

INTERMEDIATE PUBLIC FUNDS INVESTING



WEBINAR 3 | UNDERSTANDING & MANAGING RISK IN PUBLIC INVESTING

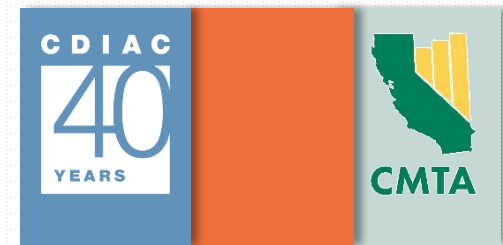
Jason Klinghoffer, CFA

Director, Debt Capital Markets | Mischler Financial Group

Bret Black

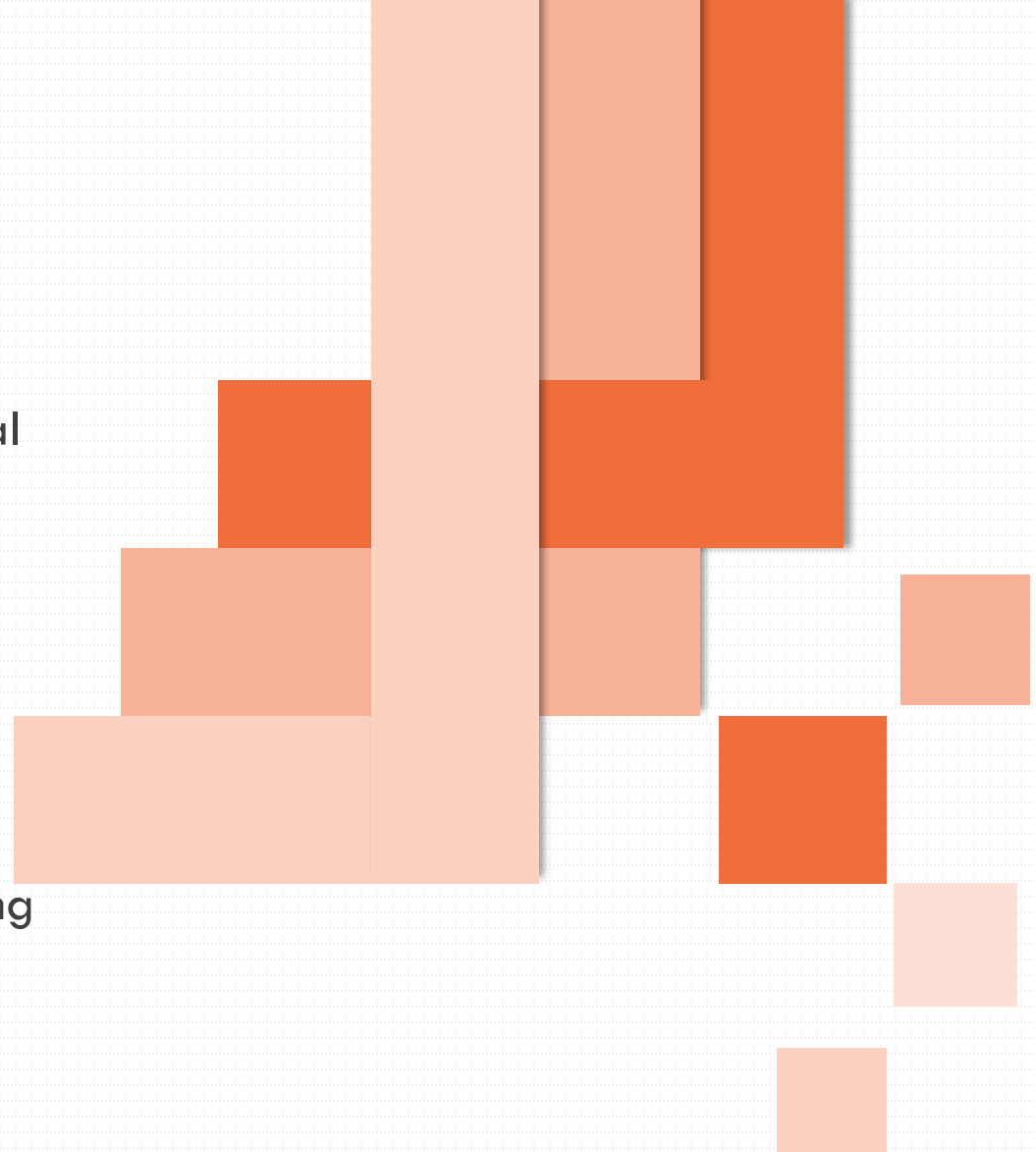
Principal Treasury Investment Officer | County of Kern

February 1, 2022



Session Objectives:

- Understand what risk means beyond mathematical or analytical measurements.
- Define the types of risk and how they can impact your decision making and outcome for your portfolio.
- Understand different approaches to mitigating risk and optimizing portfolio performance.
- See how to utilize an Investment Policy to guide strategy development and what can go wrong when a policy is not being followed or used.





“Investing consists of exactly one thing: dealing with the future. And because none of us can know the future with certainty, risk is inescapable. Thus, dealing with risk is an essential—I think the essential—element in investing.”

Marks, Howard (2011-04-19). The Most Important Thing: Uncommon Sense for the Thoughtful Investor

RISK: Beyond the Measurements

- Risk means more things can happen than will happen. Much of the risk we take is not directly observable or measurable through statistical or mathematical means:

Underperforming Expectations

- Falling short of budgetary estimates of income
 1. Minimal haircut or aggressive projections of income estimates during budgeting process.
 2. Ineffective asset allocation to meet income goals.
 3. Failure to deploy and stay invested appropriately.

Career Risks

- Selling at a loss to meet operational liquidity needs
 1. Selling at a loss in the portfolio may cause accusations of liquidity mismanagement and violating the SLI mandate (Safety, Liquidity and Income).
 2. Mark-to-Market (GASB 31) can create impressions of undue risk taking and recognized losses becoming realized headaches. Effective communication is necessary to keep constituents informed and understanding of why losses are an important and necessary part of the investing process (remember...bonds mature!).

RISK: Beyond the Measurements

Career Risks (continued)

- Constituents access to information / confidence in your abilities.
 1. If you are afraid of your own abilities, chances are those around you see it too.
 2. Confidence is much easier to ascertain when the information flow is symmetric.
 - Have a plan, run consistent reports, understand your market, ask questions, leverage your resources!
 3. Arrogance and ignorance are the deadliest combination in investing.

Idiosyncratic / Event Risk

- Specific events can affect individual credits and sectors with little or no ability to measure impact beforehand.
- Example: EMC / DELL Acquisition
 - Solid fundamentals, A1/A Credit and IG 6 Banding.
 - Dell (BB Credit) announces acquisition attempt.
 - EMC volatility spikes, trades through BB credit in anticipation (4+% Yield).
 - Negative watch initiated, Dell on upgrade watch.
 - Fundamentals unchanged.
 - Diversification only tool to mitigate this risk.

RISK: Beyond the Measurements

Systematic Risks

- This risk inherent to the entire market. It is your non-diversifiable, market risk (volatility).
 - Interest rate changes, economic pressures, recessions and expansions, geo-political situations, globalization, integrated markets, etc..
 - Volatility measurements are possible, but are historical in nature.



Credit: Paresh Nath, UAE

RISKS INHERENT TO BOND INVESTING

- INTEREST RATE RISK
- CREDIT RISK
- REINVESTMENT/PREPAYMENT RISK
- LIQUIDITY RISK
- INFLATION RISK

RISKS INHERENT TO PUBLIC FUND INVESTING

- POLITICAL RISK
- MISMATCH RISK

RISK: Interest Rate Risk – Price/Yield Relationship

Understanding interest rate sensitivity is core to both single security analysis and managing your portfolio as a whole.

- At this point, you should understand the basic price/yield relationship.
 - As interest rates decrease, bond prices increase (holding all else constant).
 - As interest rates increase, bond prices decrease (holding all else constant).

2 Yr Bullet, Price = 100.00 @ 1.00%

CUSIP	PP8C1K7Z5	Price Calc:			
Settlement:	12/22/2015	Total Present Value	\$1,000,000.00		
Maturity:	12/22/2017	Accrued Interest	\$0.00		
YTW Date	12/22/2017	Total Dollar Value	\$1,000,000.00		
Par Amount:	1,000,000.00	Price in Convention	100.000		
Yield to Worst	1.00%				
Time Period	Cash Flow Date	Cash Flow	PV Factor	Present Value	Weight
180 Days / 0.50 Years	6/22/2016	5,000.00	0.99502	4,975.12	0.498%
360 Days / 1.00 Years	12/22/2016	5,000.00	0.99007	4,950.37	0.495%
540 Days / 1.50 Years	6/22/2017	5,000.00	0.98515	4,925.74	0.493%
720 Days / 2.00 Years	12/22/2017	1,005,000.00	0.98025	985,148.76	98.515%
Total		1,020,000.00		1,000,000.00	100.00%

*Drop Interest Rates by 50Bp
YTW = 0.50%
Price increases to 100.994*

CUSIP	PP8C1K7Z5	Price Calc:			
Settlement:	12/22/2015	Total Present Value	\$1,009,937.81		
Maturity:	12/22/2017	Accrued Interest	\$0.00		
YTW Date	12/22/2017	Total Dollar Value	\$1,009,937.81		
Par Amount:	1,000,000.00	Price in Convention	100.994		
Yield to Worst	0.50%				
Time Period	Cash Flow Date	Cash Flow	PV Factor	Present Value	Weight
180 Days / 0.50 Years	6/22/2016	5,000.00	0.99751	4,987.53	0.494%
360 Days / 1.00 Years	12/22/2016	5,000.00	0.99502	4,975.09	0.493%
540 Days / 1.50 Years	6/22/2017	5,000.00	0.99254	4,962.69	0.491%
720 Days / 2.00 Years	12/22/2017	1,005,000.00	0.99006	995,012.50	98.522%
Total		1,020,000.00		1,009,937.81	100.00%

*Increase Interest Rates by 50Bp
YTW = 1.50%
Price decreases to 99.018*

CUSIP	PP8C1K7Z5	Price Calc:			
Settlement:	12/22/2015	Total Present Value	\$990,184.72		
Maturity:	12/22/2017	Accrued Interest	\$0.00		
YTW Date	12/22/2017	Total Dollar Value	\$990,184.72		
Par Amount:	1,000,000.00	Price in Convention	99.018		
Yield to Worst	1.50%				
Time Period	Cash Flow Date	Cash Flow	PV Factor	Present Value	Weight
180 Days / 0.50 Years	6/22/2016	5,000.00	0.99256	4,962.78	0.501%
360 Days / 1.00 Years	12/22/2016	5,000.00	0.98517	4,925.84	0.497%
540 Days / 1.50 Years	6/22/2017	5,000.00	0.97783	4,889.17	0.494%
720 Days / 2.00 Years	12/22/2017	1,005,000.00	0.97055	975,406.94	98.508%
Total		1,020,000.00		990,184.72	100.00%

RISK: Interest Rate Risk – Effective Duration

Effective Duration represents the approximate percentage change in a bond's price for a 100 basis points change in yield.

- Effective Duration takes into account that the bond's expected cash flow's can change when the yield changes.
- This metric works for option-free bonds such as Agency Bullets and Treasuries AND Callable Bonds.
- Effective Duration uses the same theory as Modified Duration, however the discounting of cash flows is estimated at different interest rates and the corresponding changes in those cash flows are taken into account.
- This requires a bond option valuation model to calculate and can not be done simply by hand (remember OAS?).

Modified Duration  Effective Duration

$$\text{Effective Dur} = - \frac{\text{Pup} - \text{Pdown}}{2 * \Delta i * P}$$

← Found by bond option model

Pup = Bond's price when yield curve shifted up
 Pdown = Bond's price when yield curve shifted up
 i = Yield curve shift
 P = Current price

Effective Duration = 1.42

*3.00Yr 1.50% Fixed Callable, Callable Quarterly After 3 Month Lockout. Priced @ Par

OPTION-ADJUSTED SPREAD ANALYSIS

FED HOME LN BANK .FHLB 1 1/2 01/19 NOT PRICED

Calculate	Price	OAS (bp)	Volatility	
(P,0,V) <input type="checkbox"/> P	100	0) -2.06	V) 43.28	
Cusip / ID#	PPQ815ZF0	Option Px Value:	-0.68	
Settle	1/ 8/2016	Bench settle	1/ 6/2016	Vega: -0.01
Spread	48.4bp vs 2Y	T 1 12/31/17 Govt	@99-31	(1.016)

{NUM}<GO> for:

3) Call Schedule

4/ 4/16	100.00
7/ 4/16	100.00
10/ 4/16	100.00
1/ 4/17	100.00
4/ 4/17	100.00
7/ 4/17	100.00
10/ 4/17	100.00
1/ 4/18	100.00
4/ 4/18	100.00
7/ 4/18	100.00

...more...

	OAS Method	Option Free	To Call on 4/ 4/2016	To Mty
Yld		1.267	1.500	1.500
Sprd		-2.2	130.2	21.1
M Dur	→ 1.42		0.24	2.91
Risk	1.42		0.24	2.91
Cnvx	-2.89		0.00	0.10

Model L=Lognormal

Exercise Premium 0.00

2) Customize

Curve I111 Semi

US On/Off The Run

Dated 1/ 5/2016

Settle 1/ 8/2016

None

Shift +0(bps)

Yield Spread	
3m	0.198
6m	0.479
1y	0.556
2y	1.016
3y	1.291
4y	1.568
5y	1.714
7y	2.048
10y	2.237
20y	2.670
30y	2.999

88) REFRESH

RISK: Weighted Average Maturity (WAM)

- WAM is usually applied as the weighted average amount of time until the mortgages in a mortgage-backed security (MBS) mature.
- It is also applied at the portfolio level to describe the weighted average time until the bonds in a debt portfolio mature.
- The higher the WAM, the longer it takes for all the bonds to mature.
- WAM is very easy to calculate and can be applied as a “perceived” risk measure. It is often used to compare and contrast portfolio managers along with their return and benchmark requirements.
- WAM does not measure interest rate risk and can be misleading when option-embedded bonds are present.

Sample WAM Calculation (Par Value)

1MM – 5 year GE bonds

2MM – 3 year FNMA Bonds

$$\text{WAM} = .333 * 5 + .666 * 3 = 3.66 \text{ Years}$$

Sample WAM Calculation (Book Value)

1.1MM – 5 year GE bonds

1.8MM – 3 year FNMA Bonds

$$\text{WAM} = .379 * 5 + .6206 * 3 = 3.76 \text{ Years}$$

RISK: Credit Risk – Ratings Matrix

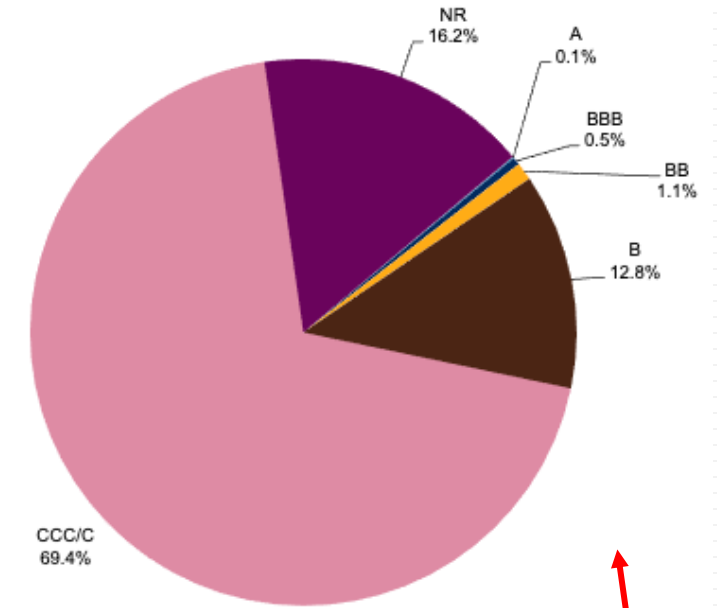
- Credit Ratings: An indicator of credit worthiness of specific debt securities or issuers.
- Credit ratings are typically assigned by one or more of three major credit rating agencies registered with the SEC (there are nine total as of Jan 2022).
- The major agencies, known as Nationally Recognized Statistical Rating Organizations (NRSRO), are Moody's, Standard & Poor's and Fitch Ratings.

Moody's		S&P		Fitch		Rating description		
Long-term	Short-term	Long-term	Short-term	Long-term	Short-term			
Aaa	P-1	AAA	A-1+	AAA	F1+	Prime	Investment-grade	
Aa1		AA+		AA+		High grade		
Aa2		AA		AA				
Aa3		AA-		AA-				
A1		A+	A-1	A+	F1	Upper medium grade		
A2		A		A				
A3	P-2	A-	A-2	A-	F2		Investment-grade	
Baa1		BBB+		BBB+				
Baa2	P-3	BBB	A-3	BBB	F3	Lower medium grade		Non-investment grade aka high-yield bonds aka junk bonds
Baa3		BBB-		BBB-				
Ba1		BB+		B		BB+		
Ba2	BB	BB						
Ba3	BB-	BB-						
B1	B+	B+						
B2	B	B						
B3	B-	B-						
Caa1	Not prime	CCC+	C	CCC	C	Substantial risks	Non-investment grade aka high-yield bonds aka junk bonds	
Caa2		CCC				Extremely speculative		
Caa3		CCC-						
Ca		CC						
		C						
C			DDD				In default	
/	D	/	DD	/				
			D					

RISK: Credit Risk – S&P Default Rates & Transitions

Global Corporate Annual Default Rates By Rating Category (%)							
2010	0.00	0.00	0.00	0.00	0.58	0.87	22.83
2011	0.00	0.00	0.00	0.07	0.00	1.68	16.42
2012	0.00	0.00	0.00	0.00	0.30	1.58	27.52
2013	0.00	0.00	0.00	0.00	0.10	1.65	24.67
2014	0.00	0.00	0.00	0.00	0.00	0.78	17.51
2015	0.00	0.00	0.00	0.00	0.16	2.42	26.67
2016	0.00	0.00	0.00	0.06	0.47	3.76	33.17
2017	0.00	0.00	0.00	0.00	0.08	1.00	26.56
2018	0.00	0.00	0.00	0.00	0.00	0.99	27.18
2019	0.00	0.00	0.00	0.11	0.00	1.49	29.76
2020	0.00	0.00	0.00	0.00	0.93	3.52	47.48

Sources: S&P Global Ratings Research and S&P Global Market Intelligence's CreditPro®.



Sources: S&P Global Ratings Research and S&P Global Market Intelligence's CreditPro®. Copyright © 2021 by Standard & Poor's Financial Services LLC. All rights reserved.

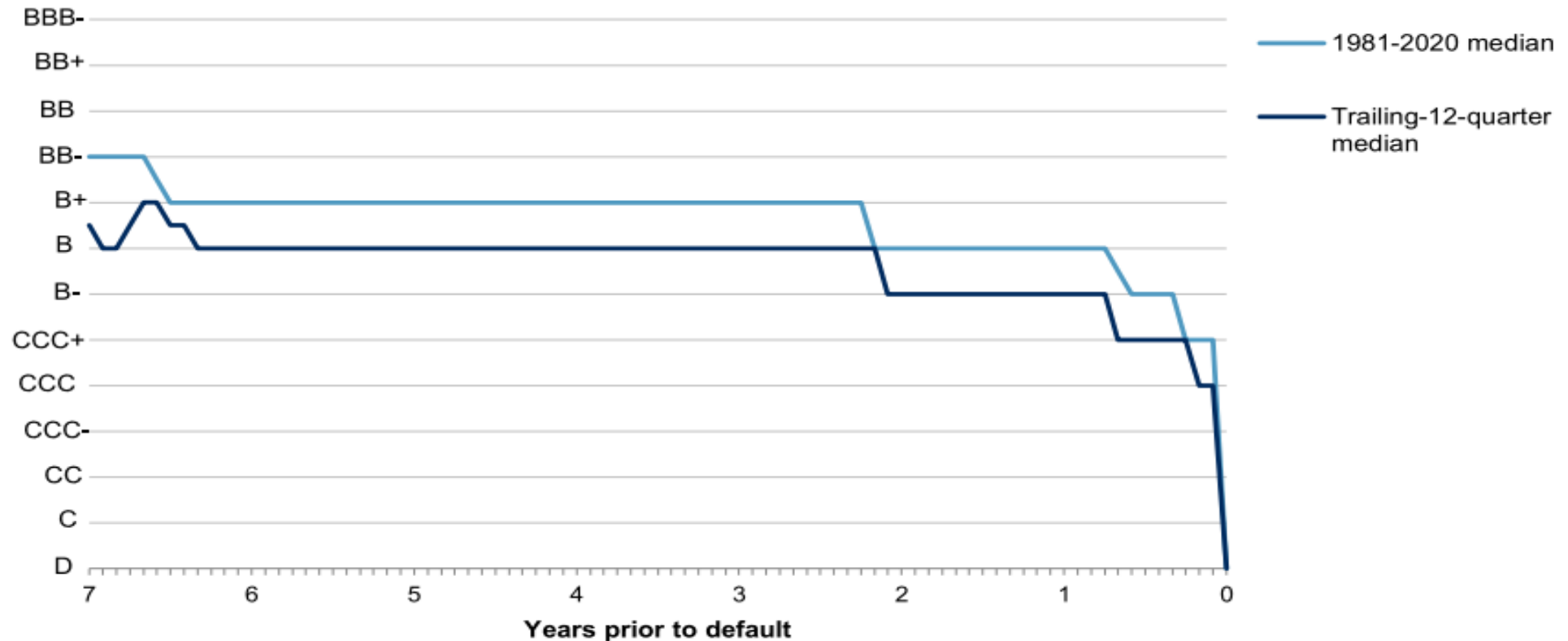
99.4% of all defaults had a BB or lower rating prior to defaulting (including NR).

U.S. Average One-Year Corporate Transition Rates (1981-2020) (%)									
From/To	AAA	AA	A	BBB	BB	B	CCC/C	D	NR
AAA	87.38	8.62	0.58	0.04	0.17	0.04	0.04	0.00	3.14
AA	0.50	87.29	7.40	0.56	0.08	0.10	0.03	0.03	4.01
A	0.04	1.64	88.37	5.22	0.35	0.14	0.03	0.07	4.13
BBB	0.01	0.11	3.40	86.60	3.65	0.56	0.10	0.20	5.37
BB	0.02	0.04	0.16	4.61	77.54	7.73	0.57	0.74	8.59
B	0.00	0.03	0.09	0.18	4.26	75.52	5.02	3.53	11.37
CCC/C	0.00	0.00	0.15	0.22	0.63	11.24	43.64	30.26	13.86

RISK: Credit Risk – S&P Default Rates & Transitions

On average, it takes 7 years for a bond to default AFTER dropping below an Investment Grade Rating (AAA-BBB)!

Median Rating Path Of Corporate Defaulters



Note: Here, we do not include rating changes to 'NR'. Data through Dec. 31, 2020. Sources: S&P Global Ratings Research and S&P Global Market Intelligence's CreditPro®.
Copyright © 2021 by Standard & Poor's Financial Services LLC. All rights reserved.

RISK: Credit Risk – Issuer Analysis

Single security analysis outside of the traditional Treasury/GSE framework can require additional time and effort to understand the risks associated with certain issuers and structures. There are a few areas that public fund managers can focus on to help assess risk in a timely and efficient manner (not comprehensive).

- Solvency/Liquidity Ratios:
 - Current Ratio = Current Assets / Current Liabilities
 - Quick Ratio = (Cash + Short Term Marketable Securities + Receivables) / Current Liabilities
 - Cash Ratio = (Cash + Short Term Marketable Securities) / Current Liabilities
 - Interest Burden = EBT/EBIT
 - Interest Coverage Ratio = EBIT / Interest Payments

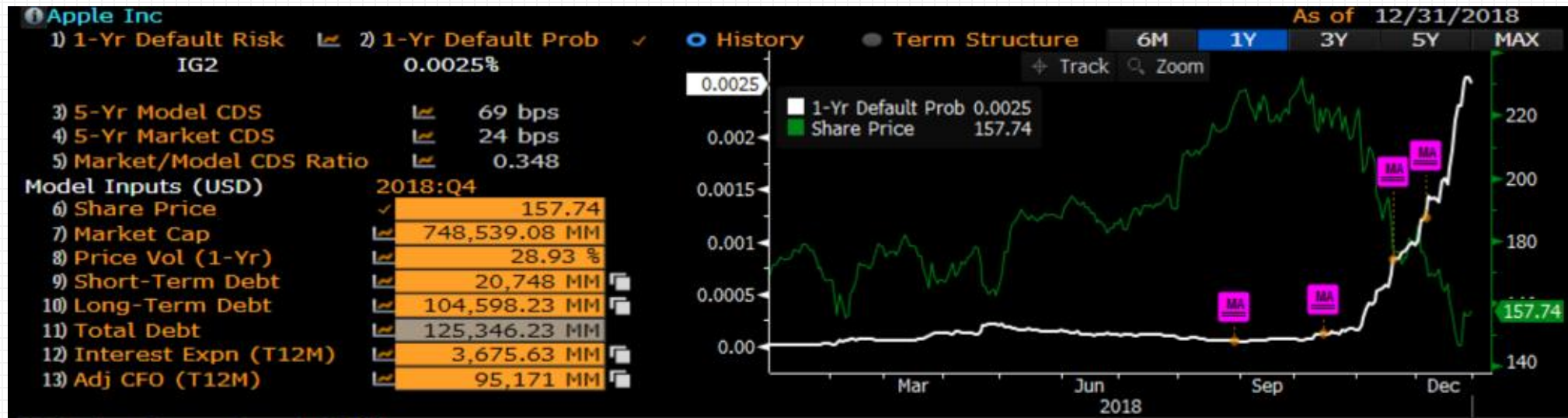
Profitability		Structure	
EBITDA	82.5B	Curr Ratio	1.1
EBIT	71.2B	Quick Ratio	0.7
OPM	30.5%	Debt/Assets	22.2%
Prtx Mrgn	31.0%	Debt/Com Eq	54.0%
ROA	20.4%	A/R Trnovr	13.6
ROE	46.2%	Inv Turnover	62.8
ROC	32.6%	GM	40.1%
Ast TO	0.9	EBIT/Tot Int Exp	97.2

RISK: Credit Risk – Issuer Analysis

Bloomberg DRSK / IG Banding

- The DRSK Function is a fairly new tool from Bloomberg that provides a lot of the data scrubbing and adjustments that credit analysts would typically want to make for accounting differentials and advantageous accounting practices that create less transparency.
- Based on the Merton Distance-to-Default methodology.
- Financials adjusted for OPEB and Operating Leases to fairly evaluate across issuers (debt levels and interest expense understated otherwise).
- Creates longer term implied CDS spreads and IG banding for estimation of default over 1 year.

* Bloomberg DRSK for Apple Inc.



RISK: Reinvestment / Prepayment

Reinvestment Risk (Call Risk)

- Risk resulting from the possibility that a callable bond will be redeemed before maturity. When interest rates decline, issuers are incentivized to call the bonds away and re-issue at lower rates. This leaves investors reinvesting proceeds sooner than expected at lower interest rates.

Prepayment Risk

- Similar to call risk, prepayment risk is the risk that the issuer of a security will repay principal prior to the maturity date, thereby changing the expected payment schedule of the bonds. This is especially prevalent in the mortgage-backed bond market, where a drop in mortgage rates can initiate a refinancing wave.

RISK: Liquidity Risk – Issuer Analysis

Bid / Ask Spreads

- The amount by which the ask price exceeds the bid. This is essentially the difference in price between the highest price that a buyer is willing to pay for an asset and the lowest price for which a seller is willing to sell it.
- Larger Bid/Ask spreads indicate additional cushion needed by dealers to maintain positions (axe) in a specific credit or issue. The larger the spread, the less liquidity is associated with it.

Bid / Ask Spreads can increase or decrease based on:

- Issue Size - Benchmarks 250MM, GSE's generally relies on MTN market
- Sector Rotation – Specific sectors can go out of favor (in favor) over time
- Dealer Balance Sheets – Dealer's constrained capital minimizes desired axes and bids
- Esoteric Structures: Uncommon structures or unique characteristics can make it hard to bid.
- Thinly Traded Names: Smaller issuers with low visibility may be more difficult to bid.

RISK: Liquidity Risk – Issuer Analysis

Benchmark Curves

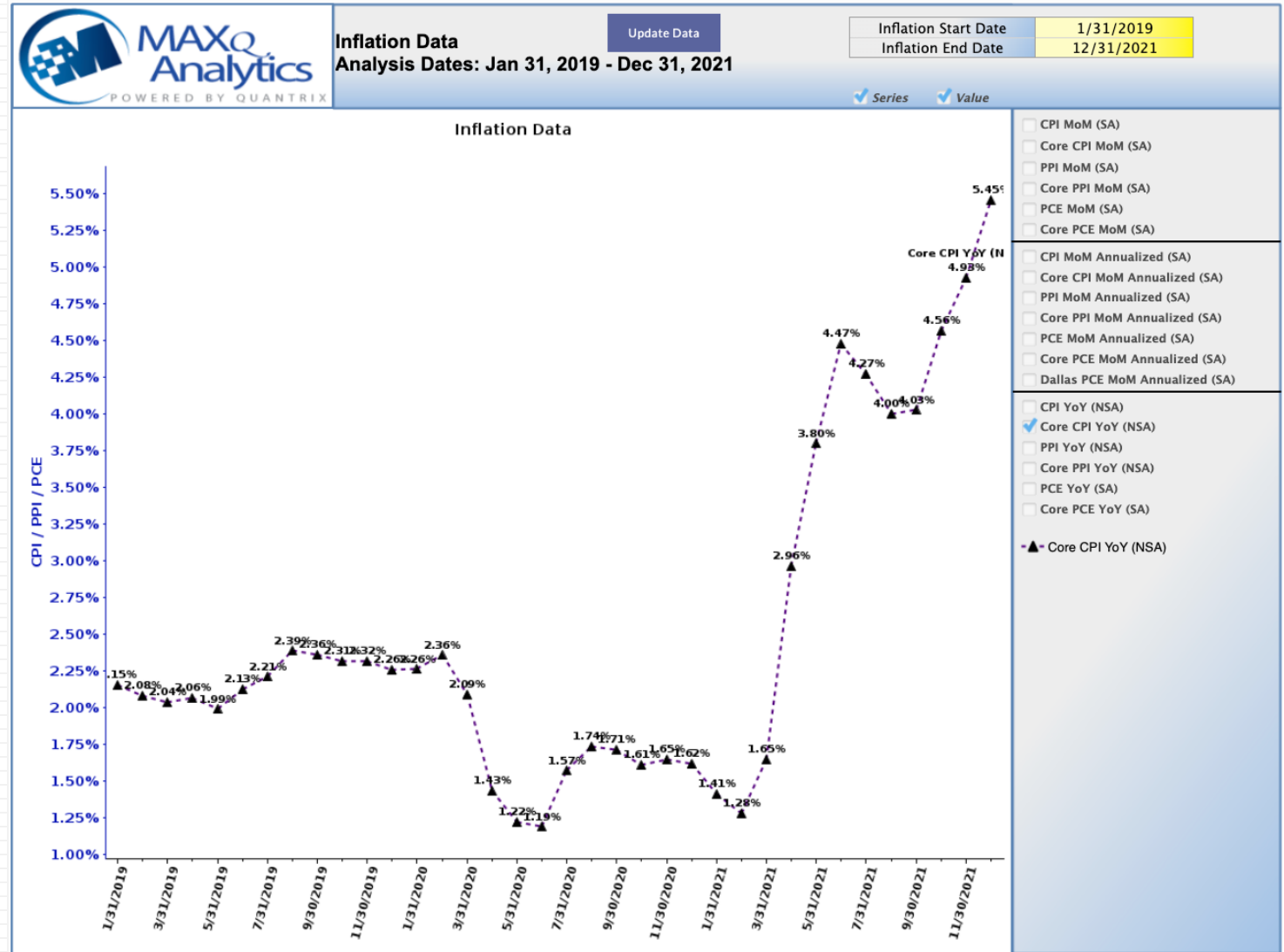
- Benchmark Curves are published for many credit rating ranges and sector types. These curves can give you a quick idea where the average benchmark issuers are yielding in the same space in which you are comparing. Since these benchmarks make up the biggest and most liquid securities, any yield differentials for a specific security may give insight into the liquidity and credit premium / discount.



RISK: Inflation Risk

Inflation Risk

- Risk that investors earn decreasing (or even negative) real interest rates over time. If inflation in the overall economy increases, the purchasing power of income generated by fixed rate bonds diminishes as the coupons stay the same. This risk can be mitigated through the use of structured bonds like floating rate securities or step-ups.



RISK: Political Risk

Political risk exists in public treasury management through constituent or supervisory pressures to invest in a certain way. Investment officials can react or bend to these ideas to appease those exerting pressure.

A few examples of this come to mind...

- 1) Banning U.S. Treasuries due to nuclear proliferation.
- 2) Removing oil & gas or fossil fuel based corporate debt from being purchased.
- 3) Hiring an investment advisor to run a one year and in Treasury only portfolio.

Other political pressures can lead to suboptimal behavior by portfolio managers. These pressures can lead to overly liquid or short duration portfolios that underperform their potential returns. The behavior centers around the idea that “no one has ever been fired for being in cash”.

Ironically, on more than one occasion I have seen elected officials lose their next election because the opposing candidate exposed and exploited this behavior.

RISK: Mismatch Risk

Mismatch risk is not something you will find in textbooks, but it is very real and is the primary reason public entities take losses.

All of the previous risks discussed exert pressure on prices and portfolio performance, but do not cause portfolios to take losses. Credit risk is the one exception, but as shown in the transition slides, it is historically an extremely remote chance given the legal investments public funds are allowed to own.

Losses in reality come from entities not having sufficient liquidity to pay their bills and have to look to the portfolio to raise cash. As cruel as the bond gods are, when in this position it is quite possible you will not have gains to take and have to sell something at a loss.

This risk is significantly mitigated by timing assets to correspond with liabilities (ALM). If assets are maturing in the timeframes most likely to cause cash strain, you in essence create a secondary liquidity and backstop to having enough cash on hand.

MITIGATING RISK WITH STRATEGY

Benchmark:

A standard or point of reference against which things may be compared or assessed.

Benchmarks should encompass metrics that help communicate the risk and return profile the portfolio is attempting to achieve.

The benchmark should encompass information that helps the manager ensure that they are achieving the following portfolio goals:

- 1) Ensuring adequate liquidity exists to pay current obligations
- 2) An appropriate amount of interest rate risk is being deployed
- 3) The portfolio is optimal among asset classes, maturities and structures
- 4) The portfolio is legal as defined by the investment policy to which the portfolio must abide
- 5) An optimal rate of return is achieved given the risks and constraints of the entity

Generally speaking, market benchmarks DO NOT qualify as adequate standards of measurement for public fund portfolios.

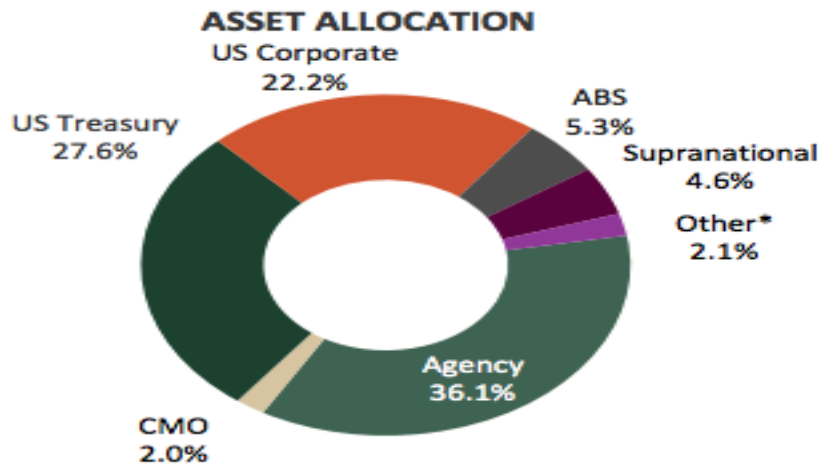
For example, it is highly unlikely that the Merrill Corp/Gov 1-5yr benchmark encompasses the liquidity requirements, interest rate risk, asset allocation and optimal return desires of a specific public fund once the appropriate analysis has been done to establish those standards.

Market Benchmarks

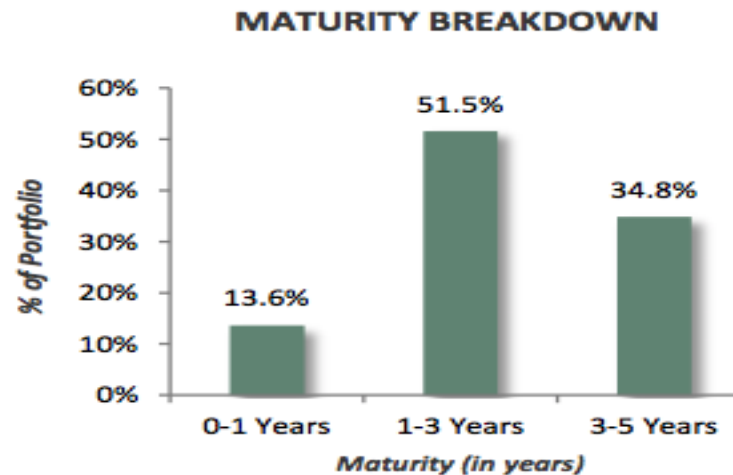
CHARACTERISTICS	Chandler Short Term Bond	ICE BAML 1-5 Year US Treasury & Agency Index
Average Maturity	2.53	2.67
Average Duration	2.31	2.54
Yield-to-Maturity	2.71%	2.52%
Average Quality*	AA	AAA
Average Coupon	1.99%	2.18%

*Composite quality based on S&P ratings. Index quality reflects S&P equivalent of composite/average of S&P, Moody's and Fitch ratings. Composite characteristics are supplemental information under GIPS and supplement the composite presentation herein.

Treasuries represent 97.5% of this index as of January 2022



*Other includes Cash, Commercial Paper, Foreign Corporate, Municipal Bonds and Negotiable CD.



Market Based Approach – Single or Multiple Curve Approach

- Uses simple methodology by utilizing a single or multiple curves that are easily accessible.
- Risk/Reward is measured through principles like the Sharpe Ratio or a duration modified Sharpe Ratio and are relatively simple calculations.
- Does not capture true portfolio exposure (single curve used to measure duration, but portfolio is allocated across different sectors).
- Multiple curve approach requires sector allocation desires before duration established (chicken vs. egg).
- Mean-Variance Analysis possible, but requires sophistication and still optimizes market-based volatility to expected returns.
- **Does not** account for liabilities or cash flow needs of portfolio.




Market Based Approach – Index Sets

- Manager uses a set of indices and measures risk/reward profiles accordingly (ICE/BAML, Lehman/Bloomberg, etc..).
- Like multiple curves, the manager could weight their preference of sectors and structures and determine the optimal blended duration for the portfolio.

Family	U.S. High Grade	Currency	USD	Maturity Band	1 - 5 Year
Sector	All	Rating	Investment Gr	Weighting Method	All
Index	Index Name	Inception Date	Launch Date		
2) GVPB	ICE BofA 1-5 Year US Bullet Agency Index	12/1998			
3) CVJO	ICE BofA 1-5 Year US Insurance & Financial Services Index	05/1991			
4) EVAG	ICE BofA 1-5 Year Eurodollar Globals Index	03/2000			
5) CVAB	ICE BofA 1-5 Year US Bullet Corporate Excluding Yankees Index	04/2000			
6) GVPC	ICE BofA 1-5 Year US Non-Bullet Agency Index	06/2000			
7) UXOV	ICE BofA 1-5 Year US Broad Market Non-Sovereign Index	12/1996			
8) CVCH	ICE BofA 1-5 Year US Corporate Index CHF Hedged Index	12/1996			03/07/2015
9) BVAY	ICE BofA 1-5 Year US Corporate & Government Excluding Tier 1 & Junior	12/1996			12/07/2009
10) BVA0	ICE BofA 1-5 Year US Corporate & Government Index	04/1986			
11) CVC0	ICE BofA 1-5 Year A-BBB US Corporate Index	01/1977			
12) C1Y0	ICE BofA 1-5 Year A-BBB US Banking and Brokerage Index	12/1987			
13) C65M	ICE 1-5 Year US Corporate, Yankees & Taxable Muni Index	12/1996			05/11/2020
14) GVA0	ICE BofA 1-5 Year US Treasury & Agency Index	02/1988			
15) CIOV	ICE BofA 1-5 Year US Industrial Index	12/1996			
16) GVAB	ICE BofA 1-5 Year US Treasury & Bullet Agency Index	12/1996			
17) UAGV	ICE BofA 1-5 Year US Composite Agency Index	02/2001			
18) CVA0	ICE BofA 1-5 Year US Corporate Index	12/1975			
19) CYOV	ICE BofA 1-5 Year US Corporate & Yankees Index	12/1996			
20) CVCS	ICE BofA 1-5 Year US Corporate Excluding Subordinated Financials Index	12/1996			10/10/2013
21) EVAX	ICE BofA 1-5 Year Eurodollar Excluding Globals Index	12/1982			
22) CPSX	ICE 1-5 Year US Senior Banking Index	12/1996			09/22/2020

Market Based Approach – Index Sets

0 – 1Yr Agy Composite = .53
 1 – 3Yr A-AAA Corporate = 1.93
 Blended 50/50 Duration = 1.23

		Static Index Stats										INDEX DATES	
		Analysis Dates: Nov 30, 2007 - Nov 30, 2019										Start Date	11/30/07
INDEX STATS 0-1		Annualized Total Return	Annualized Price Return	Annualized Income Return	Annualized Std Dev Total Return	Avg Yield to Worst	Std Dev Yld	Avg Eff Dur	TR Sharpe Ratio	Yld Sharpe Ratio	Main Street Ratio	Weighted Rank	
0-1 Treasury		0.925%	(1.137%)	1.843%	0.375%	0.767%	0.844%	0.515	0.644	0.180	0.296	4.0	
0-1 Agy Composite		1.105%	(1.385%)	2.178%	0.469%	0.915%	0.965%	0.530	0.899	0.310	0.565	3.0	
0-1 Supranational		1.395%	(1.565%)	2.553%	0.413%	1.315%	0.941%	0.539	1.724	0.743	1.298	2.0	
0-1 A-AAA Corp		1.848%	(2.162%)	3.300%	0.841%	1.782%	1.508%	0.525	1.385	0.773	2.221	1.0	
INDEX STATS 1-3		Annualized Total Return	Annualized Price Return	Annualized Income Return	Annualized Std Dev Total Return	Avg Yield to Worst	Std Dev Yld	Avg Eff Dur	TR Sharpe Ratio	Yld Sharpe Ratio	Main Street Ratio	Weighted Rank	
1-3 Treasury		1.629%	(0.396%)	1.948%	1.125%	1.051%	0.784%	1.865	0.841	0.556	0.234	6.0	
1-3 Agency Blt		1.993%	(0.587%)	2.440%	1.251%	1.233%	0.886%	1.835	1.047	0.697	0.337	4.0	
1-3 Agency Clb		1.515%	0.052%	1.471%	0.662%	1.279%	0.895%	1.169	1.257	0.742	0.568	2.0	
1-3 Municipal		1.902%	(2.674%)	3.614%	1.115%	1.159%	0.649%	1.805	1.093	0.838	0.301	5.0	
1-3 Supranational		2.329%	(0.411%)	2.636%	1.166%	1.576%	0.801%	1.935	1.412	1.200	0.497	3.0	
1-3 A-AAA Corp		2.682%	(1.089%)	3.419%	2.570%	2.318%	1.592%	1.930	0.778	1.070	0.882	1.0	

Market Based Approach – Index Sets

- Again uses simple methodology by utilizing a single or multiple indices that are easily accessible.
- Risk/Reward is measured through principles like the Sharpe Ratio or a duration modified Sharpe Ratio and are relatively simple calculations.
- Single Indices like the ICE BofAML 1-5 Tsy / Agy can be heavily weighted in one sector.
- Does not necessarily capture liquidity needs or actual allocation exposure of your portfolio (unless several indices are used with actual exposure weights).
- Multiple index approach requires sector allocation desires before duration established (chicken vs. egg).
- **Does** not account for liabilities or cash flow needs of portfolio.

Cash Flow Based Approach – ALM

- Utilizes cash flow analysis to measure the timing and magnitude of liabilities.
- Uses immunization techniques utilized in the insurance and pension world to measure individual liability streams.
- These liability streams are combined and weighted to derive a total portfolio duration that will suffice to match the liability needs.

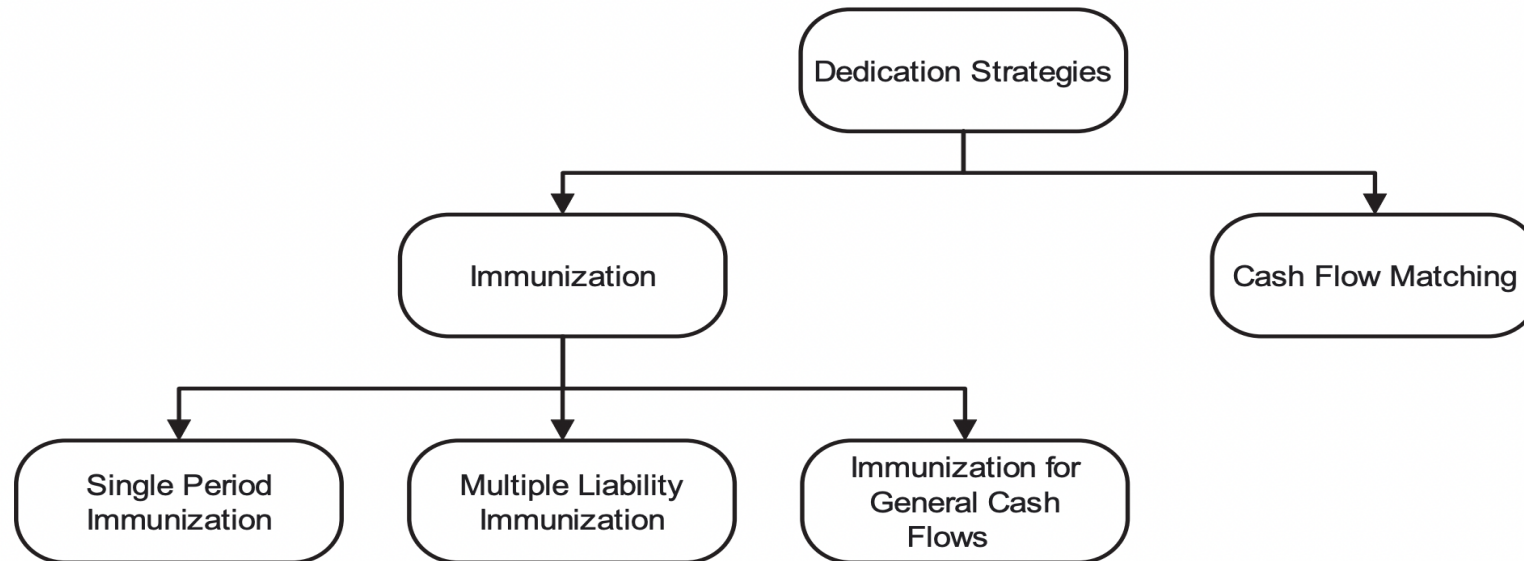


Cash Flow Based Approach – ALM

Dedication Strategy: Specialized fixed-income strategy designed to accommodate specific funding needs of the investor. They generally are classified as passive in nature, although it is possible to add some active management elements to them.

Exhibit 6

Dedication Strategies



**CFA Institute, Fixed-Income Analysis 3rd Edition*

Cash Flow Based Approach – ALM

Immunization: Aims to construct a portfolio that, over a specified horizon, will earn a predetermined return regardless of interest rate changes (duration focused). An increase in rates and the corresponding drop in investment value partially offset by an increase in re-investment rates (and vice-versa).

Cash Flow Matching: Provides the future funding of a liability stream from the coupon and matured principal payments of the portfolio (not duration focused). A simple accumulation of the coupon, reinvestment return and value at horizon will offset liability in full.

Neither strategy perfectly fits public treasury as public entities must focus on Duration as a primary risk metric and typically spend coupons as anticipated by their budget.

****CFA Institute, Fixed-Income Analysis 3rd Edition***

Cash Flow Based Approach – ALM

Combination Matching (also called horizon matching): Popular variation of multiple immunization and cash flow matching to fund liabilities by combining the two strategies. A portfolio is created that is duration-matched with the added constraint that it be cash flow-matched in the first few years, usually the first five years.

Since most public entities are policy constrained to five years and in, we can combine the strategies for the entire legal timeframe of the portfolio.

****CFA Institute, Fixed-Income Analysis 3rd Edition***

Cash Flow Based Approach – ALM

ALM Analysis

DCF/Duration Analysis of Cash Flows

Year 1 Modified Monthly Duration = $5.815 / (1 + (\text{Wtd Avg Tsy yield} / 12)) = 5.810$

Year 1 Annualized Modified Duration = $5.810 / 12 = .484$

Duration Optimization Calcs		NetFlow	NegNetFlow	Hedge Security	PV Rate	Period	PV NegFlow	PV Factor	Weight	PeriodWt
1	August	(\$2,816,016.20)	(\$2,816,016.20)	3Mo Tsy	0.946%	1	\$2,813,797.84	0.999	4.08%	0.041
	September	(\$5,986,214.20)	(\$5,986,214.20)	3Mo Tsy	0.946%	2	\$5,976,786.48	0.998	8.67%	0.173
	October	(\$8,049,693.21)	(\$8,049,693.21)	3Mo Tsy	0.946%	3	\$8,030,684.44	0.998	11.65%	0.349
	November	\$24,131,838.28								
	December	(\$11,818,508.50)	(\$11,818,508.50)	6Mo Tsy	1.040%	5	\$11,767,443.55	0.996	17.07%	0.853
	January	(\$14,084,082.35)	(\$14,084,082.35)	6Mo Tsy	1.040%	6	\$14,011,089.19	0.995	20.32%	1.219
	February	(\$3,068,198.25)	(\$3,068,198.25)	9Mo Tsy	1.101%	7	\$3,048,568.85	0.994	4.42%	0.310
	March	(\$14,099,122.36)	(\$14,099,122.36)	9Mo Tsy	1.101%	8	\$13,996,081.63	0.993	20.30%	1.624
	April	(\$8,639,622.84)	(\$8,639,622.84)	9Mo Tsy	1.101%	9	\$8,568,621.70	0.992	12.43%	1.119
	May	\$47,707,704.62								
	June	\$3,713,671.46								
	July	(\$732,993.54)	(\$732,993.54)	1.00Yr Tsy	1.162%	12	\$724,530.44	0.988	1.05%	0.126
2	August	(\$2,816,016.20)	(\$2,816,016.20)	1.25Yr Tsy	1.193%	13	\$2,779,866.49	0.987	4.09%	0.531
	September	(\$5,986,214.20)	(\$5,986,214.20)	1.25Yr Tsy	1.193%	14	\$5,903,497.88	0.986	8.68%	1.215
	October	(\$8,049,693.21)	(\$8,049,693.21)	1.25Yr Tsy	1.193%	15	\$7,930,578.28	0.985	11.66%	1.748
	November	\$24,131,838.28								
	December	(\$11,818,508.50)	(\$11,818,508.50)	1.50Yr Tsy	1.225%	17	\$11,615,346.67	0.983	17.07%	2.902
	January	(\$14,084,082.35)	(\$14,084,082.35)	1.50Yr Tsy	1.225%	18	\$13,827,863.69	0.982	20.32%	3.658
	February	(\$3,068,198.25)	(\$3,068,198.25)	1.75Yr Tsy	1.256%	19	\$3,007,817.97	0.980	4.42%	0.840
	March	(\$14,099,122.36)	(\$14,099,122.36)	1.75Yr Tsy	1.256%	20	\$13,807,209.12	0.979	20.29%	4.059
	April	(\$8,639,622.84)	(\$8,639,622.84)	1.75Yr Tsy	1.256%	21	\$8,451,898.98	0.978	12.42%	2.609
	May	\$47,707,704.62								
	June	\$3,713,671.46								
	July	(\$732,993.54)	(\$732,993.54)	2.00Yr Tsy	1.287%	24	\$714,372.32	0.975	1.05%	0.252

Macaulay Dur = Sum
PeriodWt = 5.815

Macaulay Dur = Sum
PeriodWt = 17.814

Year 2 Modified Monthly Duration = $17.814 / (1 + (\text{Wtd Avg Tsy yield} / 12)) = 17.795$

Year 2 Annualized Mod Duration = $17.795 / 12 = 1.483$

Cash Flow Based Approach – ALM

ALM Analysis DCF/Duration Analysis

Once the annualized duration's are calculated, we now weight each year based on our preference of coverage of each year's total liabilities.

Duration Optimization Values by Year		
1	<i>Annualized Duration</i>	0.484
2	<i>Annualized Duration</i>	1.483
3	<i>Annualized Duration</i>	2.481
4	<i>Annualized Duration</i>	3.480
5	<i>Annualized Duration</i>	4.477

Cash Flow Based Approach – ALM

ALM Analysis DCF/Duration Analysis

Portfolio Size	\$300,000,000.00
Immunized Portfolio	\$299,992,155.11
Percent Immunized	100.00%

Immunization Weight	
Year 1	90.00%
Year 2	70.50%
Year 3	70.00%
Year 4	70.00%
Year 5	70.00%

Duration Optimization Values by Year		
1	Sum Present Value of Outflows	\$68,937,604.13
	Sum of Asset Matched Present Values	\$62,043,843.72
	Asset Matched Weight in Portfolio	20.681%
	Annual Total Liquidity Coverage Required	\$6,893,760.41
	Annualized Duration	0.484
	Weighted Duration	0.100
2	Sum Present Value of Outflows	\$68,038,451.40
	Sum of Asset Matched Present Values	\$47,967,108.24
	Asset Matched Weight in Portfolio	15.989%
	Annual Total Liquidity Coverage Required	\$20,071,343.16
	Annualized Duration	1.483
	Weighted Duration	0.237
3	Sum Present Value of Outflows	\$66,942,361.12
	Sum of Asset Matched Present Values	\$46,859,652.79
	Asset Matched Weight in Portfolio	15.620%
	Annual Total Liquidity Coverage Required	\$20,082,708.34
	Annualized Duration	2.481
	Weighted Duration	0.388

The total immunization weights for each year should create a portfolio that is 100% immunized relative to the portfolio size.

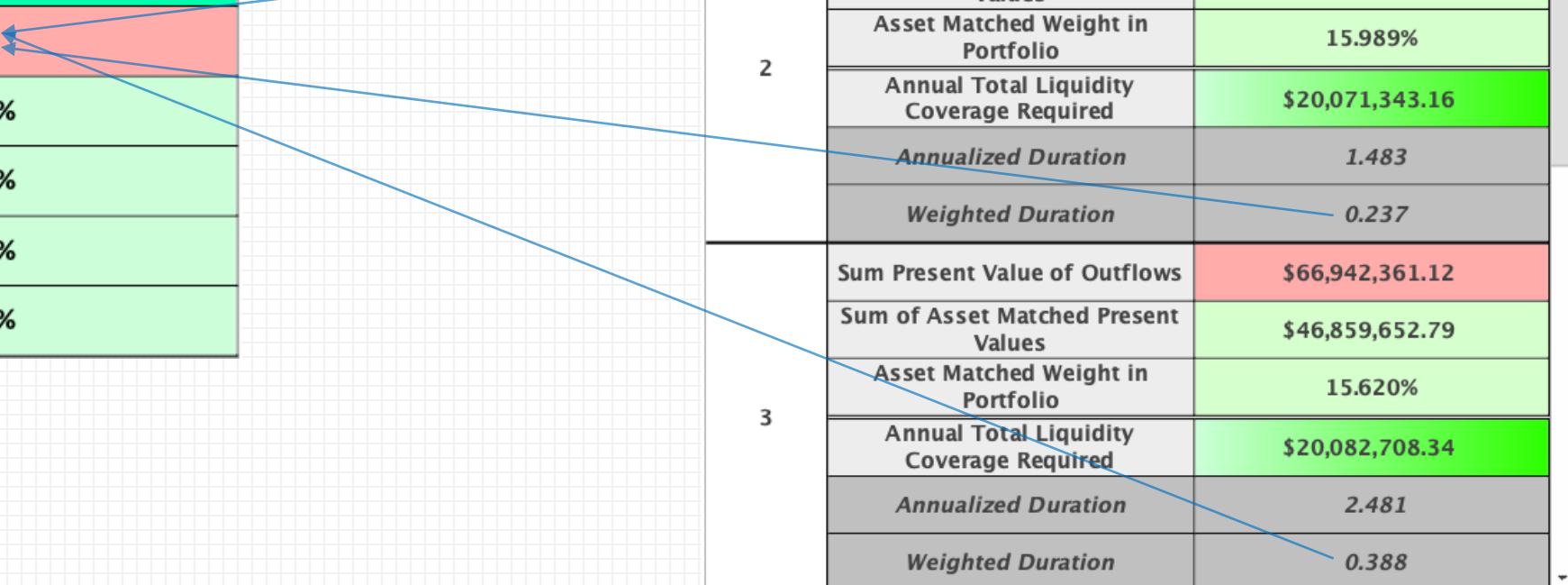
Cash Flow Based Approach – ALM

ALM Analysis DCF/Duration Analysis

Duration Estimation and Allocation Bucket Approximation	
Starting Liquidity	\$52,500,000.00
1Yr Min Liquidity	\$47,360,819.51
Weighted Average Cash Flow Duration	1.92
Cash (Liquidity Profile)	17.50%
0-1Yr	20.68%
1-3Yr	31.61%
3-5Yr	30.21%

Sum of Weighted Durations
(4 & 5 Year Not Shown)

Duration Optimization Values by Year		
1	Sum Present Value of Outflows	\$68,937,604.13
	Sum of Asset Matched Present Values	\$62,043,843.72
	Asset Matched Weight in Portfolio	20.681%
	Annual Total Liquidity Coverage Required	\$6,893,760.41
	Annualized Duration	0.484
	Weighted Duration	0.100
2	Sum Present Value of Outflows	\$68,038,451.40
	Sum of Asset Matched Present Values	\$47,967,108.24
	Asset Matched Weight in Portfolio	15.989%
	Annual Total Liquidity Coverage Required	\$20,071,343.16
	Annualized Duration	1.483
	Weighted Duration	0.237
3	Sum Present Value of Outflows	\$66,942,361.12
	Sum of Asset Matched Present Values	\$46,859,652.79
	Asset Matched Weight in Portfolio	15.620%
	Annual Total Liquidity Coverage Required	\$20,082,708.34
	Annualized Duration	2.481
	Weighted Duration	0.388



Cash Flow Based Approach – ALM

ALM Analysis DCF/Duration Analysis

Duration Estimation and Allocation Bucket Approximation	
Starting Liquidity	\$52,500,000.00
1Yr Min Liquidity	\$47,360,819.51
Weighted Average Cash Flow Duration	1.92
Cash (Liquidity Profile)	17.50%
0-1Yr	20.68%
1-3Yr	31.61%
3-5Yr	30.21%

Sum of Asset Matched Weights
(4 & 5 Year Not Shown)

Duration Optimization Values by Year		
1	Sum Present Value of Outflows	\$68,937,604.13
	Sum of Asset Matched Present Values	\$62,043,843.72
	Asset Matched Weight in Portfolio	20.681%
	Annual Total Liquidity Coverage Required	\$6,893,760.41
	Annualized Duration	0.484
	Weighted Duration	0.100
2	Sum Present Value of Outflows	\$68,038,451.40
	Sum of Asset Matched Present Values	\$47,967,108.24
	Asset Matched Weight in Portfolio	15.989%
	Annual Total Liquidity Coverage Required	\$20,071,343.16
	Annualized Duration	1.483
	Weighted Duration	0.237
3	Sum Present Value of Outflows	\$66,942,361.12
	Sum of Asset Matched Present Values	\$46,859,652.79
	Asset Matched Weight in Portfolio	15.620%
	Annual Total Liquidity Coverage Required	\$20,082,708.34
	Annualized Duration	2.481
	Weighted Duration	0.388



Cash Flow Based Approach – ALM

ALM Analysis DCF/Duration Analysis

Duration Estimation and Allocation Bucket Approximation	
Starting Liquidity	\$52,500,000.00
1Yr Min Liquidity	\$47,360,819.51
Weighted Average Cash Flow Duration	1.92
Cash (Liquidity Profile)	17.50%
0-1Yr	20.68%
1-3Yr	31.61%
3-5Yr	30.21%

Duration Optimization Values by Year		
1	Sum of Asset Matched Present Values	\$62,043,843.72
	Weighted Duration	0.100
2	Sum of Asset Matched Present Values	\$47,967,108.24
	Weighted Duration	0.237
3	Sum of Asset Matched Present Values	\$46,859,652.79
	Weighted Duration	0.388
4	Sum of Asset Matched Present Values	\$45,889,528.29
	Weighted Duration	0.532
5	Sum of Asset Matched Present Values	\$44,732,022.07
	Weighted Duration	0.668

Cash Flow Based Approach – ALM

ALM Analysis

Establish Allocation of Assets

Duration Estimation and Allocation Bucket Approximation	
Starting Liquidity	\$52,500,000.00
1Yr Min Liquidity	\$47,360,819.51
Weighted Average Cash Flow Duration	1.92
Cash (Liquidity Profile)	17.50%
0-1Yr	20.68%
1-3Yr	31.61%
3-5Yr	30.21%

MODEL WEIGHTING		Target Allocation	Agy and Credit	Agency Portfolio	Treasury Portfolio
LOUS	OVERNIGHT CASH	17.50%	17.50%	17.50%	17.50%
G0QA	Treasury 0-1Yr				20.68%
H541	Agy Composite 0-1Yr	10.68%	10.68%	20.68%	
C01A	US Corp A-AAA 0-1Yr	10.00%	10.00%		
G1O2	Treasury 1-3Yr				31.61%
G1PB	Agy Bullet 1-3Yr	11.61%	21.61%	31.61%	
G1PC	Agy Callable 1-3Yr	10.00%			
C110	US Corp A-AAA 1-3Yr	10.00%	10.00%		
G2O2	Treasury 3-5Yr				30.21%
G2PB	Agy Bullet 3-5Yr	15.21%	25.21%	30.21%	
G2PC	Agy Callable 3-5Yr	10.00%			
C210	US Corp A-AAA 3-5Yr	5.00%	5.00%		

MODEL STATS	Annualized Total Return	Annualized Price Return	Annualized Income Return	Annualized Std Dev Total Return	Avg Yield to Worst	Std Dev Yld	Avg Eff Dur	TR Sharpe Ratio	Yld Sharpe Ratio	Main Street Ratio	Weighted Rank
Target Allocation	2.372%	(0.252%)	2.548%	1.091%	1.719%	1.417%	1.576	1.207	0.545	0.490	1
Agy and Credit	2.594%	(0.219%)	2.743%	1.275%	1.712%	1.410%	1.809	1.207	0.543	0.424	2
Agency Portfolio	2.452%	(0.076%)	2.506%	1.284%	1.491%	1.387%	1.802	1.087	0.393	0.302	3
Treasury Portfolio	2.218%	0.090%	2.151%	1.350%	1.337%	1.306%	1.839	0.861	0.300	0.213	4

*ICE/BAML Index Data - July 2006 to July 2021

Cash Flow Based Approach – ALM

(4 & 5 Year Not Shown)

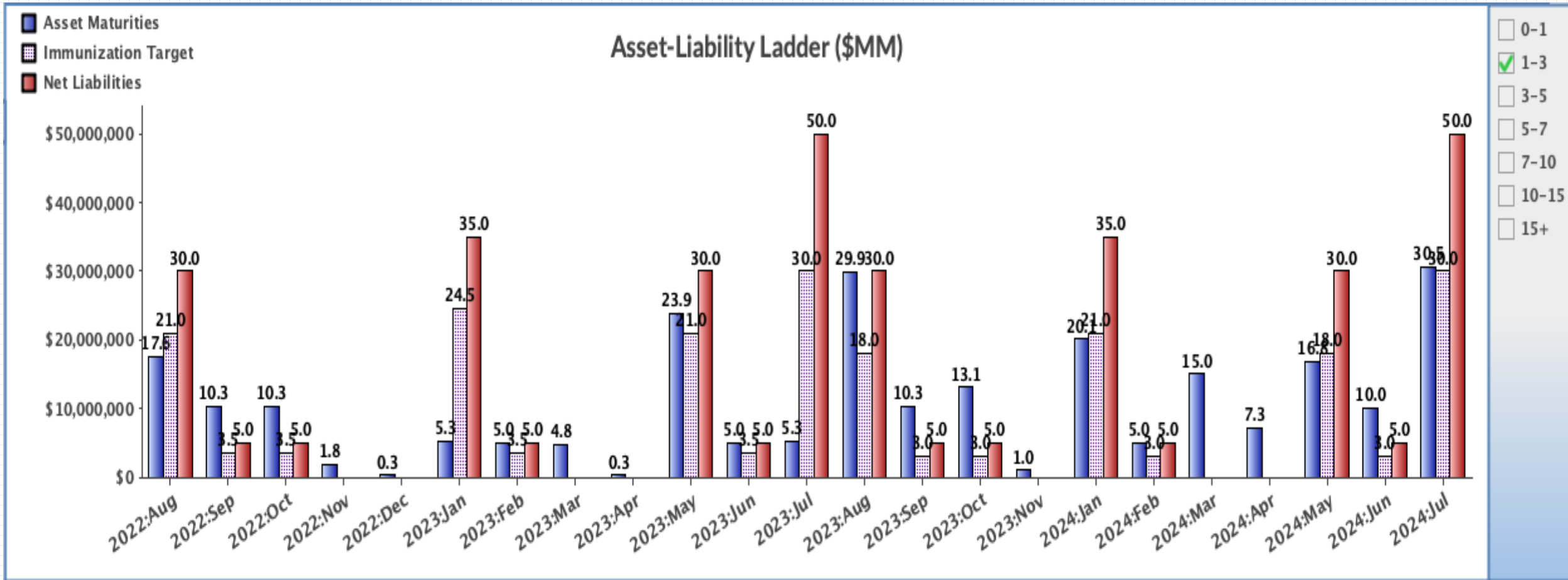
Timing of Assets

		NetFlow	PV NegFlow	Assets Needed	1Yr Liquidity Change	1Yr Liquidity Rolling Balance
1	August	(\$2,816,016.20)	\$2,813,797.84	\$2,532,418	(\$281,380)	\$52,218,620
	September	(\$5,986,214.20)	\$5,976,786.48	\$5,379,108	(\$597,679)	\$51,620,942
	October	(\$8,049,693.21)	\$8,030,684.44	\$7,227,616	(\$803,068)	\$50,817,873
	November	\$24,131,838.28			\$1,682,127	\$52,500,000
	December	(\$11,818,508.50)	\$11,767,443.55	\$10,590,699	(\$1,176,744)	\$51,323,256
	January	(\$14,084,082.35)	\$14,011,089.19	\$12,609,980	(\$1,401,109)	\$49,922,147
	February	(\$3,068,198.25)	\$3,048,568.85	\$2,743,712	(\$304,857)	\$49,617,290
	March	(\$14,099,122.36)	\$13,996,081.63	\$12,596,473	(\$1,399,608)	\$48,217,682
	April	(\$8,639,622.84)	\$8,568,621.70	\$7,711,760	(\$856,862)	\$47,360,820
	May	\$47,707,704.62			\$5,139,180	\$52,500,000
	June	\$3,713,671.46				\$52,500,000
	July	(\$732,993.54)	\$724,530.44	\$652,077	(\$72,453)	\$52,427,547
2	August	(\$2,816,016.20)	\$2,779,866.49	\$1,959,806		
	September	(\$5,986,214.20)	\$5,903,497.88	\$4,161,966		
	October	(\$8,049,693.21)	\$7,930,578.28	\$5,591,058		
	November	\$24,131,838.28				
	December	(\$11,818,508.50)	\$11,615,346.67	\$8,188,819		
	January	(\$14,084,082.35)	\$13,827,863.69	\$9,748,644		
	February	(\$3,068,198.25)	\$3,007,817.97	\$2,120,512		
	March	(\$14,099,122.36)	\$13,807,209.12	\$9,734,082		
	April	(\$8,639,622.84)	\$8,451,898.98	\$5,958,589		
	May	\$47,707,704.62				
	June	\$3,713,671.46				
	July	(\$732,993.54)	\$714,372.32	\$503,632		
3	August	(\$2,816,016.20)	\$2,738,872.78	\$1,917,211		
	September	(\$5,986,214.20)	\$5,815,759.42	\$4,071,032		
	October	(\$8,049,693.21)	\$7,811,797.51	\$5,468,258		
	November	\$24,131,838.28				
	December	(\$11,818,508.50)	\$11,430,879.00	\$8,001,615		
	January	(\$14,084,082.35)	\$13,606,489.65	\$9,524,543		
	February	(\$3,068,198.25)	\$2,957,182.76	\$2,070,028		
	March	(\$14,099,122.36)	\$13,572,833.72	\$9,500,984		
	April	(\$8,639,622.84)	\$8,307,243.38	\$5,815,070		
	May	\$47,707,704.62				
	June	\$3,713,671.46				
	July	(\$732,993.54)	\$701,302.90	\$490,912		

Cash Flow Based Approach – ALM

(4 & 5 Year Not Shown)

Timing of Assets



Cash Flow Based Approach – ALM

ALM Analysis

- Uses institution's actual cash flow data to measure future liabilities and derive duration needs
- Eliminates bias and idiosyncratic problems that public entities can have with market based approaches (liquidity, sector and structure differences).
- Ensures each institution's duration is unique and not peer or market related.
- Places emphasis on timing and magnitude of investments relative to liabilities versus market based optimizations for the masses.
- Does require more data and effort to establish the projected liability stream and involves calculations that may not be familiar.
- There are opportunity costs associated by limiting the investment universe to any particular timeframe, however it can be argued that maintaining a stable duration and limiting cash balances can more than offset any costs associated with security selection constraints (without this process, cash balances tend to be higher and more conservative securities are purchased due to uncertainty).

MITIGATING RISK WITH AN INVESTMENT POLICY

Investment Policy: Per the GFOA, an investment policy describes **the parameters for investing government funds** and identifies the investment objectives, preferences or tolerance for risk, constraints on the investment portfolio, and how the investment program will be managed and monitored.

By definition, the investment policy creates a “rule” book for investing government funds. It is important to distinguish this from a “play” book that would come from an appropriately designed strategy. The strategy has to abide by the rules, but can be very different fund to fund, even with similar policies in place.

An investment policy exists to ensure that inherently risky behavior doesn't occur regardless of manager abilities, desires or actions. It creates a constrained universe of investments that are typically conservative and fall into the “investment-grade” category.

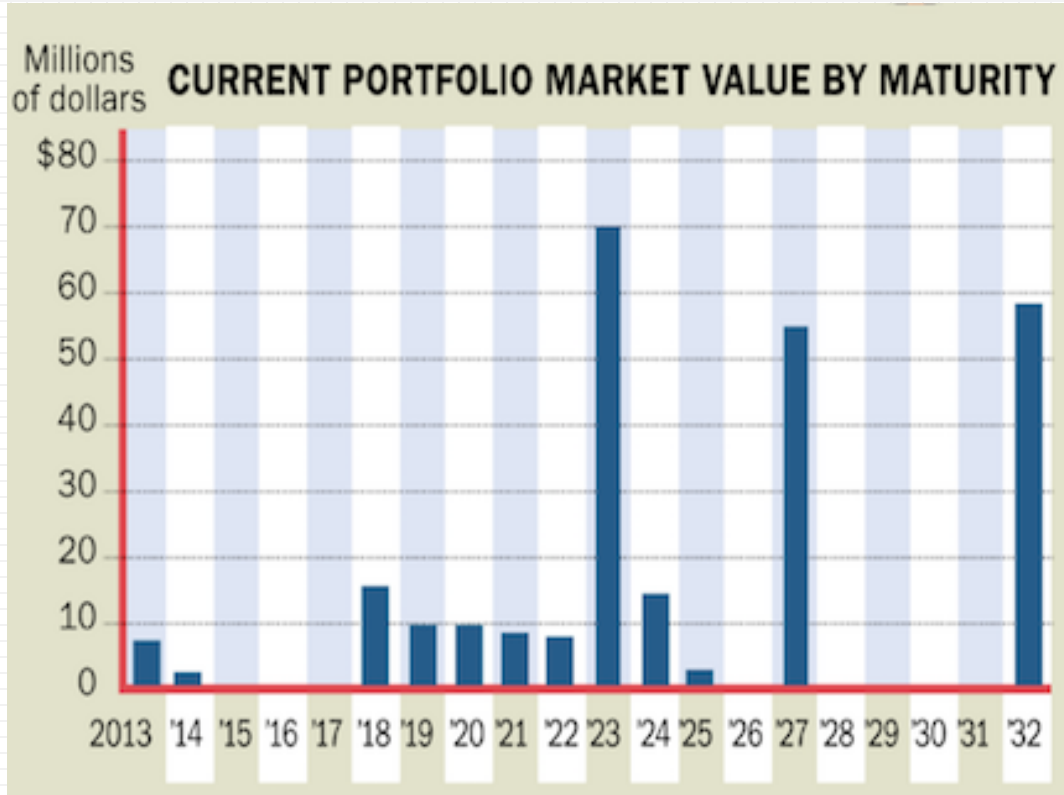
What Can Go Wrong?



Orange County Bankruptcy – Bob Citron (1994)

- \$7.6Bn portfolio ballooned to \$20.6 through leverage.
- Many investments were tied to interest rates going down (inverse-floaters). The Fed however kept raising rates.
- Citron had lost \$1.64 billion before the county declared bankruptcy and froze all participant funds.
- Citron served one year of work release and 5 years probation as punishment.

What Can Go Wrong?



Bernallilo County – Treasurer Manny Ortiz (2013)

- Majority of portfolio was invested in 5 to 20 year bonds.
- Ortiz spent tens of millions of critical operational liquidity in long callables with the expectation they would be called in a short-time frame.
- Strategy backfired leading to \$17 million in losses.
- Was also accused of pay-to-play scheme with his advisor and brokerage coverage.

What Can Go Wrong?



Alcona County, MI – Treasurer Thomas Katona (2006)

- Treasurer for 13 years, Invested \$1.2 million in Nigerian e-mail scam. This sum accounted for around 25% of the annual budget of the county.
- Katona was warned multiple times by the bank that his wire-transfers were a scam and to stop sending them.
- Katona invested \$72,500 of his own money and even flew to London to meet the scammers to "finalize" the transaction.
- Was found guilty of 9 counts of embezzlement and 2 counts of forgery. Katona spent 10 years in prison.

Investment Policies – Practical Applications

Investment Policy vs. Internal Limits

- Consider structuring a policy that allows flexibility while maintaining tighter internal policies. Keep yourself out of compliance jail.
 - Effective Duration vs. WAM and Limits
 - Credit Rating Minimums
 - How to Handle Downgrades – process for reporting
 - Lower Policy Liquidity Requirements
 - Improve or Implement Robust Compliance Forecasting
 - Consider Clarifying “Time of Purchase” (Don’t assume auditors understand anything)
 - Know your audience – be aware of sensitivities of Treasurers, Supervisors/Council, Constituents etc.

Safety, Liquidity, Yield

- No one has gotten fired for having too low of yield (probably true).
- The greatest risk we face (most likely) is not from a credit event but selling securities at a loss due to miss-managed liquidity.
- Never factor in expected call dates to fill cash flow needs.

Investment Policies – Practical Applications

Month End Projections

	January	February	March	April
Expected WAM	644	646	627	602
Projected Month End WAM	1.76	1.77	1.72	1.65
Expected Book Yield	0.95%	0.96%	0.96%	0.95%
Expected Portfolio Value	4,924,236	4,983,021	5,172,316	5,377,911

Aging

0-366 Days	39.62%	42.57%	45.18%	47.27%
367-1097 Days	37.29%	35.84%	34.60%	33.28%
1098-1827 Days	23.09%	21.59%	20.22%	19.45%

Sector Distribution

	Max	January	February	March	April
Agency	75%	19.27%	19.04%	18.34%	17.27%
MTN	30%	13.05%	12.50%	11.69%	11.24%
CP	40%	3.55%	2.50%	1.45%	1.39%
YCD	30%	11.29%	9.15%	8.82%	8.48%
Supra	10%	4.59%	4.34%	4.18%	4.02%
Callables	20%	3.47%	3.43%	3.30%	3.18%
JPA	10%	4.74%	3.98%	3.16%	0.53%

Treasurer: More than \$19 million stolen from schools

BY JAMES BURGER jburger@bakersfield.com Mar 7, 2017 Updated Oct 12, 2018



A staggering \$19 million was stolen from clearing accounts owned by the Kern Community College District and the Kern County Superintendent of Schools office, Kern County Treasurer-Tax Collector Jordan Kaufman announced Tuesday.

Internal Controls – Best Practices

What went wrong?

- Personnel changes at outside agency were not communicated to Treasurer resulting in new employees not having access to statements.
- Failure out outside agencies reconciling their ZBA accounts – assumed it was being done by someone else.
- Vulnerability in bank accounts due to product change.
- During annual audits involving all parties, fingers were pointed and blame was shifted while outside auditor looked away (not auditors because it was the same firm!). The County thought the Schools were reconciling, the Schools thought the County was reconciling...



Improvements we implemented and other best practices

- Semi-annual review of all accounts and services with our bank, ensuring all products are appropriate and no vulnerabilities exist or any changes were made (more frequent and more detailed).
- Semi-annual list is sent out to each department/agency listing their accounts, services, users and their access as well as any changes we suggest.
- Now require monthly reconciliations by outside agencies – don't assume or leave it up to auditors (internal or external).
- New (and different) outside Auditors were hired by all parities.

Internal Controls – Best Practices

Other Best Practices

- Ensure that all accounts have appropriate fraud prevention products and services.
 - Positive Pay and Payee Validation or \$0 threshold.
 - ACH Fraud Filter with dual control needed for exception items and independent verification on ACH Company ID.
 - Dual Control for all functions for both outgoing payments, template creation/maintenance as well as online user access for all accounts (operating, custody, JPAs, MMMFs etc.) and payment systems.
 - Be aware of business compromise email attempts. Independently verify wire instructions for all vendors/debt service.
 - Routinely verify that proper staff have access to required reporting.
 - Be aware of SFTP payment processes and vulnerabilities, both administratively and technologically. The less time the file sits on your servers the better and be sure to immediately terminate access for employees who are resigning.
 - Have policy in place for last minute/emergency payments – don't get tricked by urgency.
 - Lastly....RECONCILE, RECONCILE, RECONCILE – NACHA rules only give commercial accounts 24 hours for reclamation of funds. If you only reconcile once a month, it's already too late.
 - If possible, have separate auditing firm for County and outside agencies.



Questions?

Jason Klinghoffer, CFA

Director, Debt Capital Markets, Mischler Financial Group
jklinghoffer@mischlerfinancial.com | (913) 244-7101

Bret Black

Principal Treasury Investment Officer, County of Kern
blackb@kerncounty.com | (661) 868-3415



THANK YOU

We look forward to your participation in the next webinar in this series:

Developing a Benchmark

