Economics II

Instituto Superior de Economia e Gestão

Regular Exam – 31 May 2022 - **Duration: 2h**

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1. The exam has four groups. The points for each question are mentioned alongside.

2. The answers to the questions of each group have to be made in different sheets.

3. Only non-graphical calculators are allowed. It is not allowed the use of mobile phones or computers. Improper use will lead to cancellation of the exam.

4. It is not possible to use any reading material. During the exam no clarifications can be made.

5. For the questions requiring calculus, present all the intermediate calculations you make to get to your answer, keeping at least 2 decimal places.

6. No credit will be awarded without a proper justification.

7. You can only leave your room after 60 minutes of the beginning of the exam.

Group I

State whether the following statements (of both exercises 1 and 2) in bold are **true or false** and justify it in no more than 5 lines**. Present all the intermediate calculations you make to get to your answer, keeping two decimal places.** No credit will be awarded without a proper justification.

Exercise 1

The table below shows data, in nominal terms, for the Portuguese economy in 2021 (millions of euros):

Private consumption	135 921	**Public consumption**	40 113
Private investment	36 254	**Public investment**	5 316
Imports of goods	77 708	**Consumption of fixed capital**	40 963
Exports	88 798	**Exports of services**	26 680
Net capital transfers	3 662	**Consumer Price Index**	105
Mixed income	20 463	**Gross operating surplus**	61 333
GDP deflator	110	**Taxes on production**	3 366
Subsidies on production	5 790	**Taxes on products**	29 289
Net current transfers	6 506	**Subsidies on products**	437
Primary income receivable from the rest of the world	8 110	**Primary income payable to the rest of the world**	10 549
Net domestic product mp	170 314	**Gross domestic product mp per capita**	20 530

Source: INE

1.1. **"In 2021, real wages per capita in Portugal were of 9 538 euros." (15 points)**

GDPmp = NDPmp + Consumption of fixed capital = 211 277

Nominal Wages = GDPmp – Gross operating surplus – Mixed income – Taxes on production + Subsidies on production – Taxes on products + Subsidies on products = 103 053

Real wages = Nominal Wages / CPI*100 = 98 145.71

Population = GDPmp / GDPmp per capita = 10.29

Real wages per capita = Real Wages / Population = 9 537.97

True

1.2. When an economy has both a budget balance deficit and a current account deficit, it is referred to as having twin deficits. **"In 2021, Portugal had twin deficits, yet the balance of services had a surplus."** (Hint: In case you are not able to find GDPmp, consider a value of 205 000). (**10 points**)

Can use the value of GDP from the previous exercise, or compute it here. GDPmp=211 277 (205 000 as an alternative)

Private consumption + Private Investment + Public Investment + Public Consumption + Exports – Imports of goods – Imports of services = GDPmp ⇔ Imports of services = 17 417 (23 694)

Balance of services = Exports of services – Imports of services = 9 263 (2 986)

Current account = Exports – Imports + Primary income receivable from the rest of the world - Primary income payable to the rest of the world + Net current transfers = - 2 260 (-8 537)

Budget Balance = Taxes – Subsidies – Public Investment – Public consumption = -19 001

True, there are deficits in the current account and the budget balance and the balance of services has a surplus.

Exercise 2

The table below shows data for the Portuguese economy (millions of euros).

Year	Potential GDP at 2015 constant prices	GDP at current prices	GDP at 2015 prices
2019		214 375	200 414
2020	195 300	200 088	183 495
2021	190 100	211 278	192 451

Source: AMECO and Eurostat

2.1. Consider that potential GDP grew 1.24% in 2020 regarding 2019. **"In real terms, the value of potential GDP is lower than the GDP for Portugal in 2019. Therefore, the difference between the unemployment rate and the natural unemployment rate was negative in that year."** (Hint: In case you are not able to find potential GDP, analyse the case when potential GDP is lower than the GDP for Portugal in 2019). **(10 points)**

Potential GDP at constant prices 2019: 195 300 / (1+0.0124) = 192 907.94

The fact that output is above full employment does not bring the cyclical unemployment rate to 0. It is, in fact, negative. The unemployment rate includes frictional unemployment, structural unemployment and cyclical unemployment. Because cyclical unemployment is negative, the unemployment rate is below the natural unemployment rate, which only includes the first two. Thus, the statement is true.

2.2. Assume that the Portuguese economy's GDP is above potential output. **"An example of a contractionary fiscal policy that the government can make, aiming at bringing GDP to the level of potential output is spending more on health" (5 points)**

False. Spending more on health is an example of government consumption, which is an expansionary policy that will increase GDP, bringing it further away from potential output.

2.3. "Between 2020 and 2021, there was a decline in the inflation rate, with Portugal experiencing deflation in 2021." (10 points)

GDP at current prices	GDP at 2015 prices			Inflation rate
214375	**200414**	1.07		
200088	**183495**	1.09	1.02	2.0%
211278	**192451**	1.1	1.01	1.0%

False. While it is true that the inflation rate declined between 2020 and 2021, the rate remained positive in 2021. To have a deflation, the rate needs to be negative.

Group II

3. Consider the following table regarding Portugal and Spain's GDP per capita at constant prices. All values represent thousands of €:

Year	Portugal	Spain
2000	16.9	21.6
2021	18.7	23.6

Source: AMECO 2022

3.1. Is it true that Portugal and Spain "slightly" converged in the past 21 years? **Present all the calculations needed to reach your conclusion. No points will be awarded in the absence of calculations. (10 points)**

Spain's GDPpc relative to Portugal's:

In 2000: $\frac{21.6}{16.9} = 1.2781$

In 2021: $\frac{23.6}{18.7} = 1.2620$

Portugal and Spain converged. Spain's GDPpc was 27.8% higher than Portugal's in 2000, and in 2021 was 26.2% higher. Although the gap between the two economies is still very similar.

3.2. Compute the average annual growth rate of Portugal's GDP per capita between 2000-2021. **Present all the calculations needed to reach your conclusion. No points will be awarded in the absence of calculations. Present the final result in percentage with two decimal places. (10 points)**

$$\bar{g}_{2021,2000} = \left(\frac{GDPpc_{2021}}{GDPpc_{2000}}\right)^{\frac{1}{2021-2000}} - 1 = \left(\frac{18.7}{16.9}\right)^{\frac{1}{21}} - 1 = 0.48\%$$

4. Provide two potential reasons to justify why countries may not converge in terms of GDP per capita in the long-run. **No justification required. (10 points)**

Differences in the stock of human capital, technological innovation, quality of institutions, etc.

5. Consider two alternative investment opportunities.

Alternative A: invest 10M€ today in a private venture that will yield a profit of **50M€ in 5 years** without yielding any other profits.

Alternative B: invest 10M€ today in a private venture that will yield a profit of **100M€ in 10 years** without yielding any other profits.

Suppose that you also have the option of investing in a bank deposit that pays 5% per year, and that the inflation expectations are 1% per year.

Which investment alternative is preferable? **Present all the calculations needed to reach your conclusion. No points will be awarded in the absence of calculations. (10 points)**

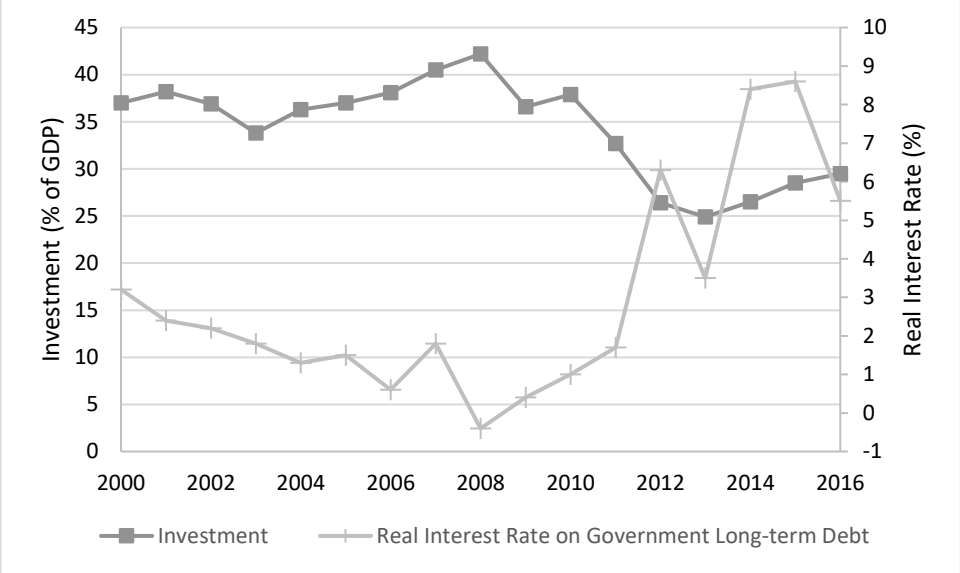
$r = i - \pi^e = 5\% - 1\% = 4\%$

$NPV_A = -10 + \frac{50}{(1+4\%)^5} = 29.18M€$

$NPV_B = -10 + \frac{100}{(1+4\%)^{10}} = 51.39M€$

Alternative B is preferable.

6. The figure below shows data for the Portuguese economy. Does it support the relationship between investment and the real interest rate studied in this course ($I = \bar{I} - br$)? **Justify in no more than two lines. (10 points)**



Source: AMECO 2022

Yes, the graph shows that investment declined when real interest rates increased, corroborating that investment is negatively affected by real interest rates

Group III

7. A closed economy without state is characterized by the following expressions for the intentions of private consumption and investment:

C = 75 + 0.8 Y

I= 200

7.1. Calculate the equilibrium values of output, private consumption and savings. **(10 points)**

$$Y = \frac{\overline{C} + \overline{I}}{1 - c} = \frac{75 + 200}{1 - 0.8} = 1375$$

$$C = 75 + 0.8 * 1375 \ = 1175$$

$$S = Y - C = 1375 \ - 1175 = 200 = I$$

7.2. Determine and interpret the values of the marginal propensity to consume and the average propensity to consume. What is the necessary condition for the marginal propensity to consume to be higher than the average propensity to consume? **(10 points)**

Marginal propensity to consume = 0.8

Average propensity to consume = $\frac{C}{Y} = \frac{75+0.8*Y}{Y} = \frac{75}{Y} + 0.8 = 0.85$

The marginal propensity to consume is higher than the average propensity to consume when autonomous consumption is negative.

7.3. Consider a decrease in the marginal propensity to save of 5 percentage points. What are the new equilibrium values of output, private consumption and savings? Provide a justification for the variation in savings. **(10 points)**

$\Delta s = -0.05 \rightarrow \Delta Y = ?;\ \Delta C = ?;\ \Delta S = ?$

$$Y = \frac{\overline{C} + \overline{I}}{1 - c} = \frac{75 + 200}{1 - 0.85} = 1833.33$$

$$C = 75 + 0.85 * 1833.33 = 1633.33$$

$$S = Y - C = 1833.33 - 1633.33 = 200 = I$$

Although the marginal propensity to save decreased, the aggregate level of savings remained constant -> Savings Paradox. In the Keynesian model without state and with close economy the level of savings is entirely determined by the level of investment. Intuitively, savings remain equal because households saved a lower percentage of a larger income.

8. The functions of exports and imports of a given economy are, respectively:

X = 150 + 25R,

M =75 + 0.25 Y - 50R

Where Y is the output and R the real exchange rate index.

8.1. Assume that nominal exchange rate index (*e)* is 1, and domestic price index (P) is 1 and that external price index (P *) is 1.1. What is the value of output for which the balance of goods and services is balanced? **(10 points)**

$$R = e * \frac{P^*}{P} = 1 * \frac{1.1}{1} = 1.1$$

$$NX = X - M = 75 + 75R - 0.25Y = 75 + 75 * 1.1 - 0.25Y$$

$$NX = 0 \rightarrow Y = 630$$

8.2. Suppose that the level of output increases by 20 m.u. and the real exchange rate index increases by 0.02. What is the effect on Net Exports? **(10 points)**

$$NX = X - M = 75 + 75R - 0.25Y$$

$\Delta NX = 75\Delta R - 0.25\Delta Y$ = 75*0.02 – 0.25*20 = -3.5

Group IV

9. Consider the following table with data for each different asset .Compute the monetary aggregate M1, M2 and M3 **(20 points)**:

Currency circulation	8,535.40
Debt bonds up to 2 years	373.50
Funds and money market securities	261.45
Overnight deposits	2,500.00
Repurchase agreements	112.05
Term deposits	3,409.40
Total	15,191.80

Solutions

M1 11,035.40

M2 14,444.80

M3 15,191.80

10. When we analyse the aggregate demand function, the graphical representation of it shows a negative slope. What explains such negative slope? **(30 points)**

Interest rate effect (10 points)

• A higher price level (P) increases money demand (Md);

• Assuming that money supply (Ms) remains constant (hypothesis 1 of monetary policy behaviour), it will lead to an increase the nominal interest rate, ceteris paribus, which balances the monetary market (MM), and increases the real interest rate;

• Consequently, inducing a decrease of investment (and consumption) intentions;

• Thus, the intentions of domestic expenditure (D) are reduced, so that to exist Equilibrium in the GSM;

• The equilibrium product must be lower .

Competitiveness effect (10 points)

• A higher level of prices (P), ceteris paribus, has as effect a decrease originates a decrease of competitiveness of internal goods and services in relation to external (R).

• Consequently, the balance of goods and services (NX) will decrease because the exports (Ex) decrease and the imports (Im) increase!

• So, planned domestic expenditure (D) decreases and, to have an equilibrium in the goods and services market (GSM), the equilibrium output must be lower.

Wealth effect (10 points)

• A higher level of prices (P), for a given level of nominal wealth of the households (W), represents a lower lever for real wealth (W/P);

• Consequently, a decrease in the intentions of private consumption (C), according the permanent income/life cycle theory;

• So, the intentions of domestic expenditure (D) decrease and, to have an equilibrium in GSM, the equilibrium output must be lower.

Economics II - Form

0. Subscripts:

fc – factor costs; bp – basic prices; mp – market prices; r – received; s – sent;

row – rest of the world

1. Taxes:

NITProducts - net indirect taxes on products

NITProduction - net indirect taxes on production

TIT – total indirect taxes net of subsidies

2. Production Approach:

GVA – Gross Value Added

Prod – Production

IC – Intermediate Consumption

GDP – Gross Domestic Product

$\mathrm{GV}A_{bp} = \mathrm{Prod} - \mathrm{IC}$

$\mathrm{GD}P_{mp} = \mathrm{GV}A_{mp} = \mathrm{Prod} - \mathrm{IC} + \mathrm{NITProducts}$

3. Income Approach:

W – wages paid by producers for the use of wage labour

MI – Mixed Income

GOS – Gross Operating Surplus

$\mathrm{GV}A_{bp} = \mathrm{W} + \mathrm{MI} + \mathrm{GOS} + \mathrm{NITProduction}$

$\mathrm{GD}P_{mp} = \mathrm{GV}A_{mp} = \mathrm{GV}A_{bp} + \mathrm{NITProducts} =$

$= \mathrm{W} + \mathrm{MI} + \mathrm{GOS} + \mathrm{NITProduction} + \mathrm{NITProducts}$

4. Expenditure Approach:

C – Private Consumption

G – Public Consumption

I – Investment

X – Exports

M – Imports

NX – Net Exports = X – M

Final Consumption = C + G

$\mathrm{GD}P_{mp} = \mathrm{C} + \mathrm{G} + \mathrm{I} + \mathrm{NX}$

5. Net Domestic Product

CFC – Consumption (or depreciation) of fixed capital

NDP – Net Domestic Product

$\mathrm{ND}P_{mp} = \mathrm{GD}P_{mp} - \mathrm{CFC}$

6. Investment

GFCF - Gross Fixed Capital Formation

$\Delta I\mathrm{nv}$ – Changes in inventories

ALDV – Acquisitions less disposals of valuables

$\mathrm{I} = \mathrm{GFCF} + \Delta I\mathrm{nv} + \mathrm{ALDV}$

7. National Income

$\mathrm{P}I_{r,row}$ – Primary Income received from the rest of the world

$\mathrm{P}I_{s,row}$ – Primary Income sent to the rest of the world

$\mathrm{NP}I_{row}$ – Net Primary Income from the rest of the world

GNI – Gross National Income

$\mathrm{NP}I_{row} = \mathrm{P}I_{r,row} - \mathrm{P}I_{s,row}$

$\mathrm{GNI} = \mathrm{GD}P_{mp} + \mathrm{NP}I_{row}$

8. Disposable Income

$CT_{r,row}$ – Current Transfers received from the rest of the world

$CT_{s,row}$ – Current Transfers sent to the rest of the world

$\mathrm{NC}T_{row}$ – Net Current Transfers = $\mathrm{C}T_{r,row} - \mathrm{C}T_{s,row}$

GNDI – Gross National Disposable Income

$\mathrm{GNDI} = \mathrm{GNI} + \mathrm{NC}T_{row}$

9. Current Account

S – Domestic Savings (or Gross savings)

CA – Current Account

$\mathrm{CA} = \mathrm{NX} + \mathrm{NP}I_{row} + \mathrm{NC}T_{row}$

$\mathrm{S} = \mathrm{GNDI} - (C + G)$

$\mathrm{GNDI} = \mathrm{C} + \mathrm{G} + \mathrm{I} + \mathrm{NX} + \mathrm{NP}I_{row} + \mathrm{NC}T_{row} \Leftrightarrow S - \mathrm{I} = \mathrm{CA}$

10. Net External Financing Capacity

NCT – Net Capital Transfers

NFC – Net External Financing Capacity

$\mathrm{NFC} = -\mathrm{CA} + \mathrm{NCT}$

11. Behavioural functions:

Cobb-Douglas Production Function: $\mathrm{Y} = \mathrm{A}.K^{\alpha}.N^{\beta}$

Investment Function: $\mathrm{I} = \bar{\mathrm{I}} - b.r$

Exports Function: $\mathrm{X} = \bar{\mathrm{X}} + \mathrm{a}_1.\mathrm{R} + \mathrm{f}.\mathrm{Y}^*$

Imports Function: $M = \bar{M} - a_2.R + m.Y$

Net Exports Function: $NX = \overline{NX} + a.R - m.Y$

Competitiveness: $\mathrm{R} = \frac{e.P^*}{P}$

Money Demand Function: $M^d = P.(k.Y - h.i)$

12. (System) equations of the Keynesian model in an open economy:

(1) D = C + I + G + X – M

(2) $\mathrm{C} = \bar{C} + \mathrm{c}.Y_d$

(3) $Y_d = \mathrm{Y} - \mathrm{T} + \mathrm{TR}$

(4) $\mathrm{T} = \bar{T} + \mathrm{t}.\mathrm{Y}$

(5) $\mathrm{TR} = \overline{TR}$

(6) $\mathrm{I} = I^{Priv} + I^{Pub}$

(7) $I^{Priv} = \overline{I^{Priv}}$

(8) $I^{Pub} = \overline{I^{Pub}}$

(9) $\mathrm{G} = \bar{G}$

(10) $\mathrm{X} = \bar{X}$

(11) $\mathrm{M} = \bar{M} + \mathrm{m}.\mathrm{Y}$

(12) Y=D