FIXED INCOME ANALYTICS

Wilshire Axiom API℠

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Wilshire Associates and the Wilshire Axiom℠

- Since 1972, Wilshire Associates Incorporated has delivered solutions to portfolio managers for analytics, performance attribution and risk management. For more than 20 years, ***Wilshire Axiom*** has been one of the **world's leading solutions** in fixed income portfolio management and analytics. *Wilshire Axiom* incorporates:
- **A comprehensive, global credit risk model**. The *Wilshire Axiom Global Credit Risk Model℠*, unparalleled in scope in the fixed income industry, measures more than 400 term structure, sector, quality, other spread and currency effects
- **An integrated risk measurement and performance attribution framework**. *Wilshire Axiom's Global Credit Risk Report℠* and *Wilshire Axiom's Global Credit Performance Attribution Report℠* allow you to measure your risk and performance in comparable terms
- **An ability to forecast**. *Wilshire Axiom Scenario Analysis℠* projects performance relative to a benchmark over a time horizon using yield curve scenarios, exchange rate changes and spread shifts
- **A historical database with multiple pricing sources**. *Wilshire Axiom's System Architecture* manages hundreds of benchmarks and thousands of portfolios and security masters
- **An industry leading client service model**. *Wilshire Axiom's Relationship Managers* are available for on-site visits, by telephone and by email in multiple countries and time zones
- ***Wilshire Axiom* is the solution of choice to more than 125 of the world's leading fixed income managers**, central banks, trust banks, state retirement boards, universities, insurance companies and mutual funds

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Wilshire Axiom API℠

- Wilshire Axiom is available with an application programming interface (API) option that allows you to call Wilshire Axiom functionalities without starting the application directly
- For example, code can be written in Microsoft® Visual Basic® for Applications (VBA) allowing you to access the results of Wilshire Axiom calculations directly in a Microsoft® Excel® spreadsheet

Fundamental goals in delivering the Wilshire Axiom API:

Make Wilshire Axiom more useful

Consume the Wilshire Axiom analytics in other systems

Leverage other technologies

Deploy custom solutions

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Wilshire Axiom API: Benefits

- Use Wilshire Axiom characteristics, risk and performance attribution data ***directly*** in third party applications
  - Deliver analytics to users in familiar tools: for example, Microsoft® Excel®, Microsoft® Office applications, Microsoft® Windows® applications, Microsoft® ASP.NET, Microsoft® SQL Server® and more
  - Deploy system access to users in familiar tools: for example, Java™ , PERL, Python™, Microsoft® Visual Studio C++®,Microsoft® Visual C#® and Microsoft® Visual Basic®
  - Develop custom reporting and post-processing of Wilshire Axiom analytics directly in the final reporting environment, with fewer or no intermediate stages
  - Deliver *ad-hoc* or formalized reporting solutions

*Increase the **usefulness** of your investment by delivering the data **where your users want it***

FIXED INCOME ANALYTICS

Wilshire Axiom API: Benefits (2)

- Expedite and facilitate effective customization
  - ***Formal data model*** encapsulates characteristics, risk and performance data meaningfully
    - API handles subtotaling for portfolio-level characteristics—e.g., client staff does not have to sort out issues related to notional exposures or multiple sides of derivatives
    - API organizes performance attribution and risk analytics into security level and subtotals, and handles sorting within groups and allocating analytics to groups
  - ***Standardized (COM) programming paradigm*** is easy to leverage
    - API integrates into the Microsoft® Windows® operating system so other applications can automatically "see" it
    - Data is presented in a format that allows "easy" interaction for programmers—no need to write cumbersome, tedious low-level parsing scripts or macros
    - Cost of maintaining customizations is lower because the architecture used to implement them is standardized

*These features make it **easier** and **faster** to deliver custom solutions incorporating Wilshire Axiom analytics*

Wilshire Axiom API Subscription Standard Features

- Access to the Wilshire Axiom API
- The *Wilshire Axiom API User's Guide and Programming Manual*, with descriptions of all classes, properties and methods, including coding examples
- Ready-to-use report templates
  - Wilshire Axiom Menu Report^{SM}
  - Wilshire Axiom Risk Report^{SM}
  - Wilshire Axiom Global Credit (GC) Performance Attribution Report^{SM}
- Standard support from Wilshire Fixed Income Analytics Technical Services with troubleshooting and issue resolution

Also available: ***Custom programming*** and solution development by Wilshire Fixed Income Analytics

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Wilshire Axiom Risk Report - Customized

- Build sophisticated, custom graphics for client reporting

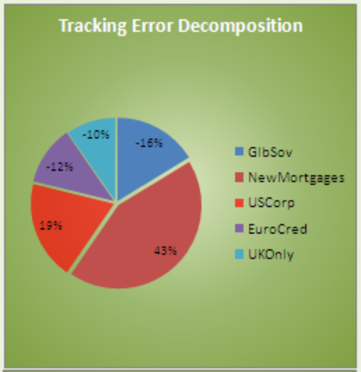
Multi Manager Risk Decomposition
Emergent Asset Management--*More Than the Sum of Our Parts* ™
Strategic Benchmark--SBench Emergent
12/31/2007

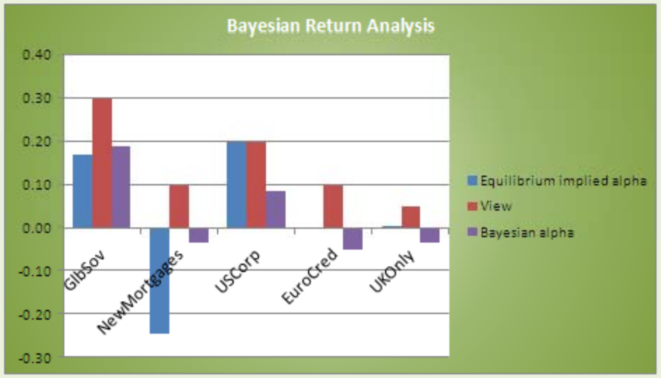
Generate Report

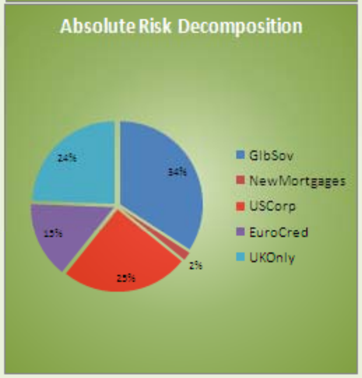
Manager	Benchmark	Weight	Duration	Yield	Tracking Error vs Manager Benchmark	Tracking Error vs Strategic Benchmark	Tracking Error Decomposition: Active	Tracking Error Decomposition: Passive	Tracking Error Decomposition: Total	Absolute Risk	Absolute Risk Decomposition: Active	Absolute Risk Decomposition: Passive	Absolute Risk Decomposition: Total
GlbSov	*MRLGBMI*	*0.2500*	*5.5547*	*4.4407*	*2.1913*	*1.9013*	*-0.5722*	*0.1613*	*-0.4109*	*5.8215*	*0.3319*	*1.0359*	*1.3678*
NewMortgages	*MTGA*	*0.3000*	*1.3489*	*4.5881*	*2.3600*	*4.4017*	*0.1223*	*0.9730*	*1.0953*	*0.9371*	*-0.4801*	*0.5465*	*0.0664*
USCorp	*CORP*	*0.2000*	*11.1863*	*6.3053*	*3.4121*	*5.4890*	*-0.0951*	*0.5820*	*0.4869*	*7.1699*	*0.3907*	*0.6085*	*0.9992*
EuroCred	*MRLEMU0*	*0.1000*	*4.4676*	*4.9452*	*0.6374*	*3.1724*	*-0.0405*	*-0.2505*	*-0.2910*	*6.7524*	*-0.0012*	*0.5938*	*0.5926*
UKOnly	*MRLUK00*	*0.1500*	*7.1235*	*5.1296*	*0.4601*	*4.2092*	*0.0254*	*-0.2694*	*-0.2440*	*7.5055*	*0.0087*	*0.9686*	*0.9773*
	Total	1.0000	5.5459	5.0116			-0.5601	1.1964	0.6364		0.2500	3.7533	4.0033
SBench Emergent			5.6027	5.0965									4.4916

Manager	Benchmark	Equilibrium implied alpha	View	Bayesian alpha
GlbSov	*MRLGBMI*	*0.1699*	*0.3000*	*0.1886*
NewMortgages	*MTGA*	*-0.2458*	*0.1000*	*-0.0342*
USCorp	*CORP*	*0.2000*	*0.2000*	*0.0854*
EuroCred	*EMU0*	*-0.0006*	*0.1000*	*-0.0505*
UKOnly	*uk00*	*0.0045*	*0.0500*	*-0.0344*
	Total	0.0094	0.1625	0.0438

Lambda	*0.51*
Tau	*5.00*







Risk Budgeting Report

FIXED INCOME ANALYTICS

Wilshire Axiom GC Performance Attribution Report

	A	B
1	Run Report	
2	Portfolio	ALANA
3	Start Date	5/30/2008
4	End Date	
5	Level 1 Group	
6	Level 2 Group	
7	Linking Frequency	
13	**Model Return**	
39	**Residual**	
40	**Interaction**	
41	**Hedge Cost**	
42	**Buy and Hold Return**	
43	**Trading Effect**	
44	**Total Return Including Tradi**	
45	**Other Asset**	
46	**Total Return**	
49	**GROUPING SECTION**	
51	**Treasury**	
545	**Agency**	
564	**Ind-Telecom**	
737	**Ind-Transport**	

Axiom Objects / Menu Report

	A	B
1	Run Report	
2	Portfolio	ALANA
3	Start Date	5/30/2008
4	End Date	
5	Level 1 Group	SECTO
6	Level 2 Group	EDUR
7	Linking Frequency	On-ch
12		**Portfo**
13	**Model Return**	
14	Yield	
20	Term Structure	
26	Inflation	
27	Spread	
34	Non-spread Valuation	
38	Currency	
39	**Residual**	
40	**Interaction**	
41	**Hedge Cost**	
42	**Buy and Hold Return**	
43	**Trading Effect**	
44	**Total Return Including Trading Effects**	
45	**Other Asset**	
46	**Total Return**	

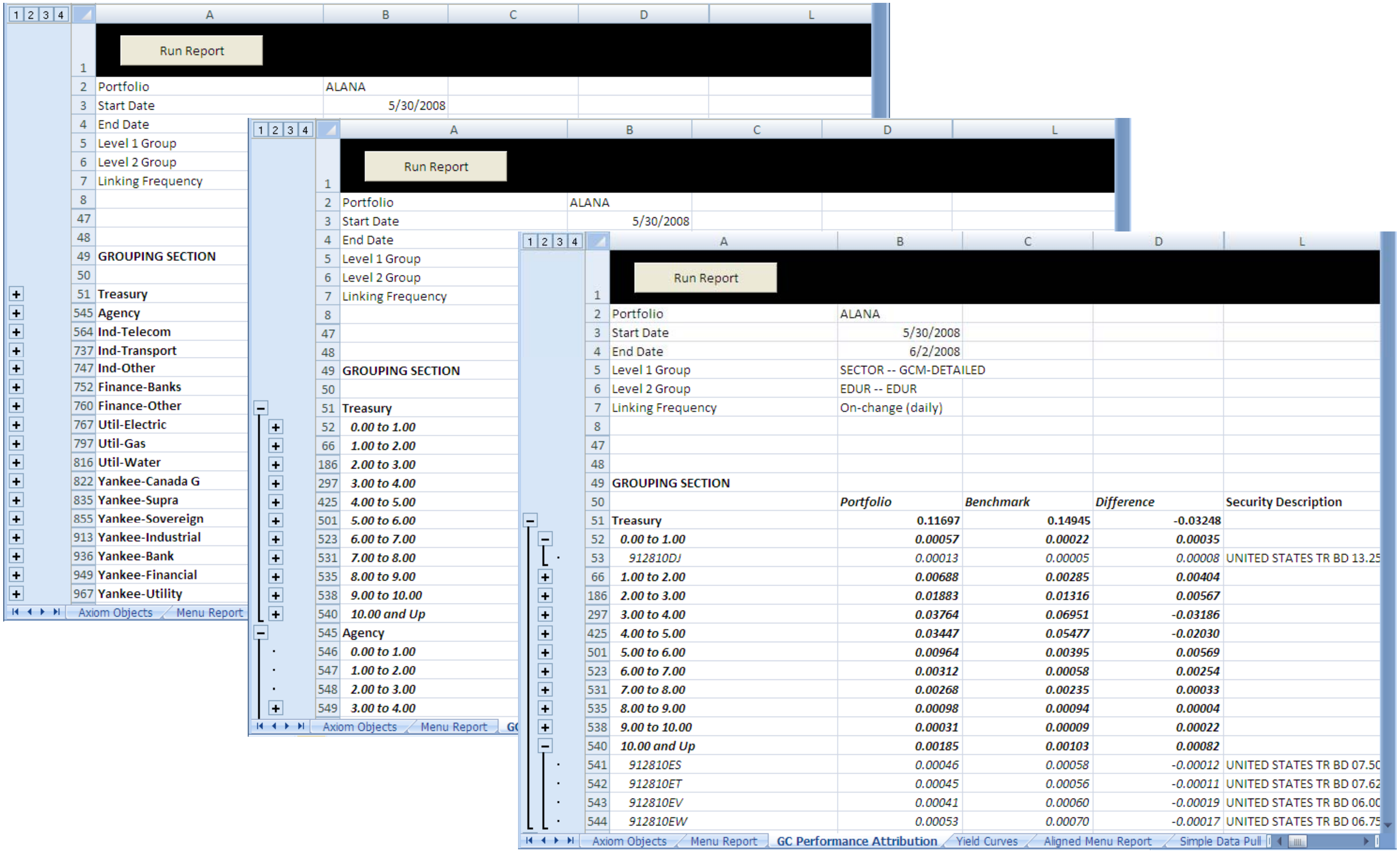
Axiom Objects / Menu Report / GC Performance

	A	B	C	D
1	Run Report			
2	Portfolio	ALANA		
3	Start Date	5/30/2008		
4	End Date	6/2/2008		
5	Level 1 Group	SECTOR -- GCM-DETAILED		
6	Level 2 Group	EDUR -- EDUR		
7	Linking Frequency	On-change (daily)		
12		**Portfolio**	**Benchmark**	**Difference**
13	**Model Return**	**0.35716**	**0.37783**	**-0.02067**
14	Yield	0.04221	0.04177	0.00044
15	*Passage of time and coupons*	*0.03531*	*0.03448*	*0.00083*
16	*Roll down*	*0.00689*	*0.00729*	*-0.00040*
17	*Paydown Surprise*	*0.00000*	*0.00000*	*0.00000*
18	*Actual Paydown*	*0.00000*	*0.00000*	*0.00000*
19	*Expected Paydown*	*0.00000*	*0.00000*	*0.00000*
20	Term Structure	0.40554	0.40656	-0.00102
21	*D1*	*0.71828*	*0.71914*	*-0.00086*
22	*D2*	*-0.49803*	*-0.49894*	*0.00091*
23	*D3*	*0.18718*	*0.18733*	*-0.00015*
24	*Eurozone Sovereign Spreads*	*0.00000*	*0.00000*	*0.00000*
25	*Convexity*	*-0.00189*	*-0.00097*	*-0.00092*
26	Inflation	0.00000	0.00000	0.00000
27	Spread	-0.08557	-0.07024	-0.01533
28	*Sector*	*-0.10972*	*-0.09256*	*-0.01716*
29	*Quality*	*-0.01914*	*-0.01914*	*0.00000*

Axiom Objects / Menu Report / GC Performance Attribution / Yield Curves / Aligned Menu Report

FIXED INCOME ANALYTICS

Wilshire Axiom GC Performance Attribution Report (2)



	A	B	C	D	L
1	Run Report				
2	Portfolio	ALANA			
3	Start Date	5/30/2008			
4	End Date				
5	Level 1 Group				
6	Level 2 Group				
7	Linking Frequency				
8					
47					
48					
49	GROUPING SECTION				
50					
51	Treasury				
545	Agency				
564	Ind-Telecom				
737	Ind-Transport				
747	Ind-Other				
752	Finance-Banks				
760	Finance-Other				
767	Util-Electric				
797	Util-Gas				
816	Util-Water				
822	Yankee-Canada G				
835	Yankee-Supra				
855	Yankee-Sovereign				
913	Yankee-Industrial				
936	Yankee-Bank				
949	Yankee-Financial				
967	Yankee-Utility				

Axiom Objects / Menu Report

	A	B	C	D	L
1	Run Report				
2	Portfolio	ALANA			
3	Start Date	5/30/2008			
4	End Date				
5	Level 1 Group				
6	Level 2 Group				
7	Linking Frequency				
8					
47					
48					
49	GROUPING SECTION				
50					
51	Treasury				
52	0.00 to 1.00				
66	1.00 to 2.00				
186	2.00 to 3.00				
297	3.00 to 4.00				
425	4.00 to 5.00				
501	5.00 to 6.00				
523	6.00 to 7.00				
531	7.00 to 8.00				
535	8.00 to 9.00				
538	9.00 to 10.00				
540	10.00 and Up				
545	Agency				
546	0.00 to 1.00				
547	1.00 to 2.00				
548	2.00 to 3.00				
549	3.00 to 4.00				

Axiom Objects / Menu Report / GC

	A	B	C	D	L
1	Run Report				
2	Portfolio	ALANA			
3	Start Date	5/30/2008			
4	End Date	6/2/2008			
5	Level 1 Group	SECTOR -- GCM-DETAILED			
6	Level 2 Group	EDUR -- EDUR			
7	Linking Frequency	On-change (daily)			
8					
47					
48					
49	GROUPING SECTION				
50		Portfolio	Benchmark	Difference	Security Description
51	Treasury	0.11697	0.14945	-0.03248	
52	0.00 to 1.00	0.00057	0.00022	0.00035	
53	912810DJ	0.00013	0.00005	0.00008	UNITED STATES TR BD 13.25
66	1.00 to 2.00	0.00688	0.00285	0.00404	
186	2.00 to 3.00	0.01883	0.01316	0.00567	
297	3.00 to 4.00	0.03764	0.06951	-0.03186	
425	4.00 to 5.00	0.03447	0.05477	-0.02030	
501	5.00 to 6.00	0.00964	0.00395	0.00569	
523	6.00 to 7.00	0.00312	0.00058	0.00254	
531	7.00 to 8.00	0.00268	0.00235	0.00033	
535	8.00 to 9.00	0.00098	0.00094	0.00004	
538	9.00 to 10.00	0.00031	0.00009	0.00022	
540	10.00 and Up	0.00185	0.00103	0.00082	
541	912810ES	0.00046	0.00058	-0.00012	UNITED STATES TR BD 07.50
542	912810ET	0.00045	0.00056	-0.00011	UNITED STATES TR BD 07.62
543	912810EV	0.00041	0.00060	-0.00019	UNITED STATES TR BD 06.00
544	912810EW	0.00053	0.00070	-0.00017	UNITED STATES TR BD 06.75

Axiom Objects / Menu Report / GC Performance Attribution / Yield Curves / Aligned Menu Report / Simple Data Pull

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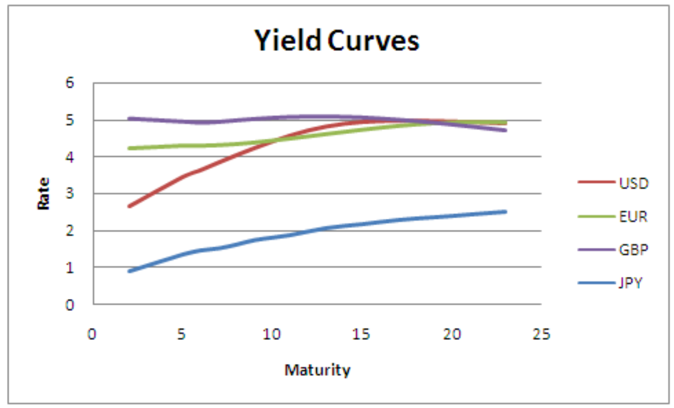
Wilshire Axiom Yield Curve Report

- Display multiple yield curves graphically and numerically

20080530

Maturity	USD	EUR	GBP	JPY
2	2.639469	4.213328	5.039687	0.90671635
5	3.442548	4.285987	4.956813	1.35803348
6	3.635199	4.285987	4.927136	1.4684737
7	3.844201	4.303182	4.949218	1.52389344
8	4.044666	4.334332	4.991713	1.62712886
9	4.234835	4.377501	5.031764	1.74628858
10	4.413792	4.429189	5.062745	1.8135979
11	4.575796	4.486276	5.08443	1.88145848
12	4.713931	4.546432	5.096282	1.97797437
13	4.820731	4.607754	5.097542	2.06841983
14	4.894372	4.668549	5.088416	2.12661002
15	4.94118	4.7272	5.070176	2.17413682
16	4.967098	4.782068	5.043924	2.23189402
17	4.977329	4.831424	5.010609	2.28610738
18	4.976597	4.873405	4.971087	2.32604498
19	4.96922	4.905983	4.926168	2.35977196
20	4.957584	4.92707	4.876642	2.39534238
21	4.942502	4.936564	4.823302	2.43301138
22	4.924734	4.936167	4.767042	2.4709643
23	4.905043	4.927605	4.708867	2.50749196



Axiom Objects | Menu Report | GC Performance Attribution | Yield Curves | Aligned Menu Report | Simple Data Pull

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Data Pull Report

WILSHIRE AXIOM SIMPLE DATA PULL REPORT

Date	5/30/2008	5/30/2008	5/30/2008	5/30/2008
Item	***COUP***	***YTE***	***EDUR***	***RMISSUER***
912810DF	12	10.27448177	1.060516477	United States Treas
912810DJ	13.25	2.690867662	0.91728425	United States Treas
912810DL	12.5	2.766834736	1.115472317	United States Treas
628855AL	9.375	4.806811333	1.198809266	BANK OF AMERICA COR
638585AN	7.75	6.079410553	5.433478355	BANK OF AMERICA COR
638585AP	7.25	6.792870522	9.642663002	BANK OF AMERICA COR
638585AU	7.800000191	6.410964489	6.030844212	BANK OF AMERICA COR
638585BF	6.800000191	6.897952557	10.30451012	BANK OF AMERICA COR
638585BH	6.599999905	4.693412304	1.823327065	BANK OF AMERICA COR
066050CV	5.875	3.46628356	0.682395339	BANK OF AMERICA COR
060505AD	7.800000191	4.576443195	1.566069245	BANK OF AMERICA COR
055451AA	4.800000191	5.246818066	4.256644726	BHP BILLITON FINANC
172967CH	3.625	3.845243692	0.669874132	CITIGROUP INC.
172967CK	5.125	5.320649147	5.022890568	CITIGROUP INC.
172967CN	4.25	4.351470947	1.108712792	CITIGROUP INC.
172967CQ	5	6.250532627	5.208849907	CITIGROUP INC.
172967CT	5.849999905	6.889720917	11.77426052	CITIGROUP INC.
172967CU	4.125	4.378502369	1.631945372	CITIGROUP INC.
40428EJQ	4.625	5.567946434	4.975536823	HSBC BANK USA, N.A.
4042Q0AN	3.875	4.44332695	1.235711455	HSBC BANK USA, N.A.
4042Q1AA	5.875	6.754128456	12.16798019	HSBC BANK USA, N.A.
4042Q1AB	5.625	6.769766808	12.22245789	HSBC BANK USA, N.A.
4042Q1AC	6	5.899773598	6.827139854	HSBC BANK USA, N.A.

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Contact Information

- Please contact us with any questions, or if you want additional information about Wilshire Axiom or the products/services offered by Wilshire Fixed Income Analytics

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- **Peter Matheos, PhD, Senior Managing Director and Principal – Head of Wilshire Fixed Income Analytics (FIA)**
  - Dr. Peter Matheos joined Wilshire in 1999 and is based in the Santa Monica office. Prior to his current role, Dr. Matheos led the Quantitative Research and Quality Assurance efforts for the Wilshire Axiom and the Wilshire Atlas℠. In that role, Dr. Matheos spearheaded the development of financial models and econometric techniques used today in Wilshire's technology solutions, including Wilshire's Global Credit Issuer Risk Model and Wilshire's GR6 Global Equity Risk Model. Dr. Matheos earned his BA in Pure Mathematics from the University of Chicago and his PhD in Pure Mathematics from University of California, Los Angeles.
- **Mark Lewis, Managing Director and Principal – Head of Global Business Development and Global Relationship Development, FIA**
  - Mark Lewis joined Wilshire in 2006 and is based in the Santa Monica office. Prior to his current role, Mr. Lewis spent more than 17 years in fixed income sales and trading to financial institutions, governments, foundations, and insurance companies throughout the United States, specializing in high grade corporate bonds, government agencies, and municipal securities. He has worked at Bear Stearns, PaineWebber and Shearson Lehman Hutton.

Wilshire Fixed Income Analytics (2)

- **John Winslow, Managing Director and Principal – Head of Research and Development, FIA**
  - John Winslow joined Wilshire in 1996 and is based in the Santa Monica office. Prior to his current role, Mr. Winslow managed Wilshire Axiom client relationships in the U.S. and South America, and participated in the development of fixed income analytics solutions. Prior to joining Wilshire, Mr. Winslow worked for The Vanguard Group in Malvern, PA on the fixed income trading desk, specializing in both active and passive portfolio management and derivatives. Mr. Winslow earned his BS in Finance from Rider College and his MS in Finance from Drexel University.
- **Yong Liu, Managing Director – Head of Structured Finance, Quality Assurance and Database, FIA**
  - Yong Liu joined Wilshire in 1998 and is based in the Santa Monica office. Prior to joining Wilshire, Mr. Liu was a senior secondary marketing analyst at Impac Mortgage Holdings, providing securitization analysis on residential and commercial mortgage loans. Mr. Liu earned his BA in Applied Mathematics/Computer Science from Columbia University and his MA in Economics from University of California, Los Angeles.

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