

GETTING THE MOST OUT OF AXIS

Volume 1 | **FALL 2014**

WELCOME TO THE AXIS NEWSLETTER!

Editor's words: We are very excited to present the first edition of our AXIS modeling newsletter. This newsletter focuses on how to get the most from GGY's actuarial software product, AXIS. Our aim is to keep you abreast of significant system features and capabilities as they relate to trends we are seeing in the industry, and to provide some useful tips and tricks for navigating the system. We hope you enjoy the newsletter and find it informative. Please look for our second edition in Spring 2015.

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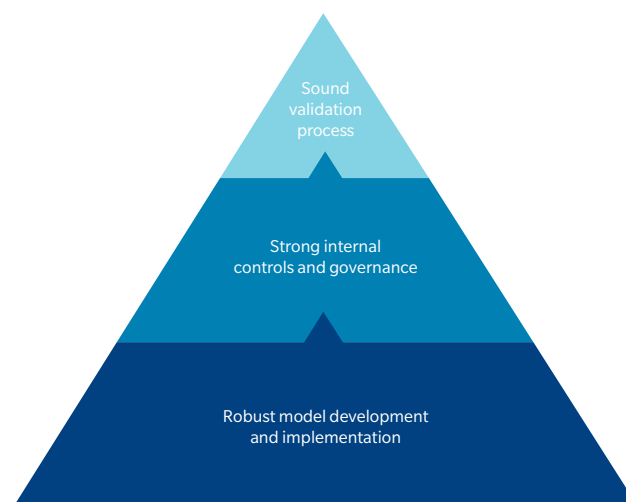
EXECUTIVE CORNER

AXIS ENTERPRISELINK

THE COMPLEMENT TO A COMPREHENSIVE MODEL GOVERNANCE POLICY

Insurance companies rely on pricing, valuation, and projection models for key business decisions and financial reporting. Model governance is vital for maintaining a competitive edge and managing risk. Comprehensive model risk management requires robust model development and implementation, strong internal controls and governance, and a sound model validation process.

Exhibit 1: Foundations of model risk management



KEY E-LINK FEATURES

- All-in-one platform
- Dataset version control
- Customizable user groups, roles, and work area permissions
- Backup, system log, and audit capabilities
- GridLink integration, run automation, and job scheduling



A comprehensive and sound model governance policy is key to safeguarding the financial well-being of your company and E-Link might be the right tool to get you there.



THE E-LINK PLATFORM

AXIS EnterpriseLink (E-Link) is a centralized, server-based model management platform that is available as part of the standard AXIS license. It provides companies with an automated and inclusive platform to address several key areas of model controls and governance. It also provides a secure enterprise-level environment for AXIS model development, testing, and production.

The following features offer a few examples of how E-Link aids model governance:

- **Dataset Version Control** supports comprehensive model change management. Dataset Version Control supports the model development and implementation process, allowing the user to track all Dataset edits and to access any intermediate Dataset versions to implement, discard or revise edits.
- **Automation of production and maintenance processes** using scripted jobs contributes to a standardized practice and limits manual intervention. Processes are streamlined by calling sequential procedures in an automated job, which are sent to the server farm for calculation.
- **Designated administrators or managers** control and maintain user permissions that dictate individual user access and capabilities. The combination of well-defined user roles and work areas establishes the security levels required for strong and transparent internal controls.
- **Business continuity features** support failover procedures and mechanisms for easy data migration in support of disaster recovery or equipment upgrades, helping mitigate operational risk.

ENTERPRISELINK SOLO

The E-Link platform has recently been brought onto the desktop with AXIS EnterpriseLink Solo (E-Link Solo). E-Link Solo is a personal edition of the E-Link operating platform and is designed for installation and use on an end-user desktop or laptop computer.

E-Link Solo allows users who are not connected to corporate E-Link servers to run AXIS on their local machines on a controlled and managed platform. While this platform is similar to the server-based version, it is not equivalent to the full E-Link installation. However, E-Link Solo provides users an opportunity to explore E-Link functionality in the absence of a server-based environment; for example, E-Link Solo could be used to test new E-Link releases before upgrading corporate installations.

ASSET MODELING IN AXIS

More and more insurance companies are building integrated asset-liability models for cash flow testing, capital planning, asset-liability management, economic capital calculations, application of certain reserve and capital standards, and a variety of other purposes. Our clients often ask us about the asset modeling capabilities of AXIS. Because AXIS has long-supported Canadian financial reporting requirements, where the reserving methodology is an integrated asset-liability approach, AXIS features robust asset and reinvestment modeling capabilities.

In AXIS, the Asset Module, Reinvestment Module, Hedge Projection Module, and Daily Hedging Module directly support the modeling and/or pricing of a comprehensive suite of financial instruments. In the following examples, we will expand on two common types of financial instruments modeled in the Asset Module: mortgages and puttable bonds. We will also introduce more sophisticated asset functionality: interest-sensitive assets and hedge assets.

MORTGAGES

There are many types of mortgages, but most can be defined by the key characteristics summarized in Exhibit 2.

AXIS allows you to model prepayment limitations and restrictions under a variety of pre-defined methodologies. There are four prepayment methodologies and four prepayment penalty options from which to choose. Further, if you require additional flexibility to model a customized prepayment assumption, the Asset Module allows for the use of a Formula Table to determine multiples of the Public Securities Association (PSA) prepayment model at a given policy month, as well as conditional prepayment rates (CPR).

Exhibit 2: Key mortgage characteristics

<h1>1</h1> <p>Interest rate</p> <ul style="list-style-type: none"> • Fixed or variable • Defined in the <i>Income rate</i> table or calculated 	<h1>2</h1> <p>Term</p> <ul style="list-style-type: none"> • The maturity date is often passed from the in-force asset extract 	<h1>3</h1> <p>Amortization schedule</p> <ul style="list-style-type: none"> • A variety of methods are available to derive the mortgage payments and amortization schedule 	<h1>4</h1> <p>Prepayments</p> <ul style="list-style-type: none"> • The user can specify any limitations or restrictions 	<h1>5</h1> <p>Renewals</p> <ul style="list-style-type: none"> • Renewals at term reset dates are defined conversely as mortgage “lapses”
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TIPS & TRICKS

Use protection

Lock objects in AXIS using one of two forms of Protection when high levels of control over object and process integrity are required.

- **Normal protection** prevents deletion or inadvertent changes. A protected object can be unprotected at any time. Thus, protected status must be confirmed and the object save date compared to the date the object was last protected to verify its integrity.
- **Superprotection** permanently prevents the object from being deleted or changed. Making changes to an object that has been superprotected involves creating a new object with a different name and substituting the new object for the old one.

The fields and assumptions to model a mortgage asset are captured in the following Asset Module Cell snapshot:

Exhibit 3: Illustrative Asset Module Cell inputs for mortgage assets

Asset Features			
Calculation type	1 - Mortgage		
Reporting type	1 - Mortgage		
Date of purchase	30 12 2013	Purchase price (\$)	1000.00
Date of maturity	30 12 2033	Maturity value (\$)	1000.00
Income rate	Flat 0.00	Mult 100.0%	Table Monthly Interest
		Table section	Monthly income rate
Asset Features - Mortgage			
Mortgage interest	0 - Use income rate table		
Mortgage payments	0 - Use payment table only		N = 4
		A = 0	B = 1
Mort payments	Flat 0.00	Mult 100.0%	Table Amortization Schedule
Asset Features - Embedded Option			
Mort prepay limits	100.0% Max Annual Prepayments		
Pricing/Projections			
Mortgage lapse	Flat 0.00	Mult 100.0%	Table Non-renewals at reset points
			Annual Mortgage lapses

PUTTABLE BONDS

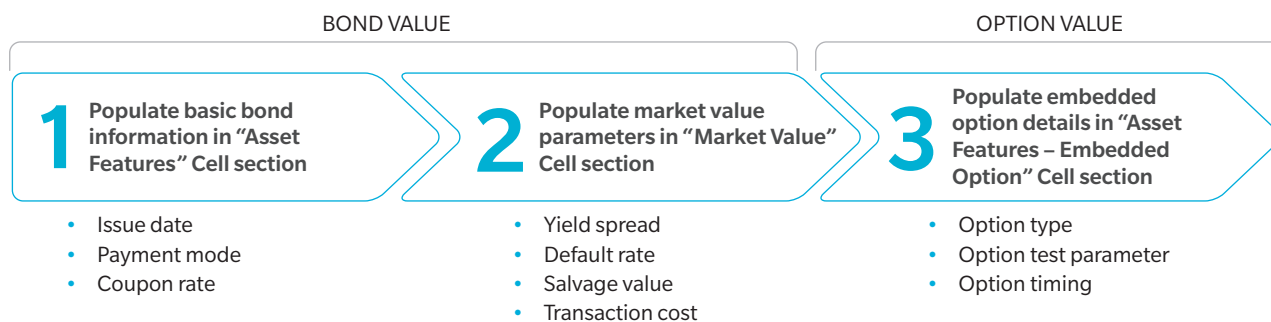
A puttable bond is a bond that allows the investor to demand early repayment of the principal portion of the bond. The value of a puttable bond is thus greater than that of an otherwise equivalent bond:

- Value of puttable bond = value of traditional bond + value of embedded option

The put option can have restrictions, such as timing between exercise or expiry dates, which should be reflected when modeling the asset. The embedded option can be modeled in the "Asset Features – Embedded Option" section of the Cell.

The Cell inputs required are an extension of those for a plain-vanilla bond, as demonstrated in Exhibit 4 below.

Exhibit 4: Defining a puttable bond in AXIS



TIPS & TRICKS

Basic instincts

- Create new Cells based on a copy of an existing Cell or “Base” Cell with preselected default assumptions. This streamlines the process of creating an “empty” Cell based on vendor defaults and setting the same basic assumptions for specific plan types, as well as ensures consistency of assumption-setting.
- A number of Base Cells may be useful for storing sets of assumptions that apply to different blocks of business. Name these Cells carefully and leverage the notepads to ensure they are used properly in creating new Cells. Consider storing Base Cells in a separate template or master Dataset and making use of protection features.

INTEREST-SENSITIVE ASSETS

With an interest-sensitive asset, interest rate changes have an impact on cash flows or maturity (e.g. coupon benchmarked to an index rate). The mortgage assets discussed above are considered interest-sensitive assets. Collateralized mortgage obligations (CMOs) are a more complex example. In a CMO, streams of principal repayments and interest on underlying mortgages are organized into components (called tranches) based on maturity, risk, coupon rate, or the terms of the deal structure. Investors are then able to choose the tranche that fits their investment needs and risk tolerance.

Modeling a CMO by first principles in AXIS requires the use of a Feature Code in the Reinvestment Module (#129, *Reinvestment CMO*). This feature is under Beta testing and is subject to change due to ongoing development.

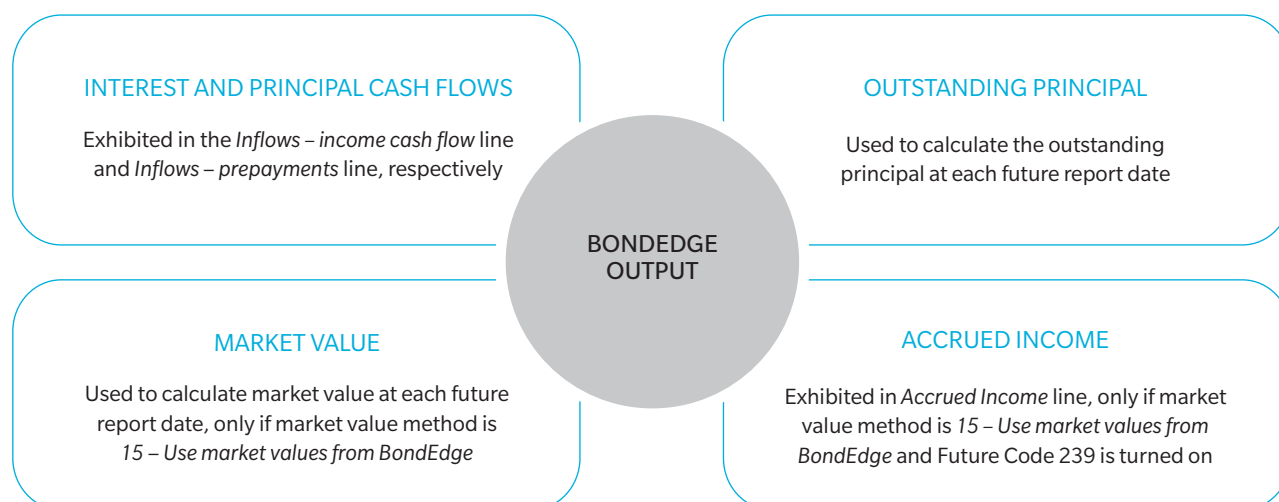
As of AXIS version 2014.11.02, in-force CMOs cannot be directly modeled in AXIS. Instead, one can use the BondEdge cash flow engine to reflect in-force CMOs indirectly. BondEdge is a service (requiring a separate license with Interactive Data Fixed Income Analytics) which uses CUSIPs to identify and uniquely model each asset.

Two options for interfacing BondEdge with AXIS are:

1. Generating cash flows in BondEdge and importing them into AXIS using a Supplement Table
2. Interactively calling the BondEdge cash flow engine to generate scenario-specific cash flows

AXIS can call BondEdge’s cash flow engine and database with the specified CUSIP and yield curves in the scenario being processed. The cash flow engine within BondEdge will then calculate and return items to AXIS as shown in Exhibit 5.

Exhibit 5: Values exported from BondEdge to AXIS



TIPS & TRICKS

Help me, Rhonda...

- Press the F1 key to access the Help files.
- This key is fully context-sensitive and delivers specific help on the field where the cursor is located in any assumption screen.

Hyperlinks will bring you to related information.

It should be noted that there are a number of feature codes that must be enabled to use BondEdge. These feature codes are detailed in the AXIS help text.

HEDGE ASSETS

As insurance products continue to grow in complexity, insurers increasingly turn to hedge assets for implementing risk management and volatility-reduction strategies. AXIS has a range of functionality for modeling hedge assets, reflecting both static and dynamic hedging, and integrating hedge asset calculations with liability logic to model management actions (e.g. dynamic cap setting for indexed products). We cover a subset of this extensive functionality below.

HEDGE ASSET FUNCTIONALITY IN THE ASSET MODULE

An interest rate swap is an agreement between two parties to exchange interest payment cash flows. A typical example is a swap of fixed and floating interest payments denominated in a particular currency.

AXIS allows this type of hedge asset to be set up in an Asset Module Cell when the *Calculation type* field is set to (7) - *Interest rate swap*, in the “Asset Cell – Asset Features” section. The majority of inputs for the payer side of the swap are in the “Asset Features – Swap” section, while the inputs for the receiver side are in the “Asset Features” section. Key feature fields are itemized in Exhibit 6.

Exhibit 6: Interest rate swap inputs by party

PAYER SIDE

- *Income rate (pay)* table
- *Payment mode (pay)* switch
- *Income rate type (pay)* switch
- *Notional exchange* switch
- *Notional amount (pay)* switch
- *Yield spread (pay)* table
- *Yield proportionate adjustment (pay)* table



RECEIVER SIDE

- *Income rate* table
- *Payment mode* switch
- *Income rate type* switch
- *Par value* field
- *Inforce par value* field
- *Yield spread* table
- *Yield proportionate adjustment* table

HEDGE ASSET FUNCTIONALITY IN THE LIABILITY MODULES

The AXIS Annuity Module and Universal Life Module both include hedge asset functionality to allow for accurate modeling of indexed products. For example, specific inputs exist in the Investment Account to mimic the purchase and sale of call options for purposes of dynamic cap setting.

In the case of an annual point-to-point cap design for an indexed universal life (IUL) product, the following transactions would be required to hedge the index credits:

- Buy a one-year call at a strike price equal to [current index value] x (1+ [guaranteed crediting rate]), and
- Sell a one-year call at a higher strike price, known as the “cap”

To model this design, definition of the hedge budget and hedge cost is required. A common derivation of these two figures (ignoring friction costs) is as follows:

- Hedge budget = ([portfolio rate] – [target spread] – [guaranteed crediting rate]) / (1 + [guaranteed crediting rate])
- Hedge cost = [cost of buying call] – [income from selling call with higher strike]



Next time you are building a model, remember that AXIS isn't just for modeling liabilities; there is a full suite of asset and hedge modeling capabilities as well.



Using Black-Scholes, AXIS can iteratively solve for the strike price of the call being sold that equates hedge cost to hedge budget under then-current market parameters. In other words, in any given projection period, AXIS can dynamically determine the appropriate current cap rate given the economic scenario being processed.

This algorithm is implemented in the Investment Account by selecting the appropriate table option for the *credited i* field and then coding an *EIUL credited rate [Formula]* table. Many of the required calculations have already been coded by GGY as a set of pre-defined functions that the user simply needs to parameterize.

More complex indexed crediting designs, such as monthly sum cap designs, can also be modeled in AXIS.

WHAT'S NEW IN AXIS

SQL LOCALDB DATABASE FOR DATALINK TABLE STORAGE

Description

- New database to store DataLink table data
- Key advantages
 - Improves storage/performance operations
 - More fields in a table
 - Increases capacity/performance of Queries

Details

- Version: 20141001

Learn more

- www.ggy.com/support/enhancebug/upddetail.asp?id=18393

BATCH SET

Description

- New type of Batch – Batch Set
 - Container to hold objects and distribute processing by Batch
 - Batches must be independent

Details

- Version: 20140903

Learn more

- www.ggy.com/support/enhancebug/upddetail.asp?id=18332

CHANGING SELECT STATEMENT IN REMOTE TABLE AND SETTING STATUS DATE

Description

- Two new functions available in Dataset Formula script
 - SetRemoteTableSQL
 - SetDataLinkTableStatusDate

Details

- Version: 20140402

Learn more

- www.ggy.com/support/enhancebug/upddetail.asp?id=17819

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