

FEC 522: Financial Econometrics II

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- R files used for this course are available upon request.



Some Projects

From Our Recent Research



Recent (and ongoing) research projects.

The following slides give an outline of four projects.

- Project 1: Green Segmentation: A Cross-National Study
(with Barış Yılmazsoy & Angi Rösch)
- Project 2: OPEC Announcements and Oil Price Volatility
(with Angi Rösch)
- Project 3: Algorithmic Trading
(with Angi Rösch, Tolga Sezer, Vehbi Sinan Tunalıoğlu)
- Project 4: Population Dynamics With Leslie-Type Models
(with Angi Rösch & Narod Erkol)



Project 1:

Green Segmentation: A Cross-National Study

Some aspects.

- world facing environmental challenges
- business consequences
- shift in consumer attitude and preferences
- understanding the “green” consumer is important
- key concepts: attitudes, behavioural intentions
- theory of Reasoned Action:
attitudes \Rightarrow behavioural intentions \Rightarrow actual behaviour
- relationship between green attitudes and green behaviour:
no agreement in literature



Project 1:

Green Segmentation: A Cross-National Study

The questionnaire: Attitude items.

strongly agree / agree / indifferent / don't agree / don't agree at all

- Tenor, basic attitudes: A1, A4, A9
too much trouble; not too late to save the environment; natural resources are scarce
- Emotional concern: A2, A5, A8
responsible for global warming; frustrated with industries polluting; frightened with chemicals in food
- Scepticism: A3, A6, A7
job loss; green trend is marketing gimmick; benefits of consumer products more important



Project 1:

Green Segmentation: A Cross-National Study

The questionnaire: Behaviour items.

always / mostly / sometimes / rarely / never

- Daily behaviour: B1, B3, B8, B9
using public transport; re-usable bags; energy-saving light bulbs; recycling
- Consumption: B5, B6
products with less packaging; buying more expensive “greener alternative”
- Environmental activism: B2, B4, B7
advising others; participation in meetings; reading about environmental issues



Project 1:

Green Segmentation: A Cross-National Study

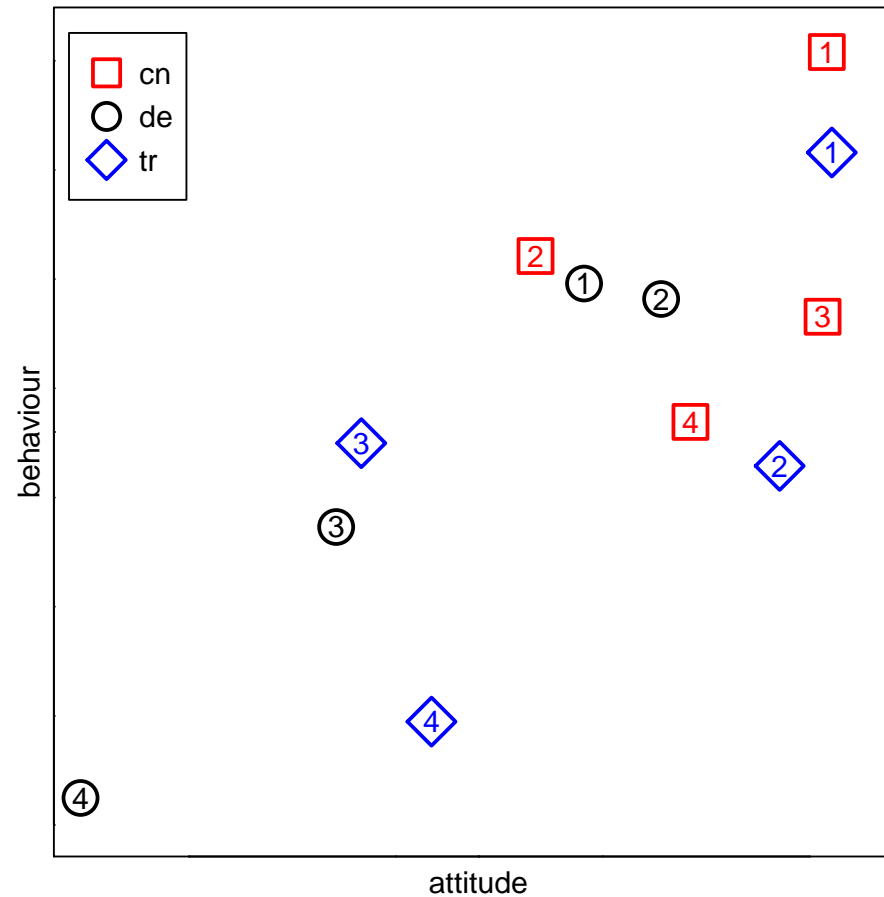
Data & Analysis.

- Data (convenience sample) from China (395), Germany (360), Turkey (660)
- students enrolled in business-related programmes in private/public universities
- “Split the difference”-method used to eliminate gender effect
- For each country: four segments (clusters) obtained using “pam”



Project 1: Green Segmentation: A Cross-National Study

Characterizing clusters.



Project 1:

Green Segmentation: A Cross-National Study

Managerial Implications.

- Focus on segment-specific customer expectations.
- Incentive for shifting customers to “greener segment”?
- “Positive marketing”: parties exchange value such that they are better off
- Environmental attitude and purchase channel choice???



Project 2:

OPEC Announcements and Oil Price Volatility

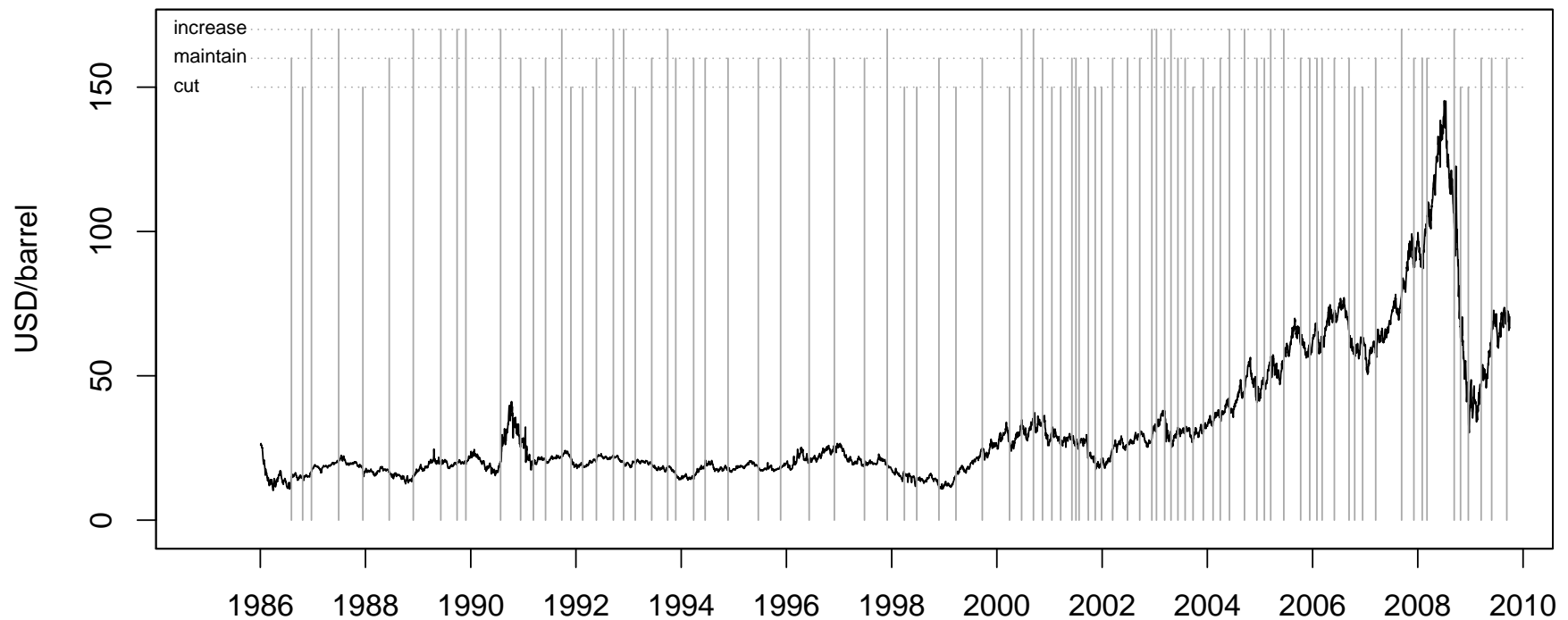
Crude oil prices and OPEC announcements.

- Impact of OPEC announcements on crude oil prices?
- Impact on the distribution of daily returns, in particular:
 - on the expectation of daily returns?
 - on the variance of daily returns?
- What can be said about expectation and volatility. . .
 - right *before* an announcement will be made (anticipation of the announcement),
 - right *after* an announcement has been made (aftereffect of the announcement)?



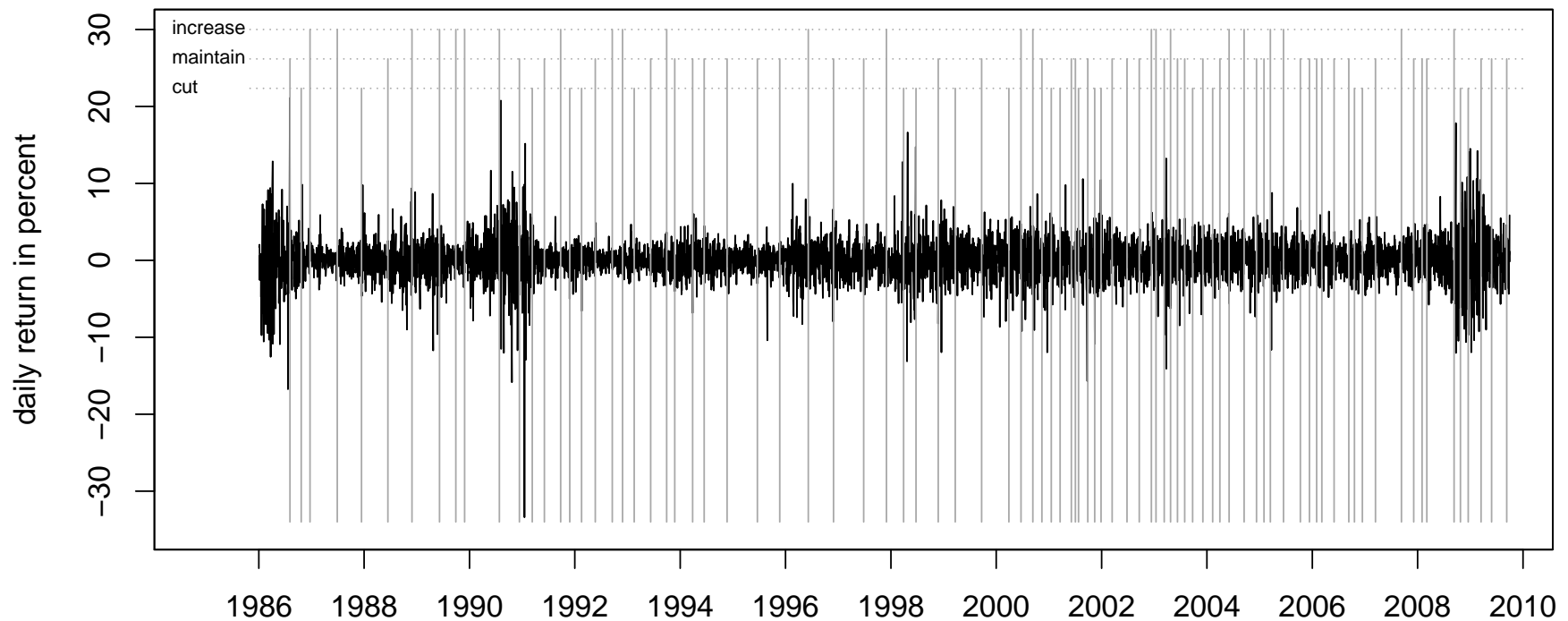
Project 2: OPEC Announcements and Oil Price Volatility

The WTI price series and OPEC announcements.



Project 2: OPEC Announcements and Oil Price Volatility

The daily WTI return series and OPEC announcements.



Project 2:

OPEC Announcements and Oil Price Volatility

Regression: conditional expectation; GARCH: conditional variance.

$$r_t = c + \sum_{s \geq 1} a_s r_{t-s} + \sum_i b_i d_{it} + \epsilon_t, \quad (1)$$

$$\epsilon_t = \nu_t \cdot \sqrt{h_t}, \quad (2)$$

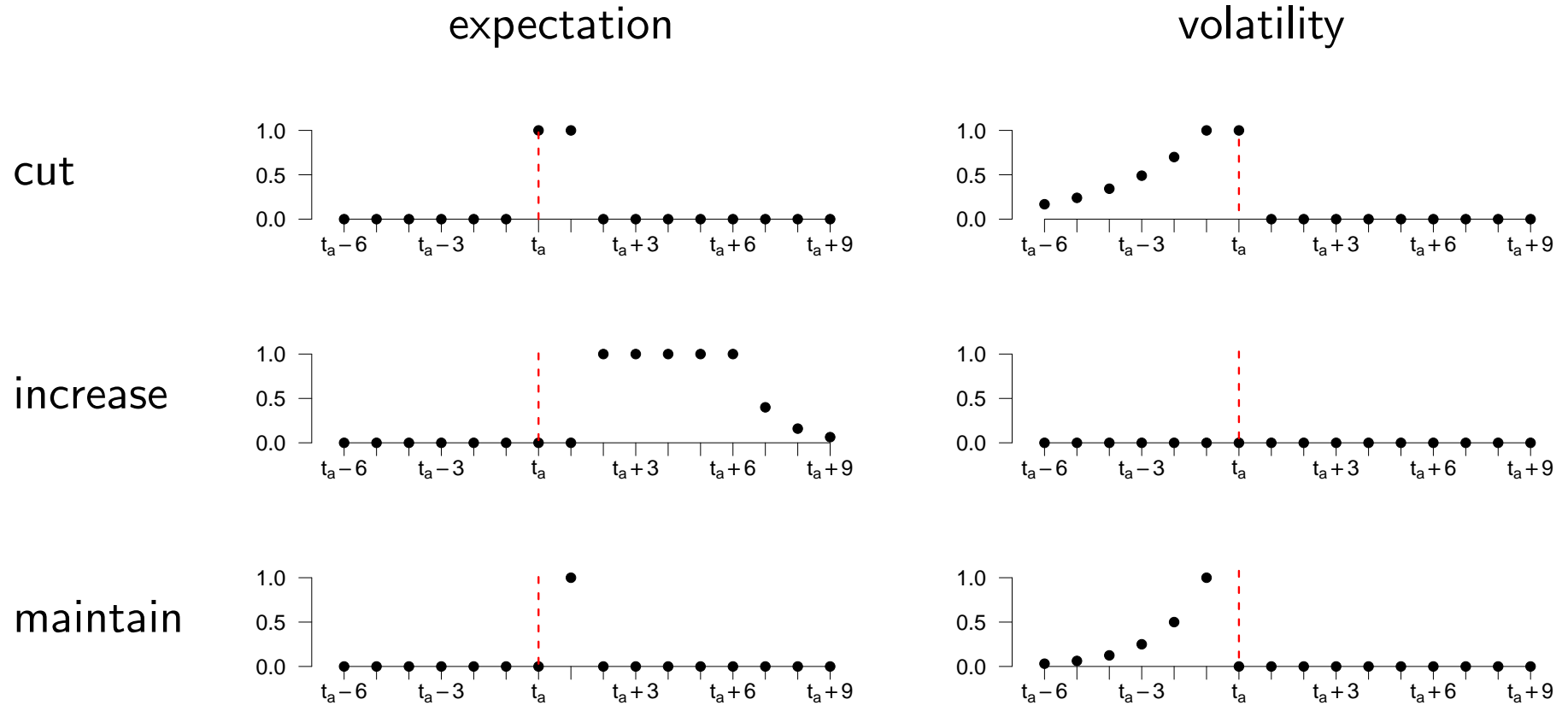
$$h_t = \alpha_0 + \alpha_1 \epsilon_{t-1}^2 + \beta h_{t-1} + \sum_i \gamma_i d_{it}. \quad (3)$$

- (r_t) : series of daily returns on WTI crude oil price
- (d_{it}) : (modified) dummy variables for announcements of kind i
- (ν_t) : Gaussian white noise with $\text{var}(\nu_t) = 1$
- b_i, γ_i : parameters (impact of an announcement of kind i)



Project 2: OPEC Announcements and Oil Price Volatility

Summary: The optimal model structure.



Project 2:

OPEC Announcements and Oil Price Volatility

Energy Economics.

Paper accepted for publication in *Energy Economics* in January 2012.

Available online.



Project 3:

Algorithmic Trading

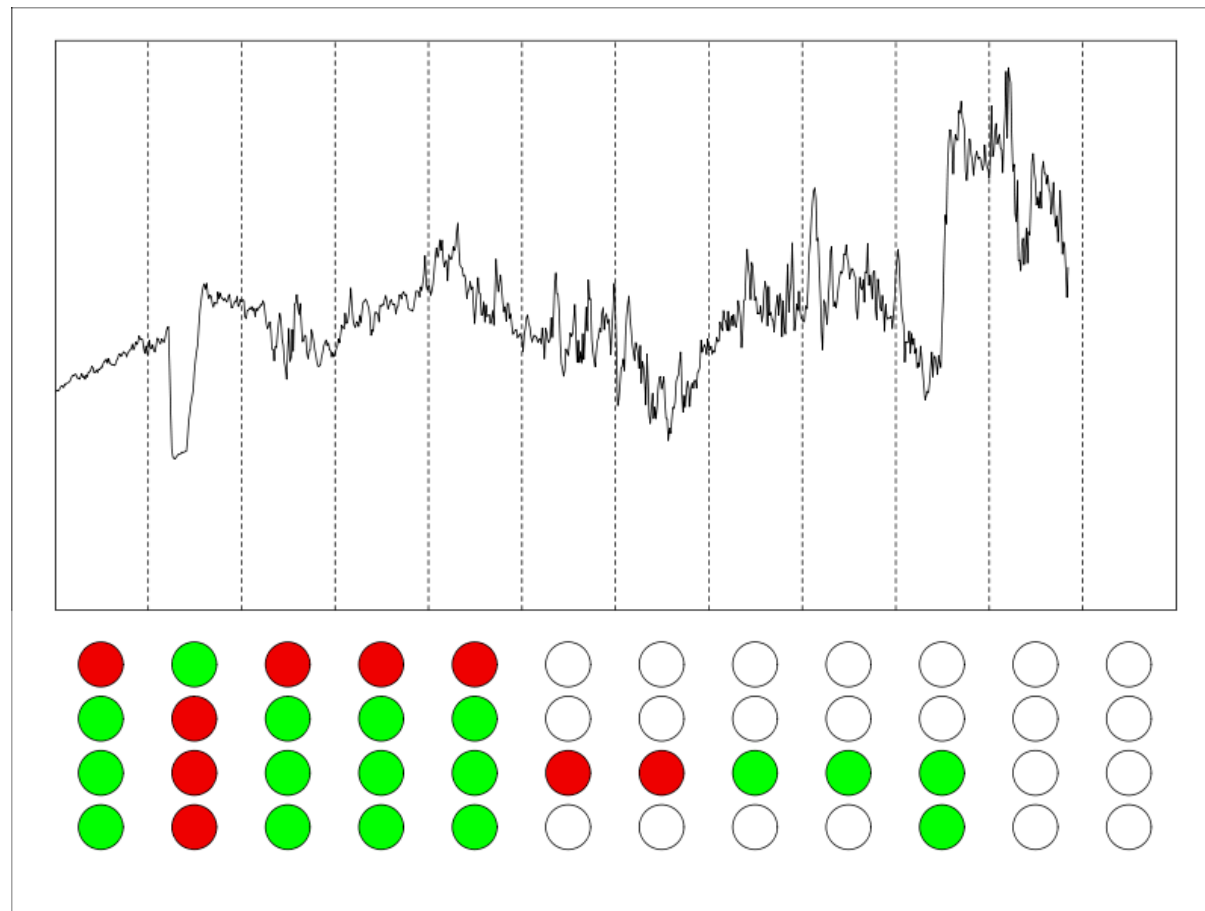
Algorithmic trading.

- Can we combine simple trading rules to generate profit?
- Example: €-\$ trading.
 - Trading every 5 minutes.
 - Use 2 days' data to construct a trading rule.
 - Use this rule for the next day.



Project 3: Algorithmic Trading

A sequence of trading signals.



Project 3:

Algorithmic Trading

How to obtain complex trading rules?

- Genetic algorithm: based on
 - cross-over
 - mutation
 - reproduction

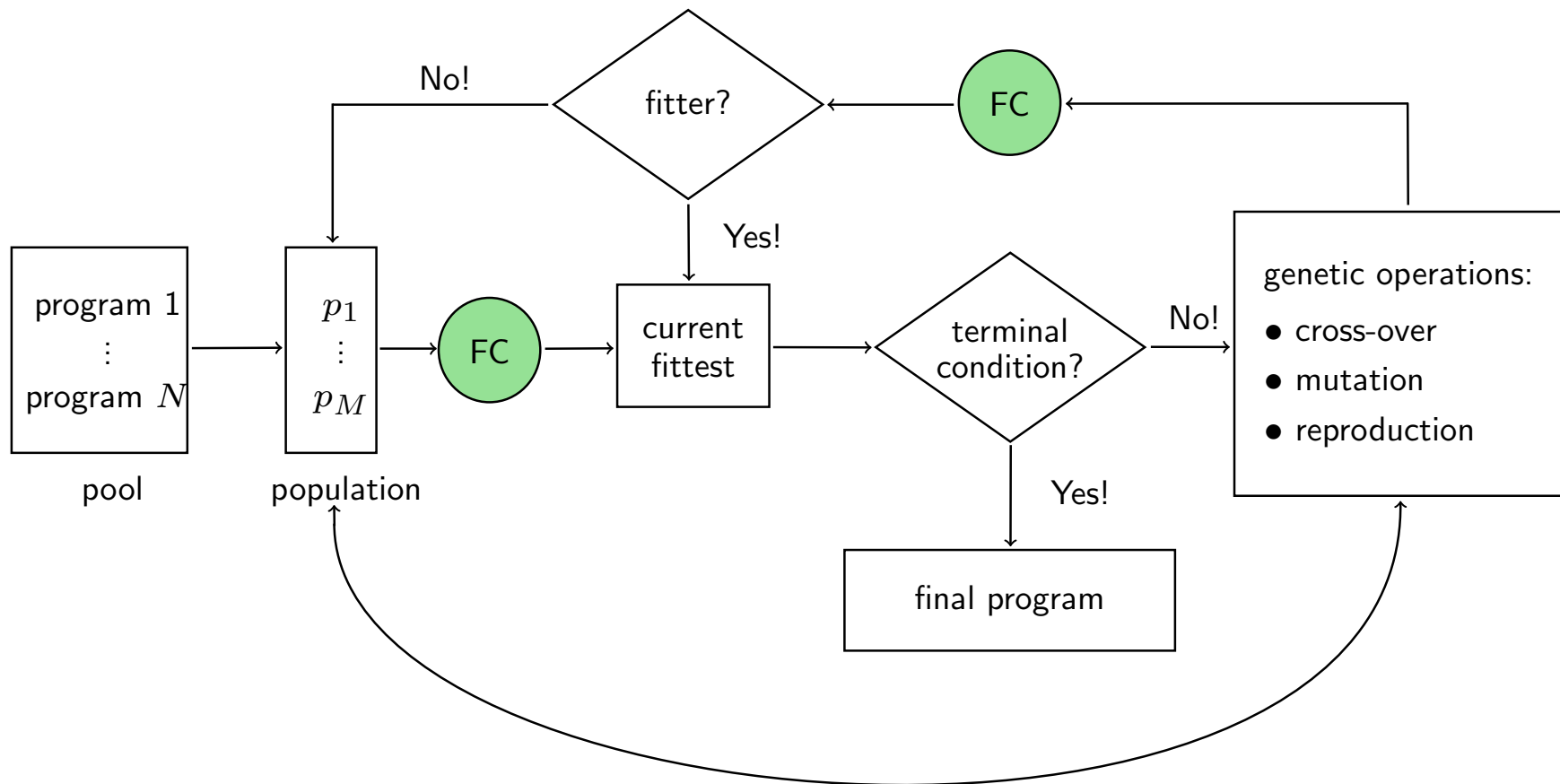
- Example of a program:

(IF $TR_1 = \text{“buy!”}$) AND NOT $\left((TR_2 = \text{“sell!”}) \text{ OR } (TR_3 = \text{“sell!”}) \right)$
THEN “buy!”



Project 3: Algorithmic Trading

Creating a Program.



Project 3:

Algorithmic Trading

Keywords.

- data-snooping bias
- robustness
- time series bootstrap
- tick data



Project 4:

Population Dynamics With Leslie-Type Models

The classical Leslie model.

- Leslie model:
a discrete, age-structured model of population growth
- time-constant age-specific fertility and mortality rates
- population is closed to migration
- only females considered
- three 15-year intervals of age covering ages 0 to 45



Project 4:

Population Dynamics With Leslie-Type Models

The classical Leslie model.

- Equation of the Leslie model:

$$\begin{pmatrix} n_{1,t} \\ n_{2,t} \\ n_{3,t} \end{pmatrix} = \begin{pmatrix} f_1 & f_2 & f_3 \\ p_1 & 0 & 0 \\ 0 & p_2 & 0 \end{pmatrix} \cdot \begin{pmatrix} n_{1,t-1} \\ n_{2,t-1} \\ n_{3,t-1} \end{pmatrix}$$

$$\vec{n}_t = M \cdot \vec{n}_{t-1}$$



Project 4:

Population Dynamics With Leslie-Type Models

A Leslie-type model for a population with constant immigration.

$$\begin{pmatrix} n_{1,t} \\ n_{2,t} \\ n_{3,t} \\ \hline n_{1,t}^* \\ n_{2,t}^* \\ n_{3,t}^* \\ \hline R \end{pmatrix} = \begin{pmatrix} f_1 & f_2 & f_3 & | & f_1^* & f_2^* & f_3^* & | & 0 \\ p_1 & 0 & 0 & | & 0 & 0 & 0 & | & 0 \\ 0 & p_2 & 0 & | & 0 & 0 & 0 & | & 0 \\ \hline 0 & 0 & 0 & | & 0 & 0 & 0 & | & r_1 \\ 0 & 0 & 0 & | & p_1^* & 0 & 0 & | & r_2 \\ 0 & 0 & 0 & | & 0 & p_2^* & 0 & | & r_3 \\ \hline 0 & 0 & 0 & | & 0 & 0 & 0 & | & 1 \end{pmatrix} \cdot \begin{pmatrix} n_{1,t-1} \\ n_{2,t-1} \\ n_{3,t-1} \\ \hline n_{1,t-1}^* \\ n_{2,t-1}^* \\ n_{3,t-1}^* \\ \hline R \end{pmatrix}$$

(Schmidbauer & Rösch, 1995)



Project 4: Population Dynamics With Leslie-Type Models

A Leslie-type model with two populations.

$$\begin{pmatrix} n_{c1,t} \\ n_{c2,t} \\ n_{c3,t} \\ \hline n_{c1,t}^* \\ n_{c2,t}^* \\ n_{c3,t}^* \\ \hline n_{v1,t} \\ n_{v2,t} \\ n_{v3,t} \\ \hline n_{v1,t}^* \\ n_{v2,t}^* \\ n_{v3,t}^* \end{pmatrix} = \begin{pmatrix} \clubsuit & \clubsuit & \clubsuit & | & \clubsuit & \clubsuit & \clubsuit & | & 0 & 0 & 0 & | & 0 & 0 & 0 \\ \spadesuit & 0 & 0 & | & 0 & 0 & 0 & | & 0 & 0 & 0 & | & 0 & 0 & 0 \\ 0 & \spadesuit & 0 & | & 0 & 0 & 0 & | & 0 & 0 & 0 & | & 0 & 0 & 0 \\ \hline 0 & 0 & 0 & | & 0 & 0 & 0 & | & \clubsuit & \clubsuit & \clubsuit & | & \clubsuit & \clubsuit & \clubsuit \\ 0 & 0 & 0 & | & \spadesuit & 0 & 0 & | & \spadesuit & 0 & 0 & | & \spadesuit & 0 & 0 \\ 0 & 0 & 0 & | & 0 & \spadesuit & 0 & | & 0 & \spadesuit & 0 & | & 0 & \spadesuit & 0 \\ \hline 0 & 0 & 0 & | & 0 & 0 & 0 & | & \clubsuit & \clubsuit & \clubsuit & | & \clubsuit & \clubsuit & \clubsuit \\ 0 & 0 & 0 & | & 0 & 0 & 0 & | & \spadesuit & 0 & 0 & | & 0 & 0 & 0 \\ 0 & 0 & 0 & | & 0 & 0 & 0 & | & 0 & \spadesuit & 0 & | & 0 & 0 & 0 \\ \hline \clubsuit & \clubsuit & \clubsuit & | & \clubsuit & \clubsuit & \clubsuit & | & 0 & 0 & 0 & | & 0 & 0 & 0 \\ \spadesuit & 0 & 0 & | & \spadesuit & 0 & 0 & | & 0 & 0 & 0 & | & \spadesuit & 0 & 0 \\ 0 & \spadesuit & 0 & | & 0 & \spadesuit & 0 & | & 0 & 0 & 0 & | & 0 & \spadesuit & 0 \end{pmatrix} \cdot \begin{pmatrix} n_{c1,t-1} \\ n_{c2,t-1} \\ n_{c3,t-1} \\ \hline n_{c1,t-1}^* \\ n_{c2,t-1}^* \\ n_{c3,t-1}^* \\ \hline n_{v1,t-1} \\ n_{v2,t-1} \\ n_{v3,t-1} \\ \hline n_{v1,t-1}^* \\ n_{v2,t-1}^* \\ n_{v3,t-1}^* \end{pmatrix}$$



Project 4: Population Dynamics With Leslie-Type Models

Turkey: Long-run growth and urbanization.

