

ACTUS: Enabling Static and Dynamic Analysis Based on Granular Financial Data

Consortium for Systemic Risk Analytics Conference
Cambridge, Massachusetts
May 27, 2015

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Foundation of the ACTUS Approach

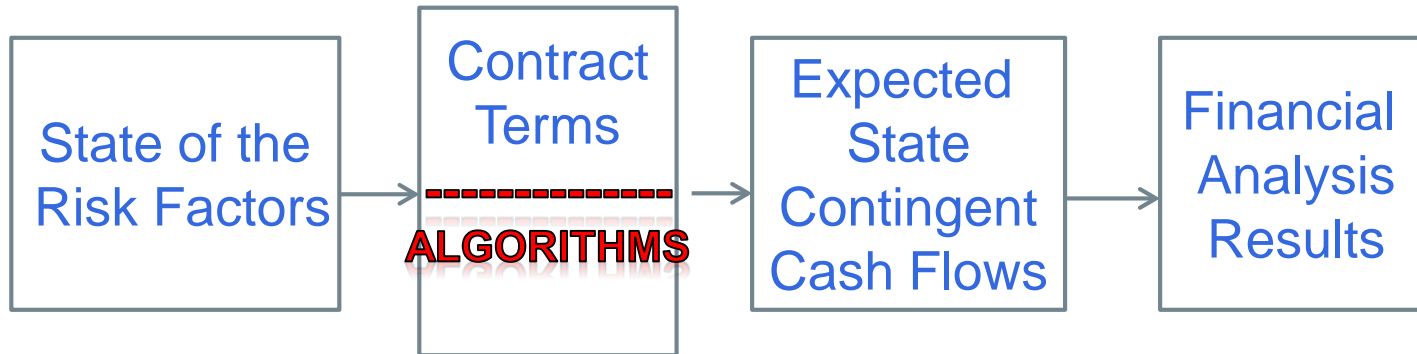
ACTUS Contribution to Static Analysis

Static vs. Dynamic Analysis

ACTUS Contribution to Dynamic Analysis

Going Concern Analysis and Systemic Risk

The Foundation of the ACTUS Approach



- ACTUS is the standard for financial data that enables financial analysis
- ACTUS represents financial obligations in the form of **Algorithms** which are the **mathematical representation** of the state-contingent **obligations** embodied in the words of legal contracts

Improving Static Analysis with Access to Usable Granular Transaction and Position Data



Regulators rely on:

Accounting based data (capital) which is not a risk metric, and
Summary measures of risk (such as duration), which lose information

Access to granular transaction and position data in the ACTUS standard can take advantage of modern information technology to gain better insight into risk.

These two banks (with highly stylized balance sheets) have the same liabilities and comparable duration of equity, but differ in the composition of assets:

	Bank A	Bank B
Assets	\$1,000 in 6-year instruments with 2.8% p.a. interest	\$500 in 2-year instruments with 1% p.a. interest; \$500 in 10-year instruments with 3.2% p.a. interest
Liabilities	\$960 in 2-year instruments with 1% p.a. interest rate	\$960 in 2-year instruments with 1% p.a. interest rate
Net Equity	40	40
Duration Equity	43	46

Comparison: Summary Statistics vs Analysis Based on Granular Data



Bank A (Dur EQ=43)				Bank B (Dur EQ=46)			
Fair Values	Initial	Shock 1	Shock 2		Initial	Shock 1	Shock 2
Assets	1060	1002	1019		1058	998	984
Liabilities	966	947	966		966	947	966
Equity	94	55	53		92	51	18
Loss		39	41			40	74

Shock Scenario 1: 1% parallel shift up in yield curve. **Shock Scenario 2:** Steepening of yield curve. Totals not exact due to rounding

Duration measures sensitivity to parallel shifts in the yield curve:
As expected a 1% parallel shift up affects both banks similarly

However, a steepening of the yield curve (comparable to the greatest steepening since 1990) creates very different results:

The Key to Understanding Risk



Regulators and risk managers should have access to granular data represented in a **data standard** that supports analysis: With such a capability they will be able to gain a deeper understanding of financial risk than is possible with reliance on either accounting measures of capital or summary measures of risk.

ACTUS is such a data standard

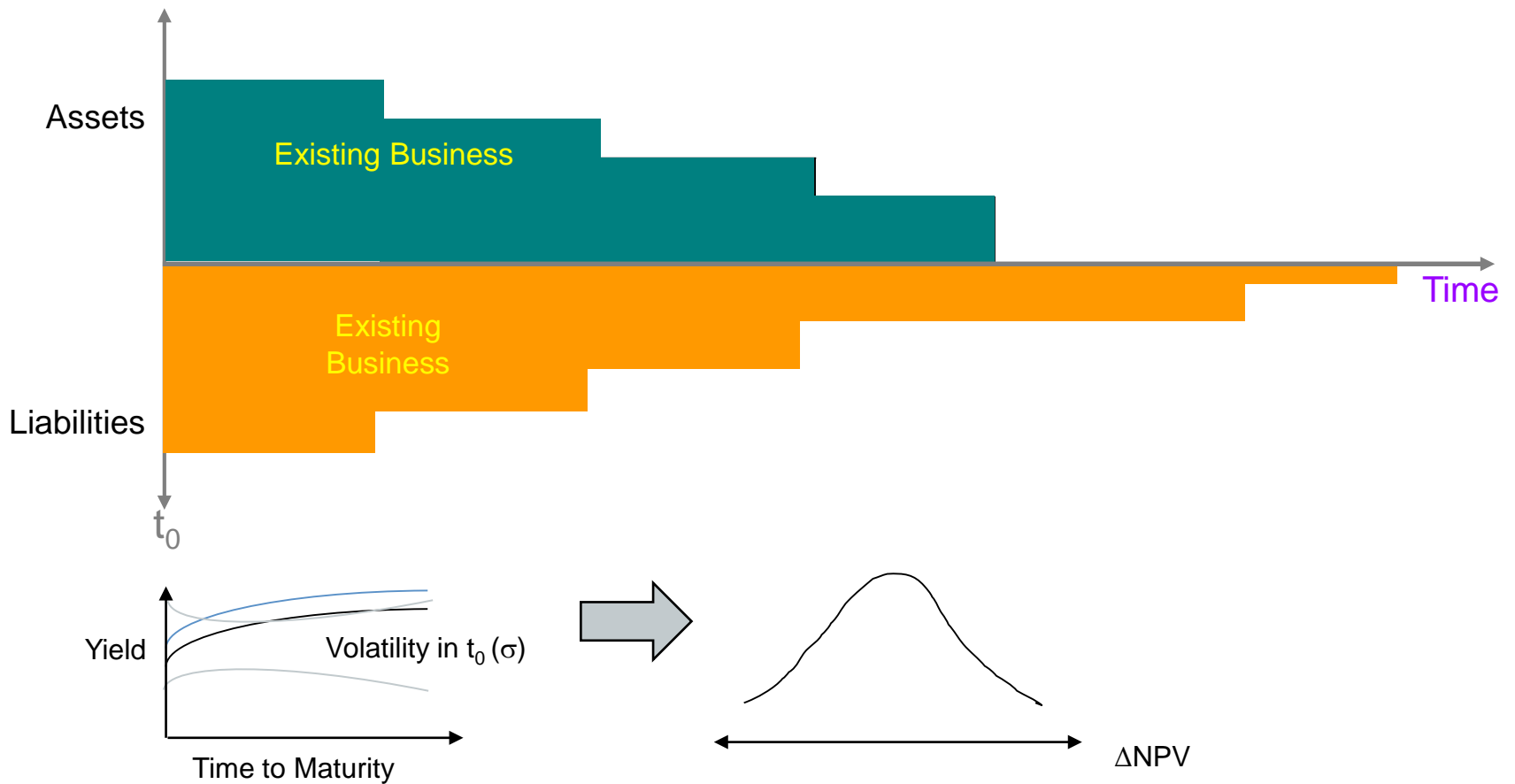
Static analysis can only capture first order impacts

- Static stress test are in effect based on a liquidation view of financial institutions
- They do not address the dynamics of financial institutions and markets

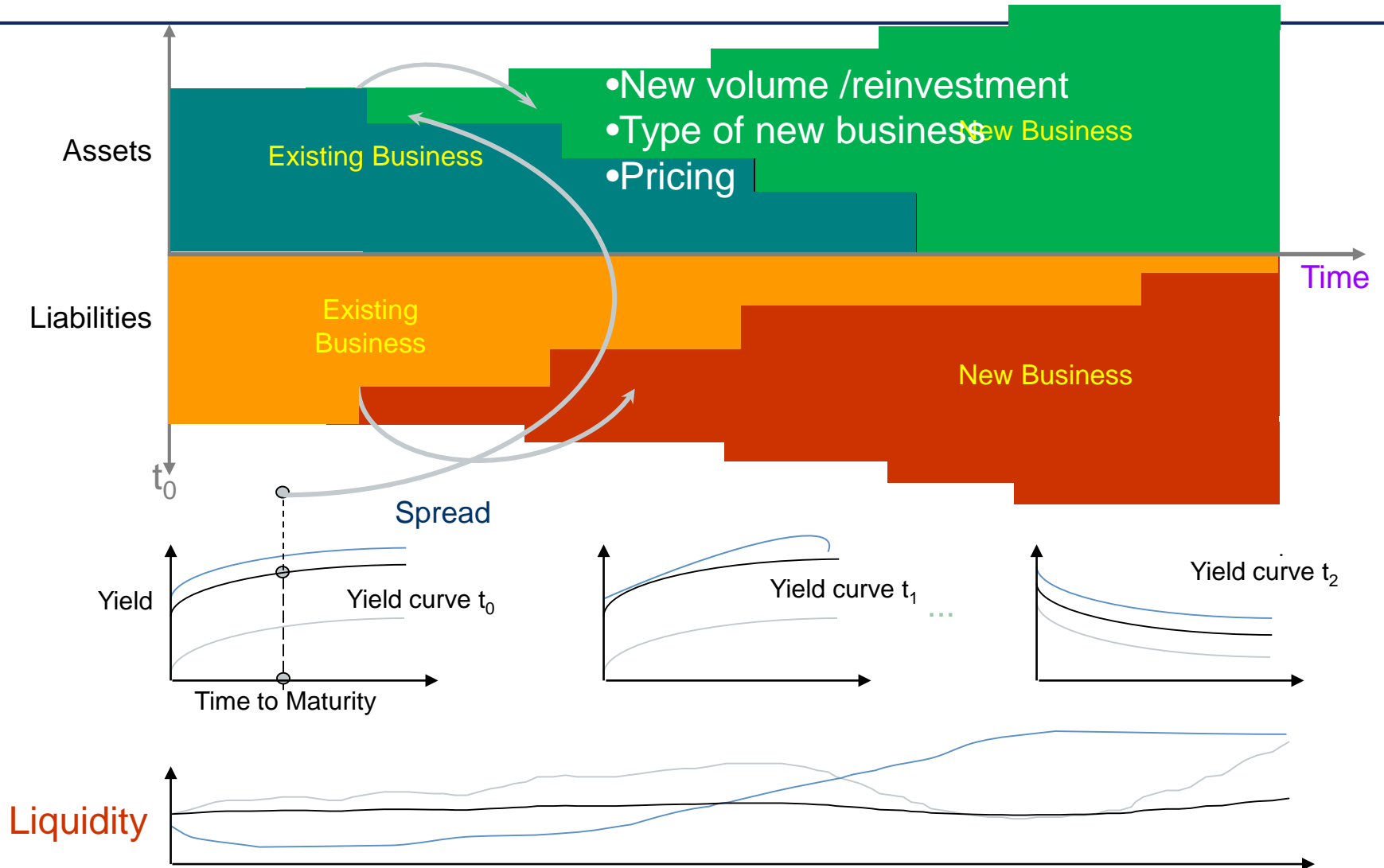
A dynamic analysis approach is needed, in order to do more meaningful systemic risk analysis

- Financial stability is about the viability of going concerns
- Therefore dynamic analysis is necessary to analyze firms as going concerns
- Dynamic analysis must include reactions to first order impacts

Static Analysis Liquidation View



Dynamic Analysis Going Concern View















Going Concern Analysis Market Scenarios



- Three scenarios for future market conditions
 - Modest parallel shift up of the yield curve
 - Upward shift and flattening of the yield curve
 - Upward shift and steepening of the yield curve

Market Scenario

Upward shift and flattening

-  X
-  Analysis Tree
-  Contract Viewer
-  RiskFactor Viewer
-  Financial Strategy
-  Risk Scenario
-  Behavior
-  Operational Strategy
-  Model and Solve
-  Reports
- 
- 

Fast Rise Flatten +  

Risk Factors

+ 

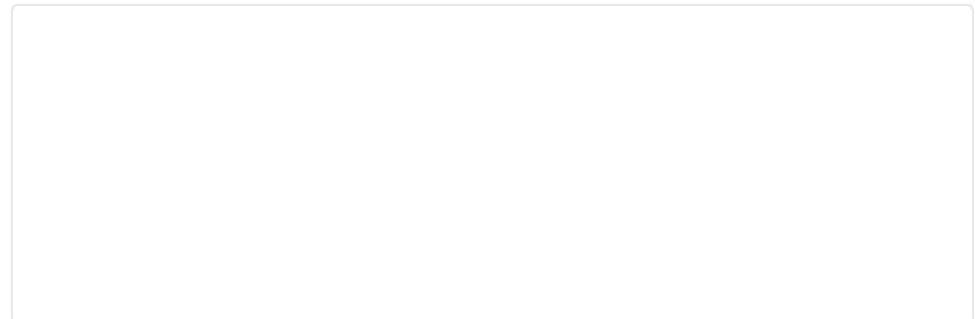
Rate Adj Type

Point in time

Define Scenarios

Tenors	2016-01-31T24	2016-02-29T24	2016-03-31T24	2016-04-30T24	2016-05-31T24	2016-06-30T24
1M	0.05	0.05	0.05	0.05	0.05	0.05
3M	0.045	0.045	0.045	0.045	0.045	0.045
6M	0.040	0.040	0.040	0.040	0.040	0.040
1Y	0.037	0.037	0.037	0.037	0.037	0.037
2Y	0.035	0.035	0.035	0.035	0.035	0.035
3Y	0.033	0.033	0.033	0.033	0.033	0.033

View Curve



Going Concern Analysis Business Strategies

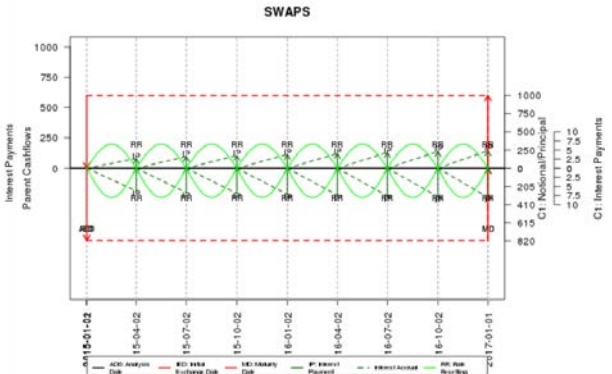
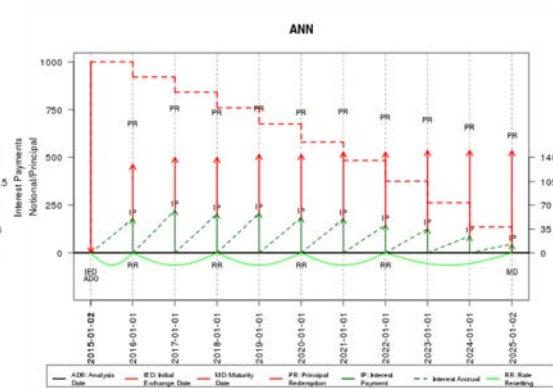
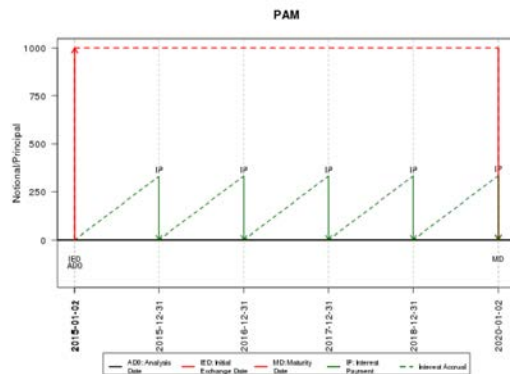


- Three strategies/contingent plans for new business
 - Wind-down strategy, no reinvestment (liquidation)
 - Maintain same composition of the balance sheet with profit reinvestment
 - 10% growth of all asset categories

Forecasting new business

Meaning of Numbers

- The meaning of forecasting new business in finance



- ACTUS provides the computational infrastructure to analyze a going concern with new business

Business Strategy



- Analysis Tree
- Contract Viewer
- RiskFactor Viewer
- Financial Strategy
- Risk Scenario
- Behavior
- Operational Strategy
- Model and Solve
- Reports

Tree Structure

Grow 10%



Search

- Assets
 - Interbank
 - Treasury
 - Longterm
 - Current Account
 - Loans
 - Accrued Interest
 - Auto
 - Mortgage
 - FixedAssets
- Liabilities
 - Interbank
 - Treasury
 - Longterm
 - Customer Deposits
 - Accrued Interest
 - Savings

Volume

Set/Inherit:

Type: TN Char: Maturity

Target

Type of target:
 Reached at:
 Conflict solution:
 Value:
 Total: %

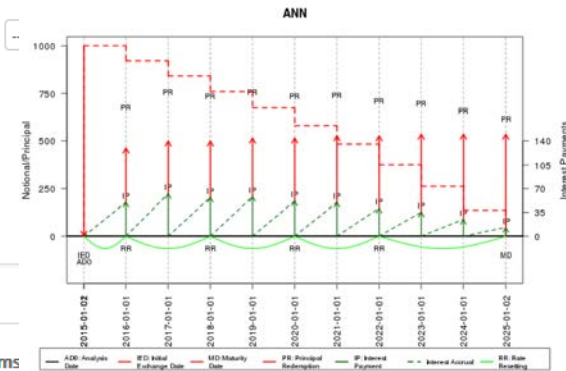
Roll

Down:
 Over original:
 Over default:

Across:

External

Roll Into:
 Operational



Characteristics & Market

Simulated Contracts

Type of contract:

Contract	Description	Percent
ANN	Fixed 10 Yrs	50
ANN	Var 30 Yrs	50

Contract Terms

IPCL:
 IPANX:
 MD:
 Description:
 PRCL:
 PRANX:
 AMD:
 Percentage:
 DCC:

Market Link

Currency:
 RRMO:
 RRSF:
 RRCL:
 RRANX:

Income: Grow 10%

Upward shift and steepening



Tree Structure	CCAR
Financial Strategy	CCAR-Grow 10%
Operational Strategy	CCAR-Simple Ops
Risk Scenario	CCAR-Fast Rise Steepen
Simulation Date	2015-12-31T24
Time Definition	2Y/1M-

	Nominal Ending	Nominal Average	Fair Values	Nominal Income	Chart	
Account	2016-01-01 - 2016-01-31	2016-02-01 - 2016-02-29	2016-03-01 - 2016-03-31	2016-04-01 - 2016-04-30	2016-05-01 - 2016-05-31	2016-06-01 - 2016-06-30
▼ CCAR	72.98	89.91	111.17	103.28	75.25	
▼ Balance Sheet	128.98	153.91	224.17	219.28	194.25	
▼ Assets	247.32	258.93	330.59	334.38	331.76	
▶ Interbank	3.62	5.39	8.15	7.99	8.36	
▶ Current Account	2.11	13.23	34.1	26.15	8.94	
▼ Loans	239.48	238.26	286.08	297.97	312.04	
▶ Accrued Interest						
▶ Auto	66.15	65.88	92.49	96.98	99.84	
▶ Mortgage	173.34	172.38	193.59	200.99	212.2	
▶ FixedAssets	2.11	2.04	2.26	2.27	2.42	
▼ Liabilities	118.34	105.02	106.42	115.1	137.51	
▶ Interbank	5.37	5.4	5.92	6	6.49	
▼ Customer Deposits	106.94	91.95	90.56	97.43	117.04	
▶ Accrued Interest						
▶ Savings	92.83	87.47	94.26	91.94	95.77	
▶ Deposits	14.1	4.48	-3.71	5.49	21.26	
▶ Bonds	6.03	7.66	9.94	11.67	13.98	
▶ Reserves	0	0	0	0	0	
▶ Equity	0	0	0	0	0	
▶ Off Balance Sheet	0	0	0	0	0	
▼ Operating Revenues and Expenses	-56	-64	-113	-116	-119	
▼ Revenues	122	119	116	113	110	
▶ Commission	122	119	116	113	110	
▼ Expenses	-178	-183	-229	-229	-229	
▶ Salaries	-70	-75	-121	-121	-121	
▶ Premises	-59	-59	-59	-59	-59	
▶ IT	-49	-49	-49	-49	-49	

Balance Sheet: Grow 10%

Upward shift and steepening



Tree Structure CCAR
 Financial Strategy CCAR-Grow 10%
 Operational Strategy CCAR-Simple Ops
 Risk Scenario CCAR-Fast Rise Steepen
 Simulation Date 2015-12-31T24
 Time Definition 2Y/1M-

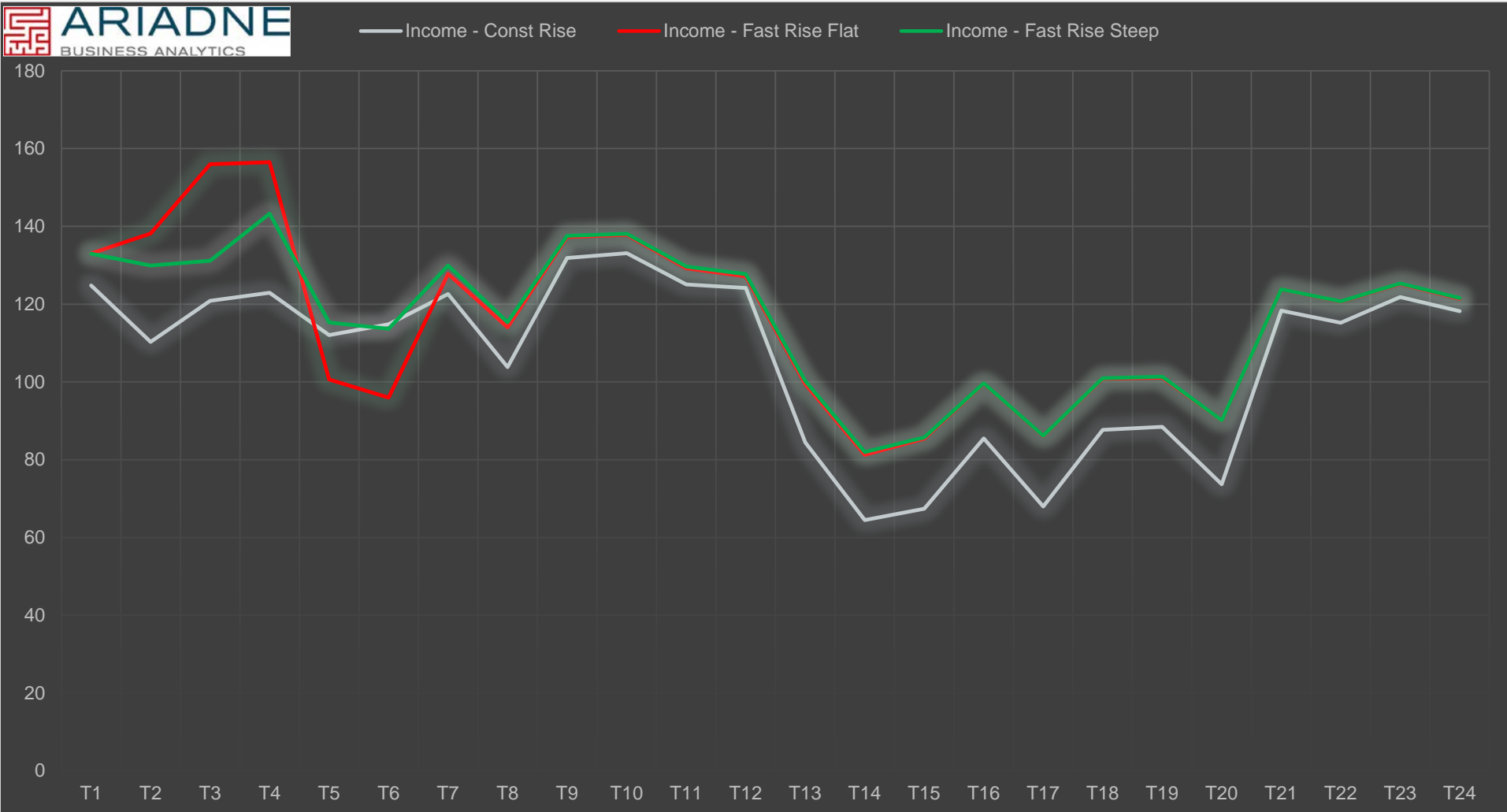
Nominal Ending Nominal Average Fair Values Nominal Income Chart

Account	ADO	2016-01-01 - 2016-01-31	2016-02-01 - 2016-02-29	2016-03-01 - 2016-03-31	2016-04-01 - 2016-04-30	2016-05-01 - 2016-05-31
▼ CCAR	3,058.65	3,131.63	3,221.54	3,332.71	3,435.99	
▼ Balance Sheet	3,058.65	3,131.63	3,221.54	3,332.71	3,435.99	
▼ Assets	100,558.06	101,587.99	102,466.74	103,235.2	104,080.37	
▶ Interbank	8,985	9,057.83	9,126.49	9,513.41	9,402	
Current Account	11,711	11,805.92	11,895.42	11,991.83	12,085.88	
▼ Loans	73,825.06	74,638.31	75,312.76	75,548.19	76,362.23	
Accrued Interest	355.06	572.8	685.81	316.35	540.36	
Auto	23,269	23,457.6	23,635.42	23,827	24,013.87	
Mortgage	50,201	50,607.9	50,991.53	51,404.84	51,808	
FixedAssets	6,037	6,085.93	6,132.07	6,181.77	6,230.25	
▼ Liabilities	97,499.41	98,456.35	99,245.19	99,902.48	100,644.38	
▶ Interbank	3,570	3,665.05	3,757.3	3,655.61	3,684.28	
▼ Customer Deposits	68,622.41	69,279.18	69,782.38	70,333	70,842.99	
Accrued Interest	51.41	152.39	131.57	117.65	76.94	
Savings	9,451	9,527.6	9,599.83	9,677.64	9,753.54	
Deposits	59,120	59,599.19	60,050.98	60,537.72	61,012.51	
Bonds	25,307	25,512.12	25,705.52	25,913.87	26,117.11	
Reserves	-0	0	0	0	0	
▶ Equity	3,058.65	3,131.63	3,221.54	3,332.71	3,435.99	
▶ Off Balance Sheet	0	0	0	0	0	

[Export Dynamic Contracts](#)

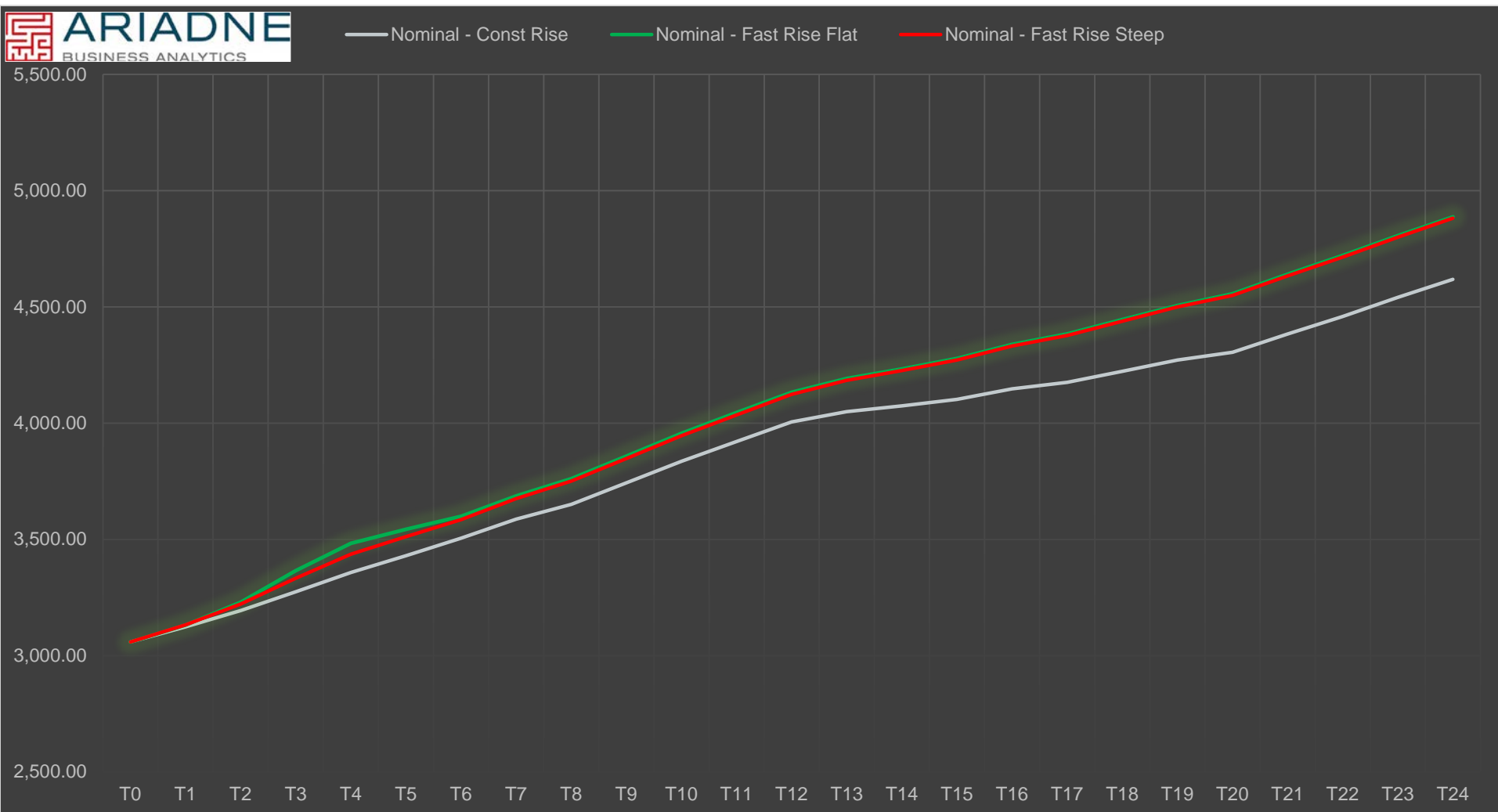
Income: Grow10%

Three Interest Rate Scenarios



Capital: Grow 10%

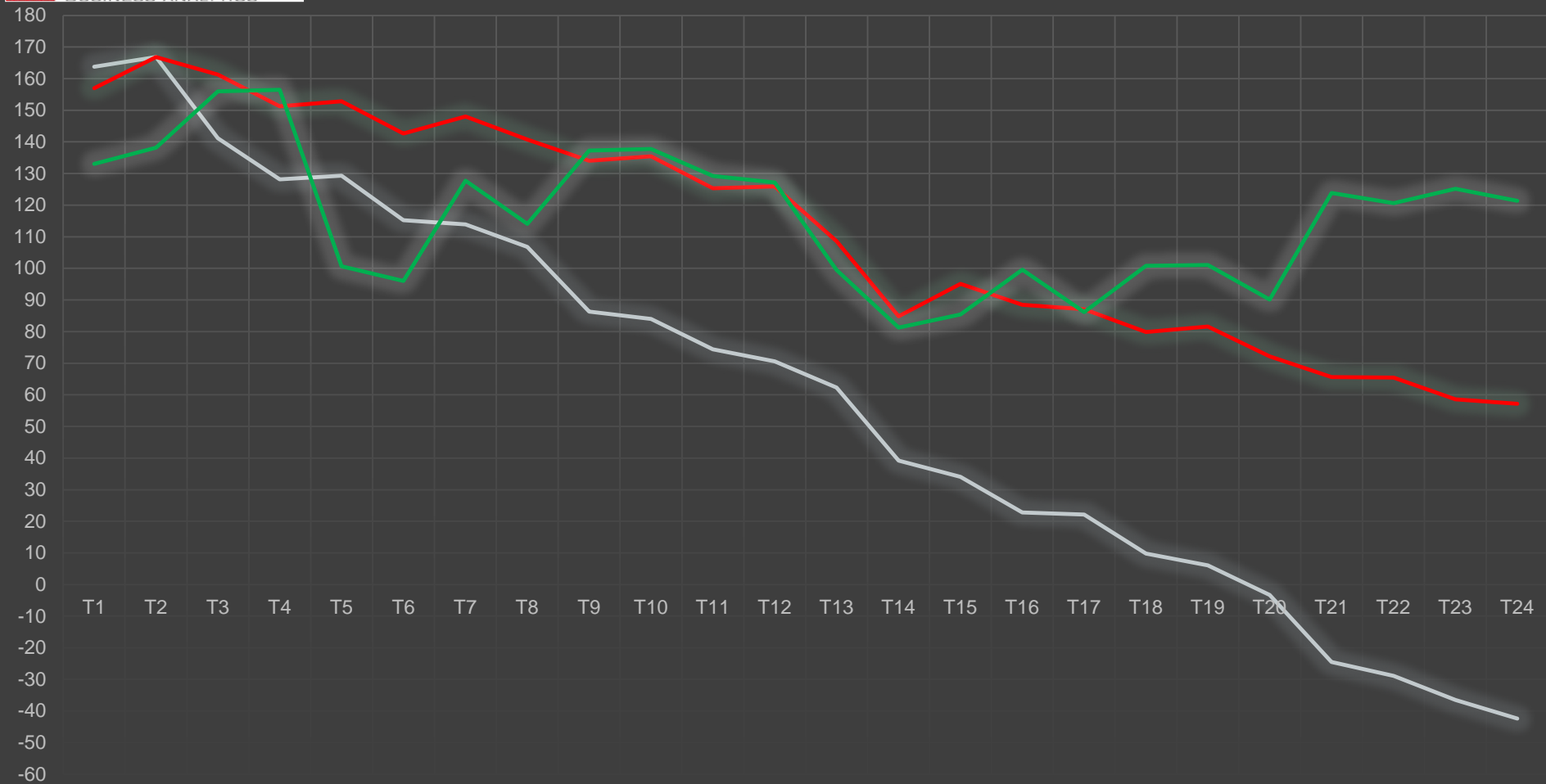
Three Interest Rate Scenarios



Income: Three Business Strategies with Upward Shift and Flattening of Yield Curve



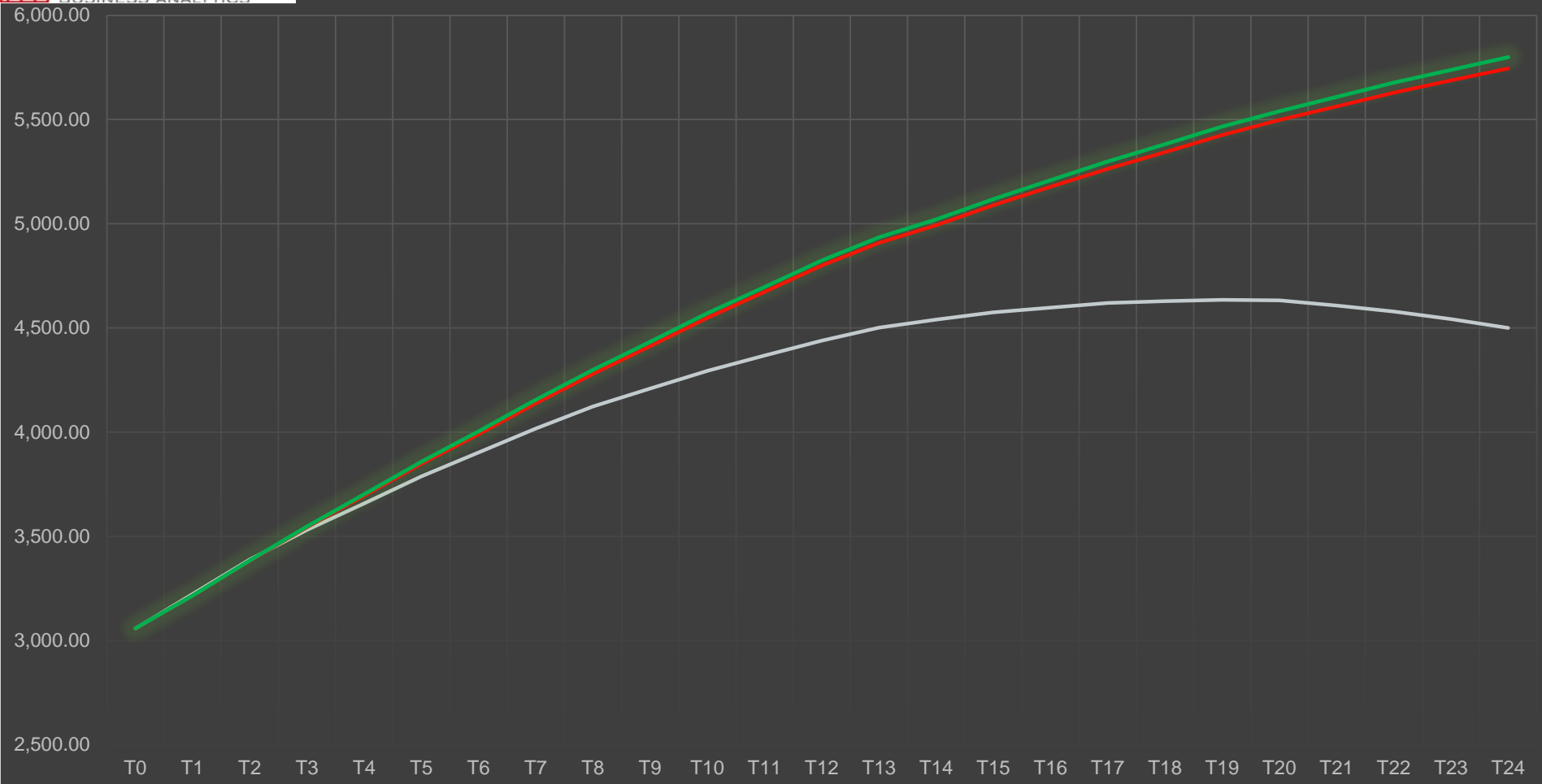
Income - Roll Down Income - Roll Over Income - Grow 10%



Capital: Three Business Strategies with Upward Shift and Flattening of Yield Curve



— Nominal - Roll Down — Nominal - Roll Over — Nominal - Grow 10%



- Systemic risk is a going concern problem encompassing many firms
- Going concern analysis means forecasting new business, such as with a reaction function
- Forecasting new business means forecasting new financial contracts from where effects on P&L and balance sheet can be derived
- This makes ACTUS as a data standard for representing financial contracts an important innovation
- Reaction functions on the single business level are part of today's corporate planning process
- Reaction functions on the systemic level need to be studied

For More Information about the ACTUS Standard See:

www.ProjectACTUS.com

In addition to the authors, the ACTUS leadership team includes: Wolfgang Breymann, Khaldoun Khashanah, Ashish Midha