FE1-Empirical analysis 2

Use 3 (or more) series (at least one series of prices for (stock or bond) indexes + at least one macroeconomic series), each, with a unit root

- Check the presence of unit root for each series (as in the first empirical analysis, with the joint analysis of deterministic and stochastic trends)

- Estimate a canonical VAR model :

    - without differencing the series of the system
        - Identify the order of the VAR model
        - Estimate the different equations

    - with first differences of the I(1) components
        - Identify the order of the VAR model
        - Estimate the different equations

Use the FRED Space to download 3 financial series of your choice. (series of quotations of a stock index; series of prices of a specific bond, GDP…)

Argument your choice by referring to a financial issue you are interested in. The choices should be different for the different groups.

a) Analysis of the dynamics of each series:
- Justify the choice of the observation period and of the frequency
- Transform the series (log); decompose each series separately and analyze the different components

- Is there stochastic trend? Perform a unit root test (ADF; see documentation); if it is the case examine the first differences of each series and check that there is no more stochastic trend.
- Turning to the first differences, ask questions about the presence a deterministic trend (constant or constant and time trend) (test for the significance of the related parameters).
- Are there seasonal variations? (idem)
- For the cyclical component, estimate a stationary ARMA model

FE1-Empirical analysis 3

Use the system of the second empirical analysis

- Test for cointegration rank test (Johansen) and estimation of the potential cointegration relationship(s) ; comment the sign of the estimated coefficients in the long term equations

    - If there is no cointegration, turn to a VAR model with first differences of the I(1) components

        - Order of the VAR
        - Estimation
        - Causality tests

    - If you validate cointegration, turn to a VECM (after finding the order of the VAR in level)

        - Estimation
        - Causality tests (long term and short-term causal links)
        - Validation of the error-correcting mechanisms, if they exist

    - If you validate cointegration, you can also consider the VAR without differencing the I(1) components - the so-called VAR in level

        - Estimation
        - Causality tests

FE1 -empirical application 4

Canonical Impulse response analysis deduced from the VAR-type model estimated in empirical applications 2&3, with IR functions and confidence intervals around them

- propose a statistical analysis deduced from :
    - the VAR with first differences (Δ)of the I(1) components, if no cointegration
    - the VAR in levels, in case of cointegration

- compare the results you obtain when you invert the VAR with Δ of the I(1) components, (if no cointegration) or from the ones obtained from the VAR in levels (in case of cointegration)

FE1- Empirical application 5 : Markov-switching models

First, consider a single linear equation explaining the current value of a stationary financial series (returns for example) by its past values and the current /past values of other explanatory -exogenous series. Estimate it.

Then, improve this equation by introducing non-linearity by estimating a Markov-switching model; with a clear interpretation of the underlying (unobservable) state variable and of the estimation result.

Don’t forget to provide graphs to illustrate your developments.

FE1- Empirical application 6 : STR models

First, consider a single linear equation explaining the current value of a stationary financial series (returns for example) by its past values and the current /past values of other explanatory -exogenous series. Estimate it.

Then, improve this equation by introducing non-linearity by estimating a STR model. Justify the choice of the transition variable from a financial point of view. Turn to estimation, validation, specification tests and prove that the non-linear model indeed improves the linear regression model.

Don’t forget to provide graphs to illustrate your developments.

Empirical application 6 : Difference-in-difference analysis

Consider the evolution of a financial series. Imagine a structural change (change in (market) regulation, change in law, change in taxes…) and implement a difference-in-difference analysis to examine whether the structural change has been followed by a significant change in the dynamics of the series (mean level, variance, extreme risks…).

Warning ; the series must be all I(0)

Don’t forget to follow the different steps described in the text « remarks aboutAssignment 2 in FE ».

Be sure that the residuas are not too badly specified (auto-correlation and serial correlations) ; otherwise, introduce control X-variables in the regression

Be sure that you look at the right coefficient to assess the treatment effect

Don't forget to look at anticipatory effects as well as the evolution of the treatment effect over time.

See for example

Differences-in-Differences (using R) by O Torres-Reyna

https://www.princeton.edu/~otorres/DID101R.pdf