

UNIVERSITÄT OSNABRÜCK

FACHBEREICH WIRTSCHAFTSWISSENSCHAFTEN

Cover page (Klausurdeckblatt)

Exam in subject (Prüfung im Fach)	Empirical Economic Policy
Examiner (Prüfer)	Prof. Frank Westermann, Ph.D.
Date (Datum)	22.02.2024

Participant (Klausurteilnehmer/in)

Course of studies (Studiengang)	
Surname, given name (Name, Vorname)	
Matriculation number (Matrikel-Nr.)	

Gained points (Erreichte Punkte)

* All tasks are to be processed *
(Es sind alle Aufgaben zu bearbeiten)

Points (Punkte)				
A1	A2	A3	A4	A5

Grading (Benotung)

Total score (Gesamtpunktzahl)	
Grade (Modulnote)	
Examiner signature (Prüferunterschrift)	



Exam “Empirical Economic Policy“

Winter term 2023/24

Total points: 60 points

For all questions: Please label all graphs and provide definitions for all variables (graphs and formulas)!

Please also use the reverse side for the solution!

Question 1: GDP forecast (5 points)

a) Assume you are in March 2020 and want to use ARIMA modelling to forecast quarterly GDP for the rest of 2020. Given COVID-19 recession, which bias in your forecast can you expect (over-, or under-estimation)? (2 points)

b) Explain the weakness of Box-Jenkins procedure that can cause problems while doing forecast before major economic events. (3 points)

Question 2: Monetary policy (14 points)

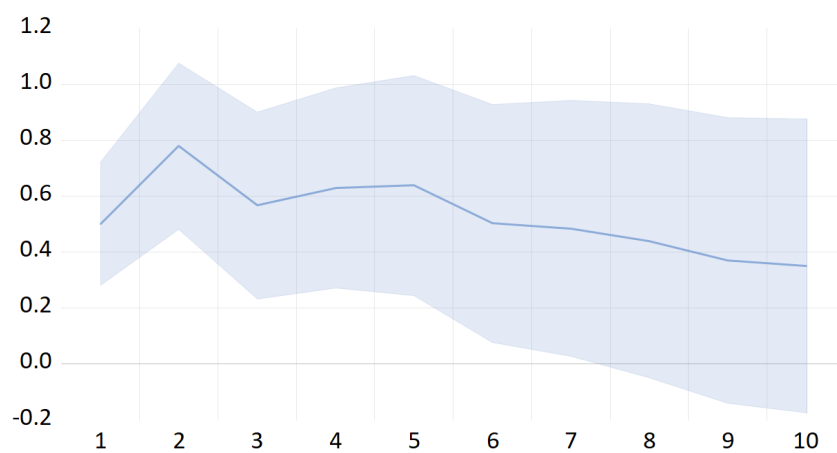
You want to study the reaction function of the US FED before the Great Recession. For this purposes, you look at the sample 1978 and 2008.

a) You start with a Granger causality test for a nominal interest rate and a cyclical component of GDP. Write down the testing procedure formally, including the regression specification(s) and null hypothesis. (6 points)

b) Next, you estimate a 3-variable structural VAR model for interest rate, inflation and output gap. As a researcher you believe that prices are sticky and do not adjust to shocks immediately. How would you order variables for a Cholesky decomposition? Explain motivation behind the ordering of interest rate (5 points)

c) Interpret the following impulse response function. Which conclusion can you make about mandate of the FED? (3 points)

Response of INTEREST_RATE to OUTPUT_GAP Cholesky One S.D. (d.f. adjusted) Innovation
95% CI using analytic asymptotic S.E.s

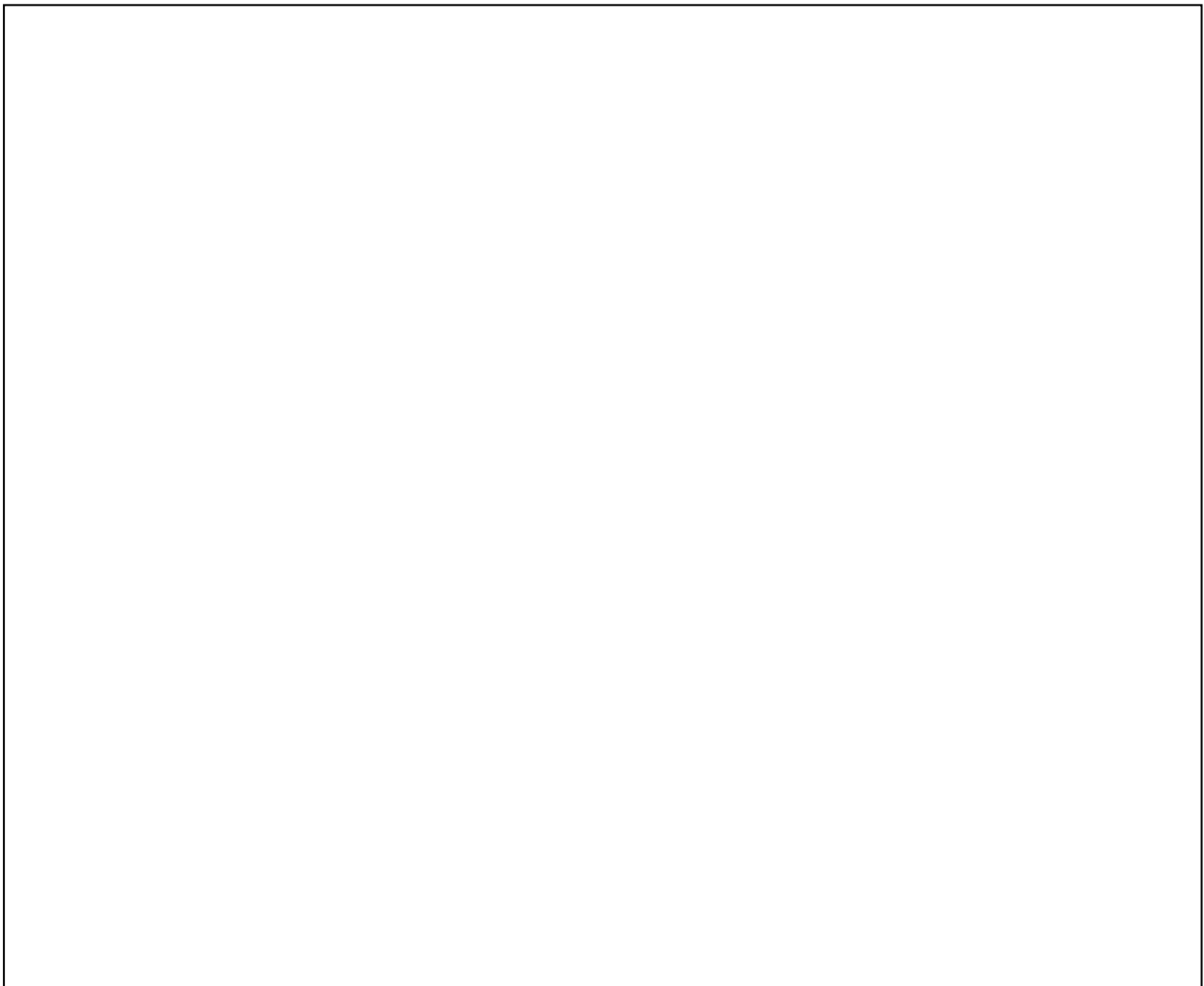


Question 3: Long-term economic policy (14 points)

- a) Neoclassical and new growth theory have different implications about economic growth. Name a key difference in the production function (2 points)



- b) Using a graph with capital on x-axis and capital growth of y-axis, show visually and explain verbally the convergence hypothesis in the neoclassical growth model (4 points)



- c) Imagine that Switzerland considers to invest in R&D to get a lead in technology and output per capita vis-à-vis the European Union. Interpret the following output while testing convergence in GDP per capita, by stating the null hypothesis and whether you accept/reject it. Do the three countries follow the same stochastic trend? What is the implication for the intended effects of R&D policy? (6 points)

☒ Summary

Johansen Cointegration Test	
Date:	02/01/24 Time: 18:45
Sample:	1860 2018
Included observations:	159
Lags interval (in first differences):	1 to 1
Endogenous variables:	GERMANY FRANCE SWITZERLAND
Deterministic assumptions:	Case 3 (Johansen-Hendry-Juselius): Cointegrating relationship includes a constant. Short-run dynamics include a constant.

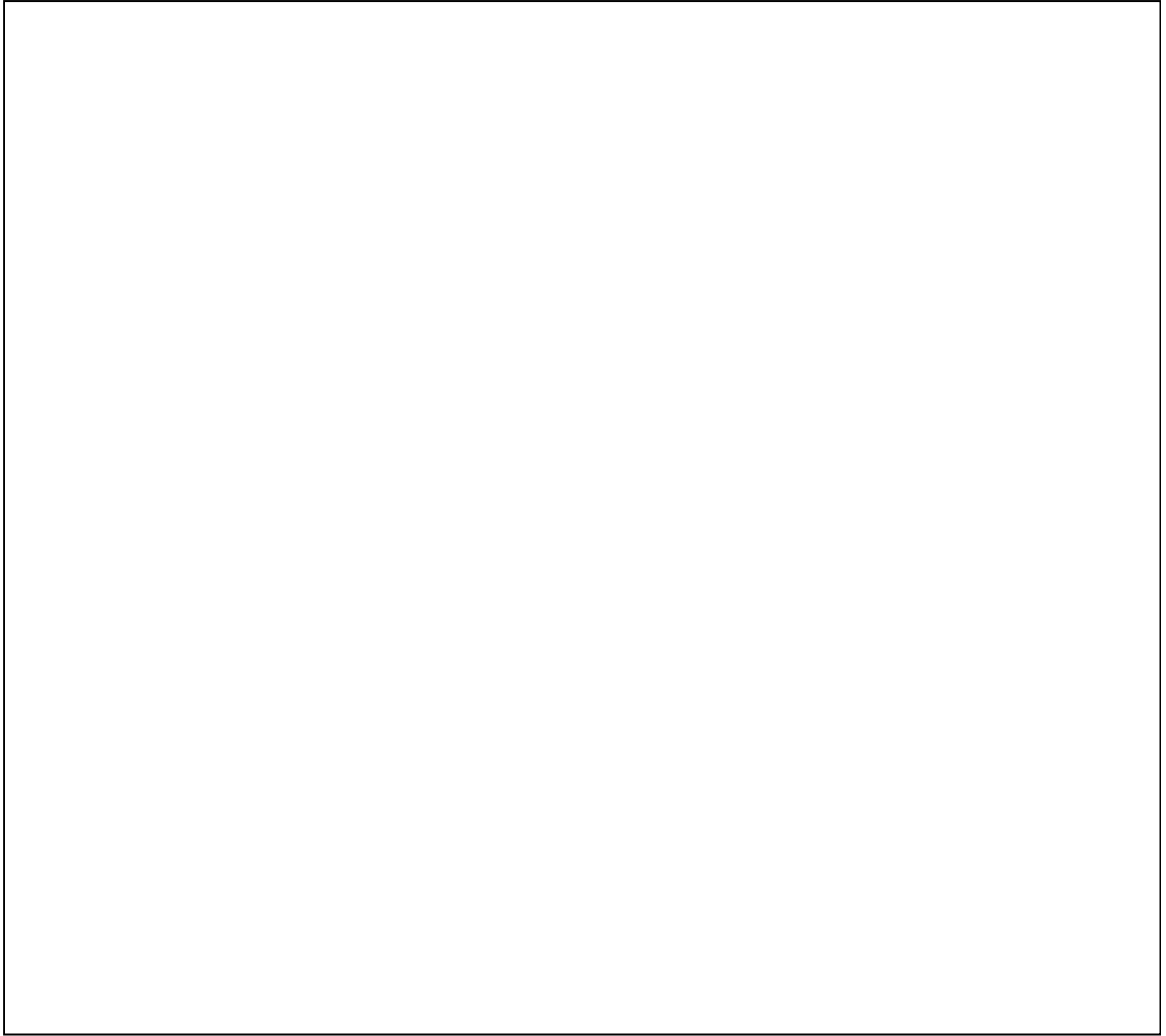
☒ Rank Tests

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.** Critical Value
None *	0.283339	60.04060	29.79707	0.0000
At most 1	0.046097	7.735599	15.49471	0.4941
At most 2	0.002076	0.326214	3.841465	0.5679

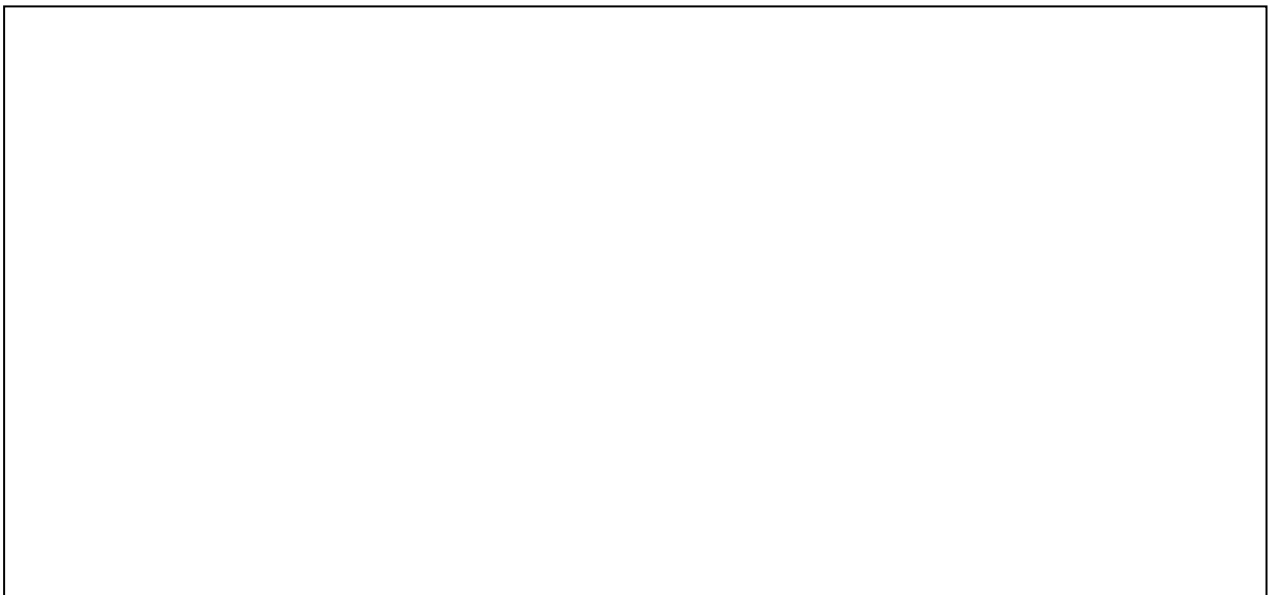
Trace test indicates 1 cointegrating equation(s) at the 0.05 level
 * denotes rejection of the hypothesis at the 0.05 level
 **MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Max-eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.** Critical Value
None *	0.283339	52.30500	21.13162	0.0000
At most 1	0.046097	7.409385	14.26460	0.4419
At most 2	0.002076	0.326214	3.841465	0.5679

Max-eigenvalue test indicates 1 cointegrating equation(s) at the 0.05 level
 * denotes rejection of the hypothesis at the 0.05 level
 **MacKinnon-Haug-Michelis (1999) p-values

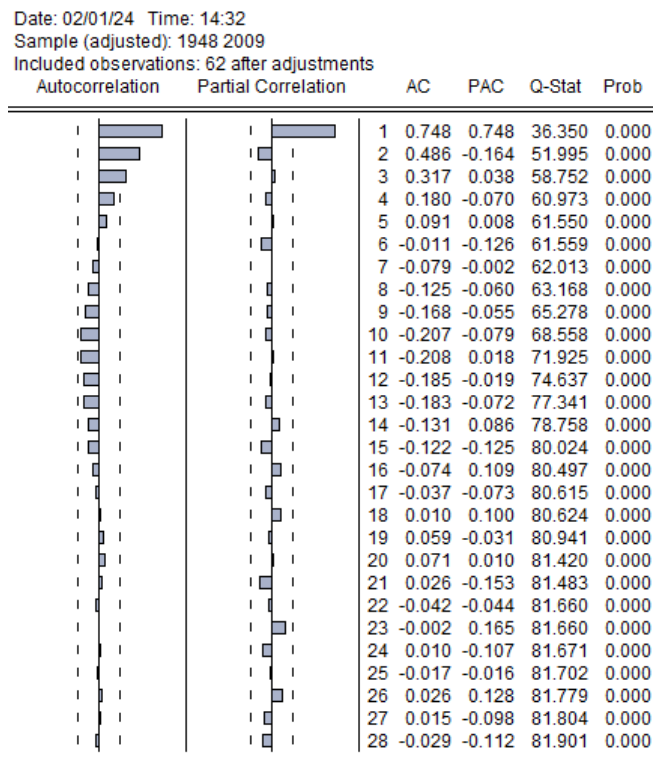


d) Formally state the definition of convergence that we have applied in (c). (2 points)



Question 4: Public debt (16 points)

a) Below you can see a correlogram for annual primary deficits of Greece. Explain which process is underlying this correlogram and why. Formally write down the equation of this process (4 points)



b) Using your answer from (a), derive the equation for the ADF test. What are the null and alternative hypotheses for this test? (5 points)

c) Interpret the following ADF test for primary surpluses of Greece. Is debt sustainable according to Bohn (1998) model and why? (4 points)

Null Hypothesis: SUPLUS_GR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

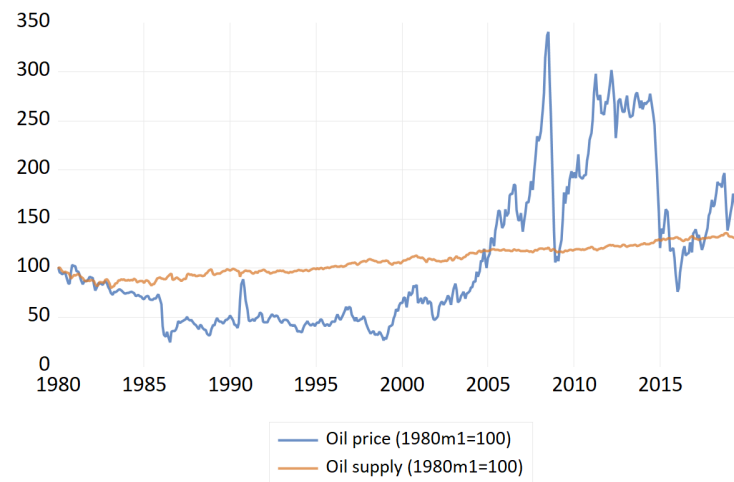
	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.219538	0.2017
Test critical values:		
1% level	-3.542097	
5% level	-2.910019	
10% level	-2.592645	

*Mackinnon (1996) one-sided p-values.

e) Which methodological weakness of a unit-root test procedure can lead to a wrong conclusion in this case? Explain verbally. (3 points)

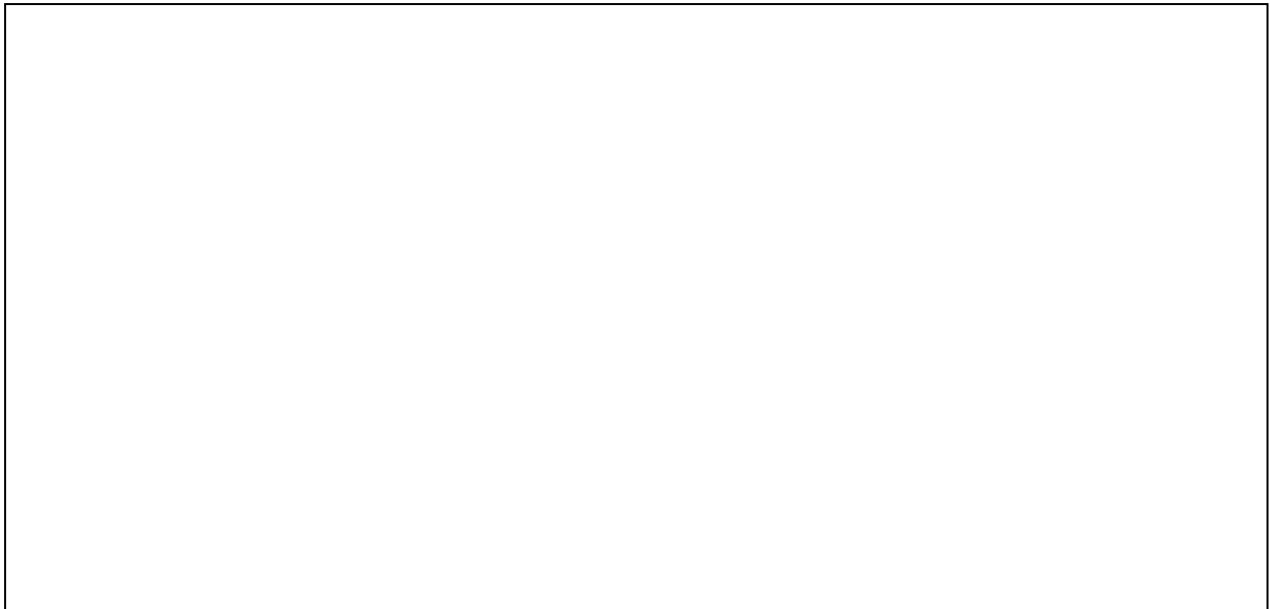
Question 5: Climate policy (11 points)

The following chart shows evolution in nominal crude oil prices and crude oil production between 1980 and 2019. For comparability, prices and quantities are shown as indices with both equal to 100 in January 1980.

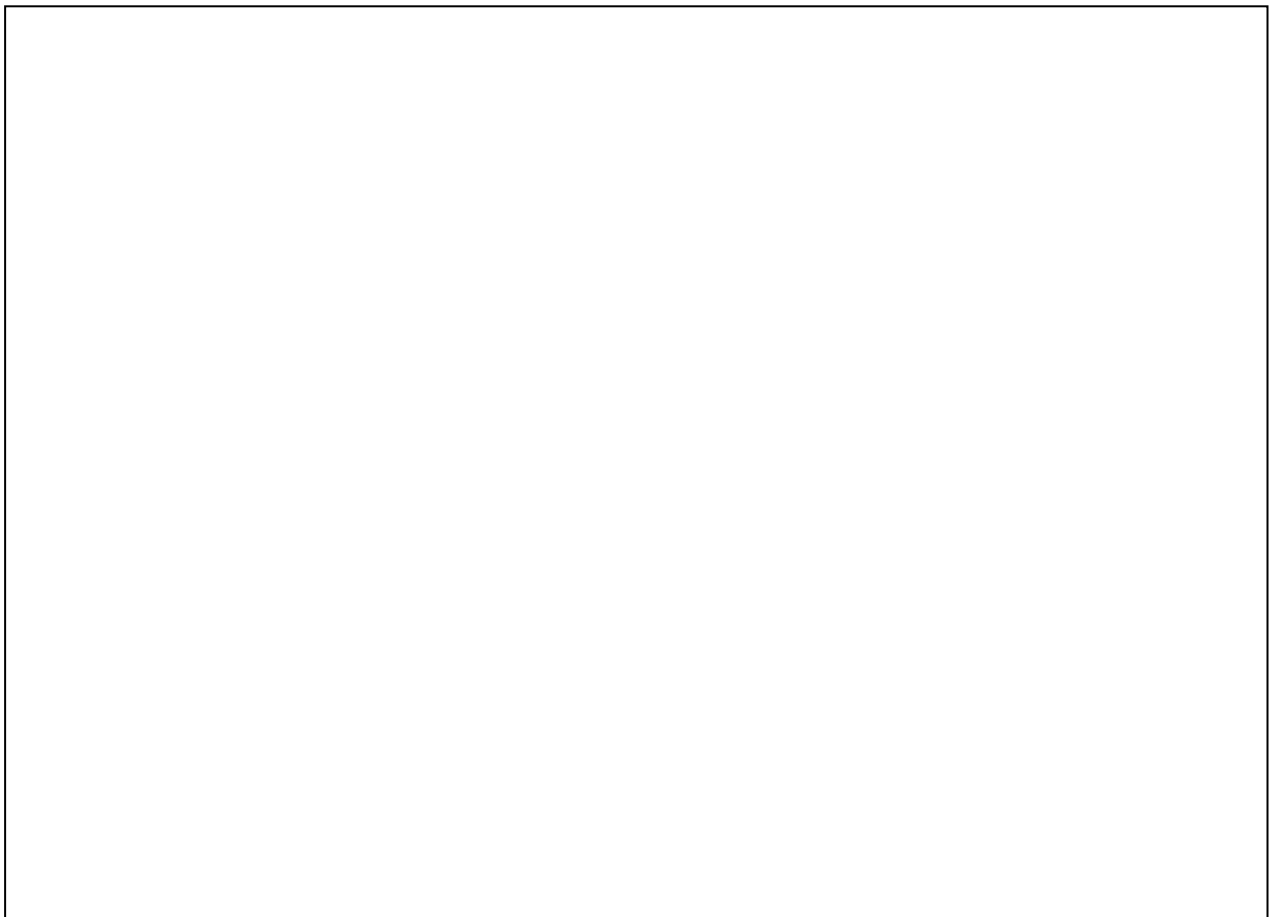


- a) Which conclusion can we make about price elasticity of oil supply, based on the first visual inspection? (2 points)

- b) Draw demand curves for an oil market with two country groups (“green” and “not green”). Clearly name the axes and curves, and mark the equilibrium price and quantity. (5 points)



- c) Assume that the “green” region implements the policies to reduce demand for oil. Verbally explain which implications for equilibrium price, demand of each region and global supply this policy has. (4 points)



**The Chair of International Economic Policy wishes you best
success!**

Please sign the exam on the last page before handing it in.