ALM automation & optimization achieving a holistic & integrated point of view

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WOLTERS KLUWER SWITZERLAND

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КАЗНАЧЕЙСТВО 2018, 16th April 2018

Sechseläuten in Zürich

Burning **Böögg**

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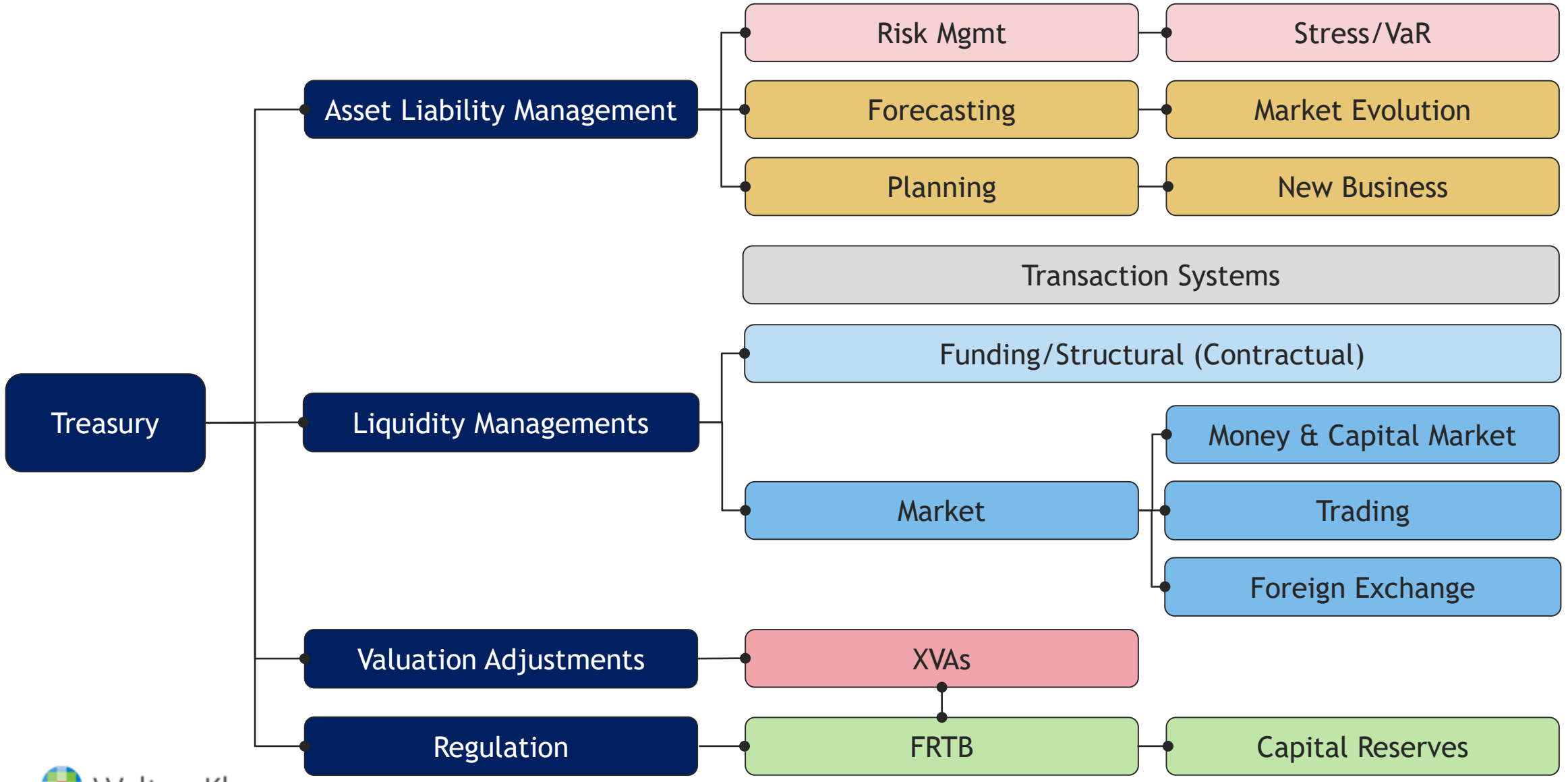
Treasury in banking business



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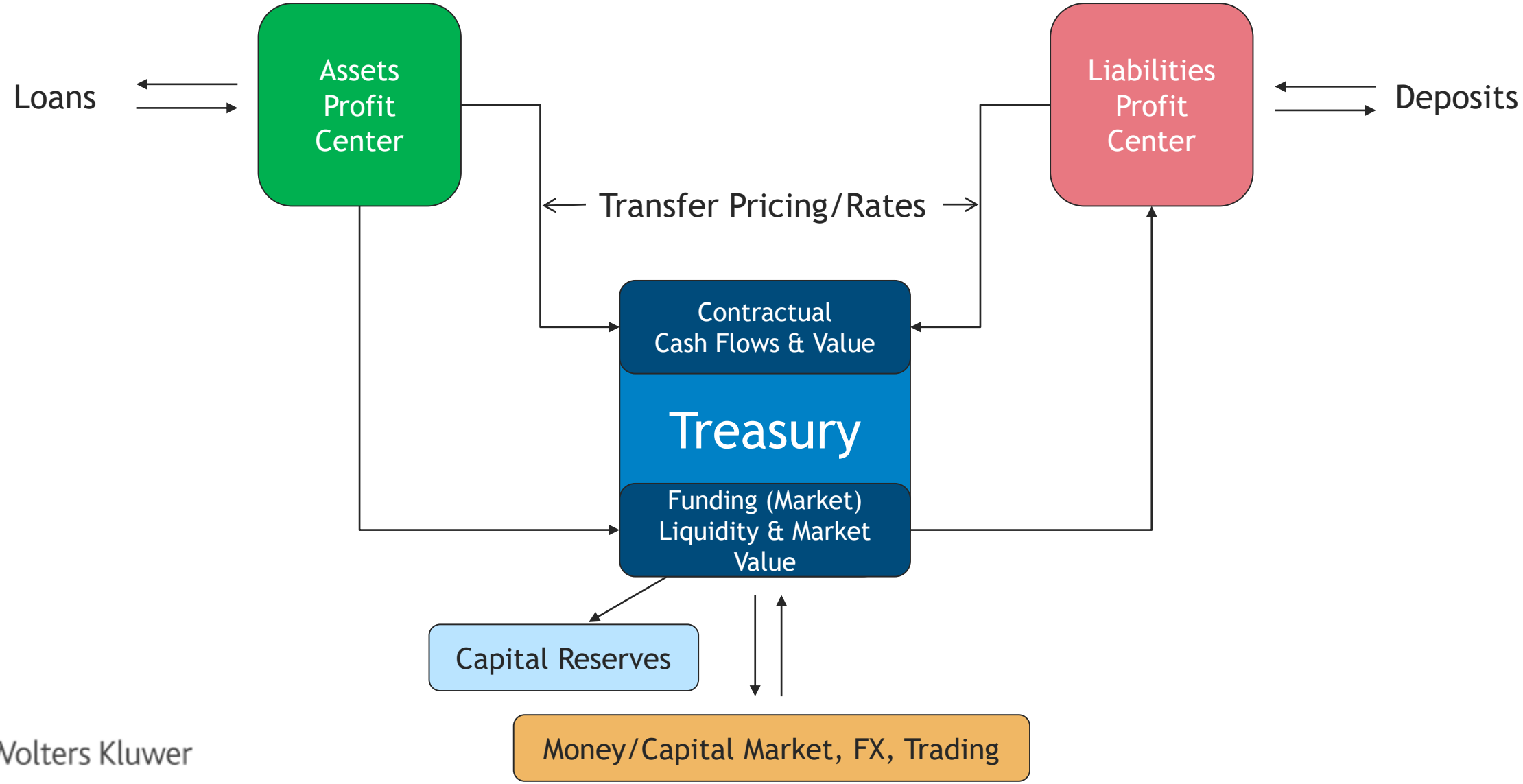
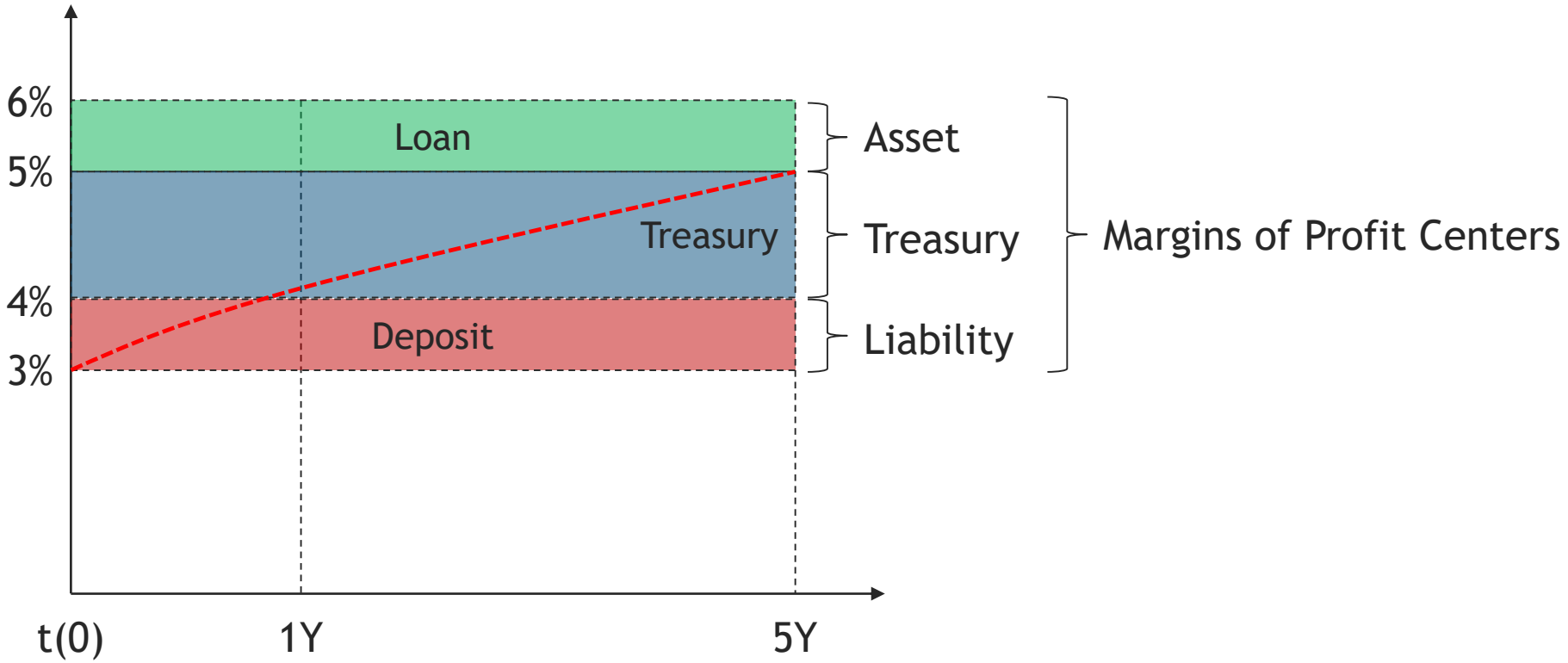
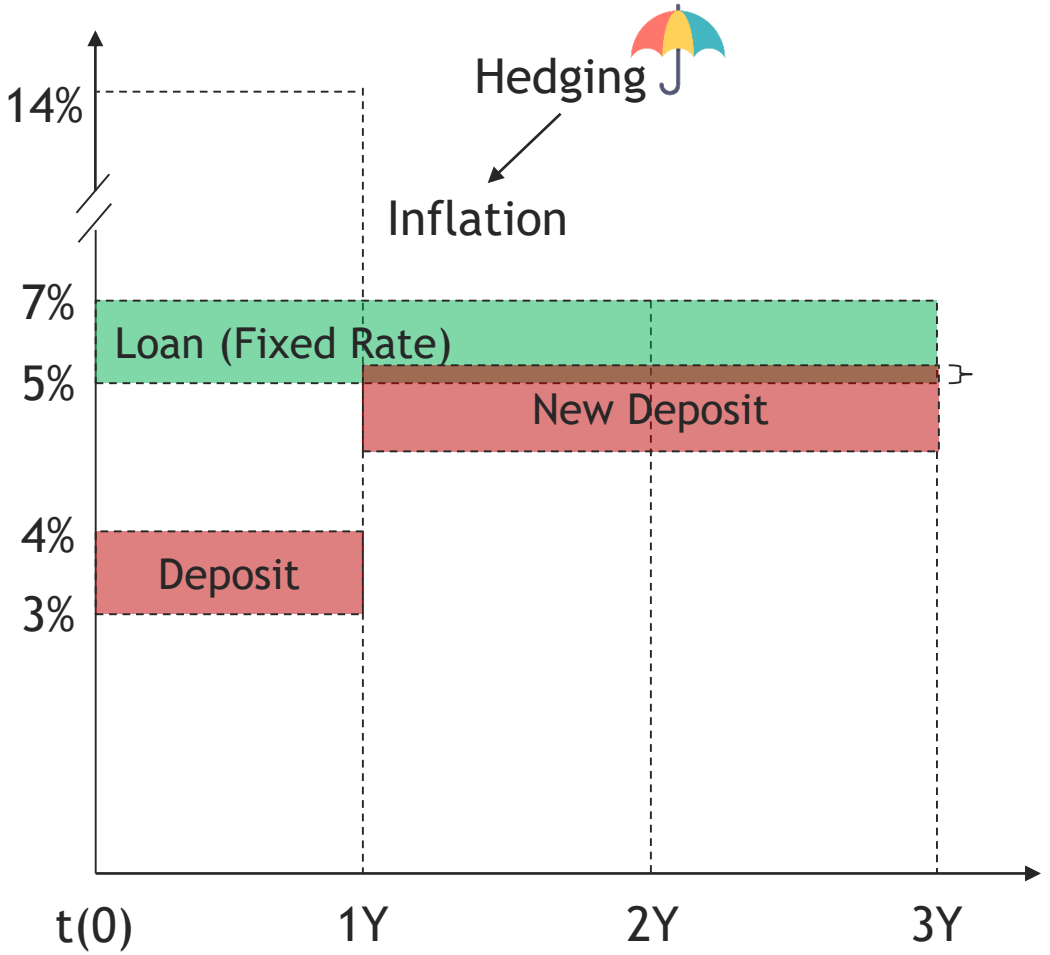
Treasury operations



Expected Margins of Profit Centers (the good scenario)

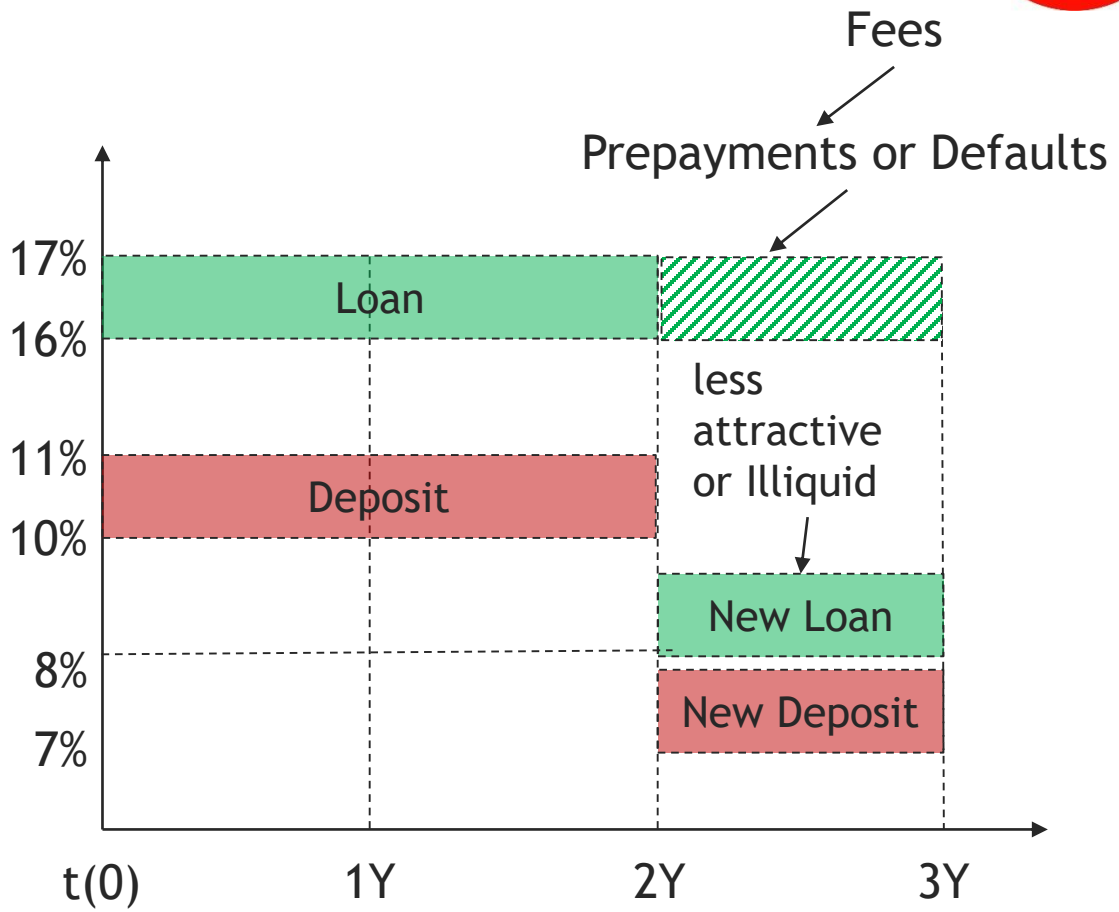


Unexpected Margins of Treasury Profit Centers (a bad scenario)



Mar ‘14

Main Risk: Market



Dec ‘14

Main Risks: Behavior driven by Market

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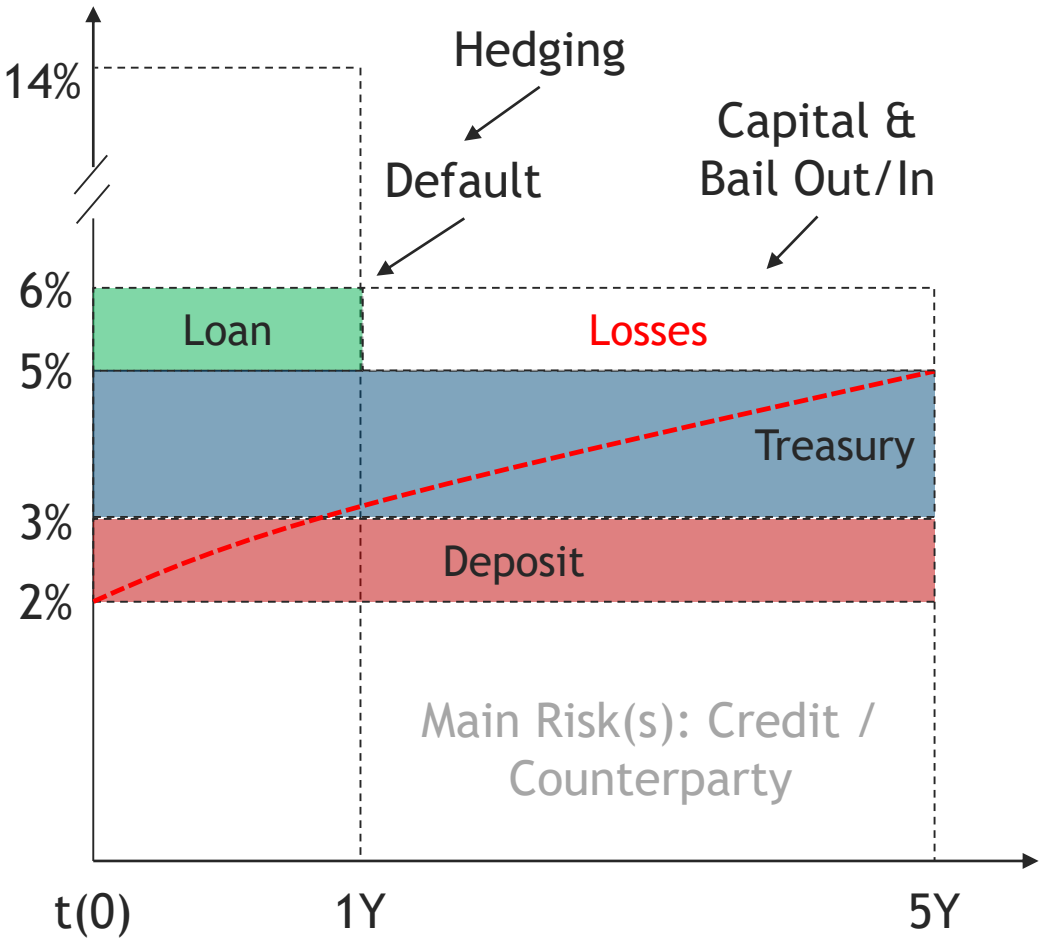
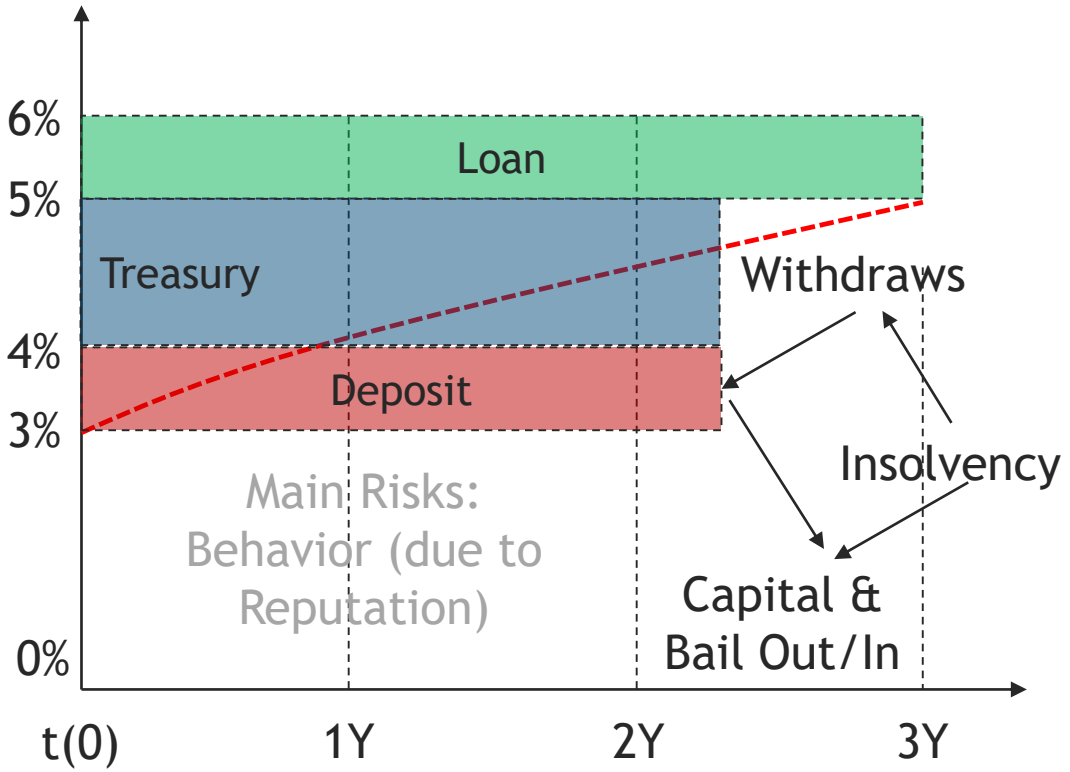
Unexpected Margins of Treasury Profit Centers (a bad scenario)



Feb '14



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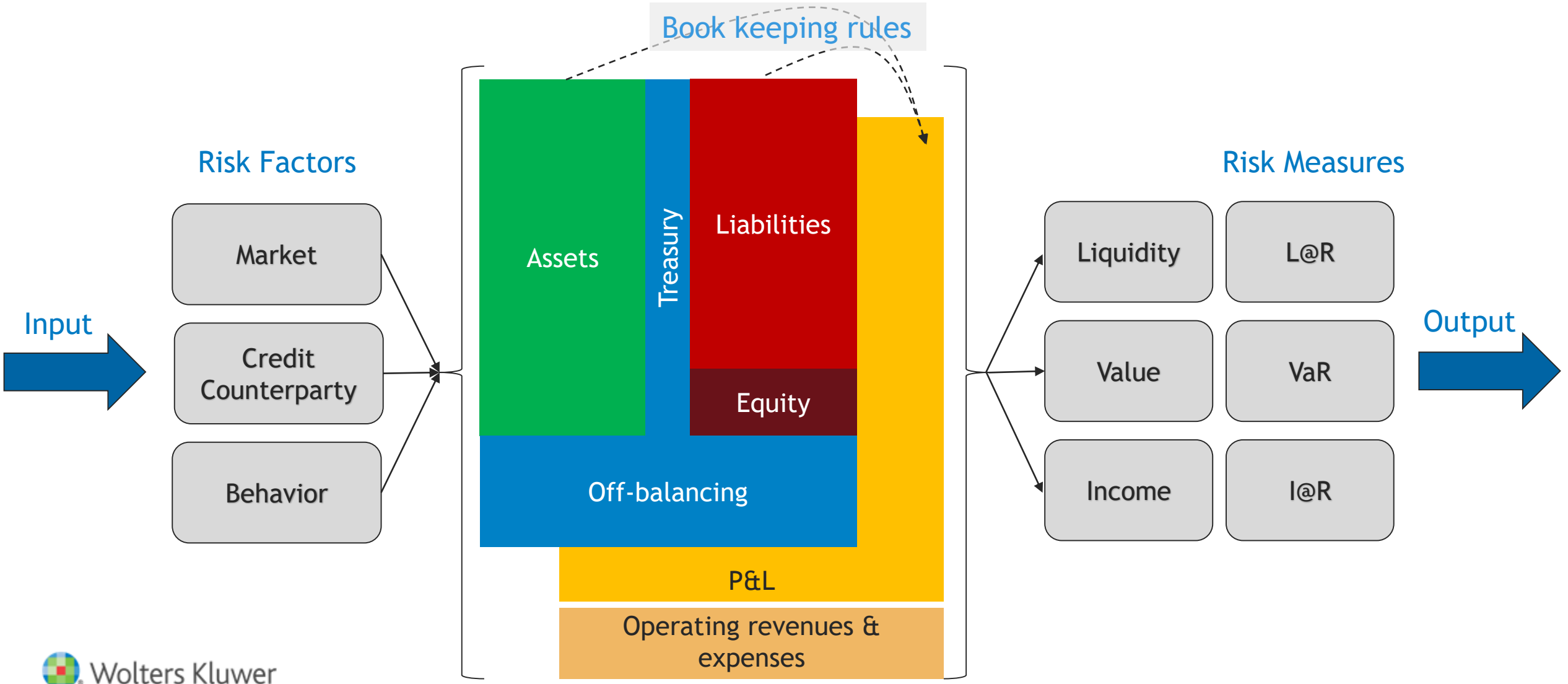
The analysis elements in A&L and P&L management



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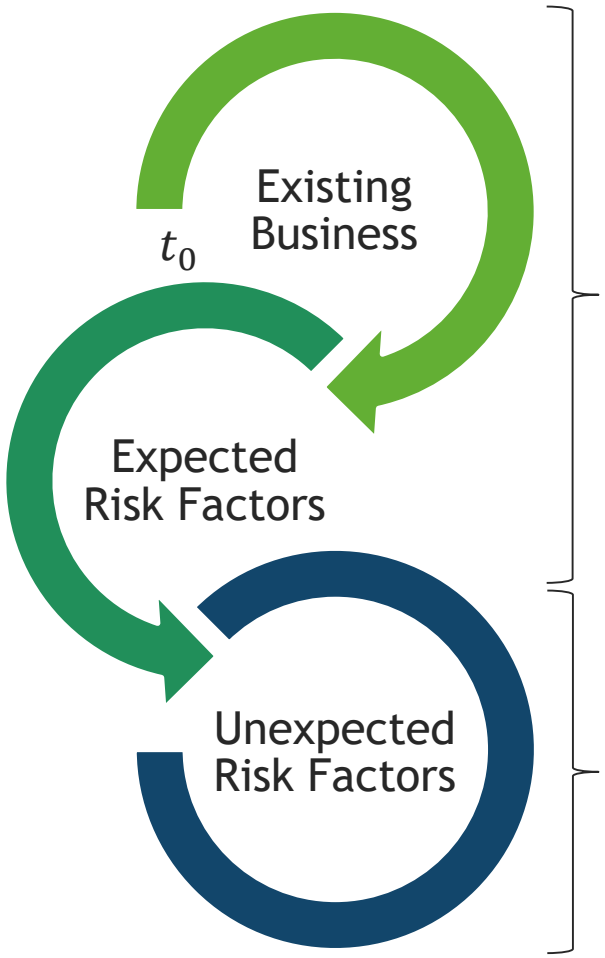
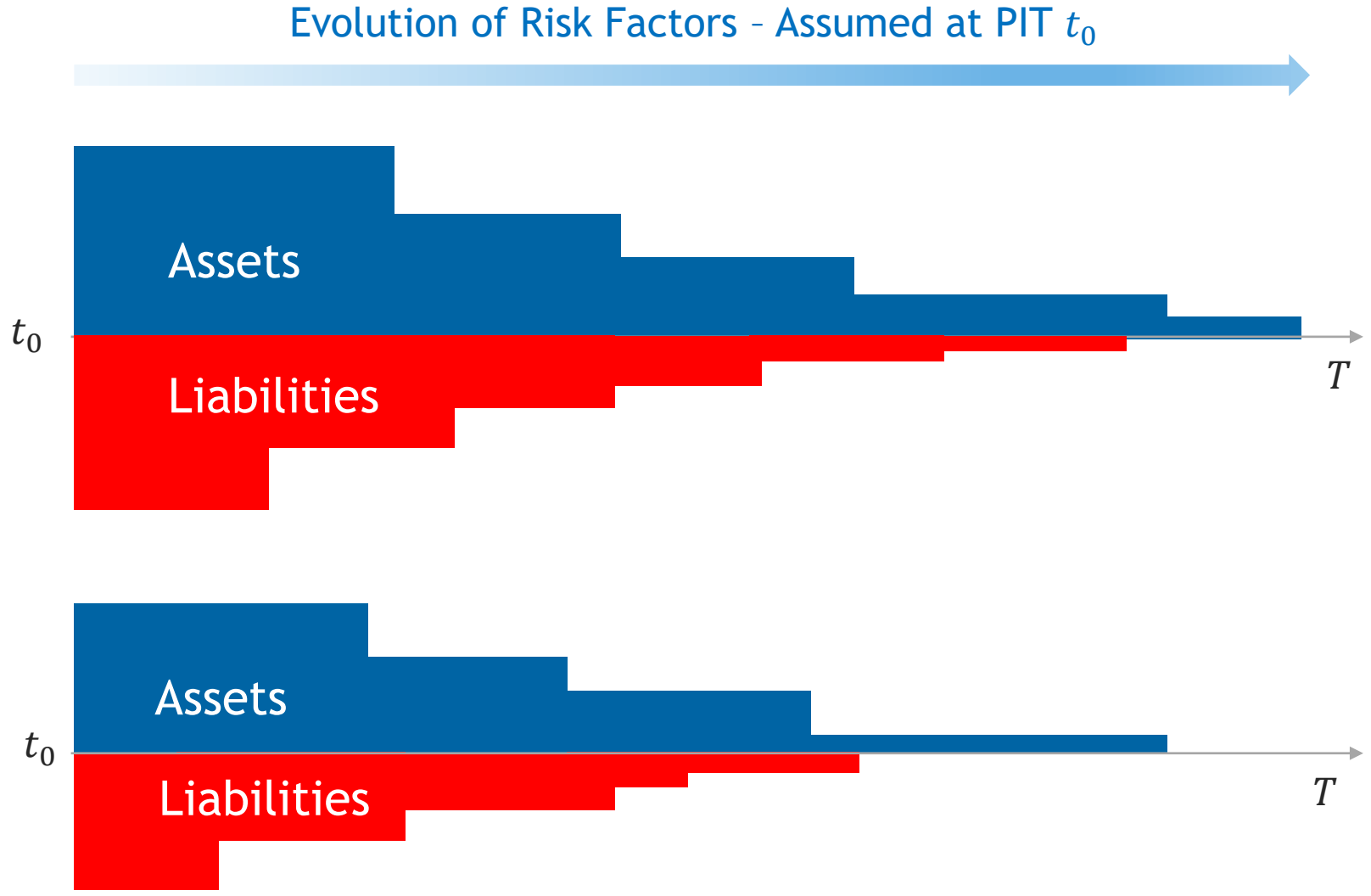
Liquidation (static) view





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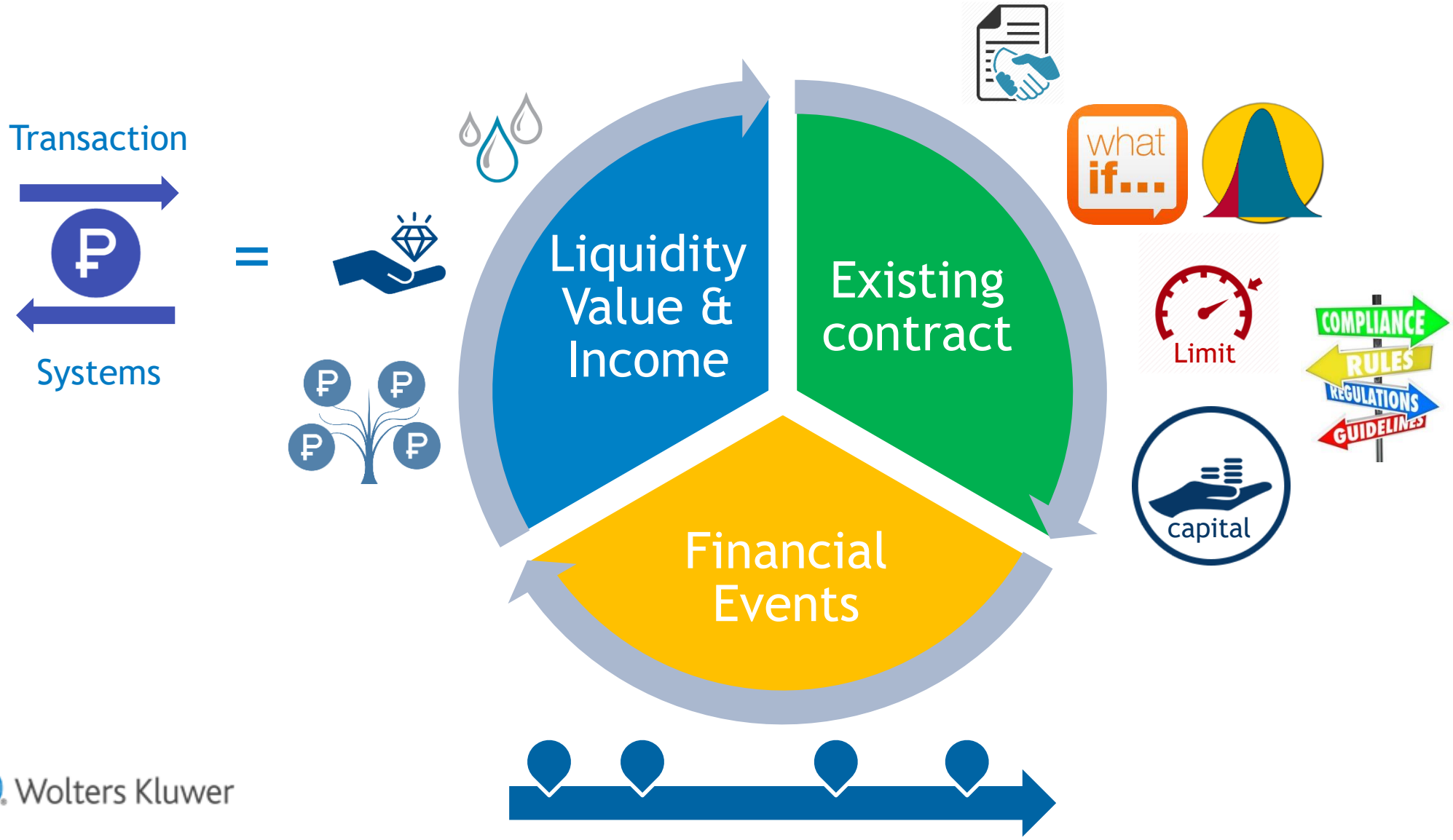
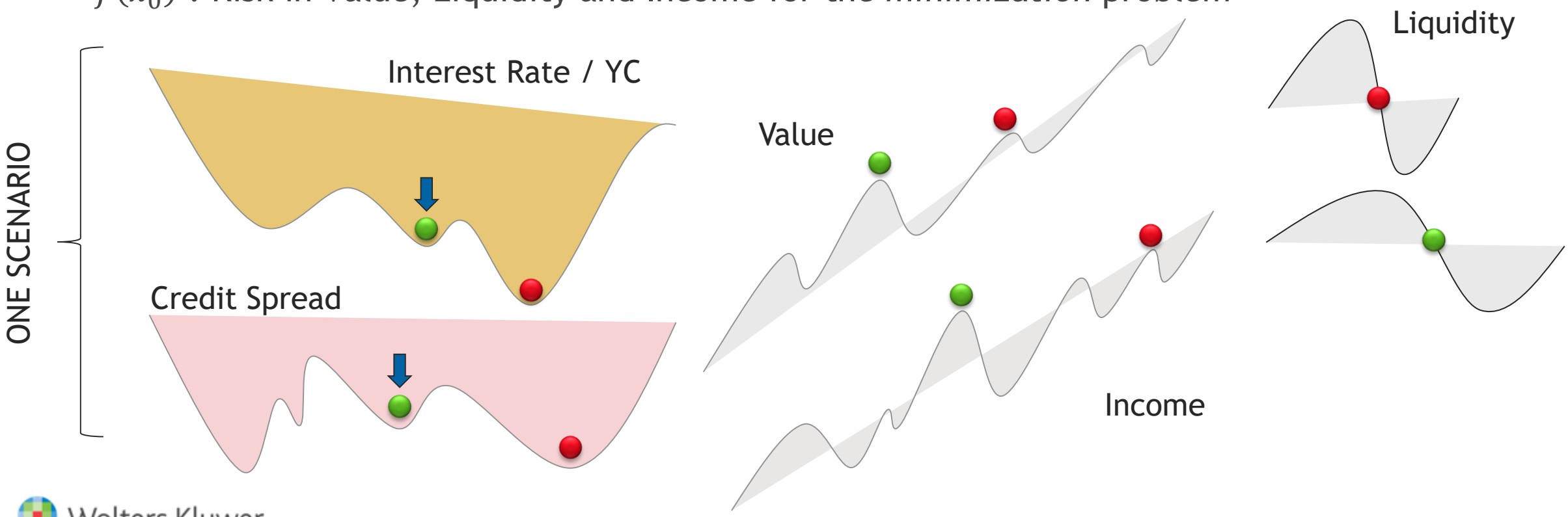
Automation via smart self-executed existing contracts



Optimizing existing business at t_0

- For a function $f: A \rightarrow R$ in *minimization* and maximization target, find optimal x_0 in A so that $f(x_0) \leq f(x)$ and $f(x_0) \geq f(x)$ for all x in A
- x_0 : risk factors
- $f(x_0)$: Value, Liquidity and Income for the *maximization* problem
- $f(x_0)$: Risk in Value, Liquidity and Income for the *minimization* problem



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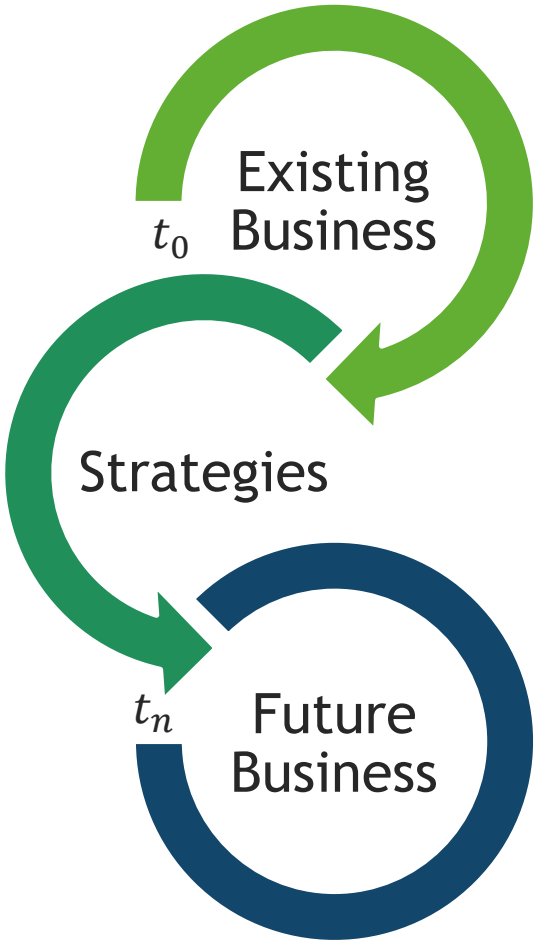
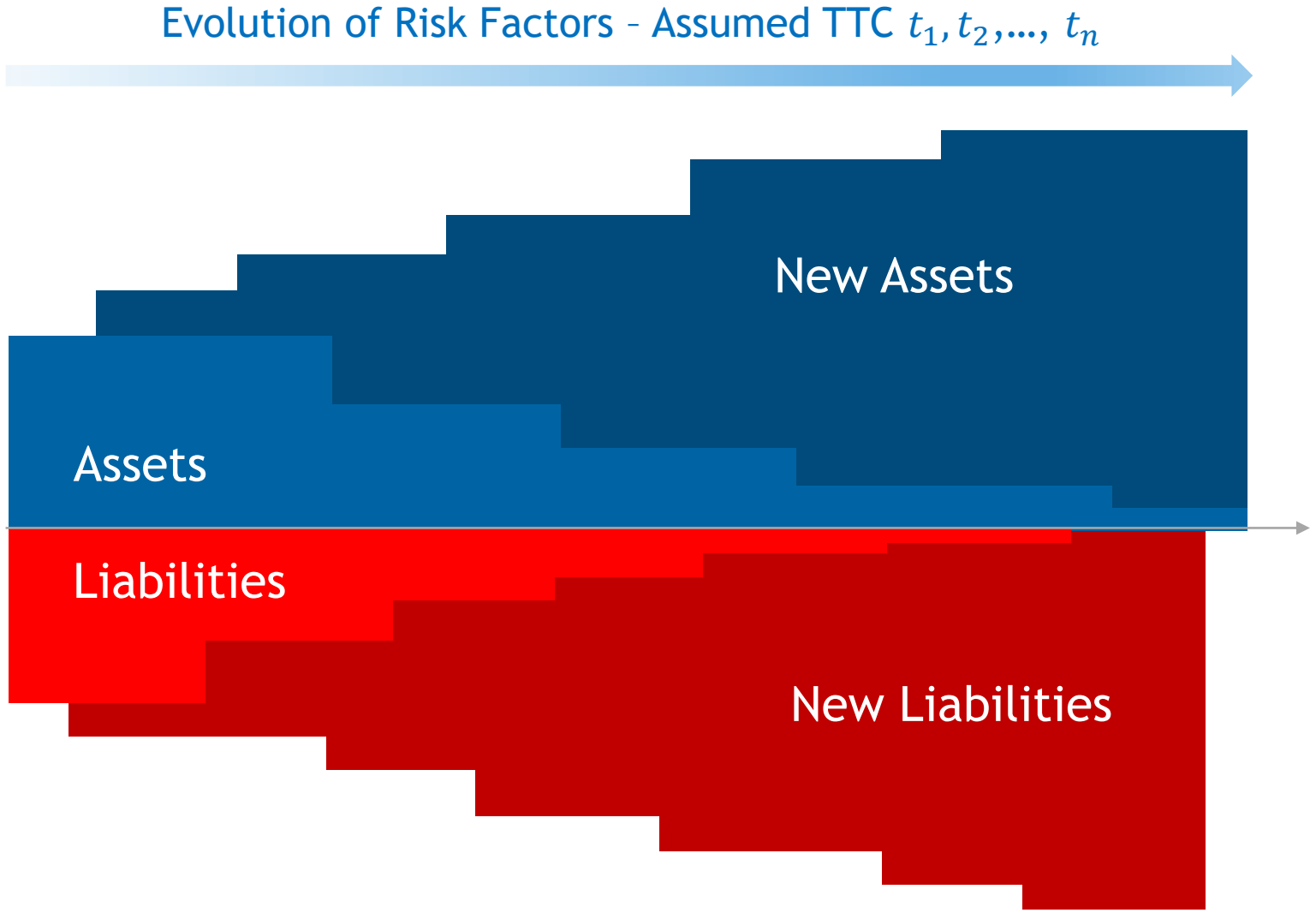
Going Concern





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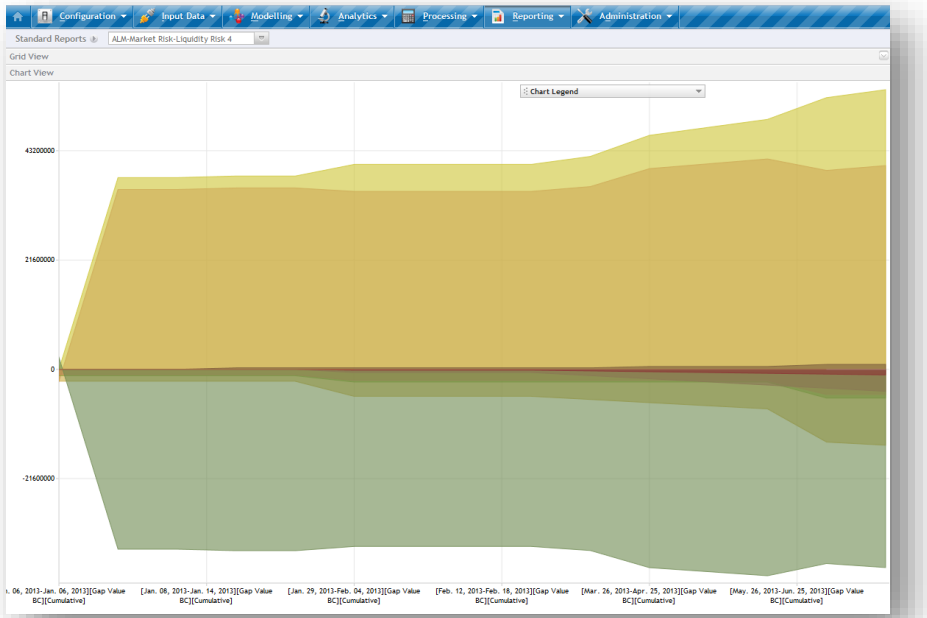
Smart origination, automation process & self executed contracts



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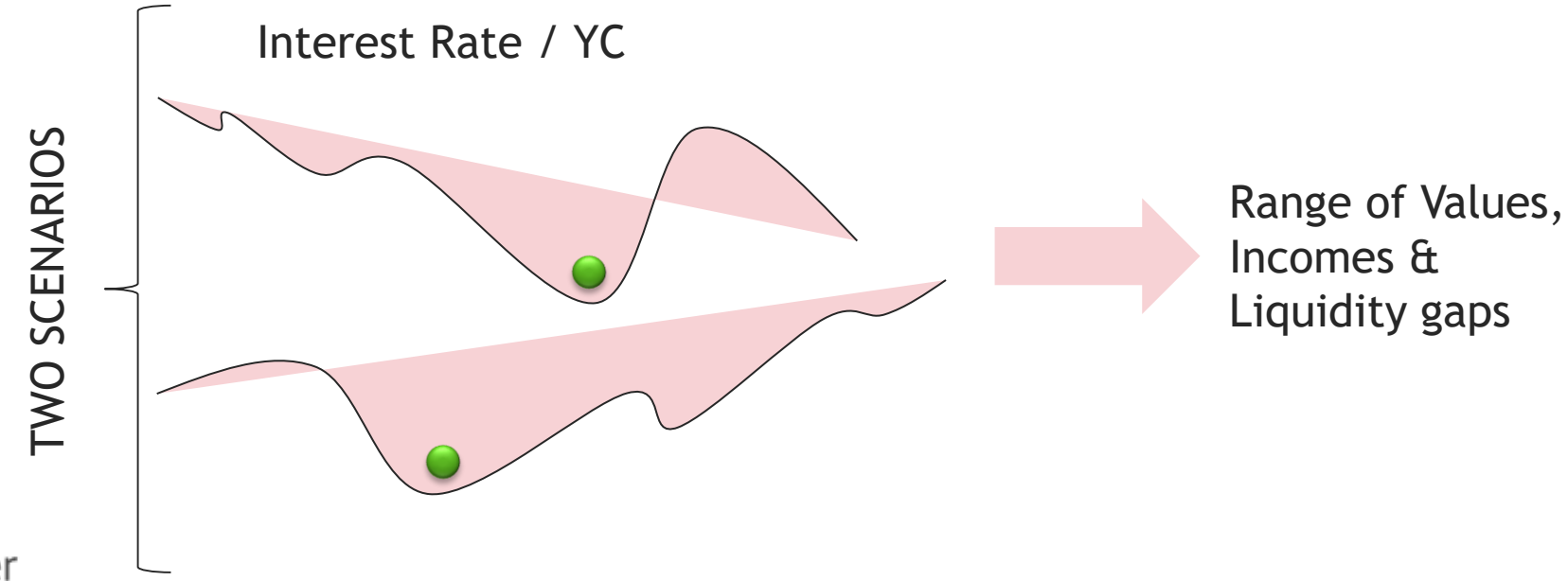
Dynamic optimization

- For a function $f(t)\colon A \to R$ in *minimization* and maximization target over time find optimal x_0 in A at diferent scenarios so that $f\big(x_0(t)\big) \leq f\big(x(t)\big)$ and $f\big(x_0(t)\big) \geq f\big(x(t)\big)$ for all x in A
- $x_0(t)$: risk factors at time t
- $f(x_0)$: Value, Liquidity and Income for the *maximization* problem
- $f(x_0)$: Risk in Value, Liquidity and Income for the *minimization* problem



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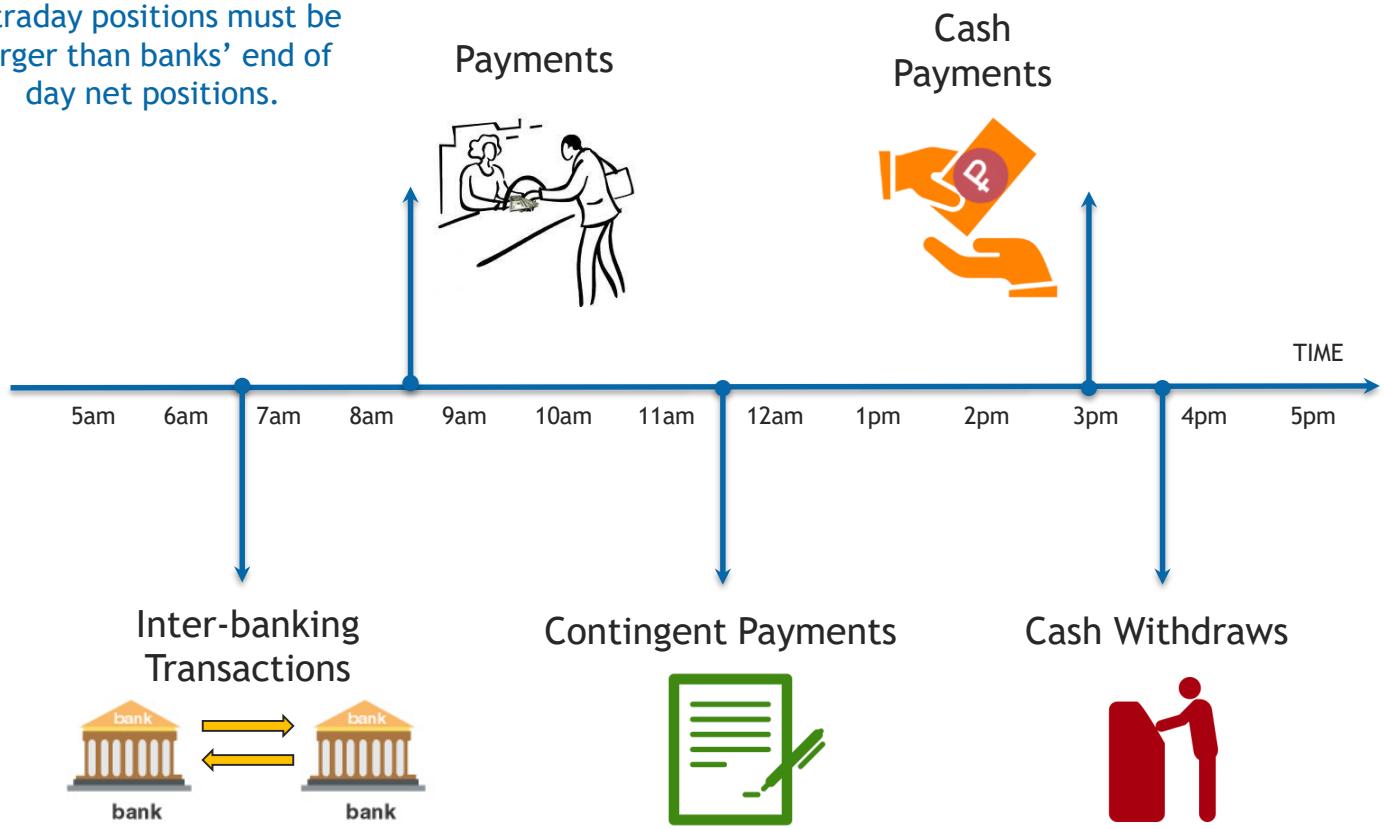
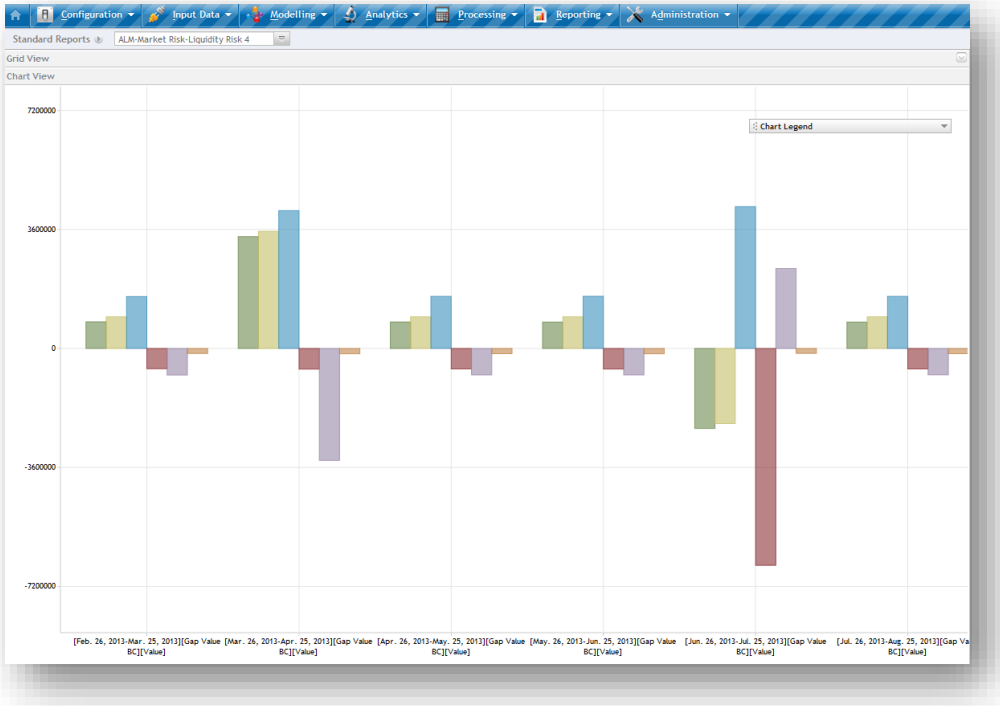
Liquidity management automation aligned to transaction systems

Intraday positions must be larger than banks' end of day net positions.





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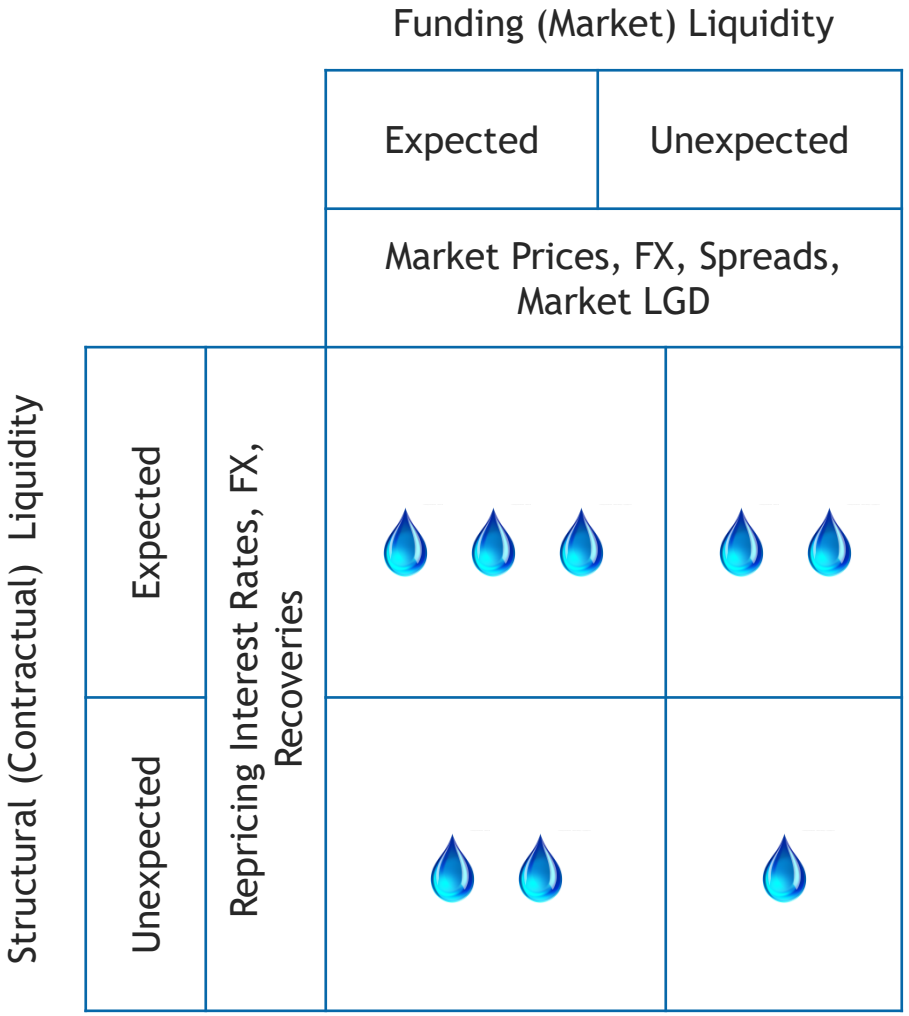
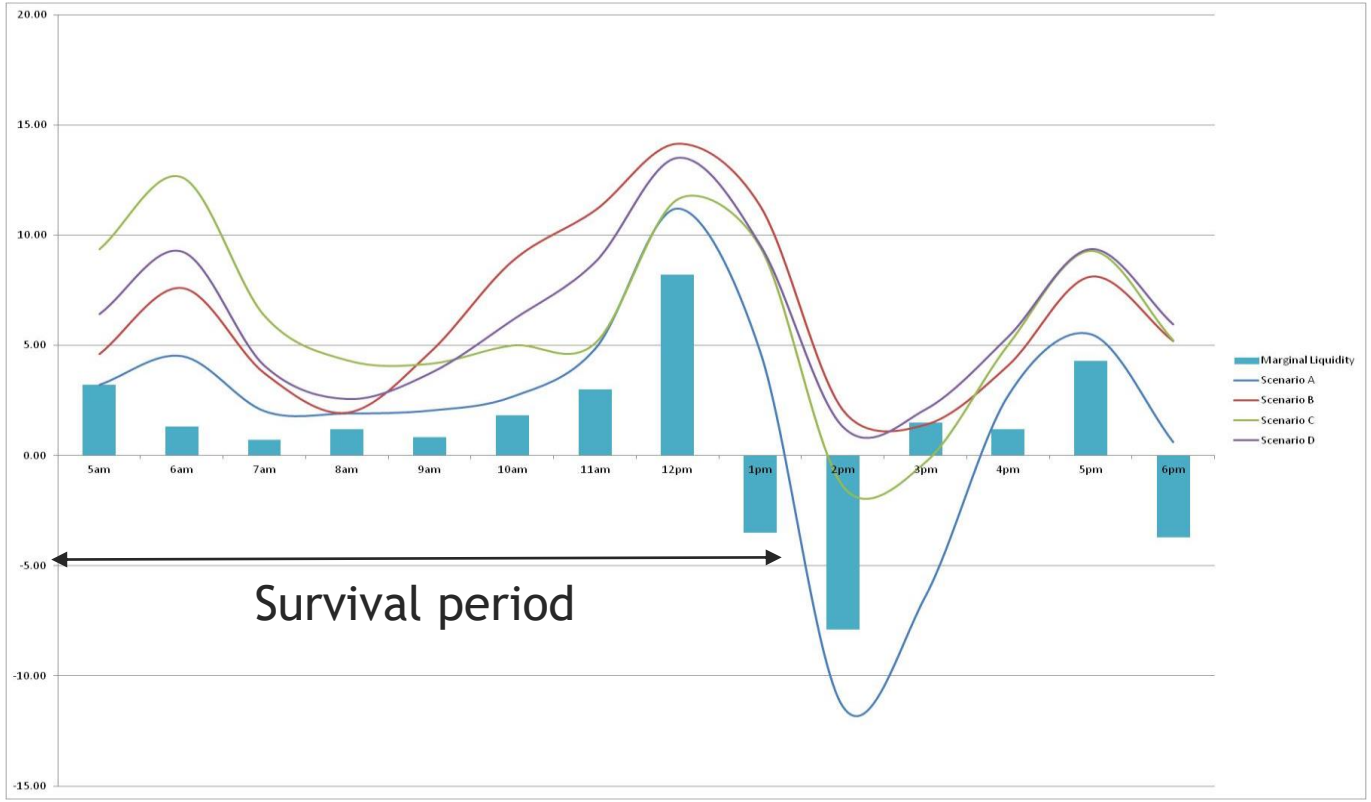
Optimizing liquidity based on scenarios





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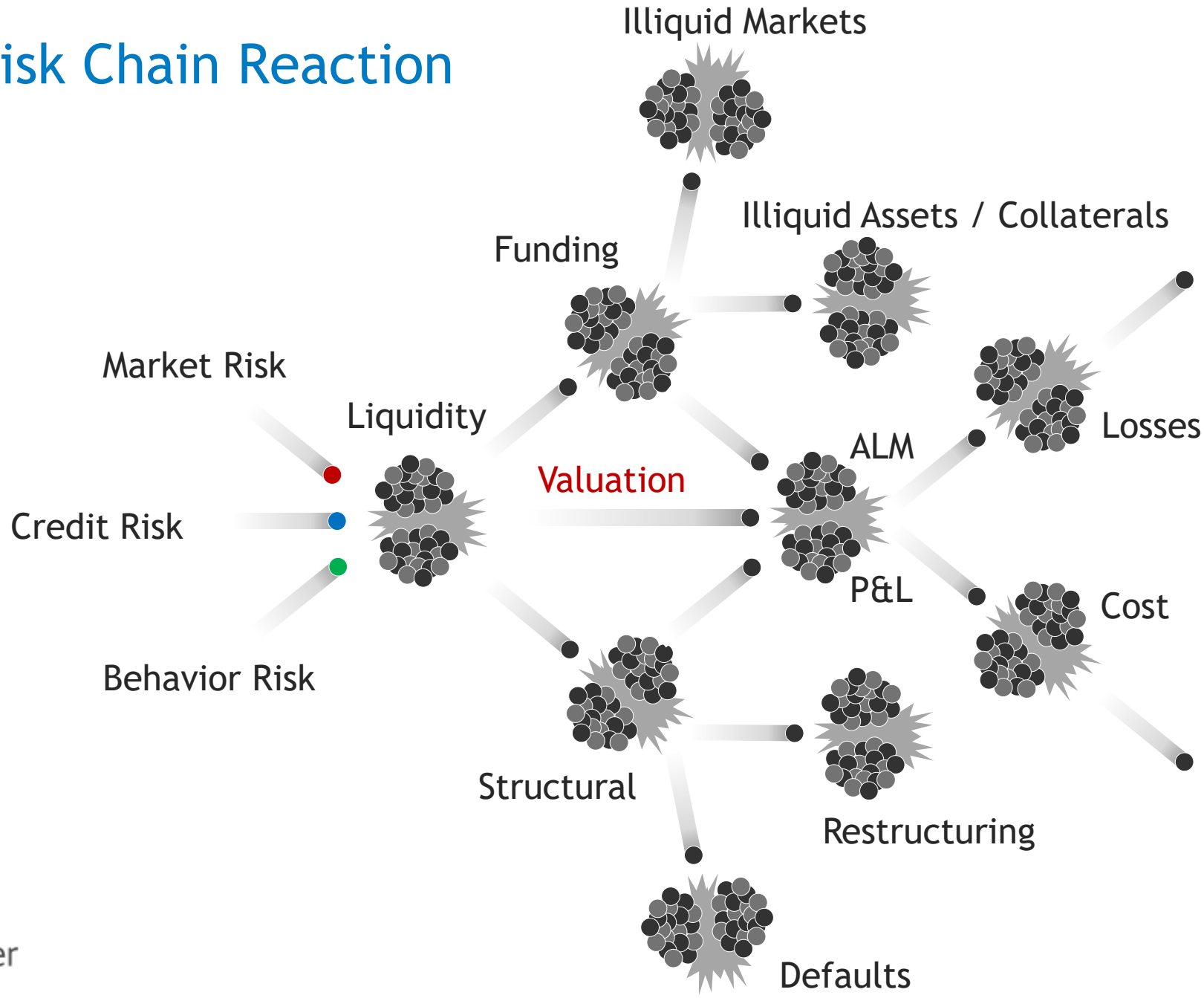
Liquidity Risk Chain Reaction



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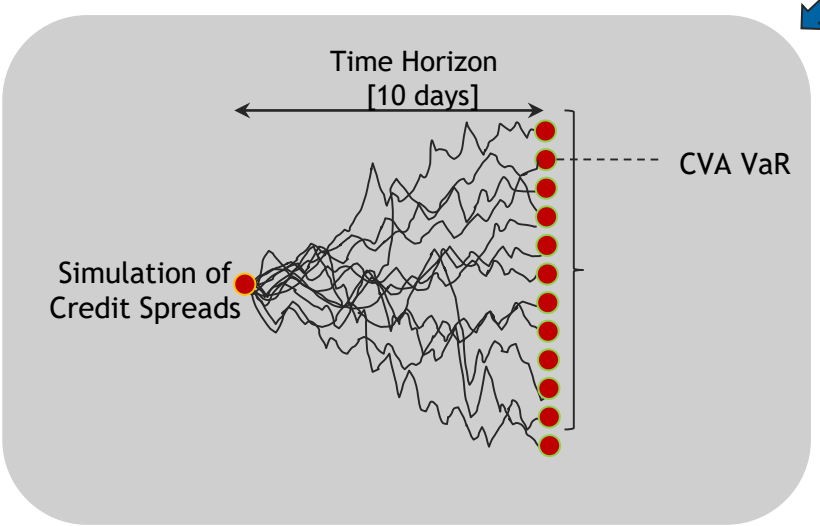
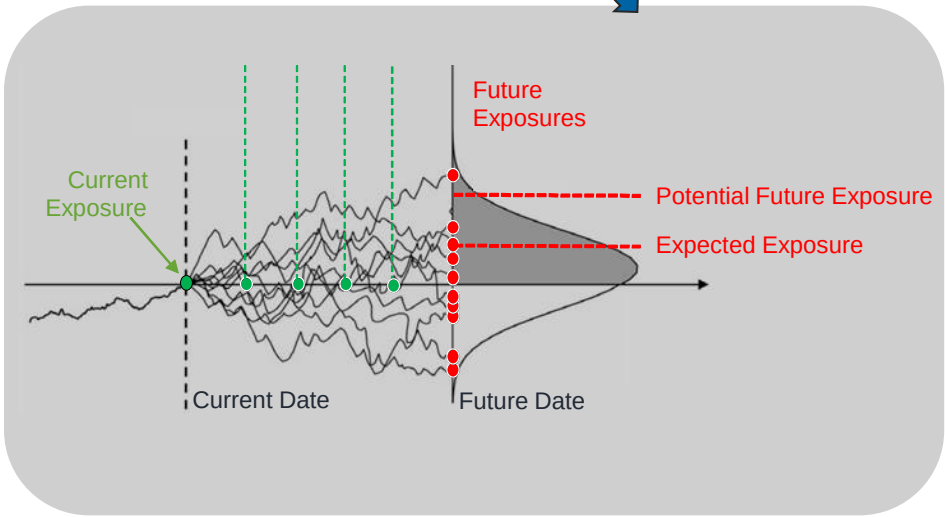
Valuation adjustment for the trading desk

LGD | Discount Factor | Spreads | Expected Exposure

$$CVA \approx (1-\bar{\delta}) \cdot \sum_{i=1}^{m} D(t_i) \cdot s(t_{i-1} - t_i) \cdot EE(t_i)$$





Calculation of VaR and Sensitivites

Optimal Exposure to market risk factors

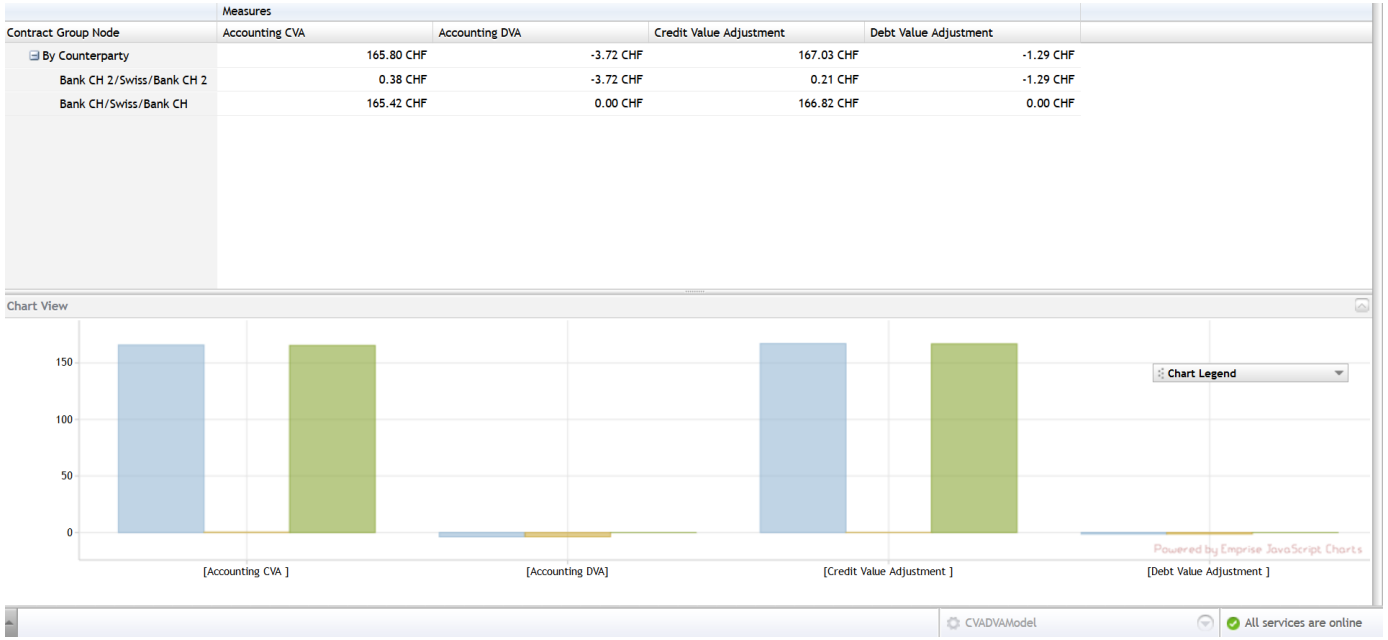
XVA calculation for the trading desk

Specific / General WWR

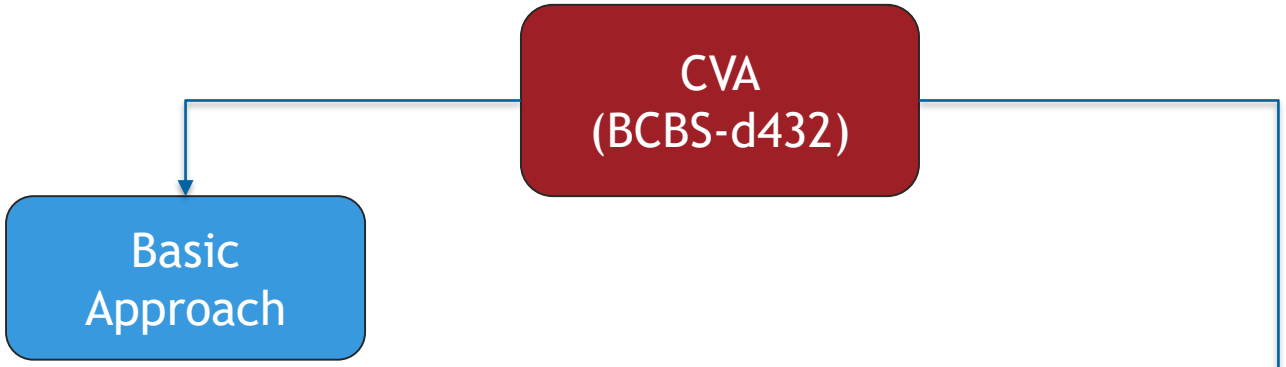
general WWR

$$BCVA \approx \underbrace{\left(1-\bar{\delta}\right)\sum_{i=1}^{n} D(t_i)\cdot s(t_{i-1},t_i)\cdot EE(t_i)}_{\text{CVA}} - \underbrace{\left(1-\overline{\delta_{FI}}\right)}_{\text{Own Market LGD}}\sum_{i=1}^{n} D(t_i)\cdot \underbrace{s_{FI}(t_{i-1},t_i)}_{\Delta\text{(Own Spreads)}}\cdot \underbrace{NEE(t_i)}_{\text{Expected Exposure}}$$

DVA (Considering Own Default Risk)



Basel III valuation adjustment for the trading desk



$$SCVA_c = \frac{RW_c}{a} \cdot \sum_{NS \in c} M_{NS} \cdot EAD_{NS} \cdot DF_{NS}$$

$$\Delta s^{CVA}_{k_{(CPspreads)}} = \frac{\partial CVA}{\partial k_{(CPspreads)}}$$

$$\Delta s^{CVA}_{E_k} = \frac{\partial CVA}{\partial E_{k_{(MRF)}}}$$

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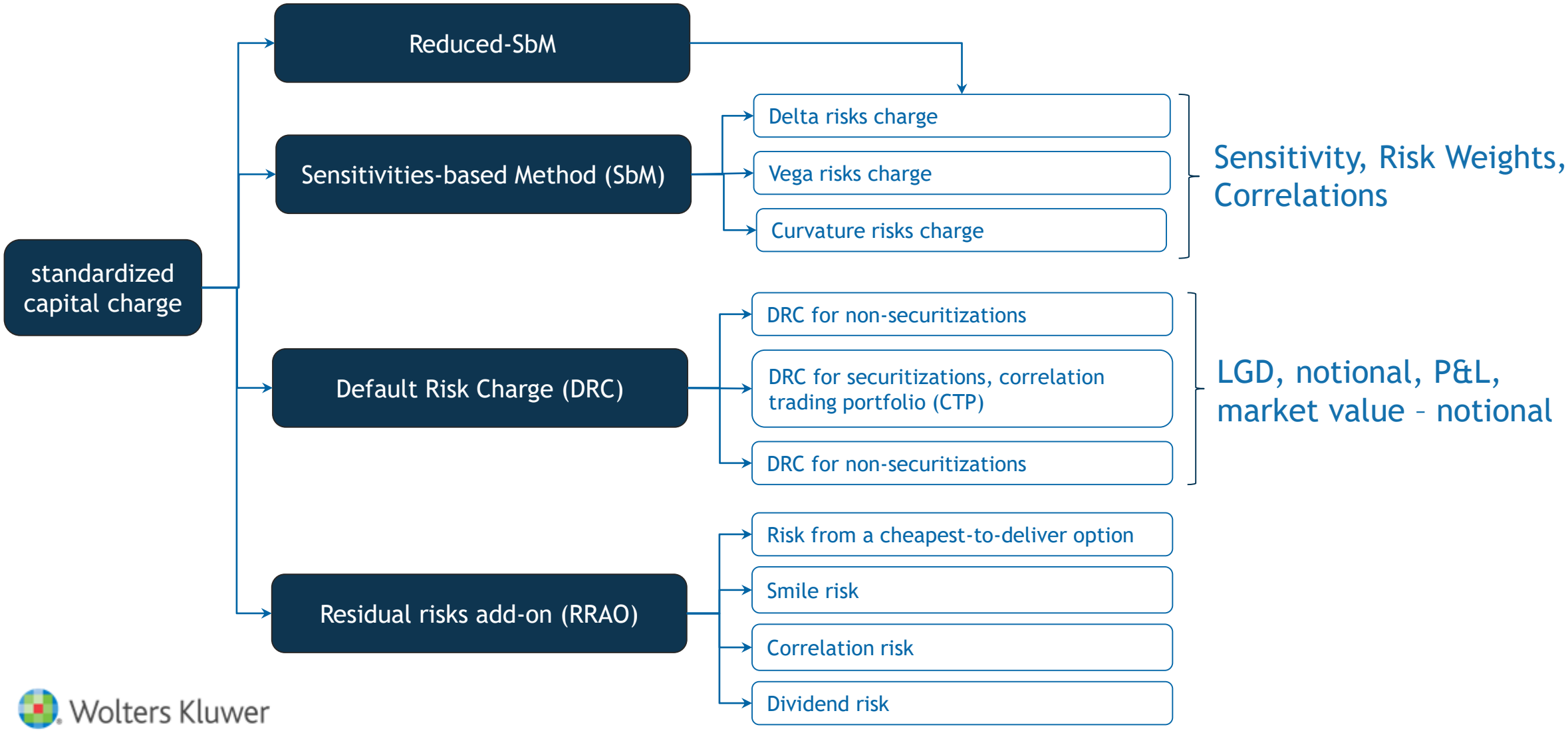
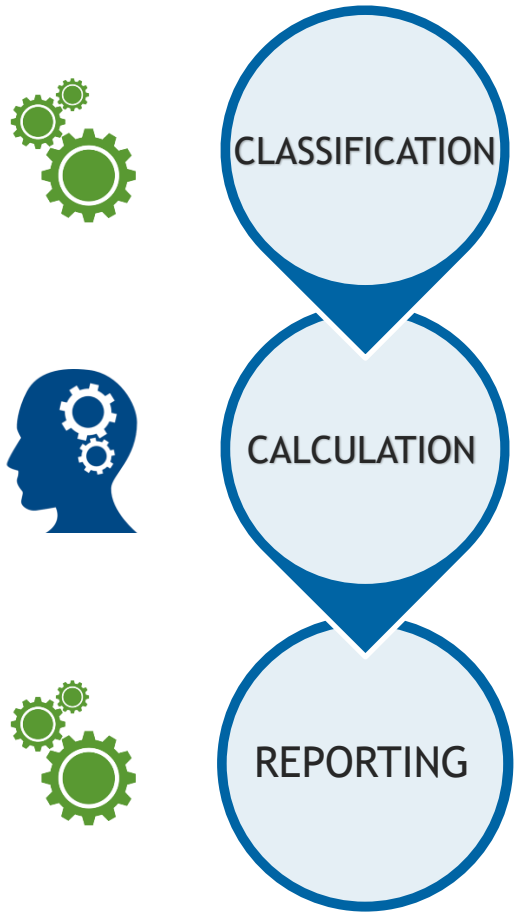
Trading desk aligned to Basel Regulation - Fundamental Review of the Trading Book



FRTB Delta (Vega) risks charge (BCBS 2016, 2018) d352, d436

Main steps for estimating the risk capital charge using sensitivity based method



DELTA	VEGA	CURVATURE
ASSIGN THE PORTFOLIO TO RISK CLASSES		CALCULATE THE CURVATURE CAPITAL CHARGE CVR AT EACH RISK FACTOR
IDENTIFY BUCKETS AND CORRESPONDING RISK WEIGHTS		
CALCULATE NET SENSITIVITIES S_k FOR EACH RISK CLASS		
ESTIMATE WEIGHTED NET SENSITIVITIES $\mathrm{WS_k}$ FOR EACH RISK FACTOR		
COMPUTE SENSITIVITIES FOR RISK POSITIONS K_b WITHIN EACH BUCKET BY USING CORRELATIONS ρ_{kl}		
COMPUTE CAPITAL CHARGE ACROSS BUCKETS BY USING CORRELATIONS γ_{bc}		
AGGREGATE THE SENSITIVITY RISK CHARGE BASED ON CORRELATION SCENARIOS		
REPORTING BASED ON REGULATORY TEMPLATES		

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FRTB Delta (Vega) and Curvature risks charge (BCBS 2016, 2018) d352, d436

$$K_b = \sqrt{\sum_k (RW_k S_k)^2 + \sum_k \sum_{k \neq l} \rho_{kl}\, RW_k S_k \cdot RW_l S_l}$$

$$S_{k,r_t} = \frac{V_i(r_t + 0.0001, cs_t) - V_i(r_t, cs_t)}{0.0001}$$

$$Delta = \sqrt{\sum_b k_b^2 + \sum_b \sum_{c \neq b} \gamma_{bc} \sum_k RW_k S_k \cdot \sum_k RW_k S_k}$$

$$CVR_k^+ = \sum_i \left\{ V_i\left(x_k^{(RW^{Curvature^+})}\right) - V_i(x_k) - RW_k^{(Curvature)} \cdot S_{ik} \right\}$$

$$CVR_k^- = \sum_i \left\{ V_i\left(x_k^{(RW^{Curvature^-})}\right) - V_i(x_k) - RW_k^{(Curvature)} \cdot S_{ik} \right\}$$

Concluding Remarks

TREASURY IS THE HARD OF THE BANKING ACTIVITIES. AUTOMATING AND OPTIMIZING ITS BUSINESS WILL IMPACT THE ENTIRE ALM AND P&L

THE CONSIDERATION OF RISK FACTORS' INTEGRATION OF LEADS TO EFFECTIVE RISK MANAGEMENT HANDLED BY THE TREASURY

BOTH STATIC (LIQUIDATION VIEW) AND DYNAMIC (CONING CONCERN VIEW) MUST BE CONSIDERED IN TREASURY ANALYTICS

SMART CONTRACTS AND AUTOMATION MUST BE SUPPORTED BY OPTIMAL AND INTEGRATED ALM AND RISK MANAGEMENT SYSTEMS

LIQUIDITY IS AN INTEGRATED RISK THAT CAN BE INITIATED AND MANGED INTERNALLY (STRUCTURALLY) OR EXTERNALLY (MARKET)

VALUATION ADJUSTMENTS (XVAs) ANALYSED AND MANAGED BY THE TREASURY. BASEL III APPROACHES ON CAPITAL AGAINST CVA RISK

UNDER BASEL III ALL CREDIT INSTITUTIONS MUST CONSIDER THE APPROACHES OF THE FUNDAMENTAL REVIEW OF THE TRADING BOOK

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