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History of the Ryan Indexes

When I was the Director of Fixed Income Research at Lehman during the late 1970s and early 1980s, I designed most of the popular Lehman bond indexes used today. In those days, these indices were **monthly data bases**. Since I was part of the broker/dealer side, our revenues came from daily trades. In order to compliment and supplement our trading revenues I needed to develop a system to analyze the bond market daily as well as to replicate our bond indexes to help our clients understand these key benchmarks. I developed a thorough 102 daily page system that decomposed the bond market by sectors and maturities. What became increasingly obvious is that most bonds gravitated around one key Treasury issue (the Auction issue) that best represented the maturity area that each bond issue lived in. Each area was grouped by maturity or duration cells (i.e. around the Treasury Yield Curve). I soon called this affect ... the **Bond Solar System**.

Bond Solar System

My daily reports were very convincing that bonds formed clusters or groups around the key issue they were priced off of in a yield spread orbit (similar to the planets revolving around the sun). These base or key issues (suns) were the **Treasury auction issues**. Each cluster moved in relationship to their sun but each cluster (solar system) was unique and distinct from each other. Looking at most Wall Street trading desk formations suggested the same relationship as they separated the Money Market trader from the Intermediate trader and the Long bond trader. As the bond sun (Treasury Auction issue) moved in yield so did that unique bond solar system (i.e. 2 year, 5 year, 10 year, etc.) follow and move in yield similarly. This produced extremely

high total return correlations to the Treasury auction issue (bond sun) within each maturity cell (solar system). Naturally, there would be outliers due to credit and event risk situations but were infrequent. When dealing with a large population of bonds (i.e. bond index), there were relatively few discrepancies. Depending on that bond's features, credit and liquidity it may move in an elliptical orbit such that its yield spread changes through time. But the key observation is that it moves with the Treasury sun. If interest rates were to spike up swiftly from 6% to 7% on the three year Treasury auction issue, every bond priced off this key issue would move approximately, if not exactly, up 100 basis points as proof that these bonds are locked in a yield spread orbit around their Treasury auction sun.

This pattern allowed me to understand the risk/reward behavior of the Lehman bond indexes by focusing on the Treasury yield curve which was a manageable portfolio to price accurately and measure daily. **By weighting the Treasury yield curve to match the term structure of the Lehman index, I could approximate the daily total return behavior of this benchmark** without marking 4,000 + bonds to the market daily. Traders did not like to price bonds. This was a nuisance especially since we needed it at a precise moment in time (3:00 pm) on month end. Can you imagine if I asked them to price these 4,000 bonds daily. As a result, only key issues were trader priced (about 200). The rest were matrix priced as a yield spread off the Treasury yield curve. This spread was fixed for the month and reviewed monthly to see if any corrections were needed. Pricing for each security is certainly an arduous task even for an army of bond traders. So what drives the bond market? Where do yields come from? How do you price one bond differently than another? It all starts with a base rate = Treasury yield curve.

The Ryan Index and Cash Index

I left Lehman in October 1982 to start my initial firm ... the **Ryan Financial Strategy Group (RFSG)**. Within six months, we created **the 1st Daily Bond Index ... the Ryan Index**. The Ryan Index is the Treasury yield curve as an index for each auction maturity series plus a composite index. We called the composite Bill curve ... the **Ryan Cash Index** and the 2-year thru 30-year auction maturity series composite ... the **Ryan Index**. Each auction maturity consisted of the current on-the-run auction issue. An equal weighted composite of the Bill auction series composed the Cash Index and an equal weighted composite of notes and bond

auction series became the Ryan Index. These indexes are the most accurate calculation of the risk/reward behavior of any auction maturity since we start our prices on auction date (trade date). A bond is owned as of trade date not settlement date. As a result, **the correct risk/reward history of any bond history is from trade date**. The Ryan Index is the **only** bond index that has this discipline and methodology rule. The Ryan Index is also the most complete history of the Treasury auction risk/reward with data going back to the 1970s’.

The Notre Dame Study

The Notre Dame study of bond indices is proof of my bond Solar System philosophy that almost all bonds are priced from the Treasury yield curve and consequently have high correlations to the auction issue. Based on a 1988 research paper by Frank Reilly, Ph.D., David Wright, Ph.D. and Wenchi Wong, Ph.D. they showed a series of comparisons between the major bond indices. The key message was they all had very high systematic risk (interest rate risk) which is a function of the yield movement of the Treasury yield curve. This meant they all had a high correlation to the Ryan Index :

Correlation Coefficients using Monthly Rates of Returns (January 1980 – December 1987)

	Lehman Govt/Corp	ML Domestic Master	Salomon BIG
Ryan Index versus	.984	.985	.986

As a result, you could explain 97% of the total return behavior of these complex bond indices of 4,000+ bonds by understanding the risk/reward behavior of the Ryan Index with just seven securities (the Treasury yield curve of seven auction issues).

The Treasury Yield Curve

Since bonds are loans, it is proper to begin the history of the Treasury yield curve with the first US loan. On June 3, 1775 the Continental Congress approved the first domestic loan of £6,000,000 to buy gunpowder for the American Revolution. This first loan was stated in British sterling. By October 3, 1776 the second American loan was approved for \$5,000,000, so stated in dollars in defiance of the British currency system¹. Who would have believed that from that humble beginning, the US would now become the largest debtor nation in the world.

¹. An Illustrated History of US Loans by Gene Hessler 1988

What may be alarming, if not unbelievable, is that the Treasury yield curve is a rather young creation. There was no orderly or continuous auction series until the 1970's. Now we have weekly, monthly, quarterly and semi-annual auctions for each maturity series. This auction process has truly defined the bond market and made bond trading the art or science it has evolved into over the last three decades. A review of the Treasury auctions histogram reveals the true bond market lineage. It wasn't until 1973 that there was a continuous auction series for any maturity series. Prior to that time, auctions were irregular and quite delinquent.

Treasury Auction History

Auction Series	Auction Date	Days Since Last Auction
2 year	9/04/73	250
3 year	2/15/74	365
4 year	6/30/79	245
5 year	9/05/79	518
7 year	11/15/67	1402
10 year	11/15/77	456
15 year	7/08/77	1239
20 year	1/12/81	2510
30 year	5/15/73	3053

The Ryan Treasury STRIP Yield Curve Indexes

In 1985 the Treasury announced the creation of STRIPS (the Separate Trading of Registered Interest and Principal Securities). This allowed investors to turn in a Treasury security to the Treasury and be given a yield curve of zero-coupon securities that compose the cash flow of that security (if eligible to be stripped). This process provides for a well defined Treasury yield curve of semi-annual zero-coupon securities out to 30 years.

My team at **RFSG and I developed the 1st STRIPS Index** the next day after this announcement. Through time it became increasingly obvious that the Ryan STRIPS Index

would become the key to understanding the intrinsic value of any asset class, the discount rate mechanism to price liabilities and the efficient frontier.

Intrinsic Value

In 2006, I will celebrate 40 years in the bond business and have been fortunate enough to witness and participate in much of the evolutionary development. As the old phase goes...as much as some things change, some things don't. **The core or foundation of the bond business is built upon a base yield curve that all bonds derive their ultimate price or yield. That base yield is the Treasury Yield Curve.** There is much reason to believe that this will continue and be even more required in the future as the Treasury yield curve becomes even more developed and defined by the Treasury STRIP curve (zero-coupon curve) as the *risk free yield curve*. Such a risk free yield curve will become the discount rate requirement to price liabilities as well as bonds. Such a risk free yield curve should be used to measure the *intrinsic value* of any investment. Comparing any investment to the Treasury STRIP yield curve should determine its relative risk/reward. If the investment you purchase loses to the Treasury STRIP maturity that it behaves like in volatility you would deduct that its relative value is a **negative!**

Discount Rate

Liabilities are usually known or calculated as a future value payment. In order to calculate the present value you need to use a discount rate that connects to future value. Only a zero-coupon rate does that. Coupon bonds have reinvestment risk and uncertainty. This rate needs to be a risk free rate which by definition means Treasury. There can be no credit risk, event risk, liquidity risk or reinvestment risk. Once calculated for each liability payment we now have a yield curve. Moreover, for Asset/Liability Management we now have the proper benchmark to determine the true economic performance of assets vs. liabilities (funded ratio). **The Treasury STRIP yield curve is the Liability Index that all assets should be compared against.**

For more information on all Ryan Indexes go to www.RyanIndex.com