

Markowitz Module

The objective of this module is to calculate efficient portfolio compositions under various conditions (short sales allowed or not, riskless lending or borrowing or not) and under simplifying assumptions (full Markowitz variance model, single index model, constant correlation model, multiple index model).

See Elton and Gruber: Modern Portfolio Theory and Investment Analysis, 5th ed., Chapters 4, 5, 6, 7, 8, and 9 for the theory behind, and description of, the models used in this section of the program.

The Overview section presents an overall description of the module and suggestions on how to use it.

Help is provided on the following topics.

File
Edit
Asset
Group

Optimizer
Options

Overview

The Markowitz module allows you to calculate efficient portfolio compositions under various conditions (short sales allowed or not, riskless lending or borrowing or not) and under simplifying assumptions (full Markowitz variance model, single index model, constant correlation model, multiple index model).

All analyses are performed on a group of securities. A group is usually defined by selecting a list of securities from an existing asset data base (Definitions of the various data bases and tables are provided under the Data Types heading.) To create a group, you must first load an asset/time series data base using the File/Open or File/Import menu items. (A shortcut File/Open button is also available on the button bar, located immediately under the menu bar.) The default extension for an asset data base file is .ats, and default data bases named "stock97.ats", "funds97.ats" and "index97.ats" are provided with the software.

Once the asset data base is loaded and displayed in a data grid, a group/time series can be created using the Asset/Create Group menu item and saved using File/Save. A default group/time series named "sample.gts" is provided with the software.

From a group/time series table, the Group menu items can be used to calculate and display various measures of the expected returns, volatility, and cross-correlation of the stocks comprising the group. Depending on the assumptions made, the results are displayed as a group/correlation table, group/single index table, group/constant correlation table, or group/multiple index table. Any group type can be saved using Group/Save table as and retrieved using File/Open.

You can then use the Optimizer to calculate the efficient frontier under various conditions (short sales allowed or not, riskless lending or borrowing or not), and display it graphically and numerically.

See Elton and Gruber: Modern Portfolio Theory and Investment Analysis, 5th ed., Chapters 4, 5, 6, 7, 8, and 9 for the theory behind, and description of, the models used in this section of the program.

Data Types

The following types of data bases and tables are used in the software. See Elton and Gruber: Modern Portfolio Theory and Investment Analysis, 5th ed., Chapters 4, 5, 6, 7, 8, and 9 for the theory behind, and description of, the models used in this section of the program.

asset/time series - default extension .ats

Time series of return on investment for a number of stocks, mutual funds or indices.

Example: stock97.gts

group/time series - default extension .gts

Time series of return on investment for a group of assets. A group time/series is usually a subset of an asset/time series.

Examples: sample.gts, index97.gts

group/correlation table - default extension .gct

Table of expected returns, standard deviation and correlation coefficients corresponding to a group/time series.

Example : sample97.gct

group/single index table - default extension .gsi

Table of expected return, standard deviation and Beta coefficients corresponding to a group/time series. The Beta coefficient calculations are based on an index selected from a group/time series (e.g., the default file "index97.gts").

Example: sample97.gsi

group/constant correlation table - default extension .gcc

Table of expected return, standard deviation and user-defined constant correlation coefficient corresponding to a group/time series.

Example: sample97.gcc

group/multiple index table - default extension .gmi

Table of expected return, standard deviation and regression coefficients corresponding to a group/time series. The regression coefficients are based on up to five indices selected from a group/time series (e.g., "index97.gts").

Example: sample97.gmi

Related topics: Group
 Data File Descriptions

Data File Descriptions

The Investment Portfolio software includes 11 data files. These data files are intended to be used with the software for pedagogical purposes only. Although every attempt has been made to ensure data accuracy, the authors, publisher, software developers, and data sources disclaim all responsibility for any inaccuracies.

"stock97.ats" contains monthly historical returns from January 1987 through December 1996 (10 years) on the following 24 stocks:

American Brands, Inc.	AMBRND
American Express Co.	AMEXP
Anheuser Busch	ANBUSCH
Chase Manhattan Bank	CHASE
Owens Corning	CORNING

Exxon Corp.	EXXON
Georgia Pacific Corp.	GAPAC
General Electric Co.	GE
General Motors Corp.	GM
Goodyear Tire & Rubber Co.	GYEAR
Huffly	HUFFY
International Business Machines	IBM
Eastman Kodak Co.	KODAK
Kroger Company	KROGER
Eli Lilly & Co.	LILLY
Merck & Co., Inc.	MERCK
Merrill Lynch	MERRILL
Mobil Corp.	MOBIL
NYNEX	NYNEX
Olin Corp.	OLIN
Pepsico, Inc.	PEPSI
Sears Roebuck & Co.	SEARS
Waste Management, Inc.	WASTE
Xerox, Inc.	XEROX

"index97.ats" contains monthly historical returns from January 1987 through December 1996 (10 years) on the following fourteen indices:

CRSP SBBI S&P 500 Stock Index	S&P500	(with reinvested dividends)
CRSP Value-Weighted NYSE Stock Index	CRSP VW	
CRSP Equal-Weighted NYSE Stock Index	CRSP EW	
Russell 2000 Stock Index	R 2000	
CRSP SBBI 30-Day T-Bill	TBILL	
Corporate Bond Index	CORP BD	
Government Bond Index	GOVT BD	
Mortgage Bond Index	MTG BD	
High Yield Bond Index	HIYLD BD	
Fama/French Market Index	FFMKT	(not in excess-return form)
Fama/French Size Index	FFSMB	
Fama/French Book-To-Market Index	FFHML	
FFSMB Plus TBILL	FFSMB1	
FFHML Plus TBILL	FFHML1	

"fund97.ats" contains monthly historical returns from January 1987 through December 1996 (10 years) on 45 mutual funds. Each mutual fund is given a six-letter name. The first three letters in the fund name indicate the fund's investment objective as follows:

BCP = corporate bond fund
 BGV = government bond fund
 BHY = high yield bond fund
 BIN = international bond fund
 BMG = government mortgage bond fund
 BMM = government money market fund
 MBL = balanced mixed fund
 MTR = total return mixed fund
 SAG = aggressive growth stock fund
 SEI = equity income stock fund
 SGR = growth stock fund
 SIN = international stock fund
 SMK = stock market index fund
 SSS = small-cap stock fund

The following mutual funds are included:

Acorn Inv: Acorn Fund	SSSACN
AIM Balanced/A	MBLAIM
AIM Equity: Constellation	SAGAIM
AIM: High Yield/A	BHYAIM
Alliance Balanced Shs/A	MBLALL
American Balanced	MBLAMB
American National Income	SEIAMN
Babson Bond Trust: Port L	BCPBAB
Calvert Soc Inv: Mgd Grth	MTRCAL
Colonial High Yield Sec/A	BHYCOL
Composite Bond & Stock/A	MBLCOM
Delaware Ltd Term Govt/A	BGVDEL
DFA: US 9-10 Small Company	SMKDFA
Dodge & Cox Balanced	MBLD&C
Federated Govt 2-5 Yrs	BGVFED
INVESCO Adv: Income/C	BGVINV
Lexington GNMA Income	BMGLEX
Lexington Wldwd Emerg Mkt	SINLEX
Matterhorn Growth Fund	SGRMAT
MFS World Governments/A	BINMFS
Oppenheimer Equity Income/A	SEIOPP
Phoenix Srs: Convertible	MTRPHC
Phoenix Srs: Growth	SGRPHX
Pilgrim Amer Magnacap/A	MTRPIL
Pilgrim Govt Sec Inc Grth/A	BGVPII
Putnam Convert Inc Grth/A	MTRPUT
Putnam Voyager/A	SAGPUT
Rea-Graham: Balanced	MBLREA
Safeco Income	SEISCO
Scudder International	SINSCD
Seligman Growth/A	SGRSEL
Sequoia Fund	SGRSEQ
Stratton Monthly Dividend	SEISTN
T Rowe Price Intl Stock	SINTRP
T Rowe Price New Horizons	SSSTRP
Templeton Funds: Foreign	SINTMP
Twentieth Century: Ultra	SSS20C
United Income	SEIUNI
United International Grth	SINUNI
Value Line Special Situations	SAGVAL
Value Line US Govt Sec	BGVVAL
Vanguard Explorer	SSSVAN
Vanguard Index: 500 Port	SMKVAN
Vanguard MM Rsv: Federal	BMMVAN
Vanguard World: US Growth	SGRVAN

"valuea97.val" and "valueb97.val" contain stock valuation data for the 24 stocks contained in "stock97.ats".

"valuea97.val" has valuation date as of January 2, 1996.

"valueb97.val" has valuation date as of January 2, 1997.

"option97.opt" contains option valuation data for 7 of the stocks contained in "stock97.ats".

"future97.fut" contains futures valuation data for the following financial futures:

S&P 500 Stock Index	STK1
91-Day T-Bills	TBL1
Japanese Yen	CUR1

British Pound	CUR2
Canadian Dollar	CUR3
German Mark	CUR4

"bonda97.bdc" and "bondc97.bdc" contain bond valuation data for Treasury coupon bonds. "bondb97.bdz" and "bondd97.bdz" contain bond valuation data for Treasury zero-coupon bonds.

"bonda97.bdc" and "bondb97.bdz" have valuation dates as of February 15, 1996. "bondc97.bdc" and "bondd97.bdz" have valuation dates as of August 15, 1996.

Related Topics: Data Types

Data Grid

Numerical data bases are presented in spreadsheet-like tables identified as data grids.

A row of buttons at the top of the grid and a column of buttons on the left of the grid contain column headings and row headings, respectively. These headings are often abbreviated. Selecting a heading button (by clicking it with the mouse) and pressing the <F1> key pops up a message box containing the full description.

The content of a cell in a data grid can be edited by double-clicking on it, or by single-clicking on it and pressing the <Enter> key. Grid elements not available for editing are grayed out.

The structure of the table (number and headings of rows and columns) can be modified using the Edit menu item or the equivalent button bar elements.

File menu

The File menu allows you to retrieve data from or store data to the disk, and to send data to the printer.

Related Topics

- New
- Open
- Save
- Save as
- Import
- Print
- Printer setup
- Exit

New

Use New to create a new data base.

You will be prompted for the type of data base you want to create (asset/time series, group/time series, group/correlation; table, group/single index table, group/constant correlation table, group/multiple index table).

An empty data grid will be displayed, ready for editing.

Open

Use the Open command to load an existing data base. The default extensions for data bases are:

.ats for asset/time series
.gts for group/time series
.gct for group/correlation table
.gsi for group/single index table
.gcc for group/constant correlation table
.gmi for group/multiple index table

The data will be displayed in a data grid.

Save/Save as

Use Save to save the current data base under its current name.

Use Save as to save the current data base under a new name.

Import

Use this command to import a data base. Whenever you are importing your own data set, this is the command you must use. The file format that must be used to import a data set is compatible with the output generated by most commercial spreadsheet packages (Tab delimited file). In Excel, for instance, proceed as follows. First click on File. Then click on Save as. When the screen appears, choose "Text (Tab Delimited) (*.TXT)" in the box titled Save as Type. This will automatically save the file in a format that can be read into the investment portfolio software.

The data for an asset data base file must follow the format of the sample file "stock97.txt" provided with the software. This file can be loaded in your favorite spreadsheet program and be used as a template.

The first line defines the table structure, and must contain the asset names (one column per asset).

The following lines define the monthly total returns (in %). The first column in each line is the date in YYYYMM format.

Print/Printer setup

Use Print to print the current data grid.

Use Printer setup to specify the printer to be used, the paper orientation (portrait or landscape), etc.

Exit

Use this command to exit from the software and return control to Windows.

You will be warned if the current data base has been edited since last saved, and you will have the opportunity to save it before exiting.

Edit

From the Edit menu:

Use Copy graph to copy a currently active graph on the clipboard.

Use Change asset to modify the row structure of an asset data grid.

Use Change period to modify the column structure of an asset or group data grid.

Use Change group to modify the row structure of a group data grid.

Asset

Use the Create Group menu item to define a group/time series from the currently- loaded asset/time series data base.

Group

Use the Group menu items to prepare group data for running the optimizer.

(Note: Most of these items are also available as labeled "tabs" on top of the data grid. Clicking a tab has the same effect as selecting the corresponding menu item.)

When a group/time series (tab label: "TS Table") is loaded and displayed in the data grid, the Time series graph item allows you to plot the time series on a graph.

The Covariance table (tab label: "Cov Table") and Correlation table (tab label: "Cor Table") items calculate the expected return, standard deviation and, respectively, the covariance or correlation coefficients for all stocks in the group.

The Single index (tab label: "SI Table") item calculates the expected return, standard deviation and Beta for all stocks in the group.

You will be prompted to select a group time series in which to select the market index needed to calculate the Beta coefficient. Once a group/single index table is displayed, you can use Beta Graph to plot the stocks in the Beta-expected return space.

The Constant correlation (tab label: "CC Table") item calculates the expected return and standard deviation for all stocks in the group. You will be prompted to enter the constant correlation coefficient.

The Multiple index (tab label: "MI Table") item calculates the expected return, standard deviation and regression coefficients for all stocks in the group. You will be prompted to select a group time series in which to select the market indices needed to calculate the regression coefficients.

Save table as allows you to save a correlation, covariance, constant correlation, or single or multiple index table to a file.

Related topic: Data Types

Optimizer

When a group table is displayed in the data grid, the Run Optimizer item under the Optimizer menu (and the corresponding element in the button bar) is active.

When you run the optimizer, you are prompted for calculation options:

short sales allowed/with riskless lending and borrowing
short sales allowed/no riskless lending and borrowing
short sales not allowed/with riskless lending and borrowing
short sales not allowed/no riskless lending and borrowing
Lintner short sales allowed/with riskless lending and borrowing

If an option with riskless lending and borrowing is included, you are prompted to supply values for the lending and borrowing rates.

See Elton and Gruber: Modern Portfolio Theory and Investment Analysis, 5th ed., Chapters 4, 5, 6, 7, 8, and 9 for the theory behind, and description of, the models used in this section of the program.

The optimizer will then compute and display the efficient frontier on a plot.

The Zoom graph and Unzoom graph can be used to magnify or reduce the graph. You can drag the cursor (white diamond) on the graph, using the mouse, to explore numerical values of the expected return and standard deviation on the efficient frontier. Press the Tab key or the arrow keys to snap the cursor to the tangent portfolio (in the cases where riskless lending and borrowing is allowed) or to the corner portfolios (short sales allowed/no riskless lending and borrowing). Use Show Portfolio to display the composition of the portfolio at the current cursor location.

Use the Graph Securities item to plot individual securities on the efficient frontier diagram. Clicking on the dot representing an individual security displays its name, expected return, and standard deviation in the lower right corner of the graph window.

The Edit Custom Portfolios item allows you to define up to three portfolios containing securities selected from the current group. You have the option to plot these custom portfolios on the efficient frontier diagram. Clicking on the dot representing a portfolio displays its name, expected return, and standard deviation in the lower right corner of the graph window. The Save Custom Portfolio and Load Custom Portfolio allow you to save the current set of custom portfolios or load previously saved ones.

If short sales are not allowed, the "corner portfolios" (points on the efficient frontier where stocks enter or leave the portfolio) are marked on the plot. Use the <Tab> key or the arrow keys to locate the cursor exactly at the corner portfolios.

Use the Run editor menu item to return to the data grid, and run the optimizer with new options.

Options

Use the Return menu item to enter data in a time series data base in the form of monthly total return (in percent).

Use the Price and Dividend menu item to enter data in a time series data base in the form of current stock price and annual dividend.

Check the Hide cursor item if you do not wish to display the cursor (white diamond) and cross hairs on the efficient frontier graphs.

Equilibrium Module

The objective of this module is to present the Capital Asset Pricing Model (CAPM) and illustrate buy/sell decisions based on the position of individual securities relative to the security market line in Beta-Return space. See Elton and Gruber: Modern Portfolio Theory and Investment Analysis, 5th ed., Chapter 13 for the theory behind, and description of, the models used in this section of the program.

The Overview section presents an overall description of the module and suggestions on how to use it.

Help is provided on the following topics.

File

Print

Printer setup

Exit

Edit

Copy graph

CAPM

Graph CAPM

Graph securities

Clear securities

Overview

The Equilibrium module allows you to compare the risk(Beta)/return relationship of individual securities to the equilibrium risk/return relationship calculated under the CAPM model.

The first step is to select a security market line in Beta-Return space using the CAPM/Graph CAPM menu item. (A shortcut is available via a button on the button bar, which is located immediately under the menu bar).

Once the security market line is displayed, specific company stocks can be analyzed using the CAPM/Graph securities menu item or the corresponding button.

Graph CAPM

Use this menu item to plot a security market line in Beta-Return space.

The software will prompt you for the origin of data (data base or manual input).

If you choose to use data from the data base, the software will first prompt you to select a group/time series index file (e.g., "index97.gts"). It will then prompt you to select a riskless security index and an index representative of the market as a whole.

If you choose to input data manually, you will be prompted to enter the return of the riskless security (R_f) and of the market (R_m) in a dialog box.

The software then displays a plot of the security market line, defined by the points $[0, R_f]$ and $[1, R_m]$, in Beta-Return space.

Multiple security market lines, corresponding to different (R_f , R_m) sets, can be plotted simultaneously if the "clear graph" check box (in the "origin of data" dialog box) is left unchecked.

Data Types

The following types of data bases and tables are used in the Equilibrium module.

group/time series - default extension .gts

Time series of return on investment for a group of assets. A group time/series is usually a subset of an asset/time series.

Examples: index97.gts

group/single index table - default extension .gsi

Table of expected return, standard deviation and Beta coefficients corresponding to a group/time series. The Beta coefficient calculations are based on an index selected from a group/time series (e.g., the default file "index97.gts").

Example: sample97.gsi

Related topics: Data File Descriptions

Data File Descriptions

The Investment Portfolio software includes 11 data files. These data files are intended to be used with the software for pedagogical purposes only. Although every attempt has been made to ensure data accuracy, the authors, publisher, software developers, and data sources disclaim all responsibility for any inaccuracies.

"stock97.ats" contains monthly historical returns from January 1987 through December 1996 (10 years) on the following 24 stocks:

American Brands, Inc.	AMBRND
American Express Co.	AMEXP
Anheuser Busch	ANBUSCH
Chase Manhattan Bank	CHASE
Owens Corning	CORNING
Exxon Corp.	EXXON
Georgia Pacific Corp.	GAPAC
General Electric Co.	GE
General Motors Corp.	GM
Goodyear Tire & Rubber Co.	GYEAR
Huffy	HUFFY
International Business Machines	IBM
Eastman Kodak Co.	KODAK
Kroger Company	KROGER
Eli Lilly & Co.	LILLY
Merck & Co., Inc.	MERCK
Merrill Lynch	MERRILL
Mobil Corp.	MOBIL
NYNEX	NYNEX
Olin Corp.	OLIN
Pepsico, Inc.	PEPSI
Sears Roebuck & Co.	SEARS
Waste Management, Inc.	WASTE
Xerox, Inc.	XEROX

"index97.ats" contains monthly historical returns from January 1987 through December 1996 (10 years) on the following fourteen indices:

CRSP SBBI S&P 500 Stock Index	S&P500 (with reinvested dividends)
CRSP Value-Weighted NYSE Stock Index	CRSP VW
CRSP Equal-Weighted NYSE Stock Index	CRSP EW
Russell 2000 Stock Index	R 2000
CRSP SBBI 30-Day T-Bill	TBILL
Corporate Bond Index	CORP BD
Government Bond Index	GOVT BD
Mortgage Bond Index	MTG BD
High Yield Bond Index	HIYLD BD
Fama/French Market Index	FFMKT (not in excess-return form)
Fama/French Size Index	FFSMB
Fama/French Book-To-Market Index	FFHML
FFSMB Plus TBILL	FFSMB1
FFHML Plus TBILL	FFHML1

"fund97.ats" contains monthly historical returns from January 1987 through December 1996 (10 years) on 45 mutual funds. Each mutual fund is given a six-letter name. The first three letters in the fund name indicate the fund's investment objective as follows:

BCP = corporate bond fund
 BGV = government bond fund
 BHY = high yield bond fund
 BIN = international bond fund
 BMG = government mortgage bond fund
 BMM = government money market fund
 MBL = balanced mixed fund
 MTR = total return mixed fund
 SAG = aggressive growth stock fund
 SEI = equity income stock fund
 SGR = growth stock fund
 SIN = international stock fund
 SMK = stock market index fund
 SSS = small-cap stock fund

The following mutual funds are included:

Acorn Inv: Acorn Fund	SSSACN
AIM Balanced/A	MBLAIM
AIM Equity: Constellation	SAGAIM
AIM: High Yield/A	BHYAIM
Alliance Balanced Shs/A	MBLALL
American Balanced	MBLAMB
American National Income	SEIAMN
Babson Bond Trust: Port L	BCPBAB
Calvert Soc Inv: Mgd Grth	MTRCAL
Colonial High Yield Sec/A	BHYCOL
Composite Bond & Stock/A	MBLCOM
Delaware Ltd Term Govt/A	BGVDEL
DFA: US 9-10 Small Company	SMKDFA
Dodge & Cox Balanced	MBLD&C
Federated Govt 2-5 Yrs	BGVFED
INVESCO Adv: Income/C	BGVINV
Lexington GNMA Income	BMGLEX
Lexington Wldwd Emerg Mkt	SINLEX
Matterhorn Growth Fund	SGRMAT
MFS World Governments/A	BINMFS
Oppenheimer Equity Income/A	SEIOPP
Phoenix Srs: Convertible	MTRPHC
Phoenix Srs: Growth	SGRPHX
Pilgrim Amer Magnacap/A	MTRPIL
Pilgrim Govt Sec Inc Grth/A	BGVPII
Putnam Convert Inc Grth/A	MTRPUT
Putnam Voyager/A	SAGPUT
Rea-Graham: Balanced	MBLREA
Safeco Income	SEISCO
Scudder International	SINSCD
Seligman Growth/A	SGRSEL
Sequoia Fund	SGRSEQ
Stratton Monthly Dividend	SEISTN
T Rowe Price Intl Stock	SINTRP
T Rowe Price New Horizons	SSSTRP
Templeton Funds: Foreign	SINTMP
Twentieth Century: Ultra	SSS20C
United Income	SEIUNI
United International Grth	SINUNI
Value Line Special Situations	SAGVAL
Value Line US Govt Sec	BGVVAL
Vanguard Explorer	SSSVAN

Vanguard Index: 500 Port	SMKVAN
Vanguard MM Rsv: Federal	BMMVAN
Vanguard World: US Growth	SGRVAN

"valuea97.val" and "valueb97.val" contain stock valuation data for the 24 stocks contained in "stock97.ats".

"valuea97.val" has valuation date as of January 2, 1996.

"valueb97.val" has valuation date as of January 2, 1997.

"option97.opt" contains option valuation data for 7 of the stocks contained in "stock97.ats".

"future97.fut" contains futures valuation data for the following financial futures:

S&P 500 Stock Index	STK1
91-Day T-Bills	TBL1
Japanese Yen	CUR1
British Pound	CUR2
Canadian Dollar	CUR3
German Mark	CUR4

"bonda97.bdc" and "bondc97.bdc" contain bond valuation data for Treasury coupon bonds.

"bondb97.bdz" and "bondd97.bdz" contain bond valuation data for Treasury zero-coupon bonds.

"bonda97.bdc" and "bondb97.bdz" have valuation dates as of February 15, 1996.

"bondc97.bdc" and "bondd97.bdz" have valuation dates as of August 15, 1996.

Related Topics: Data Types

Button bar

The button bar, located immediately below the menu bar at the top of the main window, offers shortcut access to the most commonly-used menu items.

Active buttons are identified by color icons. Inactive buttons are grayed out to indicate that the corresponding function is not accessible from the current state of the program.

When the mouse pointer rests on top of any button bar element, a yellow help balloon pops up to identify the button functionality.

Graph securities

Use this menu item to plot selected securities on the same graph as the security market line.

The software will prompt you to select a group/single index file. It will then display the securities contained in this file on the Return-Beta plot.

You can identify the securities corresponding to each point on the plot, and read their Beta and Return values, using the left/right arrow keys or the <Tab> key.

File menu

The File menu allows you to send data to the printer.

Use Print to print the current data grid.

Use Printer setup to specify the printer to be used, the paper orientation (portrait or landscape), etc.

Use Exit to exit from the software and return control to Windows.

Edit

From the Edit menu, use the Copy Graph command to copy a currently-active graph to the clipboard.

CAPM

Use the CAPM menu to plot security market lines in Beta-Return space, according to the Capital Asset Pricing Model, and to plot individual securities on the same graph to help make buy/sell decisions.

Related Topics:

Graph CAPM
Graph securities
Clear securities

Graph CAPM

Use this menu item to plot a security market line in Beta-Return space.

The software will prompt you for the origin of data (data base or manual input).

If you choose to use data from the data base, the software will first prompt you to select a group/time series index file (e.g., "index97.gts"). It will then prompt you to select a riskless security index and an index representative of the market as a whole.

If you choose to input data manually, you will be prompted to enter the return of the riskless security (R_f) and of the market (R_m) in a dialog box.

The software then displays a plot of the security market line, defined by the points $[0, R_f]$ and $[1, R_m]$, in Beta-Return space.

Multiple security market lines, corresponding to different (R_f , R_m) sets, can be plotted simultaneously if the "clear graph" check box (in the "origin of data" dialog box) is left unchecked.

Graph securities

Use this menu item to plot selected securities on the same graph as the security market line.

The software will prompt you to select a group/single index file. It will then display the securities contained in this file on the Return-Beta plot.

You can identify the securities corresponding to each point on the plot, and read their Beta and Return values, using the left/right arrow keys or the <Tab> key.

Clear securities

Use this menu item to clear the security data points from the security market line plot.