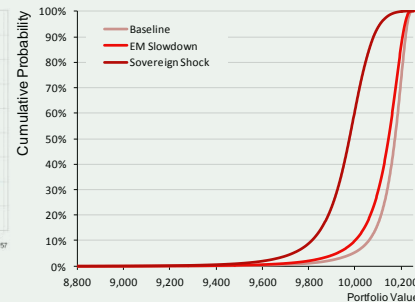
Expected Losses

Calculations

	Baseline	EM Slowdown	Sovereign Shock
Holding Amount	10,000,000,000	10,000,000,000	10,000,000,000
Value	10,000,024,316	9,963,273,473	9,913,169,121
Loss in value	-	- 36,750,843	- 86,855,195
Expected liability value	10,174,140,435	10,146,942,361	10,122,714,617
0.1% Value at Risk	754,991,765	867,030,010	1,025,607,795
0.5% Value at Risk	399,133,060	513,646,579	632,609,276
1% Value at Risk	306,991,073	368,525,104	426,653,699
2% Value at Risk	232,324,292	281,828,600	331,718,611

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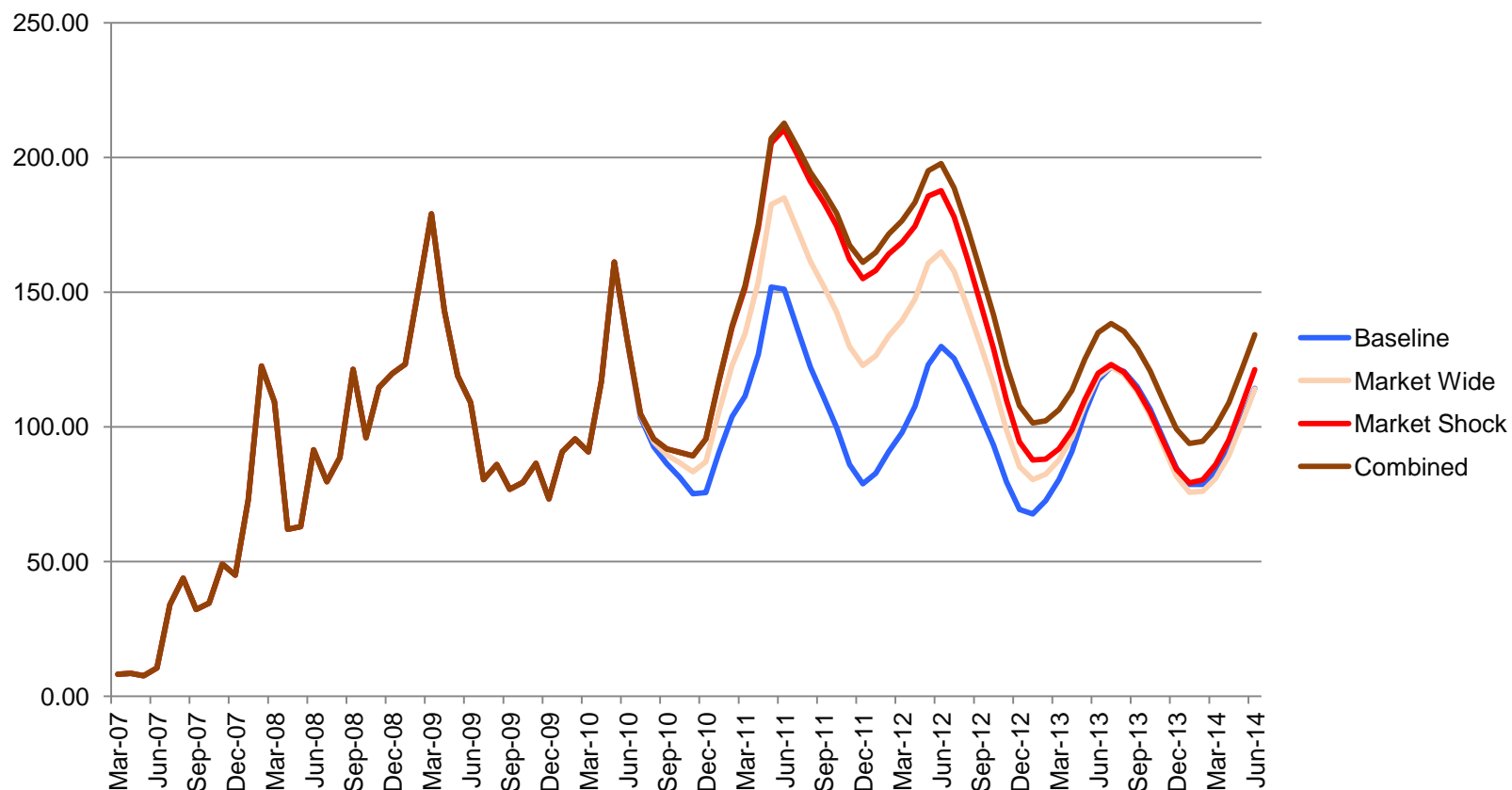# Financial Models: Money Market Rates
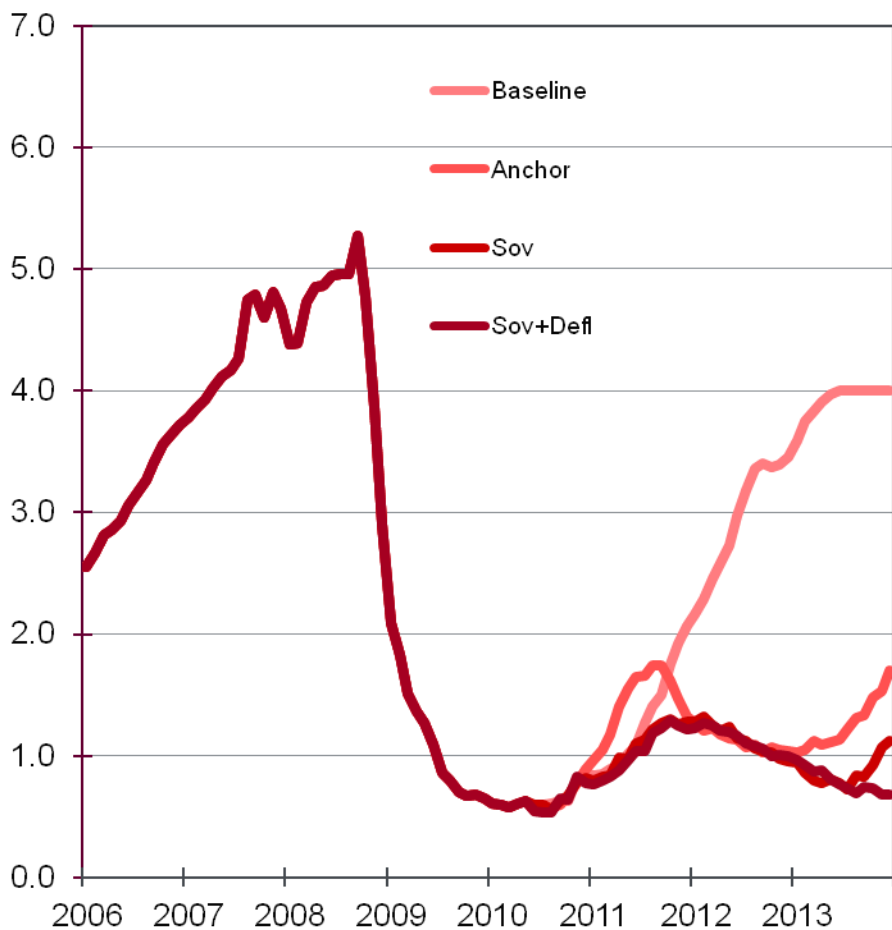
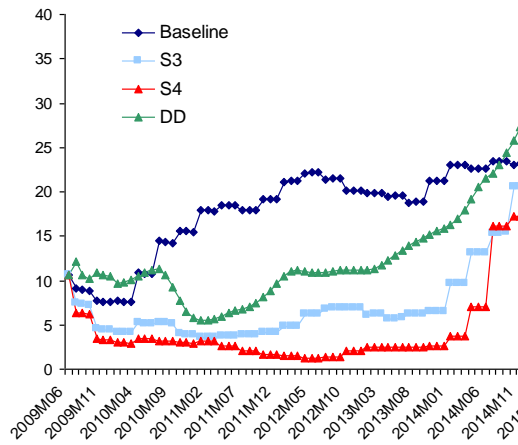

3-month Libor, EUR
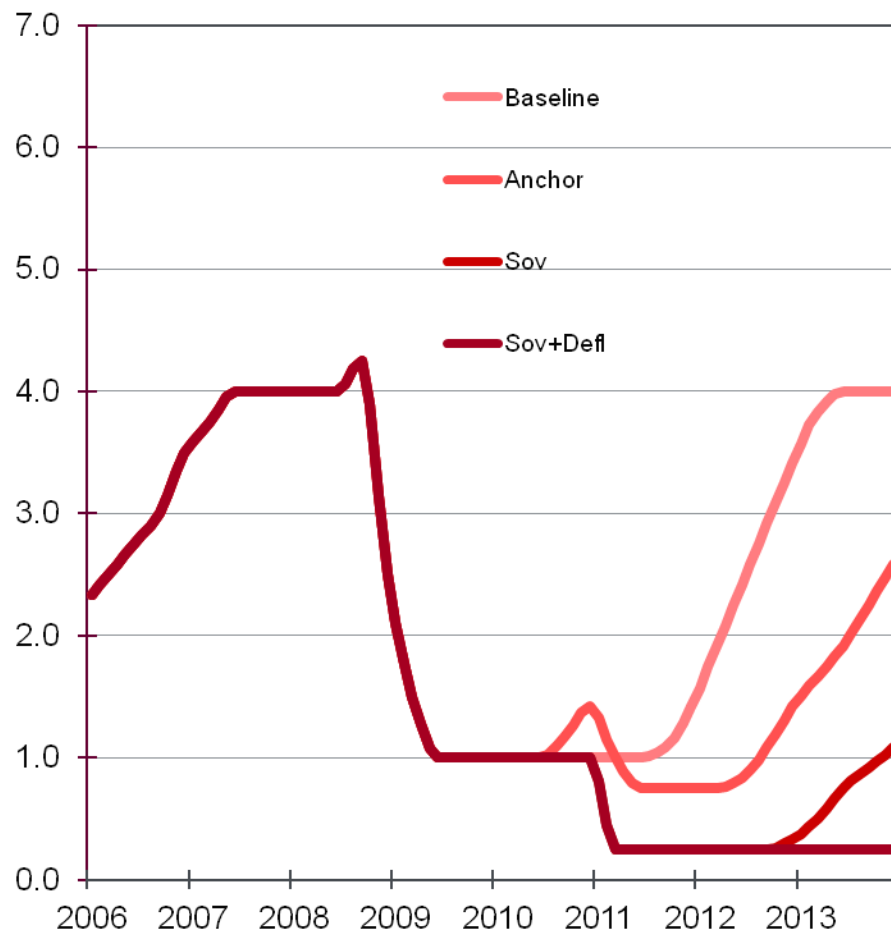
ECB policy rate

Financial Models: CDS Spreads

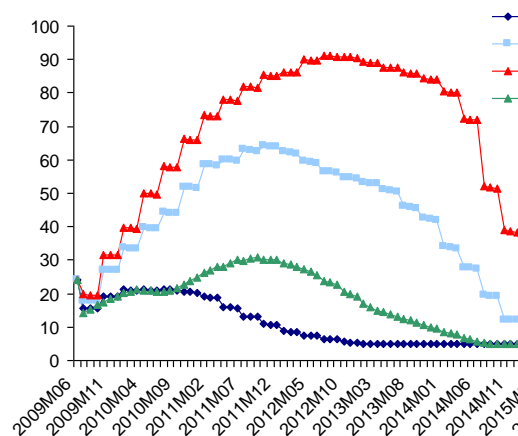## Index CDS Spread - Investment Grade Bonds
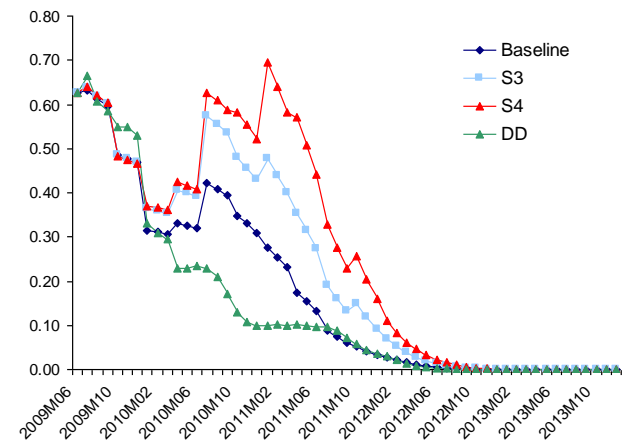## Financial Corporations

Key Output Vectors of Econometric Model
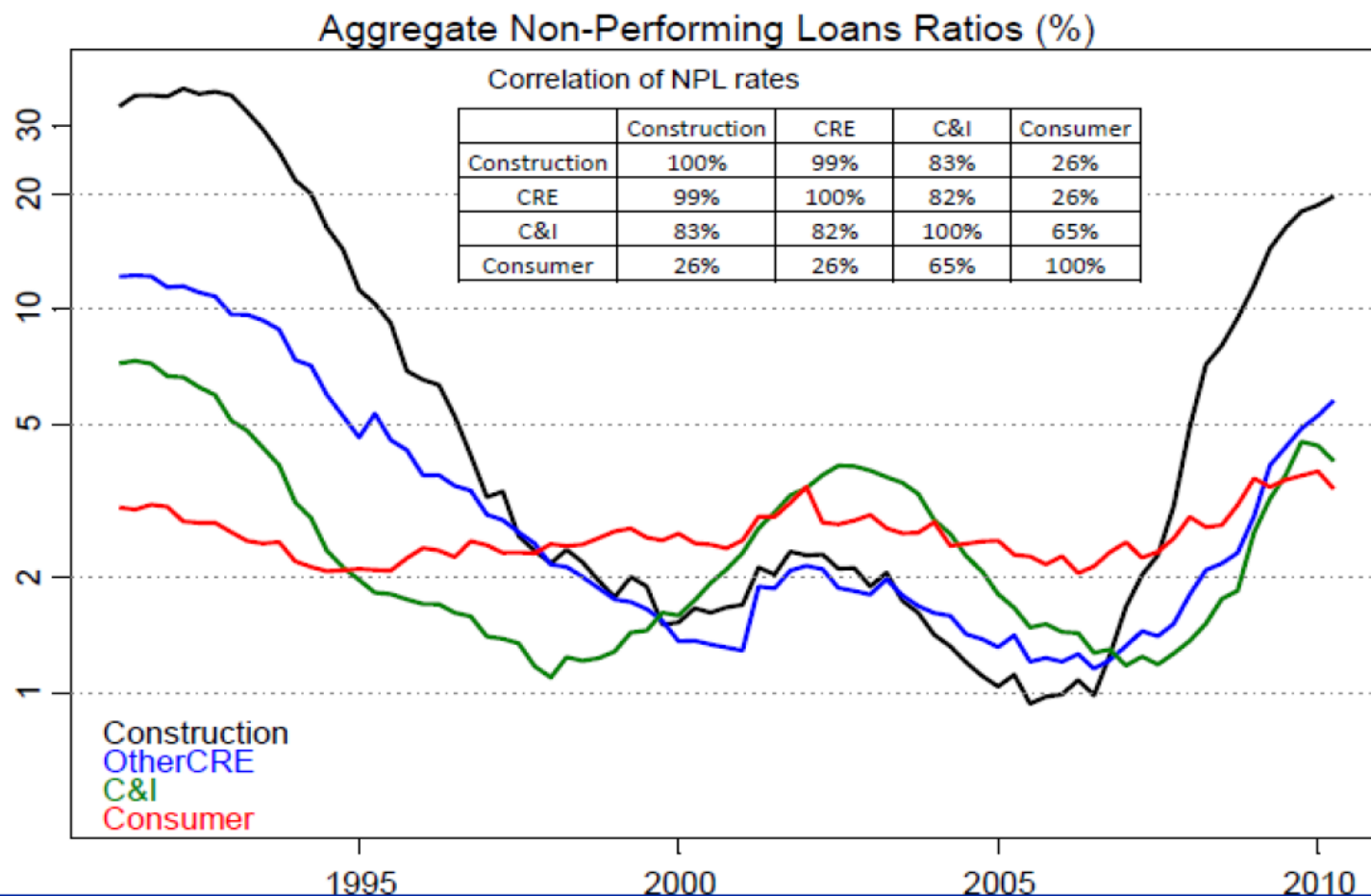

Constant Prepayment Rate (CPR)

Legend: Baseline, S3, S4, DD

Severity of Losses (LGD)

Legend: Baseline

Probability of Default (PD)

Legend: Baseline, S3, S4, DD

All asset classes are correlated: Importance of measuring correlations & concentrations

Aggregate Non-Performing Loans Ratios (%)

Correlation of NPL rates

	Construction	CRE	C&I	Consumer
Construction	100%	99%	83%	26%
CRE	99%	100%	82%	26%
C&I	83%	82%	100%	65%
Consumer	26%	26%	65%	100%

Construction
OtherCRE
C&I
Consumer

Econometric model: System of equation model using panel data regression techniques to account for latent pool quality

Time series performance for a given vintage of loans

$= f$

Lifecycle component

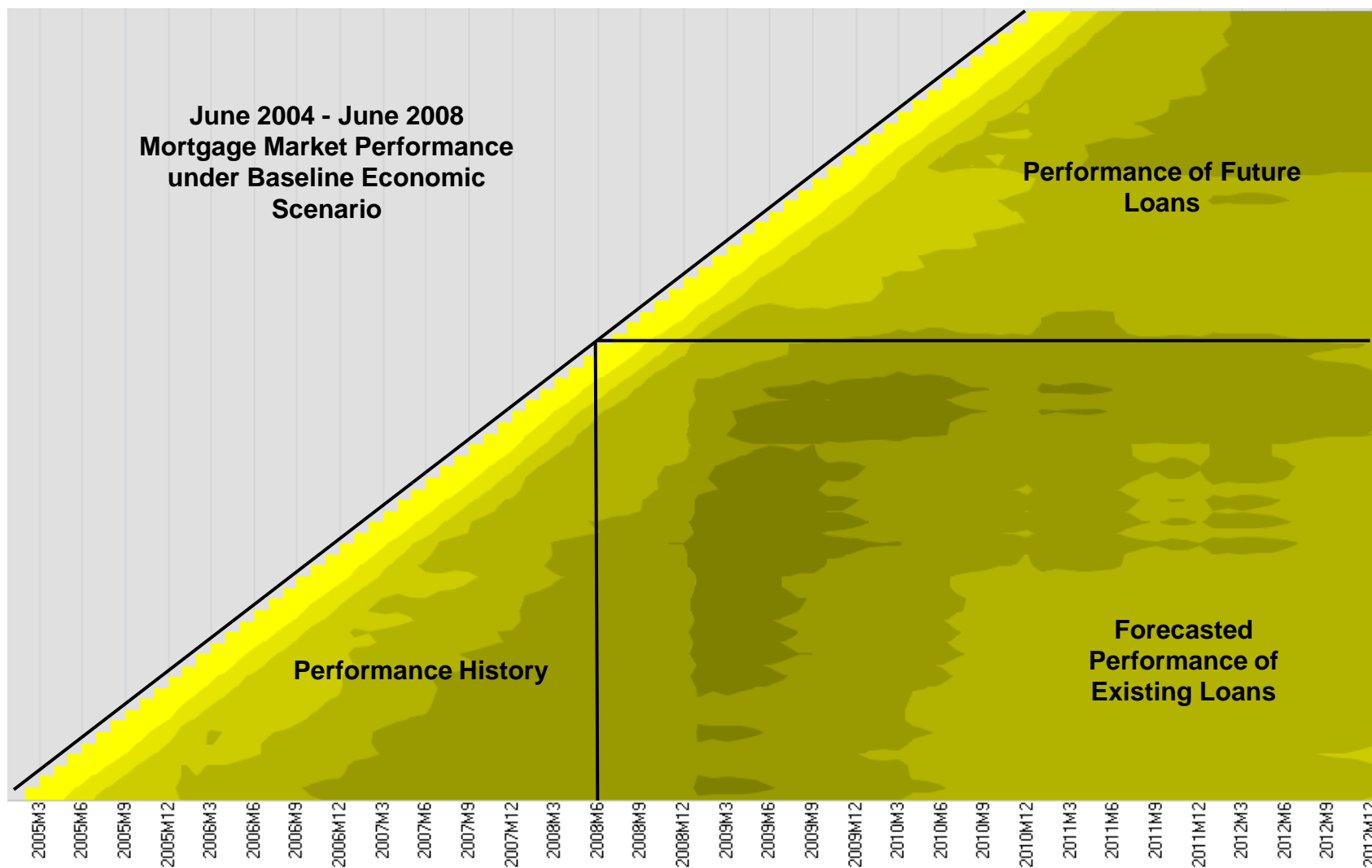» Dynamic evolution of vintages as they mature

» Nonlinear model against "age"

Vintage-specific quality component

» Vintage attributes (LTV, asset class/collateral type, geography, etc.) define heterogeneity across cohorts

» Early arrears serve as proxies for underlying vintage quality

» Economic conditions at origination matter

» Econometric technique accounts for time-constant, unobserved effect

Business cycle exposure component

» Sensitivity of performance to the evolution of macroeconomic and credit series

Stress Testing of Retail Portfolios

June 2004 - June 2008
Mortgage Market Performance
under Baseline Economic
Scenario

Performance of Future
Loans

Performance History

Forecasted
Performance of
Existing Loans

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Managing the Basel III ratios

Two effects of the prepayment option

The borrower's option to prepay results in two adverse effects to the lender:

1. Loss of potential income – when the borrower prepays in favorable credit states
   Captured by the option spread component of the FTP

2. Asset-liability mismatch – the funding cost is quoted for a fixed maturity loan whereas the client loan can terminate prematurely
   Captured by the funding liquidity component of the FTP

Funding cost: computing spread in a one-period model

Borrower	Cash Flow to Bank Shareholder
ND	*1+r$_{Borrower}$-1*
D	*(1-LGD$_{Borrower}$)-1*

$$V_{BankShareholder} = \Pr^Q\{ND_{Borrower}\}(1+r_{Borrower}) +$$
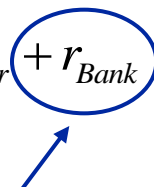
$$\Pr^Q\{D_{Borrower}\}(1-LGD_{Borrower})-1$$

break even rate $\longrightarrow$ $r_{Borrower} \approx PD^Q_{Borrower} \cdot LGD_{Borrower}$

Funding cost: what if the bank faces default risk?

Bank	Borrower	Cash Flow to Shareholder
ND	ND	$(1+r_{Borrower})-(1+r_{Bank})$
ND	D	$(1-LGD_{Borrower})-(1+r_{Bank})$
D	ND or D	0

$$V_{BankShareholders} = \Pr^{Q}\{ND_{Bank}\}\left[\begin{array}{l}\Pr^{Q}\{ND_{Borrower}\}(1+r_{Borrower})+\\ \qquad \Pr^{Q}\{D_{Borrower}\}(1-LGD_{Borrower})-(1+r_{Bank})\end{array}\right]$$

break even rate $\longrightarrow$ $r_{Borrower} \approx PD^{Q}_{Borrower} \cdot LGD_{Borrower} \boxed{+ r_{Bank}}$
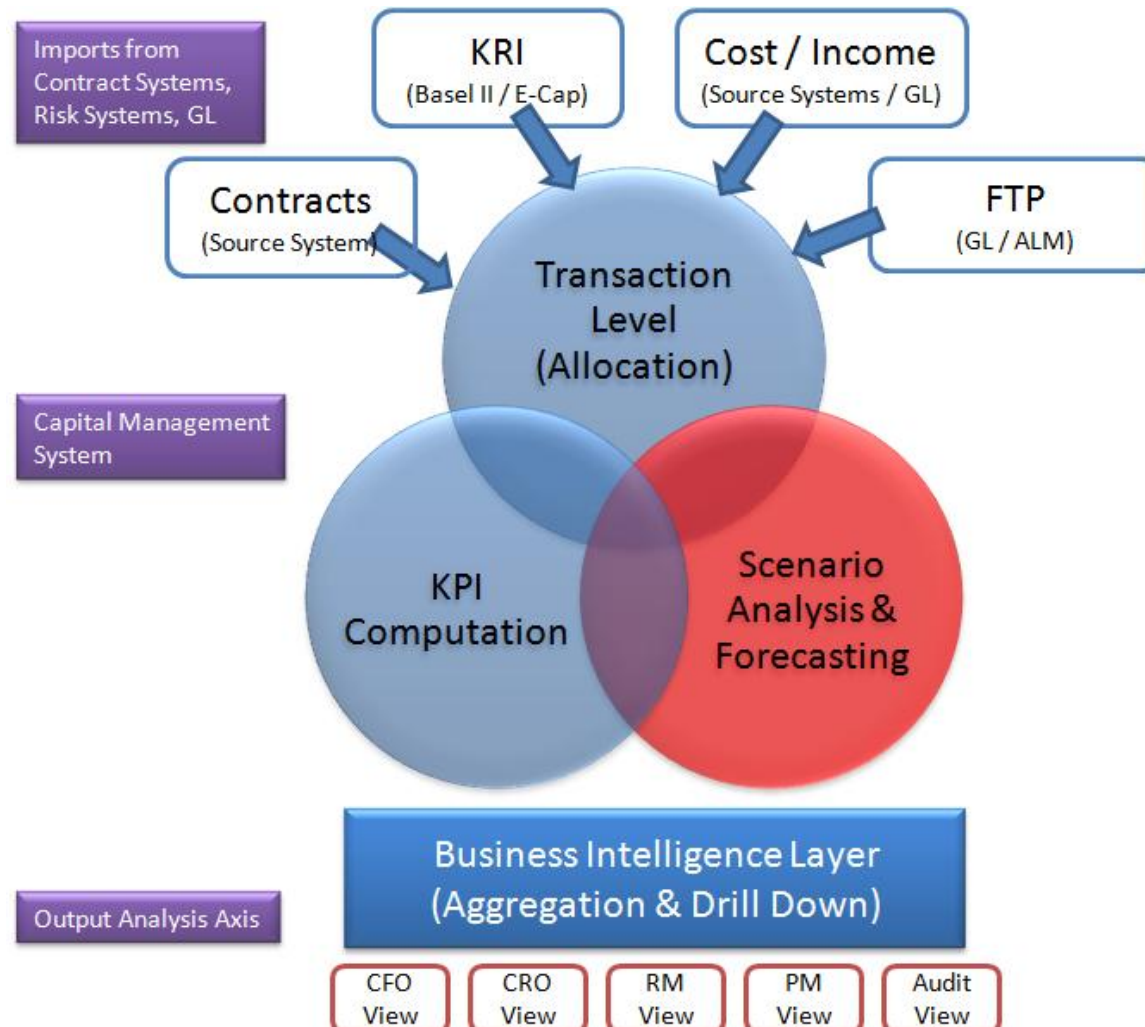
Funding liquidity premium (captured by the funding cost) is encapsulated in the client rate

Multi-period setting: prepayment option

- In general, a pre-payable loan should have a higher fee to offset the value of the option – a prepayment premium.

  - With the funding liquidity premium priced in, the likelihood of prepayment increases.

- The lattice valuation model facilitates the modeling of credit-contingent cash flows, which include loan prepayment, dynamic utilization of revolving lines, and grid pricing.
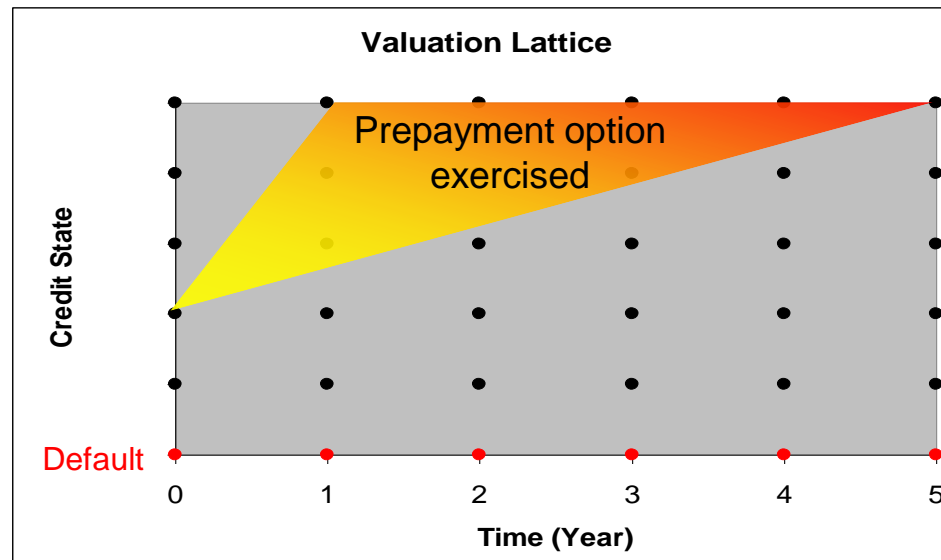
Data Management: Unification of data at transaction level

Liquidity coverage ratio (LCR) – example

Assets	470
Cash	50
Gov. Bonds	100
Financial Institution Bonds	50
Loans	270

Stock of high quality liquid assets   **150**

Liabilities and Equity	470	Run-off factor	Outflows*	Inflows**	Net outflows
Stable retail deposits	100	7.50%	7.5		
Less stable retail deposits	100	15%	15	-	
Unsecured Wholesale Funding (Non fin. Corporate with no operational relationship)	170	75%	127.5		
Equity	100		150.0	20	130

x   =

LCR   115%

*Additional requirements are also considered as outflow (e.g. 100% of outstanding liquidity facilities to non fin. Corporate, etc)

** 100% of planned inflows from performing assets

Higher costs… and a better allocation

Cost of holding these assets:

$$C = X\% \text{ per year} \times 150$$

Stock of high quality liquid assets   150

|		Run-off factor		Outflows*
Stable retail deposits	100	7.50%		7.5
Less stable retail deposits	100	15%	=	15
Unsecured Wholesale Funding (Non fin.	170	75%		127.5
Corporate with no operational relationship)				
Equity	100			**150.0**

x

C is allocated depending on the outflows generated by the instrument

Cost allocation at a transaction level

Most of the indicators – capital, income, cost are not available at contract granularity.

RAPM uses allocation rules to allocate indicators from higher granularity to contracts.

Activity Based Costing Approach
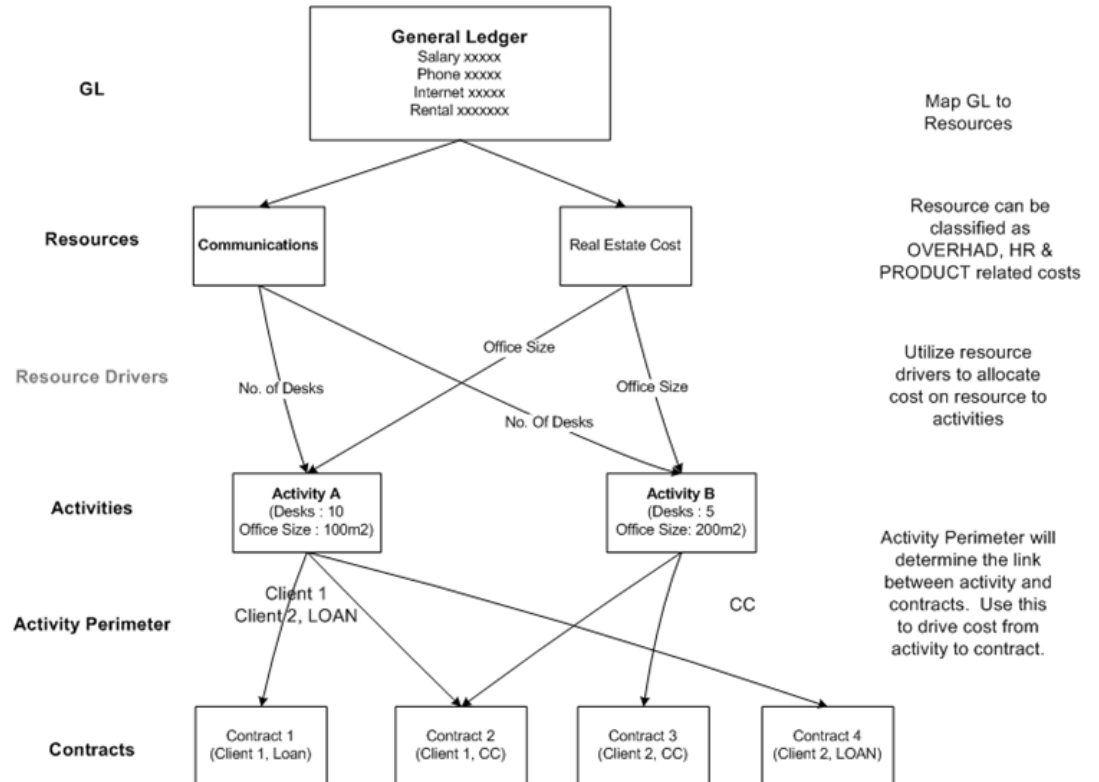
Overview of the FTP process

Using the stress test scenarios

	SCENARIO	
BL	**Baseline** Current	
S2	**Deeper Recession** Weaker Recovery	
S3	**Prolonged Credit Squeeze Very Severe** Recession	
S4	**Complete Collapse** Depression	

MoodysEconomy.com scenarios

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Conclusion

Next steps

➢ Liquidity Risk has been underestimated in many countries

➢ Basel III provides an efficient framework for liquidity management

➢ Include Senior management in the project

➢ Reconcile P&L and risk and having a longer term strategy

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