

Constructing Dedicated Portfolio against District Bond Obligations from a Simplified Scenario

Stone & Youngberg

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Outline

- Introduction
- Objectives & Deliverables
- Approaches & Research Accomplished
- Conclusion & Future Recommendations

My sponsor

- Stone & Youngberg

A division of Stifel Nicolaus

Leader in municipal finance in the Far West, with roots in California dating back to 1931

Work with state and local governments, school districts and non-profit agencies to strengthen local communities.

Background

Poway Unified School District is a school district located in Poway, California.

It borrowed 105 million dollars from investors by selling a district bond. Taxpayers in the area will end up with 1 billion billl.

Ttaxpayers in the Poway district will have to start paying about 50 million a year to cover the bill

Problems

The district could have authorized more taxes from taxpayers, but it would break down the promises they made to the community

Poway school district decided to employ other means and has sought help from Stone & Youngberg

Stone & Youngberg has come up with a strategy to construct a portfolio to satisfy Poway's future financial obligations

Objectives

In this project, we will try to select the appropriate assets at a minimum cost but with maximum degree of matching, then find the optimal proportion of each asset

Deliverables

The R packages of present value calculations of liability stream

The list of assets in portfolio

The Excel spreadsheet of asset proportion calculations

The performance of our portfolio

Dummy Data

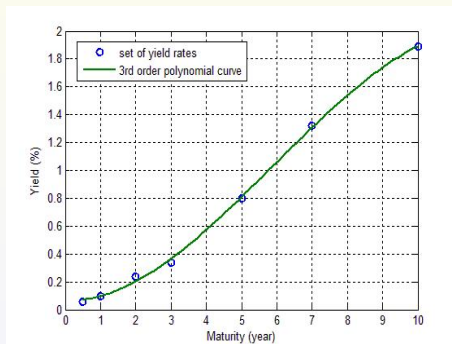
Date	Liability	Date	Liability
7/15/2012	6	7/15/2016	8
1/15/2013	6	1/15/2017	8
7/15/2013	9	7/15/2017	8
1/15/2014	9	1/15/2018	8
7/15/2014	10	7/15/2018	6
1/15/2015	10	1/15/2019	6
7/15/2015	10	7/15/2019	5
1/15/2016	10	1/15/2020	5

Table: Liability Stream.

Calculating present value of the liability stream

- Polynomial

We used seven yield rates between 6 months and 10 years, 3rd order polynomial curve



fit

Calculating present value of the liability stream

- Bootstrapping

First we compute the discount factor. The basic idea of bootstrapping is like this,

$$P = C(t_1) \times d(t_1) + C(t_2) \times d(t_2) \quad (1)$$

Once we have $d(t_1)$, from the equation, we will get $d(t_1)$ and $d(t_2)$, etc. After we compute the discount factors, we compute the present value of each liability .

Calculating present value of the liability stream

Date	Liability	PV from Polynomial	PV from Bootstrap
7/15/2012	6	6.00	6.00
1/15/2013	6	5.99	5.99
7/15/2013	9	8.98	8.98
1/15/2014	9	8.96	8.96
7/15/2014	10	9.93	9.93
1/15/2015	10	9.89	9.90
7/15/2015	10	9.84	9.86
1/15/2016	10	9.77	9.79
7/15/2016	8	7.76	7.76
1/15/2017	8	7.68	7.68
7/15/2017	8	7.60	7.59
1/15/2018	8	7.51	7.49
7/15/2018	6	5.56	5.55
1/15/2019	6	5.48	5.47
7/15/2019	5	4.50	4.49
1/15/2020	5	4.43	4.43
sum	124	119.9	119.86

Table: Liability Stream.

Asset Allocation

We will choose around 30 assets to construct a portfolio. The assets are a pool of Treasury notes with different maturities.

Reasons:

- Credit Risk
Governmental bonds ensures that all obligations will be fulfilled without concerned of default risks.

Asset Allocation

- Interest Risk

We choose bonds with fixed payments to eliminate TIPS

- Payment Matching

Our assets should pay semi-annually. We choose T-notes with maturity BEFORE the exact payment dates.

Asset Allocation

T-NOTE 30/06/12	T-NOTE 30/11/14	T-NOTE 31/05/17
T-NOTE 15/07/12	T-NOTE 31/12/14	T-NOTE 30/06/17
T-NOTE 31/12/12	T-NOTE 31/05/15	T-NOTE 30/11/17
T-NOTE 15/01/13	T-NOTE 30/06/15	T-NOTE 31/12/17
T-NOTE 30/06/13	T-NOTE 30/11/15	T-BOND 31/05/18
T-NOTE 15/07/13	T-NOTE 31/12/15	T-NOTE 31/05/18
T-NOTE 15/12/13	T-NOTE 31/05/16	T-BOND 15/11/18
T-NOTE 31/12/13	T-NOTE 30/06/16	T-NOTE 15/11/18
T-NOTE 31/05/14	T-NOTE 30/11/16	U S TREAS SEC 15/05/19
T-NOTE 30/06/14	T-NOTE 31/12/16	T-NOTE 15/05/19
		U S TREAS SEC 15/11/19

Table: Assets

What we have done

1. Calculated the present value of the liability stream using polynomial regression and bootstrapping methods
2. Selected 32 T-notes as our portfolio assets

We are almost halfway there.....

What to do next

How to construct the portfolio?

We want to make sure:

1. Our initial investment and the excess cash from each period will be minimized.
2. Duration, convexity and present value of the bond portfolio are equal to those of the liability stream.

Recommendations:

Use Excel to set up a Linear Program

Use Immunization Theory to compare the duration and convexity.

Thanks for Watching!