Financial Econometrics 1 - M2 FTD

Empirical Applications

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Introduction

something, probably describe how all applications make sense one after the other and what is the research question we could have made ourselves when doing the applications, try to give a coherent look to the whole thing.

This document compiles all our applications of the Financial Econometrics course. Each section represents a specific application, but we tried to make them coherent across them around a broad question:

1 Series Dynamics

Note: Depending on each exercise along these applications we might use different series. In this first section, we performed the stationarity and component analysis of all of them to be able to use them rapidly without having to worry about seasonality or the presence of UR. Therefore, this section encompasses more than the 3 series that were asked in the exercise.

1.1 Seasonality

Table 1: Estimation of the seasonality of each series

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
infl_e	-0.104	-0.108	0.031	0.078	0.149	0.1	0.017	0.088	0.031	0.006	-0.116	-0.17
deflator	0.018	0.035	0.053	0.072	0.06	0.045	0.03	-0.024	-0.078	-0.128	-0.072	-0.01
unempl	0.464	0.327	0.132	-0.045	-0.074	0.296	0.284	0.007	-0.257	-0.406	-0.379	-0.34
rate	-0.042	-0.05	-0.046	-0.059	-0.03	0.025	0.048	0.067	0.074	0.025	0.008	-0.02
splong	0.003	0.002	-0.005	0.003	0.007	0.006	0.007	0.002	-0.007	-0.017	-0.003	0.003
corp_debt	0.003	0.001	-0.006	-0.007	-0.007	-0.004	0.001	0.006	0.006	0.002	0.001	0.003

1.2 Unit root and trends

ADF - Test jointly for deterministic and stochastic trend (with drift) We first run the following specification to the ADF model to *jointly* investigate the presence of a stochastic and a determinist trend for each series $(X_t)_t$:

$$\Delta X_t = \alpha + \beta tt + \gamma X_{t-1} + \sum_{i=1,2,..} \rho_i \Delta X_{t-i} + \varepsilon_t \tag{1}$$

As per usual, the ADF test assumes H0: $\gamma = 0$ i.e. a unit exists and the series is non-stationary. We use R's built in function *ur.df* with *type='trend'* to get this estimation.

Let us examine each series' results:

- Inflation expectation,
- Fed fund rate, $t_\gamma = -1.709$

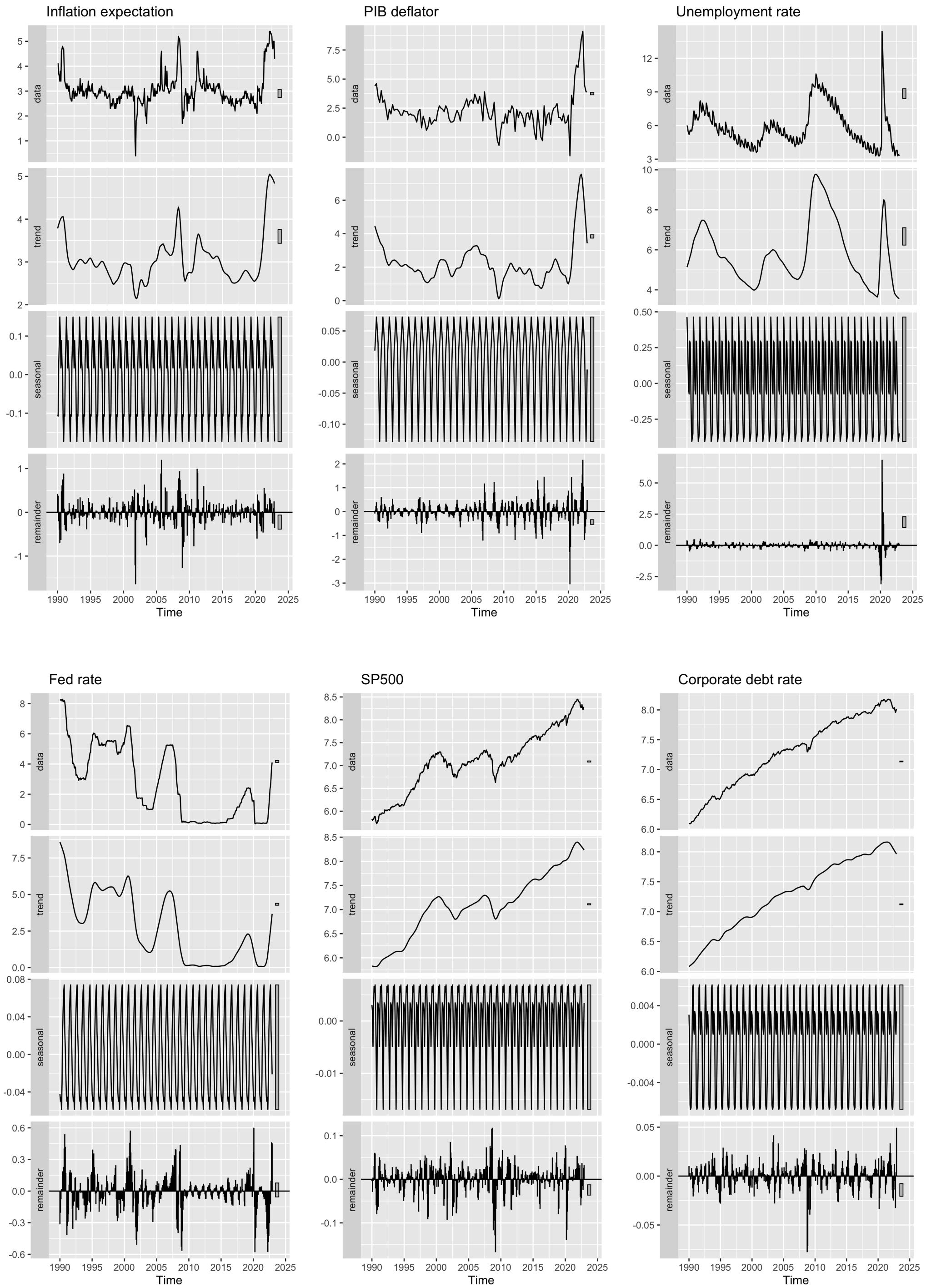

Figure 1: Time series decomposition

ADF - Test jointly for stochastic trend and drift

ADF - Test for stochastic trend only DECOMPOSITION SERIES IN DELTAS

Table 2: ADF test - 1st regression with drift, deterministic trend and stochastic trend

	infl_e	deflator	unempl	rate	splong	corp_debt	CV 1pct	CV 5pct	CV 10pct
tau3	-4.490	-1.672	-1.949	-1.759	-5.166	-3.346	-3.980	-3.420	-3.130
phi2	6.945	2.022	3.926	10.602	8.984	3.786	6.150	4.710	4.050
phi3	10.416	2.927	1.953	4.228	13.475	5.665	8.340	6.300	5.360

Table 3: ADF test - 1st regression t statistics

	infl_e	deflator	unempl	rate	splong	corp_debt
alpha	3.829	2.584	3.016	0.649	2.078	1.882
gamma	-4.490	-5.166	-3.346	-1.672	-1.949	-1.759
beta	1.366	1.154	-0.488	-0.127	1.696	1.407
rho	-0.558	14.221	1.072	15.797	4.100	6.757

Notes: With N=396, critical values at 5%: alpha = 3.09 ; gamma= -3.43 ; beta = 2.79

Table 4: ADF test - 2nd regression with drift and stochastic trend

	infl_e	rate	corp_debt	deflator	unempl	splong	CV 1pct	CV 5pct	CV 10pct
tau2	-4.527	-2.412	-1.005	-2.480	-5.090	-3.752	-3.440	-2.870	-2.570
phi1	10.246	3.014	4.300	14.279	12.953	7.057	6.470	4.610	3.790

Table 5: ADF test - 3rd regression regression with only stochastic trend

	infl_e	rate	corp_debt	deflator	unempl	splong	CV 1pct	CV 5pct	CV 10pct
tau1	-0.884	-1.935	2.647	4.471	-2.658	-1.235	-2.580	-1.950	-1.620

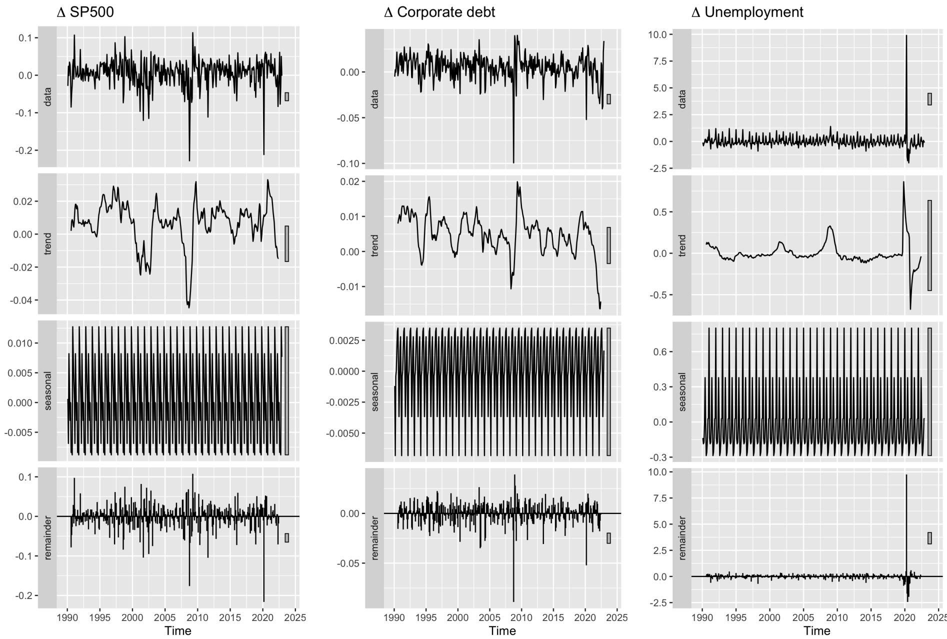

Figure 2: Decomposition of the series in deltas

1.3 Cyclical component

2 Canonical VAR model application

Table 6: Canonical VAR in levels - Identify order

	1	2	3	4	5	6	7	8	9	10
AIC(n)	-10.01	-10.56	-10.59	-10.73	-10.88	-10.87	-10.93	-11.01	-11.00	-10.98
HQ(n)	-9.96	-10.48	-10.47	-10.57	-10.68	-10.64	-10.66	-10.71	-10.66	-10.60
SC(n)	-9.89	-10.35	-10.29	-10.33	-10.38	-10.29	-10.25	-10.25	-10.14	-10.03
FPE(n)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 7: Level VAR - Estimation

	Dependent variable:		
	deflator	unempl	splong
deflator.l1	1.830^{***}	-0.199	0.026^{***}
	(0.051)	(0.124)	(0.008)
unempl.l1	0.120^{***}	0.956^{***}	0.003
	(0.022)	(0.053)	(0.004)
splong.l1	0.556^{*}	-4.968^{***}	1.174^{***}
	(0.321)	(0.786)	(0.053)
deflator.l2	-0.819^{***}	-0.317	-0.042^{**}
	(0.101)	(0.246)	(0.017)
unempl.l2	-0.117^{***}	-0.131^{*}	-0.004
	(0.031)	(0.075)	(0.005)
splong.l2	-0.553	5.816^{***}	-0.246^{***}
	(0.506)	(1.237)	(0.083)
deflator.l3	-0.894^{***}	1.008^{***}	0.010
	(0.108)	(0.264)	(0.018)
unempl.l3	0.014	0.182^{**}	0.002
	(0.031)	(0.076)	(0.005)
splong.l3	0.149	-0.992	0.137
	(0.521)	(1.275)	(0.085)
deflator.l4	1.526^{***}	-0.716^{**}	0.019
	(0.113)	(0.277)	(0.019)
unempl.l4	-0.013	-0.150^{**}	0.003
	(0.031)	(0.076)	(0.005)
splong.l4	0.428	-0.516	-0.012
	(0.523)	(1.278)	(0.086)
deflator.l5	-0.653^{***}	-0.130	-0.021
	(0.111)	(0.271)	(0.018)
unempl.l5	0.001	0.092	-0.008^{*}
	(0.031)	(0.076)	(0.005)
splong.l5	-0.027	1.417	0.063
	(0.527)	(1.288)	(0.086)
deflator.l6	-0.498^{***}	0.609^{**}	-0.003
	(0.107)	(0.262)	(0.018)
unempl.l6	0.004	-0.105	0.006
	(0.031)	(0.075)	(0.005)
splong.l6	-1.048^{**}	-1.069	-0.302^{***}
	(0.527)	(1.290)	(0.086)
deflator.l7	0.834^{***}	-0.476^{*}	0.019
	(0.103)	(0.252)	(0.017)
unempl.l7	0.081^{***}	0.088	-0.0004
	(0.030)	(0.073)	(0.005)
splong.l7	0.954^{*}	-0.455	0.261^{***}
	(0.526)	(1.287)	(0.086)
deflator.l8	-0.350^{***}	0.153	-0.010
	(0.054)	(0.131)	(0.009)
unempl.l8	-0.075^{***}	0.039	-0.001
	(0.021)	(0.052)	(0.004)
splong.l8	-0.428	0.746	-0.078
	(0.340)	(0.832)	(0.056)
const	-0.268^{*}	0.490	0.015
	(0.149)	(0.365)	(0.024)
Adjusted R^2	0.977	0.913	0.997
Residual Std. Error (df = 363)	0.210	0.515	0.034
F Statistic (df = 24; 363)	684.697^{***}	170.695^{***}	$5{,}592.560^{***}$
Note:			*p<0.1; **p<0.05; ***p<0.01

3 Cointegration theory

4 Impulse Response Analysis

4.1 Canonical IRF

4.2 Structural IRF

5 Introduce non-linearities

5.1 Markov-switching model

5.2 STR model

6 Difference-in-Difference

https://www.tidy-finance.org/r/difference-in-differences.html