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## **Business cycles and trends in Germany and Portugal: macroeconomic policy implications in the Euro Area**

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## **Abstract**

We describe the business cycle neoclassical view adopted by European Institutions in the Euro Area, and derive the stylized facts of business cycles and trends for Germany and Portugal in the period 1991–2018. The data is extracted from the European Commission’s AMECO database. To separate cycle and trend, we use the decomposition available in the AMECO database for the output, and the the Hodrick-Prescott filter for the other variables. The results show that the amplitude of the business cycle and persistence of shocks are greater in Portugal than in Germany. They also show that the stylized facts of the business cycles of the two economies are quite different. Moreover, common shocks have asymmetric consequences. In the long run, there has been a convergence of inflation, general government structural balances, and real unit labour costs, but general government consolidated gross debt, fixed investment, and per capita potential GDP have been increasingly diverging, despite the behaviour of real wages and net exports in the two countries. Additionally, temporary shocks have permanent effects on the Portuguese economy. The results raise questions about the place-neutral macroeconomic policy enforced by the European institutions in the Euro Area, particularly in what concerns cohesion Member States.

## **Keywords**

Euro Area, Germany, Portugal, New Neoclassical Synthesis, Stylized facts of the business cycle, Trends, Output gap, Potential output, Macroeconomic policy, Place-based approach

## **JEL codes**

B22; B41; E32; E63; F45; H70; O11; R10; R50; R58

**Word Count:** 8316

## 1. Introduction

In this paper, we adopt theoretical and empirical tools similar to those used by the European Institutions (EIs) to analyse the business cycle and trends of two Member States (MSs) of the Euro Area (EA), in the period 1991-2018: Germany, a core MS, and Portugal, a peripheral MS. Three main innovations of the research are: i) The overall and comparative analysis provided to the reader of business cycles and trends in Germany and in Portugal; ii) Testing the new stylized fact by Cerra and Saxena that “(...) all types of recessions lead to a persistent loss in production” (Cerra and Saxena, 2017, p. 6) in our data; and iii) Discuss the appropriateness and feasibility of an alternative place-based (instead of place-neutral) approach to macroeconomic policy in the EA<sup>1</sup>.

In June 1988 the European Council took the decision to implement an Economic and Monetary Union (EMU). In April 1989, a committee chaired by Jacques Delors proposed the EMU to be achieved in three stages (Committee for the Study of EMU, 1989)<sup>2</sup>. Today, the EA has 19 members, but is still an incomplete and nonoptimal currency area. For instance, its central level is well equipped with monetary capacity, but still lacks financial regulatory and fiscal capacities. These fundamental flaws in its design explain why the 2007-2008 Global Financial Crisis (GFC) led to a split of the EA between core MSs, such as Germany, and peripheral MSs, such as Portugal, inflicting enormous economic and social costs on the latter, and retarding economic recovery for a decade in the entire European Union (EU; on the EMU and the GFC, see, for instance, Krugman, 2012; Van Parijs, 2012; De Grauwe, 2013, 2018; De Grauwe and Ji, 2013a,b; Casaca and Artamendi, 2014; Baldwin *et al.*, 2015; Baldwin and Giavazzi, 2015; Costa, Martins, and Guedes de Oliveira, 2016; Wren-Lewis, 2016; Stiglitz, 2016; Macchiarelli, Gerba, and Diessner, 2019).

The paper unfolds as follows. After this introduction, section 2 describes the neoclassical theory of the business cycle informing macroeconomic policy in the EA. This is followed by section 3, with the empirical analysis (data and its treatment, business cycle and trend results). Section 4 discusses the implications of the results to the current place-neutral approach to macroeconomic policy in the EA, and the appropriateness and feasibility of a place-based approach alternative. Section 5 concludes the paper.

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<sup>1</sup> By Macroeconomic policy in the EA, we mean the policies of the European Central Bank (ECB) and the Fiscal Stability Treaty (TSCG, Treaty on Stability, Coordination and Governance in Economic and Monetary Union)

<sup>2</sup> On the EMU and its developments see also EC (1990, 2020), Gross and Thygesen (1998), De Grauwe (2018), and Macchiarelli, Gerba, and Diessner (2019).

## **2. The European Institutions' neoclassical view of the business cycle**

The so-called New Neoclassical Synthesis (NNS, Goodfriend, and King, 1997) combines neoclassical New Keynesian and New Classical macroeconomics to explain the business cycle.<sup>3</sup> It is still the theoretical view underlying many central banks' decisions and policies, namely those of the ECB. It is also the view of the European Commission, the European Council, the International Monetary Fund (IMF), and the Organisation for Economic Co-operation and Development (OECD), to name a few relevant international institutions.

The NNS assumes that the economy is constantly an equilibrium-seeking and sustaining system. It looks at the business cycle as short run fluctuations in output around its long run trend. The output gap is mainly caused by temporary shocks on demand. It is assumed that these shocks do not have permanent effects on supply. In other words, they are neutral in the long run. Prices in the economy can be flexible or sluggish. Expectations may (or may not) be rational. Information is sometimes incomplete. The behaviour of agents has microeconomic foundations (in the sense of optimization).

The NNS suggests that monetary policy can have real effects on the economy, little long run trade-off between inflation and output, the existence of significant gains from eliminating inflation, and the importance of credibility to understand the effects of monetary policy (Goodfriend, and King, 1997). It chooses price stability as the main target for monetary policy, although specific monetary policy rules have been proposed, namely by Taylor (1993, 1999), to minimise the output gap and the deviation of inflation from the target set by the central bank. The NNS does not assign any stabilisation role to fiscal policy.

Neoclassical New Keynesianism combines i) the short run market failures and price rigidities of neoclassical Keynesianism; ii) the hypothesis of a long run natural equilibrium and the monetary policy focus of neoclassical monetarism; and iii) the possibility of rational expectations and the microeconomic foundations of neoclassical New Classicism. Neoclassical New Keynesian models explain price rigidity in the output market (e.g. Mankiw, 1985), nominal wage and real wage rigidity in the labour market (e.g. Yellen, 1984), failures in the capital markets (e.g. Greenwald and Stiglitz, 1993), and other types of market failures. For

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<sup>3</sup> The development of the NNS took a few decades. It all started with neoclassical Keynesianism, the theoretical attempt made by Hicks to reconcile Keynes's ideas in the *General Theory* (Keynes, 1936) with the notion of Walrasian general equilibrium (see Hicks, 1937, 1980-1981), and with the empirical work on business cycles of Burns and Mitchell (see Burns and Mitchell, 1946).

neoclassical New Keynesianism, in the long run, demand-side monetary and fiscal policies are neutral.

Neoclassical New Keynesianism is behind the NNS. It has adopted and transformed the neoclassical New Classical Real Business Cycle (RBC)<sup>4</sup> Dynamic Stochastic General Equilibrium (DSGE) models. Several of these more recent New Keynesian models incorporate, among others, an equation like the expectations-augmented Phillips curve: the New Keynesian Phillips curve (e.g. Clarida, Galí, and Gertler, 1999; Blanchard and Galí, 2007). They have been the workhorse models used by many central banks (Blanchard, 2015; Romer, 2016). The GFC and the Great Recession have questioned the ability of these models to inform monetary policy and have recovered a stabilisation role to fiscal policy (see Blanchard, 2015; Romer, 2016; and Vines and Wills, 2018).

Regarding the EIs governance of the EA, it has been shown to be very influenced by the macroeconomic priorities established by Lucas (2003), the founding father of neoclassical New Classical macroeconomics, particularly with the GFC. Lucas (2003) sees little benefit in the use of active countercyclical stabilisation policies. He argues that monetary policy emphasis should be placed on providing price stability for the agents' expectations formation, while fiscal policy emphasis should be placed on providing people with better incentives to work and save (Lucas, 2003). The latter are what the EIs call fiscal consolidation and supply side structural reforms. In the EA, structural reforms have consisted of decreasing government expenditure and size, deregulating markets, namely the labour market, and increasing the weight of exports in the economy.

The Expansionary Fiscal Contraction (EFC) hypothesis,<sup>5</sup> introduced by Giavazzi and Pagano (1990), was brought to the European political debate by Jean-Claude Trichet<sup>6</sup> as the correct response to the GFC in the EA.<sup>7</sup> In academia, Alesina and Ardagna (2010) advocate cuts in public spending as a way of stimulating the private sector confidence and a rapid economic recovery. Reinhart and Roggoff (2010), who advocate the same idea, point to a 90% limit on public debt from which countries would have financing problems and growth would cease.<sup>8</sup> In

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<sup>4</sup> On the RBC theory, see Kydland and Prescott (1982), Long and Plosser (1983), and Plosser (1989).

<sup>5</sup> Also known as the Expansionary Austerity Hypothesis (EAH). According to this hypothesis, cuts in government spending reduce expected long run interest rates and taxes, increasing the confidence of the private sector and leading it to spend more immediately, compensating for government expenditure reduction.

<sup>6</sup> President of the ECB at the time.

<sup>7</sup> The EFC hypothesis is a variation of the Ricardian Equivalence Hypothesis (REH) introduced by Barro (1974).

<sup>8</sup> Herndon, Ash, and Pollin (2014) show the existence of errors in the calculations of Reinhart and Roggoff (2010).

the EU, these ideas reinforced the EIs' economic convictions in their response to the crisis and later led to the establishment of the Fiscal Stability Treaty (TSCG) and the European Semester. The NNS is the framework we use in this paper to address the business cycle and a few variable trends in Germany and Portugal. An important criticism of the NSS relates to the fact that temporary demand shocks can cause permanent supply effects. According to Blanchard and Summers (1986, 1987), business cycles can have permanent effects on supply due to unemployment hysteresis. The longer people are unemployed in a recession, the less employable they become, as they lose human capital. In addition, people start to give up looking for a new job. Moreover, with the GFC, many young and qualified Portuguese emigrated, including to Germany, and did not return to Portugal. This fact means a negative permanent shock on supply of the Portuguese economy (Costa, Martins, and Guedes de Oliveira, 2016), and a positive permanent shock on supply of the destination countries. Finally, according to Cerra and Saxena (2017), all types of recessions lead to permanent output losses, not only but also those related to financial and political crises (Cerra and Saxena, 2008).

In the empirical analysis, we will pay special attention to the new stylized fact of Cerra and Saxena (2017). In the presence of permanent effects, the benefits of using active countercyclical stabilisation policies are not negligible, contrary to what Lucas (2003) suggested.

### **3. The empirical analysis**

#### *The data and its treatment*

We use annual data drawn from the European Commission AMECO database. Our choice is justified by the following reasons: i) it is admissible to use annual data in business cycle analysis; ii) this way, we avoid to deal with seasonality problems in the data, which can be problematic when using filters such as the Hodrick-Prescott (HP) filter; iii) we are dealing not only with cycles but also with trends; iv) it is sufficient to illustrate the existence of important differences between business cycles and trends in Germany and Portugal; v) the TSCG and the European Semester set annual targets for the EA economies to comply with; and vi) last, but not least, we want to explore the AMECO data base, which is the annual macroeconomic database of the European Commission's Directorate General for Economic and Financial Affairs.

The data covers the period 1991–2018 in Germany and Portugal. The year 1991 is the first in which there is data on unified Germany. It is also the first year after the beginning of stage one of the EMU, which started on 1 July 1990, with total liberalization of capital movements.

To separate cycle and trend, we use the AMECO data’s available decomposition for the output, and the HP filter decomposition for the remaining variables, as suggested by the ESCB (see Kremer *et al.*, 2006; Braz, Sazedj, and Campos, 2019).

The HP filter has often been used in business cycle analysis by institutions such as the IMF. It was very popular in the RBC literature (Cooley and Prescott, 1995). King and Rebelo (1993) identified as main advantages of the use of the HP filter the fact that it can be applied to nonstationary series and it is simple to implement. The HP filter determines the trend of a time series as a weighted bilateral moving average that results from the minimization of the following quadratic function:

$$\min_{y_t^T} L = \sum_{t=1}^S (y_t - y_t^T)^2 + \lambda \sum_{t=2}^{S-1} (\Delta y_{t+1}^T - \Delta y_t^T)^2 \quad (1)$$

$y_t^T$  yields the long run trend at time  $t$

$y_t$  time  $t$  observation of the time series

$\lambda$  smoothing parameter.

The cycle is given by the deviations of the trend. The smoothing parameter is a penalty factor on abrupt fluctuations. The value of  $\lambda$  depends on the frequency of the data and of the economy. We use  $\lambda = 100$  for Germany and  $\lambda = 30$  for Portugal. The former is the value recommended in the literature for annual data.<sup>9</sup> The latter is the value recommended by the Bank of Portugal for annual data in Portugal (see Braz, Sazedj, and Campos, 2019).<sup>10</sup>

Although still in use, the HP filter has been criticized and other filters have been used and proposed in the literature. The main drawbacks of the HP filter relate to the choice of the smoothing parameter  $\lambda$ , which affects the results, and the boundary problem, which translates into errors in the estimates based on data from the beginning and end of the sample period,

<sup>9</sup> It is the value used for annual data in the United States.

<sup>10</sup> In Portugal, a smoothing parameter  $\lambda=30$  presupposes a cycle of eight years.

particularly when using annual data. On these drawbacks see, for instance, Baxter and King (1999), Phillips and Jin (2015), and Hamilton (2018).

Given the above, our choice of the HP filter is conservative. It is justified because it is the basis for many of the stylized facts of the business cycle described in the literature, and it is still being suggested by the ESCB.

Variables expressed in monetary values (euros) were extracted from AMECO database at constant prices of 2015. For these variables (including the output) and for variables expressed as index numbers, the variable deviation from trend (including the output gap) is computed as a percentage of the variable trend value (the potential output, in the case of output). This is the procedure followed by the European Commission and is a way of normalizing the cyclical components of the two countries' data. For variables expressed as percentages and/or Gross Domestic Product (GDP) percentages, the variable deviation from the trend was considered as such.

All calculations were performed using EXCEL or GRET. Variables such as potential output and general government structural balance excluding interest rates were retrieved directly from the AMECO database.

### *Business cycle results*

Tables 1 and 2 yield, respectively, the stylized facts of the business cycle of Germany and Portugal, in the period 1991–2018.<sup>11</sup>

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<sup>11</sup> To control for the value of  $\lambda$  used in Portugal ( $\lambda = 30$ ), we computed the HP filter decomposition in Portugal using the value of  $\lambda$  recommended in the literature for annual data ( $\lambda = 100$ ). The results are very similar to the ones reported in Table 2, but with a higher volatility. As additional robustness controls, filter decomposition was computed using for the two countries the Baxter-King (BK) filter (with  $K=3$ , annual data, and assuming a 2 to 8 years cycle), and a filter assuming a polynomial trend of order 3. The stylized facts of the business cycles and trends of the two countries are, in general, alike the ones reported in the paper using the HP filter. We also have computed the beta elasticities and semi-elasticities. All of these results are made available to the reader upon request.



Table 1: Stylized facts of the business cycle in Germany (1991–2018,  $\lambda=100$ )

Germany (HP filter with lambda = 100) 1991-2018	Unit	Stdev (sd)	sd(x)/ sd(GDP)	Autocorrelation coefficients		Correlation coefficient of x(t) with GDP(t + i)				
				-1	-2	i=-2	i=-1	i=0	i=+1	i=+2
<b>GDP</b>	2015 prices	1.736	1.00	0.36*	-0.37*	-0.37*	0.36*	1.00***	0.36*	-0.37*
<b>Expenditures</b>										
Private final consumption expenditure	2015 prices	0.850	0.49	0.55***	0.13	-0.23	0.28	0.47***	0.32	0.06
Gross fixed capital formation	2015 prices	3.342	1.93	0.38**	-0.22	-0.41**	0.20	0.72***	0.28	-0.23
General government final consumption expenditure	2015 prices	1.241	0.71	0.58***	0.28	0.19	0.14	-0.20	-0.22	0.10
<b>Net exports</b>										
Net exports of goods and services	gdp percentage	0.779	0.45	0.46**	0.08	0.05	0.04	0.01	-0.20	-0.26
<b>Labour market variables</b>										
Total unemployment	1000 persons	9.478	5.46	0.67***	0.08	0.08	-0.35*	-0.51***	-0.05	0.33*
Real wages	2015 prices	0.903	0.52	0.24	0.12	-0.01	0.33*	0.20	-0.19	-0.13
Real unit labour costs	index	1.271	0.73	0.40**	-0.17	0.45**	0.24	-0.42**	-0.22	0.31
<b>Interest rates and inflation</b>										
Nominal short-term interest rates	percentage	0.955	0.55	0.50***	-0.10	-0.11	0.52***	0.71***	0.00	-0.47**
Nominal long-term interest rates	percentage	0.425	0.25	0.31	-0.23	-0.05	0.15	0.36*	-0.17	-0.64***
GDP deflator inflation	percentage	0.703	0.40	0.16	-0.08	0.33*	0.64***	0.02	-0.34*	-0.34*
Consumer Price Index (CPI) inflation	percentage	0.629	0.36	0.08	-0.53**	-0.47**	0.12	0.64***	-0.11	-0.47**
<b>Public finance</b>										
General government net lending (+) or net borrowing (-)	gdp percentage	0.875	0.50	0.36*	-0.37*	-0.37*	0.36*	1.00***	0.36*	-0.37*
General government consolidated gross debt	gdp percentage	3.691	2.13	0.69***	0.20	-0.14	-0.61***	-0.46**	0.13	0.42*

Source: AMECO and authors' calculations. Table adapted from Bonfim and Neves (2002).

Level of significance: \*\*\*1%, \*\*5%, and \*10%

The highest (in absolute terms) significant correlation coefficients are signalled with shadows

Table 2: Stylized facts of the business cycle in Portugal (1991–2018,  $\lambda = 30$ )

Portugal (HP filter with lambda = 30) 1991-2018	Unit	Stdev (sd)	sd(x)/ sd(GDP)	Autocorrelation coefficients		Correlation coefficient of x(t) with GDP(t + i)				
				-1	-2	i=-2	i=-1	i=0	i=+1	i=+2
<b>GDP</b>	2015 prices	2.189	1.00	0.76***	0.38*	0.38*	0.76***	1.00***	0.76***	0.38*
<b>Expenditures</b>										
Private final consumption expenditure	2015 prices	2.135	0.98	0.63***	0.10	0.20	0.54***	0.71***	0.39**	-0.07
Gross fixed capital formation	2015 prices	6.956	3.18	0.67***	0.11	0.15	0.57***	0.78***	0.50***	0.03
General government final consumption expenditure	2015 prices	1.670	0.76	0.65***	0.12	0.26	0.43**	0.49***	0.30	-0.15
<b>Net exports</b>										
Net exports of goods and services	gdp percentage	1.384	0.63	0.46**	0.00	-0.16	-0.43**	-0.61***	-0.31	0.03
<b>Labour market variables</b>										
Total unemployment	1000 persons	12.152	5.55	0.69***	0.14	-0.14	-0.60***	-0.73***	-0.44**	-0.04
Real wages	2015 prices	1.373	0.63	0.09	-0.40**	0.24	0.42**	0.18	-0.11	-0.25
Real unit labour costs	index	1.238	0.57	0.21	-0.46**	0.34*	0.48**	0.12	-0.13	-0.26
<b>Interest rates and inflation</b>										
Nominal short-term interest rates	percentage	0.803	0.37	0.38*	-0.25	-0.04	0.25	0.32*	-0.05	-0.19
Nominal long-term interest rates	percentage	1.465	0.67	0.40**	-0.34*	0.04	0.02	-0.15	-0.41**	-0.45**
GDP deflator inflation	percentage	0.873	0.40	-0.02	-0.22	-0.10	-0.09	0.20	0.24	0.14
Consumer Price Index (CPI) inflation	percentage	1.030	0.47	0.28	-0.35*	0.04	0.23	0.30	-0.09	-0.34*
<b>Public finance</b>										
General government net lending (+) or net borrowing (-)	gdp percentage	1.178	0.54	0.76***	0.38*	0.38*	0.76***	1.00***	0.76***	0.38*
General government consolidated gross debt	gdp percentage	5.362	2.45	0.74***	0.21	-0.20	-0.53***	-0.71***	-0.54***	-0.22

Source: AMECO and authors' calculations. Table adapted from Bonfim and Neves (2002).

Level of significance: \*\*\*1%, \*\*5%, and \*10%

The highest (in absolute terms) significant correlation coefficients are signalled with shadows

Following Bonfim and Neves (2002), and for all the macroeconomic variables analysed, the tables yield three types of results: i) the standard deviation of the cyclical component of each variable (in absolute terms and relative to the standard deviation of the cyclical component of GDP); ii) the autocorrelation coefficients of the contemporaneous cyclical component of each variable with itself in periods  $t = -1$  and  $t = -2$ ; and iii) the correlation coefficients among the cyclical component of each variable and the cyclical component of GDP in periods  $t = -2, -1, 0, 1,$  and  $2$ . The first type of results measures cycle volatility; the second type measures shocks' persistence; and the third gives the stylized facts of the business cycle (see also the graphs in the Appendix).

Concerning the amplitude of the cyclical behaviour of the variables considered, in general it is higher in Portugal than in Germany. The same holds when referring to the shocks' persistence. Regarding the correlation coefficients of the several variables with GDP, which give the stylized facts of the business cycle, the results are the following:

a) Expenditures

Consumption is procyclical in both economies and coincident, as pointed out in the literature (Knoop, 2015, p. 25). However, the magnitude of the correlation coefficient is much higher in Portugal than in Germany.

Fixed investment (gross fixed capital formation) is procyclical in both economies and coincident. The direction is consistent with the literature. The timing is not. The literature points to investment as a leading variable (Knoop, 2015, p. 25). The use of annual data may explain the difference. The correlation coefficient is similar in both economies.

Government purchases (general government consumption expenditure) are acyclical in Germany and procyclical and coincident in Portugal. These facts are inconsistent with the literature. According to Knoop (2015, p.25), government expenditure is countercyclical in rich countries and acyclical in poor ones.

b) Net exports

Net exports are acyclical in Germany and countercyclical and coincident in Portugal. In Germany, the fact is inconsistent with the literature. In Portugal, the fact is consistent in

direction, but not in timing. The literature points net exports to be countercyclical but lagging (Knoop, 2015, p. 25). The use of annual data may explain the timing difference in Portugal. The second highest significant correlation coefficient in Portugal is lagging by one year.

c) Labour market variables

Total unemployment is countercyclical and coincident in both economies. The direction is consistent with the literature, but the timing is not. The literature point to this variable to be lagging (Knoop, 2015, p. 25). The use of annual data may explain the difference in both Germany and Portugal. In both economies, the second highest correlation coefficient, in absolute terms, is lagging. Still in absolute terms, the correlation coefficient is much higher in Portugal than in Germany.

Real wages are procyclical and lagging in both economies. The literature points to the existence of different situations (Knoop, 2015, p. 25).

Real unit labour costs are procyclical and lagging, although more lagging in Germany than in Portugal. In Portugal, the fact seems to be more explained by the cyclical behaviour of real wages than by the cyclical behaviour of labour productivity. The literature points labour productivity to be procyclical and leading (Knoop, 2015, p. 25). The correlation coefficient is similar in both countries.

d) Interest rates and inflation

Nominal short-term interest rates are procyclical and coincident in both economies.<sup>12</sup> The magnitude of the correlation coefficient in Germany more than doubles the Portuguese one. The literature points to nominal short-term interest rates to be procyclical and lagging (Knoop, 2015, p. 25). The direction is consistent with the literature, but the timing is not. The use of annual data may explain the difference. In Germany, the second highest significant correlation coefficient is lagging by one year.

Nominal long-term interest rates are countercyclical and leading in both Germany and Portugal. The direction is inconsistent with the literature, but the timing is not (Knoop, 2015, p. 25). The correlation coefficient is, in absolute terms, higher in Germany than in Portugal.

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<sup>12</sup> Most of the money in circulation in an economy is created by the operations of commercial banks (McLeay, Radia, and Thomas, 2014). However, short-term interest rates and the money in circulation can be influenced by the operations of the central bank (McLeay, Radia, and Thomas, 2014).

GDP deflator inflation is procyclical and lagging in Germany and acyclical in Portugal. This fact is consistent with the literature in Germany (Knoop, 2015, p. 25).

Consumer Price Index (CPI) inflation is procyclical and coincident in Germany and countercyclical and leading in Portugal. The literature points to CPI inflation to be procyclical and leading (Knoop, 2015, p. 25). The direction (timing), but not the timing (direction), is consistent with the literature in Germany (Portugal).

e) Public finance

General government net lending (+) or net borrowing (-) is procyclical and coincident in Germany and in Portugal. The variable is expressed as a percentage of GDP. The correlation coefficient being approximately one in both economies implies that the behaviour of this ratio is more dictated by the denominator than the numerator.

General government consolidated gross debt is countercyclical and lagging in Germany and countercyclical and coincident in Portugal. In absolute terms, the correlation coefficient is higher in Portugal than in Germany.

Some literature addresses the issue of business cycle synchronization, and part of it between EA countries, as a necessary condition for the successful implementation of a common monetary policy and/or the existence of an endogenous Optimal Currency Area (OCA) (e.g., Clark and van Wincoop, 2001; Belke, 2007; Gouveia and Correia, 2008; Cerqueira, 2013; Belke, Domnick, and Gros, 2017).<sup>13</sup> It is not the approach we take in this paper. Instead, we characterize some stylized facts of the business cycle in Germany and Portugal, to identify: i) the degree and nature of the correlation between the cyclical behaviour of the various variables and the output gap; ii) the volatility of the business cycle; and iii) by filtering the cyclical component, the latent trends.

Our results indicate that: i) the divergence found in the correlation between the cyclical component of nominal short-term interest rates (a variable strongly influenced by central banks) and the output gap points to a weak business cycle synchronization between the two economies;

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<sup>13</sup> The results of this literature are diverse. For instance, Clark and van Wincoop (2001) find a European border effect – within-country correlations are substantially larger than cross-country correlations. According to the authors, this border effect is explained by differences in production structure, bilateral trade, and monetary and fiscal policies. Moreover, and concerning the EMU, inability to respond to country specific shocks can lead to higher business cycle volatility and lower business cycle synchronization. Belke, Domnick and Gros (2017) find an increased synchronization among core countries of the EA, while peripheral countries decreased synchronization with regards to the core. Moreover, the authors find large differences in the amplitude of national cycles.

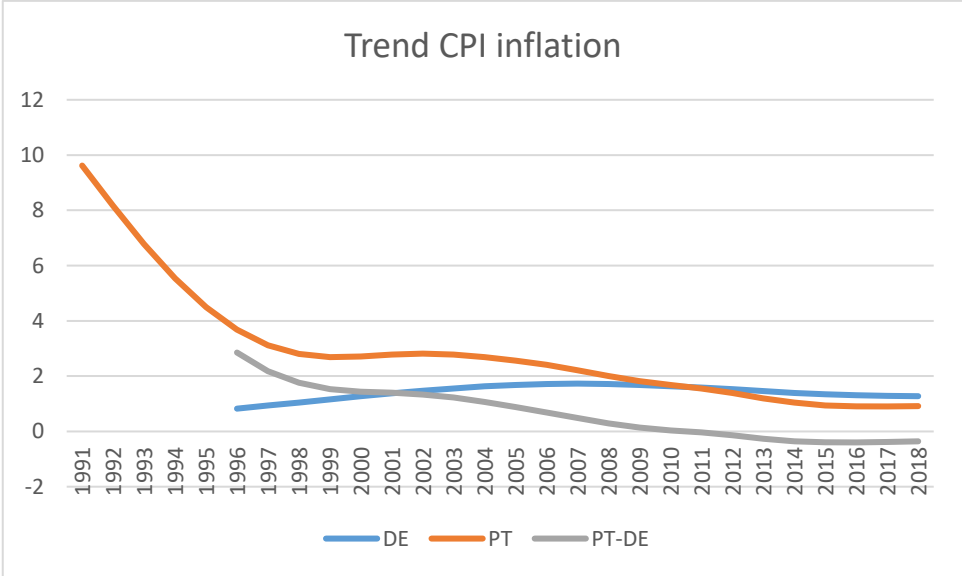
ii) more important than just the correlation patterns, the divergence found in the amplitude of the business cycle also questions the adequacy of a single common monetary policy; iii) the divergence found in the correlation between the cyclical component of general government final consumption expenditure and the output gap indicates that fiscal consolidation can be a more demanding task in Portugal than in Germany. Given these results and its current governance, the EA can hardly be considered an OCA.<sup>14</sup>

*Trend results*

The EIs take Lucas (2003) suggested supply-side approach to macroeconomic policies in the EA. They are more concerned with the structural behaviour of economies than with their cyclical behaviour. The latter is just a means to address the latent structural behaviour. In this section, we look at the trends of inflation, general government structural balance excluding interest, and general government consolidated gross debt, three macroeconomic policy targets in the EA, real unit labour costs and real wages, net exports, fixed investment (as a percentage of potential GDP), and per capita potential GDP, addressing the issue of convergence.

a) CPI inflation

Figure 1: Trend CPI inflation (Germany, Portugal, and difference, 1991–2018)



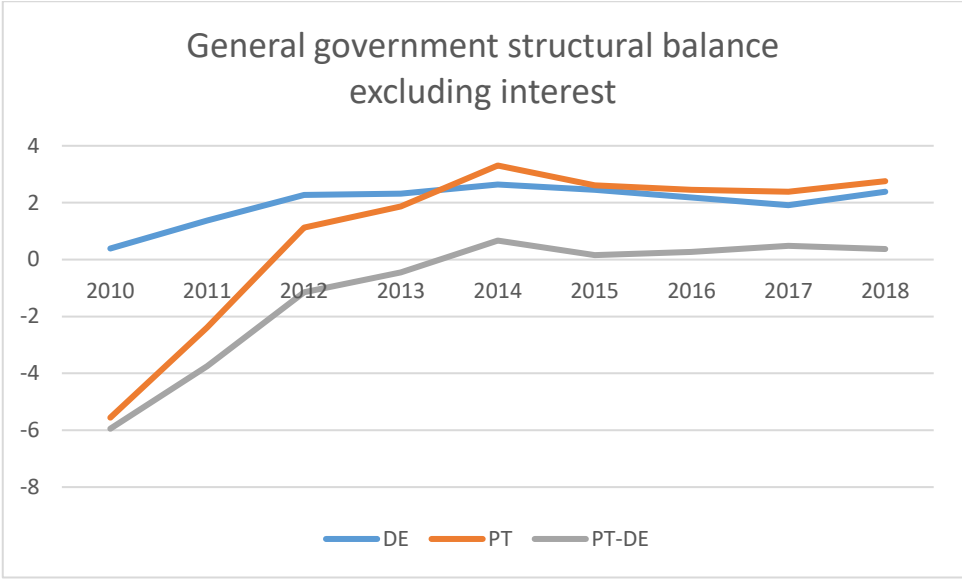
<sup>14</sup> Dividing the data into three periods - period 1 (1991-1998, before the euro); period 2 (1999-2007, with the euro before the CGF); and period 3 (2008-2018, with the euro and the GFC), the nature of the main results obtained does not change. In addition, in both countries, the volatility of the output gap first decreases (from period 1 to period 2), and after increases (from period 2 to period 3). This latter increase is much more pronounced in Portugal than in Germany. All of these results are made available to the reader upon request.

Source: AMECO and authors' calculations.

For Germany, data is only available since 1996. CPI inflation has converged in the two countries to less than 1%, well below the 2% target.

b) General government structural balance excluding interest

Figure 2: General government structural balance excluding interest (Germany, Portugal, and difference, 2010–2018)

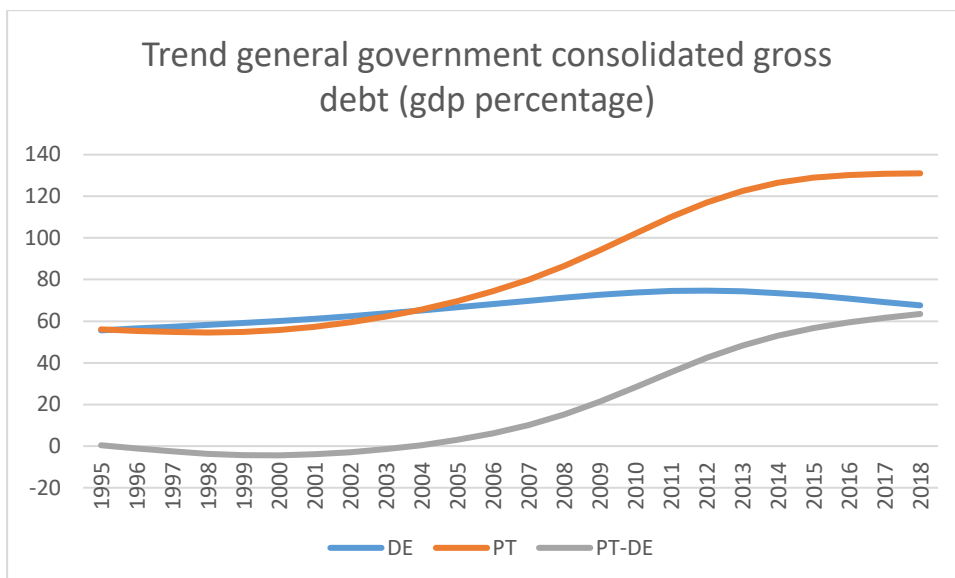


Source: AMECO

General government structural balance excluding interest has converged in the two countries, with Portugal having surpluses higher than Germany and above 2% since 2014.

c) General government consolidated gross debt

Figure 3: Trend general government consolidated gross debt (Germany, Portugal, and difference, 1991–2018)

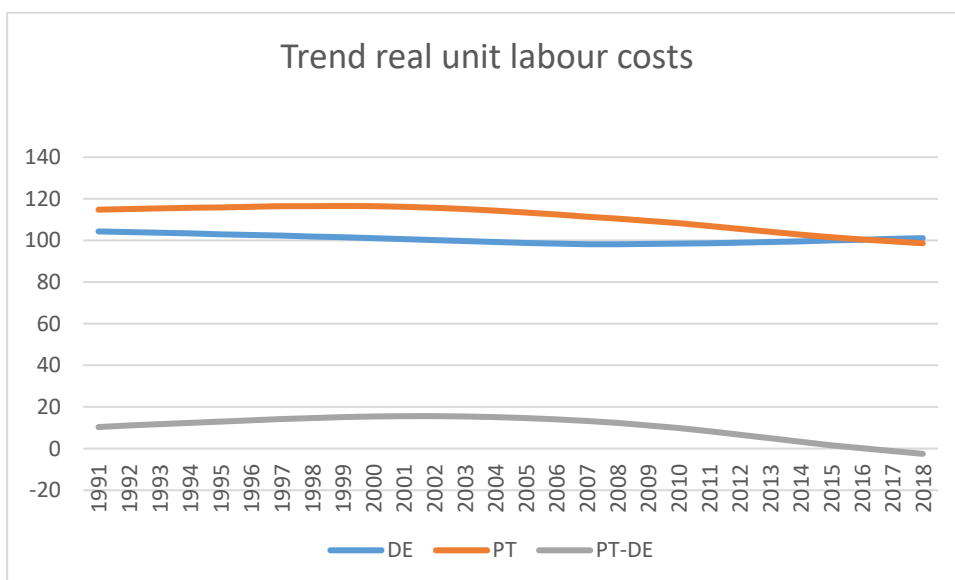


Source: AMECO and authors' calculations.

Since 2004, general government gross debt has been strongly diverging in Portugal and Germany. With the Euro adoption, in 1999, the general government gross debt has increased more rapidly in Portugal than in Germany. Moreover, in Germany, it has started to decline after 2012.

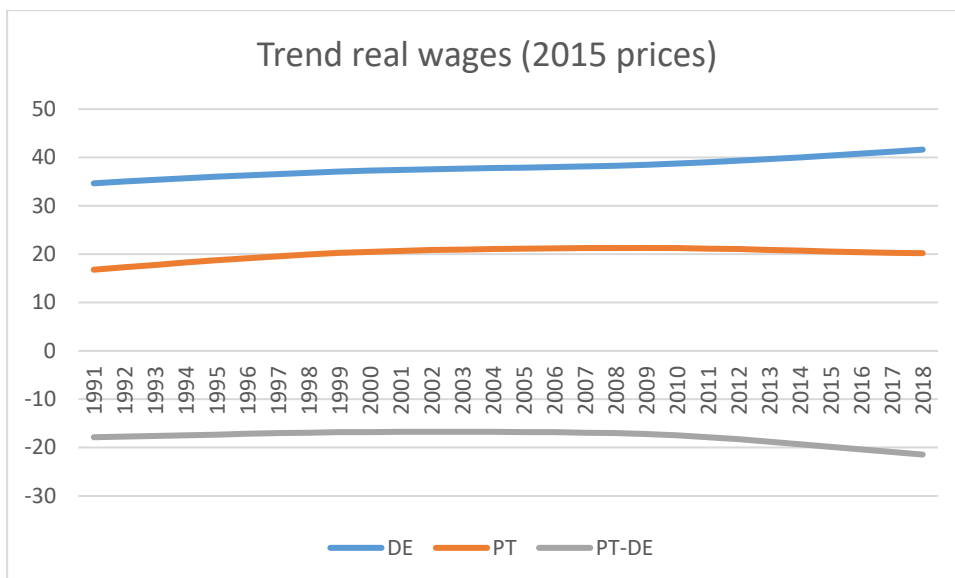
d) Trend real unit labour costs and trend real wages

Figure 4: Trend real unit labour costs (Germany, Portugal, and difference, 1991–2018)



Source: AMECO and authors' calculations.

Figure 5: Trend real wages (Germany, Portugal, and difference, 1991–2018)

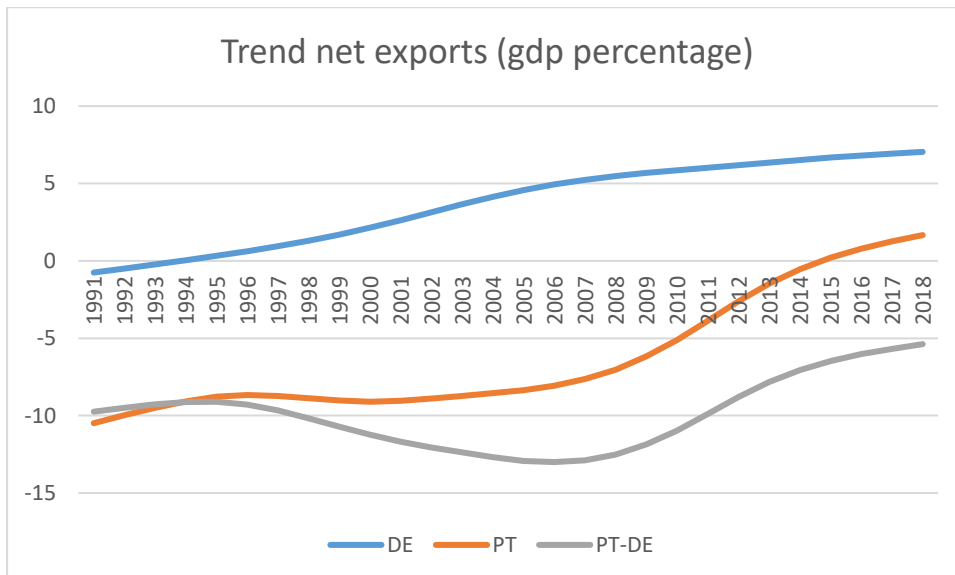


Source: AMECO and authors' calculations.

Figure 4 shows a convergence of trend real unit labour costs, and Figure 5 an increasing divergence of trend real wages.<sup>15</sup> At least in part, the latter explains the former.

e) Net exports

Figure 6: Trend net exports (Germany, Portugal, and difference, 1991–2018)



Source: AMECO and authors' calculations.

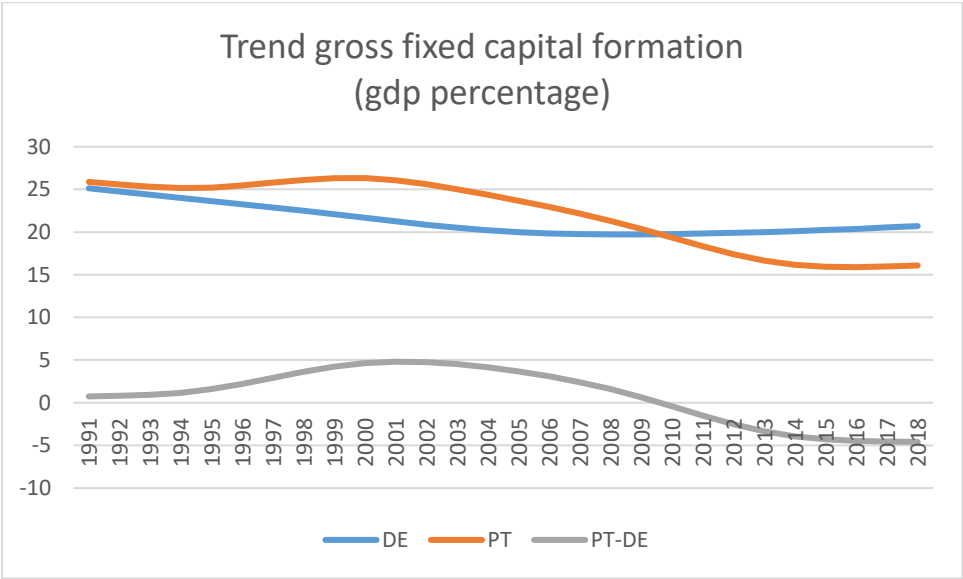
Figure 6 illustrates an increasing convergence of trend net exports after 2006.

f) Trend fixed investment

<sup>15</sup> From 2010 to 2018, trend real wages have increased 7.5% in Germany and declined 5% in Portugal.



Figure 7: Trend fixed investment (Germany, Portugal, and difference, 1991–2018)

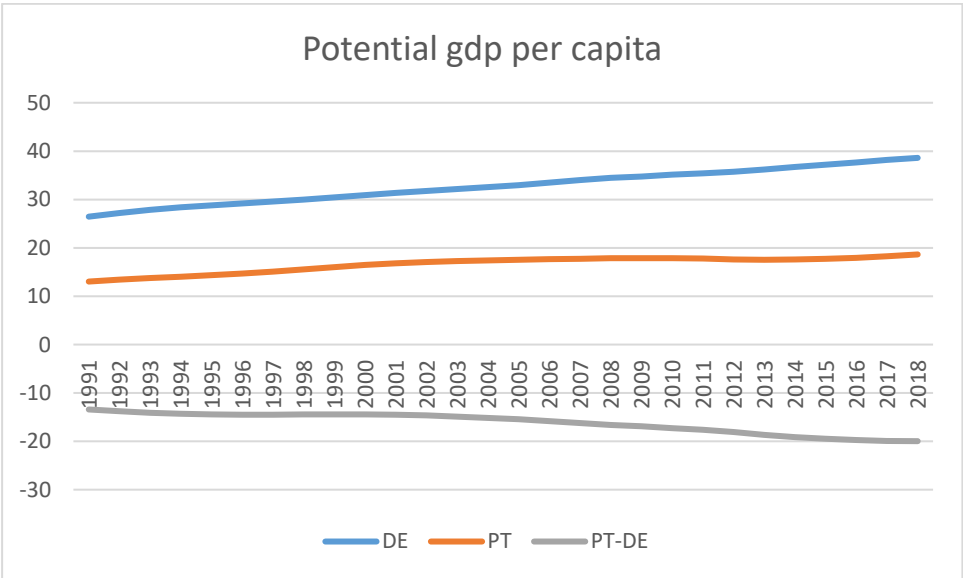


Source: AMECO and authors' calculations.

Figure 7 illustrates trend fixed investment (or gross fixed capital formation) as a percentage of potential GDP in the two countries. It shows that, since 1999, trend fixed investment has declined in Portugal, and after 2010 has been lower in Portugal than in Germany.

g) Per capita potential GDP

Figure 8: Per capita potential GDP (Germany, Portugal, and difference, 1991–2018)



Source: AMECO and authors' calculations.

Figure 8 illustrates the behaviour of per capita potential GDP.<sup>16</sup> Portugal has been increasingly diverging from Germany in the entire period. This divergence increased after 1999, when the Euro was adopted. After 2008, with the GFC, the Portuguese per capita potential GDP has stagnated.

We conclude that the one-size-fits-all place neutral macroeconomic policy enforced by the EIs in the EA has been successful in the period in achieving long run price stability and general government structural balance excluding interest surpluses. It was also successful in promoting the convergence of long run real unit labour costs (with the relative decline of long run real wages in Portugal), and long run net exports. However, the two countries have been diverging regarding long run general government consolidated gross debt, long run fixed investment, and per capita potential GDP, despite all other progress. These last three results raise questions about the costs of the macroeconomic policy pursued in the EA for cohesion countries such as Portugal.<sup>17</sup>

#### *VAR models results*

Temporary shocks can produce a permanent macroeconomic impact (Blanchard and Summers, 1986; Cerra and Saxena, 2017). Shortfalls in aggregate demand may diminish aggregate supply (Yellen, 2016). For instance, a shortfall in investment (demand shock) reduces the capital stock in the long run (supply shock) (IMF, 2015; Cerra and Saxena, 2017). Moreover, aggressive cuts in government expenditure (demand shock) may increase unemployment and labour force emigration, which reduces the labour and human capital stocks in the long run (supply shock, Costa, Martins, and Guedes de Oliveira, 2016). In contrast, expansionary macro policies during recessions help recover some of the lost output (Yellen, 2016).

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<sup>16</sup> In the calculations, we are considering the trend population obtained with the HP filter.

<sup>17</sup> According to Alcidi et al. (2016), “For an economy that starts with a large current account deficit (like Greece or Portugal, but much less Ireland), export growth is the key to long-term growth” (Alcidi et al., 2016, page 350). Moreover, Belke, Oeking and Setzer (2015) find a strong substitution effect between domestic demand and export of goods during more extreme stages of the business cycle in Portugal, such that during business cycle troughs domestic demand is relevant for the exporting dynamics. Our results show that the trend of net exports in Portugal has increased since 2002 and that the growing convergence of German and Portuguese trends, after 2006, was not sufficient to prevent an increasing divergence in potential GDP per capita, at least, since 1991. Differences in sectoral composition, technological capabilities, and firm performance in the two countries may explain this divergence (see Gräbner et al., 2019).

To assess the links between temporary demand shocks and permanent effects on supply in both countries, we estimate two VAR systems using GRETL.<sup>18</sup> Model 1 allows us to perform a Granger causality test between the output gap and the potential output in both countries:

Model 1

$$y_t^p = \alpha + \beta_{t-1}y_{t-1}^p + \beta_{t-2}y_{t-2}^p + \gamma_{t-1}y_{t-1}^g + \gamma_{t-2}y_{t-2}^g + u_t \quad (2)$$

$$y_t^g = \alpha + \beta_{t-1}y_{t-1}^p + \beta_{t-2}y_{t-2}^p + \gamma_{t-1}y_{t-1}^g + \gamma_{t-2}y_{t-2}^g + u_t \quad (3)$$

Model 2 has as a dependent variable the potential output (output gap) and treats the output gap (potential output) as an exogenous variable, allowing to assess the impact of the output gap (potential output) on the potential output (output gap):

Model 2

$$y_t^p = \alpha + \beta_{t-1}y_{t-1}^p + \beta_{t-2}y_{t-2}^p + \gamma_t y_t^g + u_t \quad (4)$$

$$y_t^g = \alpha + \gamma_{t-1}y_{t-1}^g + \gamma_{t-2}y_{t-2}^g + \beta_t y_t^p + u_t \quad (5)$$

$y_t^p$  potential output at time  $t$

$y_t^g$  output gap at time  $t$

Table 3 yields the estimation results of Model 1.

Table 3: Model 1 coefficients and Granger causality test

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<sup>18</sup> GRETL output is made available to the reader upon request. The null hypothesis of the longest lag being 1 was rejected against the alternative hypothesis of the longest lag being 2.

$y_t^p$	Germany	Portugal
constant	-14.085	1.10278
$y_{t-1}^p$	1.729***	2.197***
$y_{t-2}^p$	-0.720***	-1.207***
$y_{t-1}^g$	-1.032	-0.258**
$y_{t-2}^g$	0.726	-0.216***
<b>F tests</b>		
All lags of $y_t^p$	F(2, 21) = 31129.000***	F(2, 21) = 10710.000***
All lags of $y_t^g$	F(2, 21) = 1.2664	F(2, 21) = 16.259***
$y_t^g$	Germany	Portugal
constant	-2.779	-6.346*
$y_{t-1}^p$	0.052*	0.810***
$y_{t-2}^p$	-0.052*	-0.785***
$y_{t-1}^g$	0.253	0.355
$y_{t-2}^g$	-0.503***	-0.334**
<b>F tests</b>		
All lags of $y_t^p$	F(2, 21) = 1.5394	F(2, 21) = 7.3499***
All lags of $y_t^g$	F(2, 21) = 4.7909 **	F(2, 21) = 2.4329

Source: Authors' calculations. Level of significance: \*\*\*1%, \*\*5%, and \*10%

Looking at the results of the F tests in Table 3, we can see that output gap (potential output) granger causes potential output (output gap) in Portugal but not in Germany. In other words, we have evidence of Granger's causality between the output gap and the potential output only in Portugal and working both ways.

Table 4 yields the estimation results of Model 2.

Table 4: Model 2 coefficients

$y_t^p$	Germany	Portugal
constant	-6.647	6.277***
$y_{t-1}^p$	1.671***	1.461***
$y_{t-2}^p$	-0.664***	-0.490***
$y_t^g$	0.833	0.387***
$y_t^g$	Germany	Portugal
constant	-0.864	1.563
$y_{t-1}^g$	0.375*	1.002***
$y_{t-2}^g$	-0.417**	-0.417**
$y_t^p$	0.000	-0.010

Source: Authors' calculations. Level of significance: \*\*\*1%, \*\*5%, and \*10%

Table 4 shows that: i) the output gap positively affects potential output in Portugal, but not in Germany; and ii) potential output has no significant effect on output gap in both countries.

We conclude that temporary shocks on demand (the output gap) have permanent effects on supply (the potential output) in Portugal, but not in Germany.<sup>19</sup>

#### 4. Policy implications

Our results show that these two economies of the EA are different in many respects. The amplitude of the business cycle and the persistence of the shocks are higher in Portugal than in Germany. Not only have both countries suffered asymmetric shocks a few times (as happened during the peak of the Euro crisis), but also common shocks clearly have asymmetric consequences. Moreover, we expect aggressive fiscal consolidation efforts (demand shock) to cause major output losses (supply shock) in Portugal, but not in Germany.

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<sup>19</sup> In light of the results in Table 4, Table 3 results are easy to explain. For example, in Portugal, the lagged output gap leads the EIs to act, reducing the current output gap and potential GDP. As a result, a negative relationship between the lagged output gap and the current potential GDP is expected.

In the long run, there has been a convergence of CPI inflation and general government structural balances excluding interest, real unit labour costs, and net exports, but general government consolidated gross debt, fixed investment, and per capita potential GDP have been increasingly diverging, despite the behaviour of real wages and net exports. Therefore, it seems that the one-size-fits-all place-neutral macroeconomic policy approach enforced by the EIs in the EA works for the benefit of core countries like Germany, but not for the benefit of peripheral countries like Portugal. This may explain why the EU took more time to recover from the Great Recession than the United States.

Contrary to the assertion of Lucas (2003), stabilisation policies in cohesion MSs such as Portugal may have benefits that are not negligible, given that countercyclical policies can significantly reduce permanent losses in output and/or the decline in potential output in recessions. To better address these and other differences among EA MSs, the EIs should adopt a place-based approach to macroeconomic policy in the EA.

A place-based approach to sectoral policies has been advocated on the EU agenda, as is illustrated by the Territorial Agenda of the European Union 2020 – TA2020 (Council of the European Union, 2011).<sup>20</sup> So far, it has been first adopted by the LEADER programme of the Common Agricultural Policy (CAP), and after by the cohesion policy (see EC, 2015). Recently, it is being discussed its adoption in the first pillar of the Common Agricultural Policy (CAP). We suggest the EIs extending this type of approach to macroeconomic policy in the EA. A place-based approach will allow not only to deal better with the macroeconomic stability of the different Eurozone territories, but also to better articulate macroeconomic policy and sectoral policies in the different territories.

Can monetary policy in the EA, a single-currency area, be place-based? Monetary policy in the EA is conducted by the ECB focusing on price stability in normal times.<sup>21</sup> In theory, it is possible for the ECB, for instance, to implement place-based open market operations. Moreover, in response to the Euro crisis, the ECB under Mário Draghi's tenure has been able to implement exceptional measures such as quantitative easing. Except for Greece (at the time still under a rescue program), this policy was (but need not have been) place-neutral.

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<sup>20</sup> On place-neutral versus place-based approaches, see Barca, McCann, and Rodríguez-Pose (2012) and Pugalis and Gray (2016). See also OECD (2002, 2009, and 2017).

<sup>21</sup> Several authors have questioned the single mission and the 2% limit on inflation (see, for instance, Krugman, 2012; Stiglitz, 2016).

Consequently, the answer to the question is positive. Even more positive if monetary policy is combined with fiscal policy.

Can fiscal rules and/or policy in the EA be place-based in a single currency area such as the EA? The fiscal rules are monitored by the European Commission through the European Semester focusing on deficit and debt reduction. Again, it was a political choice of the EIs to make these rules place-neutral instead of place-based, not making distinctions between, for instance, cohesion and/or peripheral Member States such as Portugal and core Member States such as Germany. Hence, again, even with a common denominator, the answer to the question is positive.

Adopting a place-based approach to macroeconomic policy would help the EIs to achieve their overall macroeconomic goals in EA, whatever they may be, and not the other way around.

Two main barriers to the completion of the euro zone and the adoption of a place-based approach to macroeconomic policy are: i) the way the EU budget is funded<sup>22</sup>; and ii) the territories of macroeconomic policy in the EA. To shift EU budget funding from MSs' resources to the EU's own resources would be a way of removing the first barrier, particularly if the EU levied taxes on capital which MSs could not collect.

Regarding the second barrier, there is nothing to prevent macroeconomic policy from descending to the regional level and addressing regional business cycles and trends. The policy distinction of territories would be between types of regions of the MSs (instead of between MSs), as in cohesion policy. This would not only reduce tensions between EA MSs, but also help to articulate macroeconomic policy with sectoral policies.

## **5. Conclusions**

Germany is a core Member State of the EA, while Portugal is a peripheral one. Adopting the NNS paradigm of the business cycle and the approach suggested by the ESCB, we have described the business cycle and a few variable trends of the two countries, in the period 1991–2018.

In general, the business cycle amplitude is higher in Portugal than in Germany, corroborating previous findings in the literature. The same holds for shocks' persistence. Regarding the

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<sup>22</sup> The EU budget is funded with its own resources and resources from the Member States. The former includes, for instance, customs duties levied. The latter provide the bulk of the budget.

business cycle stylized facts, there are important differences between the cyclical behaviour of the two economies, in both direction and timing. Moreover, temporary shocks on demand may cause permanent losses of output, notably in cohesion countries like Portugal. All these imply that common shocks may have asymmetric consequences. In addition, the shocks can be asymmetric, as happened during the peak of the EA crisis. Together with the place-neutral macroeconomic policy approach pursued by the EIs in the EA, all these may explain, at least in part, the long run increasing divergence of general government gross debt, fixed investment, and per capita potential GDP between the two countries, despite the behaviour of real wages and net exports.

To be more effective, the macroeconomic policy approach adopted in the EA should be place-based instead of place-neutral. This also would allow a better combination between macroeconomic and sectoral policies, making the entire policy framework of the EU more cost-effective.

Two main barriers to the EIs completing the EA and adopting a place-based approach for all policies are: i) the way the EU budget is funded (and its small size); and ii) the territories of macroeconomic policy (countries) in the EA. Shifting EU budget funding from MSs' resources to the EU's own resources would allow for a bigger budget that would not weigh on national budgets, and thus it could be a way of removing this barrier. Making macroeconomic policy in the EA descending to the regional level would allow not only to reduce tensions between EA MSs but also help to better adjust the stabilisation role of macroeconomic policy to the different needs of the various regions and to articulate macroeconomic policy with sectoral policies, making the entire policy-framework more cost effective. In the EU, regional policy could assume the role of the missing industrial policy.

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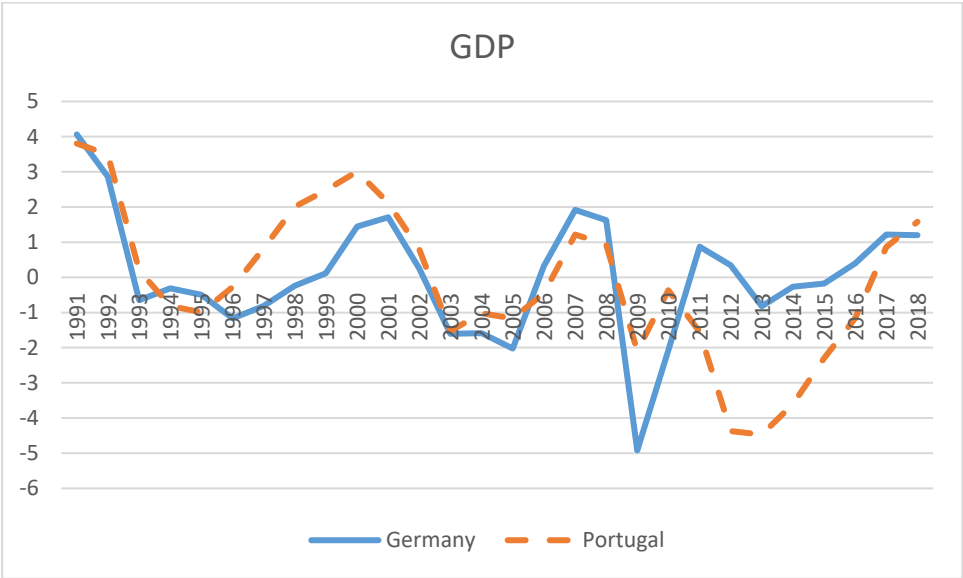
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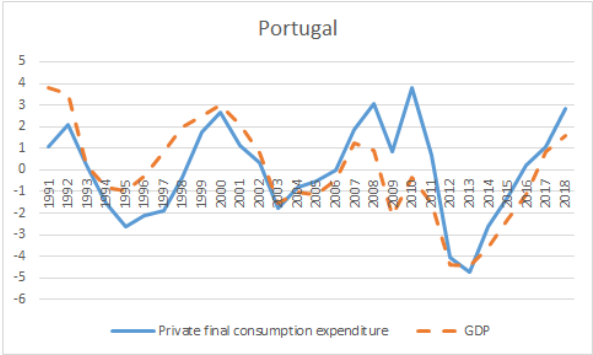
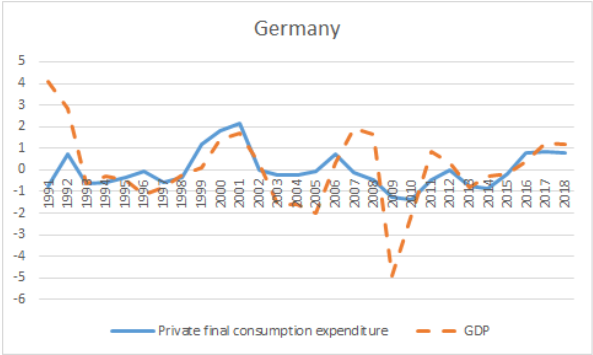
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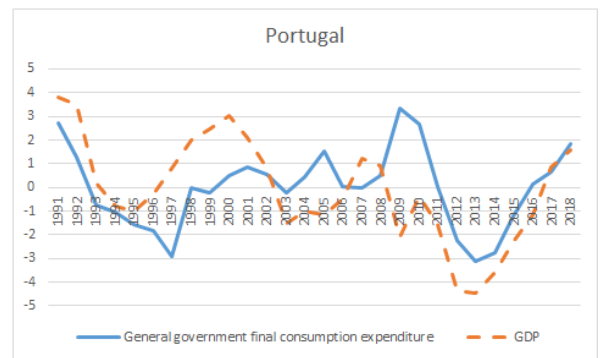
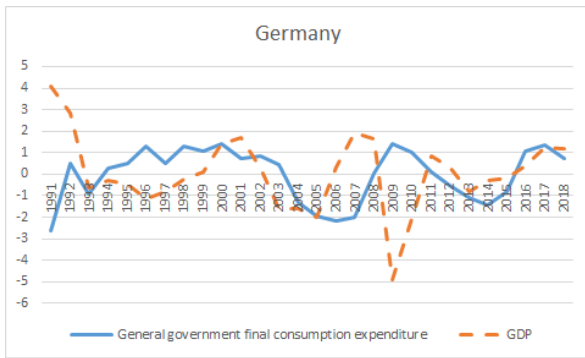
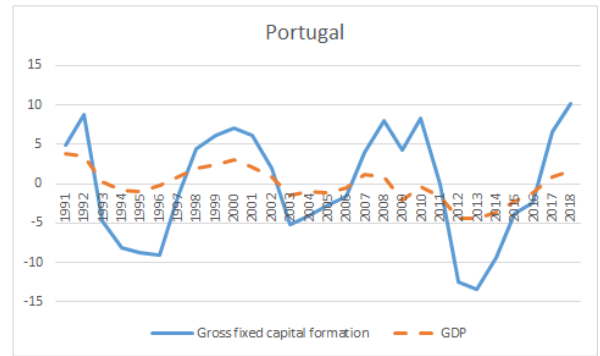
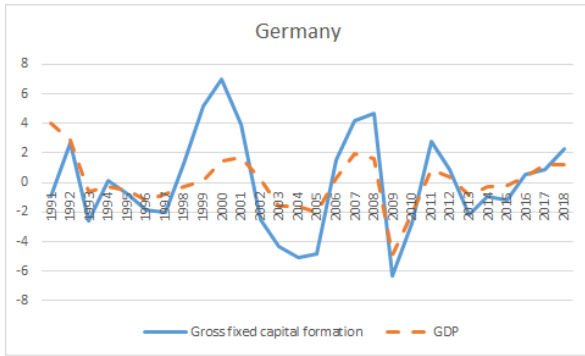
**Appendix - Stylized facts of the business cycle in Germany and in Portugal (1991–2018), graphs**

**GDP**

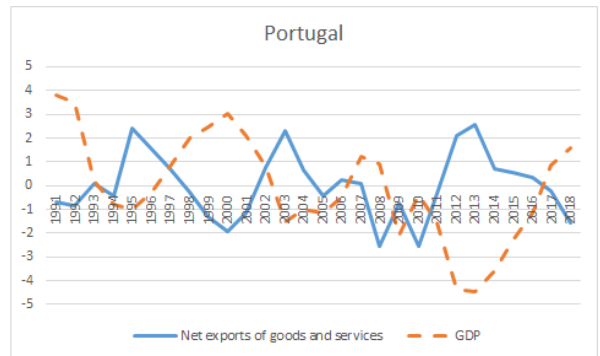


**a) Expenditures**

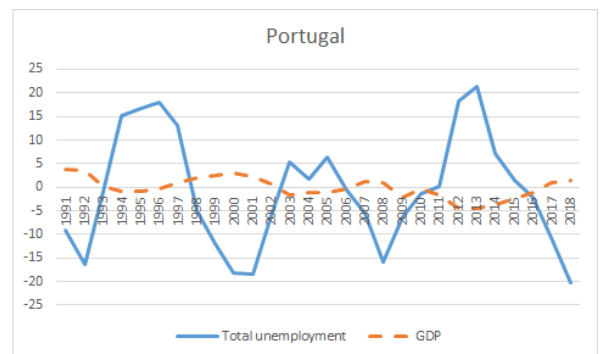
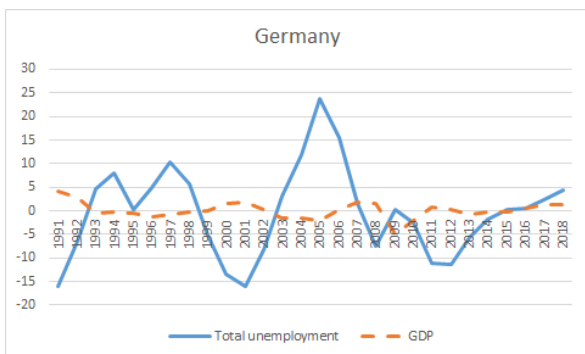




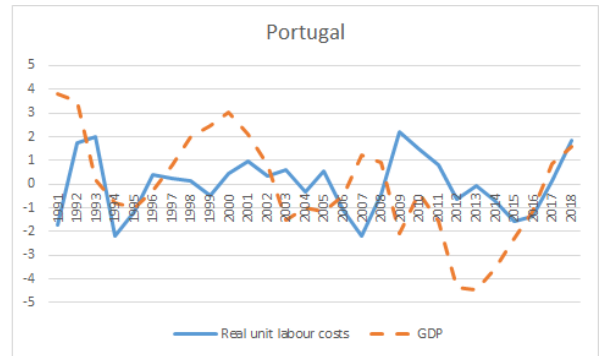
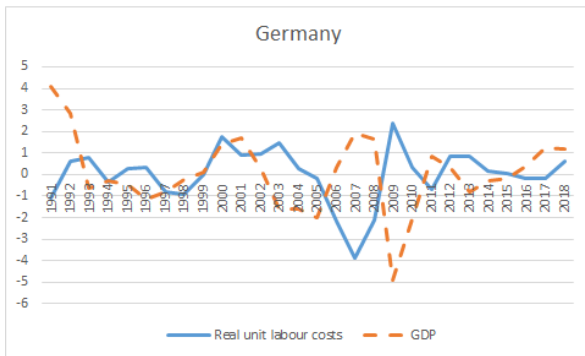
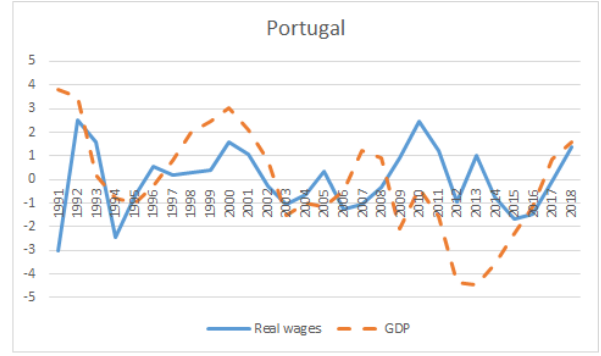
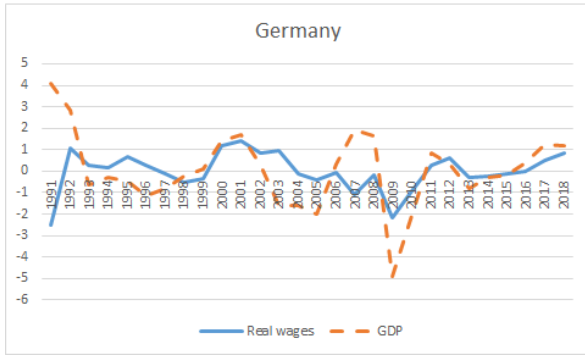
**b) Net exports**



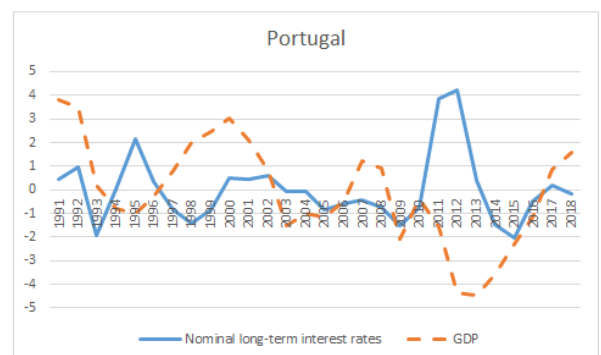
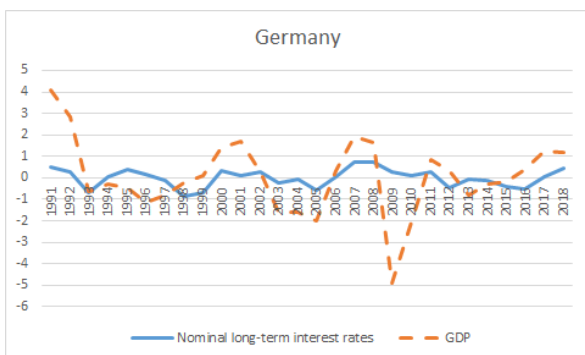
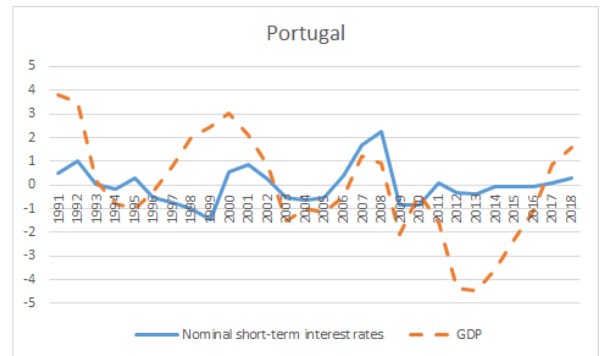
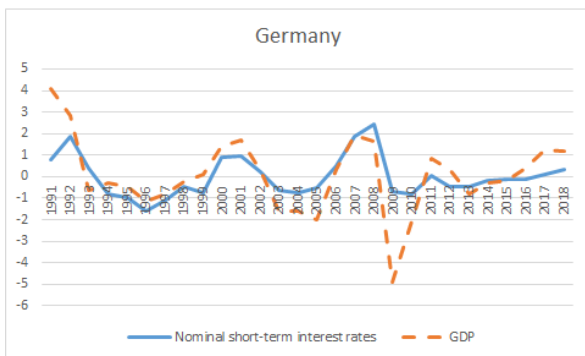
**c) Labour market variables**

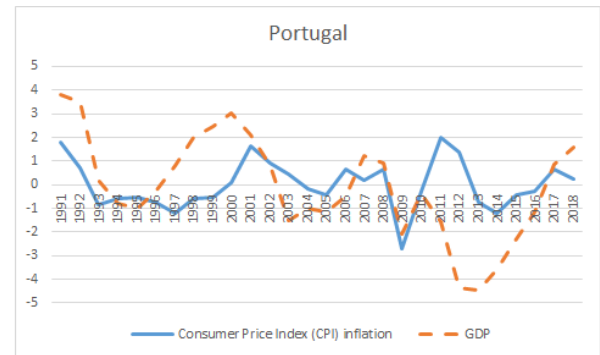
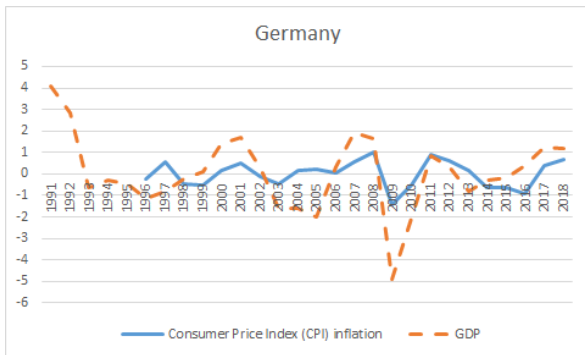
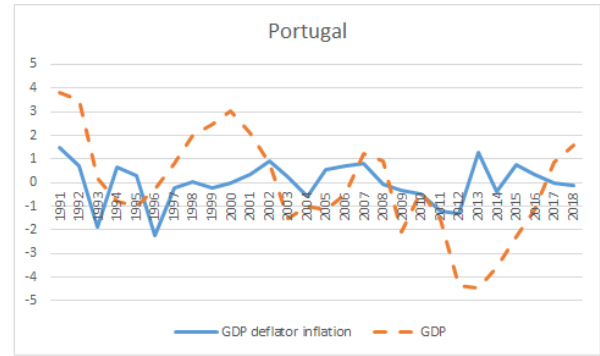
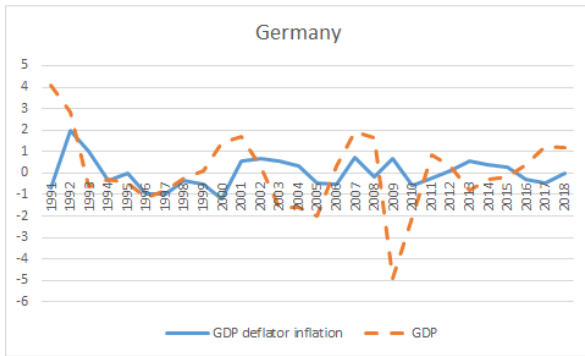






d) Interest rates and inflation





**e) Public finance**

