

Stylus Pro v11.5

Proxy Handling Features

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Introduction

One of the most common challenges in performing quantitative analysis of investment returns is that it requires dealing with time series of different lengths. In many cases this requires users to decide whether to:

- 1. Drop a series from analysis if its track record is too short.
- 2. Reduce the time frame of the analysis to the common period that is usually determined by the shortest time series.
- 3. Extend shorter time series by assigning another series, a "proxy series," having longer history.

In Stylus Pro version 11.5, we enhanced our Proxy Handling functionality, which allows users to perform both ad-hoc assignments of proxies to analyzed series as well as automated assignments based on fund classifications or more complex rules. Such proxy assignments can be saved in a Stylus study in the newly created Proxy node. They can also be used in multiple studies by saving them in the Proxy Library, a feature of Stylus Workspace. This document provides details of how to use proxy functionality in Stylus.

Proxies in Stylus Studies

Parameters: Proxy Node

The Parameters section in the design tree contains a **Proxy** node. This node allows users to choose one of the seven options for proxy assignment within the study, after enabling the *Use Proxy* checkbox: *Workspace Default, Series, Benchmark, Style, Peer, Library* and *None* (Figure 1).

Study Managers Parameters Advanced	\/ Design \/ Review \ \/ \/ Use Proxy Common assignments:	Series C Benchmark C Style C Peer C	Library @ None			
2 VaR "Foosy Style Outine Peer Groups Benchmarks Hedge Groups Dictionaries Peer Peer Peer Peer Peer Peer Peer Peer	Common assignments are not used. Use Individual	or Macro-based Proxy Assignments.				<u>S</u> ave
Dictionaries Views Reports	Apply to: Managers and Portfolio constituents	Indices in Style Outline Benchmarks Pee	er Group 🗌 Hedge Groups			
Reports	Use Individual or Macros-based Proxy Assignment	🕹 Add - 📝 Check All 🔲 Unchec	k All 🗙 <u>C</u> lear All			×
	Original Series	Proxy Series	Limit History Forced Periods	Original Series Range	Proxy Series Range	



Workspace Default: This setting allows users to proxy the return series using the category association within Stylus Workspace and the specified proxy assigned on the category. Stylus Pro has mappings for several databases, including the Morningstar US family of databases and HFR database. Figure 2 shows an example of the default assignments of Proxy Series within Stylus Workspace. Users with an Advanced Analytics license can modify these assignments and create their own classification mappings.

Attribute: MPI Category: MStar 🔺	Default Model	Default Benchmark	Default Proxy
Allocation15% to 30% Equity	Allocation US 10	Dow Jones US Moderately Conservative Po	Dow Jones US Conservative Portfolio Index
Allocation30% to 50% Equity	Allocation US 10	Dow Jones US Moderately Conservative Po	Dow Jones US Moderately Conservative Portfoli
Allocation50% to 70% Equity	Allocation US 10	Dow Jones US Moderate Portfolio Index	Dow Jones US Noderate Portfolio Index
Allocation70% to 85% Equity	Allocation US 10	Dow Jones US Moderately Aggressive Port	Dow Jones US Moderately Aggressive Portfolio I
Allocation85%+ Equity	Allocation US 10	Dow Jones US Aggressive Portfolio Index	Dow Jones US Aggressive Portholio Index
Bank Loan	US Bank Loans	S&P/LSTA Leveraged Loan TR	S&P/LSTA Leveraged Loan TR
Bear Market	Global Equity Regions	S&F 500 Index	5&P 500 Index
China Region	China Equity by Style	MSCI China ND USD	MSCI China ND USD
Commodities Agriculture	Commodities Agriculture	Bloomberg Agriculture TR	Bloomberg Agriculture TR
Commodities Broad Basket	Commodities Broad	Bloomberg Commodity Index Total Return	Bloomberg Commodity Index Total Return
а м е			

Figure 2

Series: This setting allows users to assign a single proxy series (*S&P 500 Index* in the example below) to all the return series in the Stylus study.

Study	Design Review
 Managers 	
Manager 1	G Use Proxy
Manager 2	Common assignments: C Workspace Default C Series C Benchmark C Style C Peer C Library C None
 Parameters 	Selected proxy is used for all the relevant and applicable study series, unless overridden by individual proxy assignment.
/ Advanced	Selected proxy is used for all the relevant and applicable study seles, unless overhoden by individual proxy assignment.
🗶 VaR	
Proxy	S&P 500 Index MPI Indices Monthly S5500 D View
Style Outline	
Peer Groups	Save
Benchmarks	
Hedge Groups	Apply to: ☑Managers and Portfolio constituents □Indices in Style Outline □Benchmarks □Peer Group □Hedge Groups
Dictionaries	
Views	
Reports	Use Individual or Macros-based Proxy Assignment 🔒 Add - Check All Uncheck All X Clear All

Benchmark: This setting allows users to apply one of the benchmarks selected in the Stylus study as a proxy series for all the managers available in the study. It is possible to specify the benchmark by selecting either the name of it or the exact numeric position based on the list available under the Benchmark node of the design tree (from 1 to 9 and from -1 to -9).

/Design / Review \
Vise Proxy
Common assignments: C Workspace Default C Series Benchmark C Style C Peer C Library C None
Selected proxy is used for all the relevant and applicable study series, unless overridden by individual proxy assignment.
Benchmark 1
Apply to: Managers and Portfolio constituents Indices in Style Outline Benchmarks Peer Group Hedge Groups
Appy to. Immanagers and Fortubilo constituents Lindices in Style Outline Liberchimarks LiPeer Group Lineoge Groups
Limit Combined History
TUse Individual or Macros-based Proxy Assignment

Figure 4

Style: This setting allows users to assign a synthetic series built dynamically as a proxy series for all the managers selected in the Stylus study. The synthetic series construction process relies on the market factors listed under the Style Outline node of the study design tree; the market risk exposures are calculated by regressing the manager versus the market factors. It is possible to choose among three different types of exposures (as result of the multi-factor regression) to be used to build the synthetic series: *earliest, average* and *recent* exposure.

Study		/Design / Review
 Managers 		
Manager		Vise Proxy
 Parameters 		Common assignments: C Workspace Default C Series C Benchmark C Style C Peer C Library C None
/ Advanced		Proxy returns are computed based on the study model. They are updated automatically when study model or parameters change.
2 VaR		Proxy recurs are computed based on the study model. They are updated automatically when study model or parameters change.
Proxy		
✓ Style Outline Min ⇔ Max		© Earliest Exposure C Average Exposure C Recent Exposure
✓ \$ Cash 0.00 100.	00	
✓		
I S&P 500/Citi Growth 0.00 100.	00	
I S&P 500/Citi Value 0.00 100.	00	Apply to: Managers and Pottfolio constituents Indices in Style Outline Benchmarks Peer Group Hedge Groups
I S&P MidCap 400/Citi Growth 0.00 100.	00	Appy W. El Managers and Portonio constituents. El notces in orgie Outrine El benchmarks. El Peer Group El neuge Groups
I S&P MidCap 400/Citi Value 0.00 100.	00	Limit Combined History
I S&P SmallCap 600/Citi Growth 0.00 100.	00	Use Individual or Macros-based Proxy Assignment
I S&P SmallCap 600/Citi Value 0.00 100.	00	
Peer Groups		
Benchmarks		
Hedge Groups		
Dictionaries	4	
Views	•	
Reports		

Figure 5

Peer: This setting allows users to use either the average or the median of a peer group as a proxy series for all the managers selected in the Stylus study. The existing peer group must be loaded into the study under the Peer Groups node of the design tree in order to compute the proxy series.

Study	/Design (Review)
 Managers 	
Manager	C Use Proxy
 Parameters 	Common assignments: O Workspace Default O Series O Benchmark O Style O Peer O Library O None
J Advanced	Providence and the state of the
🞗 VaR	Proxy returns are computed based on the study peer group. They are updated automatically when peer group changes.
Proxy	
Style Outline	C Average Return C Median Return
 Peer Groups 	
🗹 🗓 Peer Group	
Benchmarks	
Hedge Groups	Apply to: ☑Managers and Portfolio constituents ☐Indices in Style Outline ☐Benchmarks ☐ Peer Group ☐Hedge Groups
Dictionaries	Apply to: Ediminiagers and Folioto constituents E indices in Style Outline E benchmarks E Peer Gloup E Nedge Gloups
Views	Limit Combined History
Reports	□Use Individual or Macros-based Proxy Assignment

Figure 6

Library: This setting allows users to link the Stylus study to a library of generic proxy rules set in the Stylus Workspace. This feature allows users to build a Proxy Library and use it in multiple Stylus studies.

Workspace has also been seeded with 3 Morningstar based libraries to provide access to the following indices as a proxy.

- Morningstar Best Fit Index
- Morningstar Primary Index
- Morningstar Prospectus Benchmark

Study	Design Review
 Managers 	
Manager	I Use Proxy
Parameters	Common assignments: C Workspace Default C Series C Benchmark C Style C Peer C Library C None
/ Advanced	Proxy definition and settings are retrieved from Stylus Workspace. Some of the settings may be overridden by selecting the options or individual assignments below.
🧏 VaR	Proxy deminition and settings are retrieved nom Stylus vvorkspace. Some of the settings may be overnoden by selecting the options of individual assignments below.
Proxy	
Style Outline	Proxy Rule
Peer Groups	
Benchmarks	
Hedge Groups	
Dictionaries &	Apply to: Vanagers and Portfolio constituents Indices in Style Outline Benchmarks Peer Group Hedge Groups
Views 🚱	Appry to. El Managers and Portiolio Constituents El indices in Style Outline El Benchmarks El Peer Gloup El Heoge Gloups
Reports 🚱	Limit Combined History
	Use Individual or Macros-based Proxy Assignment

Figure 7 - Stylus study

/	tixis mockup.sty	
 Itists Model Libraries Attributes Categories Categories Databases Templates Stress Tests Regime Models 	Common assignments: C Workspace Default C Series C Style C Peer C None Common assignments are not used. Use Individual or Macro-based Proxy Assignments.	
Scenario Analysis Proxy Library	Use Individual or Macros-based Proxy Assignment 🛛 🙀 Add 🛛 🗹 Check All	Unchec
Morningstar Best Fit Index	Original Series Proxy Series Limit History	Forced Pe
 Morningstar Primary Index Morningstar Prospectus Benchmark 		

Figure 8 - Stylus Workspace

Use Individual or Macro-based Proxy Assignments

This option allows users to assign an individual proxy to each series within the study. The option enables the grid shown in Figure 9. This option is also applicable when using one of the Common assignments and allows users to override any such assignment for specific series.

udy	/r	/Design (Review)						
Managers M Manager1 M Manager1 M Manager2 M Manager3 M Manager4 Parameters J Advanced 22 VaR [™] Parager	T C	JOesign (Review) Vuse Proxy Common assignments Workspace Default Series Benchmark Style Peer Library None Common assignments are not used. Use Individual or Macro-based Proxy Assignments. Individual or Macro-based Proxy Assignments.						
Style Outline Peer Groups	Ac	oply to: Vanagers and Portfolio	constituents Indices in S	Style Outline Benchn	arks Peer Group	Hedge Groups		
Benchmarks	(A. 2.)							
Hedge Groups		Use Individual or Macros-based Pr	oxy Assignment 🔄 Add	- Check All	Uncheck All	X <u>C</u> lear All		
Dictionaries		Original Series	Pr	oxy Series	Limit History	Forced Periods	Original Series Range	Proxy Series Range
Views		Manager 1	S&P 500 Growth				201601 202002	197501 202002
Reports			S&P 500 Growth				201902 202002	197501 202002
			S&P 500 Value				201901 202002	197501 202002
		Manager 4	S&P 500 Value				201810 202002	197501 202002
	-							

Figure 9

The grid can be updated manually by adding series to "Original Series" column. It can also be populated by clicking the arrow next to "Add" button and selecting one of the options:

- 1. Add from databases
- 2. Add managers
- 3. Add indices
- 4. Add benchmarks
- 5. Add peer group series
- 6. Add sources

Notes:

- When a user selects a portfolio (.fnd file) the constituents of the portfolio will be added to the grid.
- Removing a series from the design tree does not automatically remove the series from this grid.

The Forced Periods field can be used to override the returns of any period with the proxy returns. This is often helpful when a manager starts and has a partial period return for the first month.

Column Definitions

Table 1

Original Series	Series for which the proxy is being defined
Proxy Series	Series which is being used to fill in the returns of the Original Series
Limit History	Maximum length of track record to be used within the study. The length specified is equal to Original History + Proxy used. For example, if the original manager has five years of history and the Limit History is specified as 10Y (10 years) then the combined series (original series + proxy) will be limited to no more than 10 years even if the Proxy series has a significantly longer history.

	The limit is specified as nP, where n is the number of periods and P is the period type (D: days, W: weeks, M: months, Q: quarters, Y: years). For example, 120M.
Forced Periods	Time periods to be overridden from the proxy series, even if the original series has returns for those periods. (A specified return value can also be specified instead of a proxy return). For example 20120501, 2013010120131231, 20150515[0.1408], 2015010120151231[0.00].
Series Range	Shows the range of the original series (before proxy is applied)
Proxy Range	Shows the range of the proxy series
Check box column (left)	No proxy is applied to the series unless the checkbox is in checked. Users can check individual check boxes and also use Check/Uncheck buttons on top of the grid.

Proxy Information

Design Tree

When a returns series has a proxy assigned, it will appear underlined in the Design Tree. This is to help give a visual hint that a proxy is in use.

Study	Design (Review)
 Managers 	
M American Century Small Company A	Use Proxy
M BlackRock NJ Municipal Bond Instl	Common assignments:
M JHancock Fundamental Large Cap Core A	Selected provv is used
	Salactan brown is lisar



The proxy information will also appear at the bottom right of the manager detail pane. In addition, you can see which returns are actually being used in the analysis through the "Used in Study" column.

Label:	Database: Mfi	ld:			
American Century Small Company A	Mstar US	FOUSA02SLA			🥪 Edit
Description:	American Century Sma	all Company A			
	, · · ·	Memo			
					\$
T Adjust Series					
Date format:		Return units:		Frequency:	Currency:
YYYYMMDD	1%		-	Monthly 🔽	USD 🚽
Date AReturn		Used in Study		Type:	Series Type:
199705	NA	11.1249			Return 🗾
199706 199707	NA NA	4.2858 4.6531		Since Inception:	. 0000007
199708	NA	2.2882			date: 20000907
199709	NA	7.3192		End	date: 202002
199710	NA	-4.3929		Fractional r	eturn: N/A
199711	NA	-0.6470			eturn: 6.533000
199712	NA	1.7506		Total I	etum: j0.555000
199801	NA	-1.5783		Proxy Info:	
199802 199803	NA NA	7.3945 4.1237		Russell 2000 Index	
199804	NA	4.1237		Limits: 0	, 0
199805	NA	-5.3856		Filled: 1979013	1 19980731
199806	NA	0.2103			
199807	NA	-8.0955	02		
199808	-20.016640	-20.0166			
199809	5.728000	5.7280			
199810	4.469990	4.4699			
199811	6.312720	6.3127			
199812	6.786290	6.7862	90		

Figure 11

A Review tab has also been added to give a summary view of all the proxy series being used and the time range for each.

/Design / Review							
	Original Series	Original Series Range	Proxy Series	Proxy Series Range	Proxied Range		
Manager	American Century Small Company A	199808 202002	Russell 2000 Index	197901 202003	197901199807		
Manager	BlackRock NJ Municipal Bond Instl	199009 202002	ICE BofA US Municipal Securities Inde	198901 202003	198901199008		
Manager	JHancock Fundamental Large Cap Core A	201106 201601	Russell 1000 Index	197901 202003	197901201105		



Proxied Range indicates the time period the proxy is being used in the study as the source of the returns for the Original Series.

Other Options Apply To

By default, proxies are applied to individual managers and managers within portfolios specified by the Manager node on the design tree. Users can also enable proxy use for series specified in other sections of the design tree as shown in Figure 13.

Apply to: 🗹 Managers and Portfolio constituents 🗌 Indices in Style Outline 🗎 Benchmarks 🗋 Peer Group 🗋 Hedge Groups

Figure 13

Limit Combined History

✓ Limit Combined History	
Fill Forward	
Limit combined history to: 🛛 🗗 🚔 🔿 days 🔿 weeks 🔅 months	O quarters O years
Restrict to series with history less than: 0 🚔 C days C weeks C months	C quarters C years ("0" - no restriction)

Figure 14

When checked, this option will limit the history of combined series (original + proxy) to the specified number of days, weeks, months, quarters or years.

Fill Forward: This option turns on proxy returns for any time periods after a return series ends.

Reporting Proxy Information

In order to include proxy information in views and reports, several system properties have been added:

Table 2

STY_PROXYDBID	Database ID of the proxy series
STY_PROXYFILEID	File ID of the proxy series
STY_PROXYLBL	Label of the proxy series
STY_PROXYSTART	Start date of the combined (proxy + original series)
STY_PROXYEND	Last date the proxy series is used

In addition, relevant property options have been added to @SELF, @MNG and related macros. Please see our macro reference guide for more information.

Properties block can be used in reports and views to display proxy information.

Advanced Proxy Specification

When using the Individual Proxy assignment option, it is possible to specify both the series to be proxied and the series being used as a proxy in Stylus expressions and macros. The following example shows how to specify a category average series from the Morningstar database to be used as a proxy.

	Original Series	Proxy Series
V	decode('@SELF{DBID}','Mfi',1,'Mce',1,'Mfv',1)=1	[@SELF{DBID}]@DBF{@SELF{DBID},@SELF{FILEID},Category Code}

Figure 15

The original series option specifies that any series where database ID is either "Mfi", "Mce" or "Mfv" will use the series that has an ID matching the category code. The category field for each fund within the above-mentioned databases will be represented as a two-letter code. The code will also correspond to an ID for a category average series (named as Cat: <Category Name>).

	Cat Code	STY_DBID	STY_PROXYLBL	STY_PROXYSTART	STY_PROXYEND
1290 Multi-Alternative Strategies R	GY	Mfi	Cat: Multialternative	20080430	20150731
1290 High Yield Bond A	HY	Mfi	Cat: High Yield Bond	20080430	20141128
1290 DoubleLine Dynamic Allocation I	CA	Mfi	Cat: Allocation30% to 50% Equity	20080430	20160331
1290 Low Volatility Global Equity I	WS	Mfi	Cat: World Large Stock	20080430	20170228
1290 GAMCO Small/Mid Cap Value T	SB	Mfi	Cat: Small Blend	20080430	20141128
AMG Pantheon Advisory	MR	Mce	Cat: Miscellaneous Sector	20130228	20130430
1290 VT Convertible Securities K	CV	Mfv	Cat: Convertibles	20080430	20131031
AGFiQ US Market Neutral Anti-Beta	NE	Met	S&P 500 Index	19730131	20110930
ALPS Disruptive Technologies ETF	ST	Met	S&P 500 Index	19730131	20171229



Saving a Proxy

Proxy set up in a study can be saved and placed in a Proxy Library within Stylus Workspace. This is accomplished by clicking on the "Save" button in the top right corner of the proxy definition screen (Figure 17).

Use Proxy								
Common assignments: C Workspace Default C Series C Benchmark C Style C Peer C Library C None								
Selected proxy is used for all the relevant and applica		ridden by individual proxy	assignment.					
					E Save			

Figure 17

Once saved, the proxy will be placed in the Proxy Library section of Stylus Workspace (Figure 18).

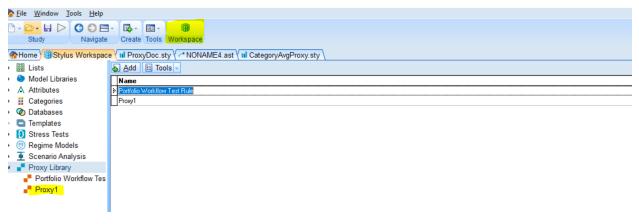


Figure 18

In Workspace, users can review and edit saved proxy configurations by clicking on the proxy name in the left navigation tree. Users can also create reusable proxy configurations from scratch within Stylus Workspace by clicking on the Add button.

Proxy Use in Other Modules

Proxy functionality can also be used in Allocator and Prospector studies similar to how they are used in Stylus studies.