cep**Study**

20 Years of the Euro: Winners and Losers

An empirical study

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Eurozone country	Impact of euro-introduction on prosperity 1999-2017 per inhabitant	Impact of euro-introduction on prosperity 1999-2017 overall
Germany	+ 23,116 euro	+ 1,893 billion euro
Netherlands	+ 21,003 euro	+ 346 billion euro
Greece	+ 190 euro	+ 2 billion euro
Spain	− 5,031 euro	− 224 billion euro
Belgium	− 6,370 euro	− 69 billion euro
Portugal	− 40,604 euro	− 424 billion euro
France	− 55,996 euro	− 3,591 billion euro
Italy	− 73,605 euro	− 4,325 billion euro

20 years since its introduction and the euro remains controversial. cep has used the synthetic control method to analyse which countries have gained from the euro and which ones have lost out.

► Germany has gained by far the most from the introduction of the euro; almost € 1.9 trillion between 1999 and 2017. This amounts to around € 23,000 per inhabitant. Otherwise, only the Netherlands has gained substantial benefits from the introducing the euro.

► In the first few years after its introduction, Greece gained hugely from the euro but since 2011 has suffered enormous losses. Over the whole period, the balance of € 2 billion or € 190 per inhabitant, is only just positive.

► In all the other countries analysed, the euro has resulted in a drop in prosperity: € 3.6 trillion in France and as much as € 4.3 trillion in Italy. In France, this amounts to € 56,000 per capita and in Italy € 74,000.

Contents

1 Introduction

This year, the euro is celebrating its 20th birthday. From 1 January 1999, the euro could be used as bank money. The celebrations to mark this anniversary have, however, been muted. The reason for this is the still smouldering euro crisis. The euro crisis began at the end of 2009 in Greece and then engulfed numerous other eurozone countries. At its height in mid-2012, five of the then 17 eurozone countries – Greece, Ireland, Spain, Portugal and Cyprus – needed financial assistance: Via the specially created financial assistance funds – the EFSM, the EFSF and the ESM – as well as bilateral loans, Greece received € 261.9 billion, Ireland € 45 billion, Spain € 41.3 billion, Portugal € 50.3 billion and Cyprus € 6.3 billion. The situation only eased when, on 26 July 2012, the President of the European Central Bank (ECB), Mario Draghi, promised that the ECB would do everything within its mandate to uphold the currency union: "Within our mandate, the ECB is ready to do whatever it takes to preserve the euro."[1] Thus a breakup of the euro was just about averted.

Although Mario Draghi was able to reassure the capital market players with this promise, it did nothing to change the fundamental problems of the eurozone. In particular, the problem of the divergent competitiveness of the Eurozone countries remains unsolved. It arises from the fact that individual eurozone countries can no longer devalue their currency in order to remain internationally competitive; a method commonly used before the euro was introduced. Since introduction of the euro, an erosion of international competitiveness leads to lower economic growth, a rise in unemployment and falling tax revenues. Greece and Italy in particular are currently experiencing major difficulties due to the fact that they are unable to devalue their currency.

In virtually every eurozone country, this trend has led to a discussion about the pros and cons of the single currency. Whilst the citizens of the troubled eurozone countries are lamenting low economic growth and high unemployment, other eurozone countries criticise Mario Draghi's intervention and the fact that financial assistance makes them liable for the problem countries. Twenty years after its introduction, the euro is therefore more controversial than ever.

There is still a lack of reliable empirical data about which eurozone countries have gained from the introduction of the euro and which ones have lost out. Although there have been studies of whether the euro has promoted trade between eurozone countries,[2] the results are not clear-cut. In addition, focussing on trade only throws light on a small aspect of the introduction of the euro. Disadvantages of introducing the euro arising from the fact that eurozone countries can no longer devalue their currencies, remain unaccounted for.

One meaningful indicator of whether, for individual eurozone countries, the euro has on balance led to a growth or a fall in prosperity, is the trend in gross domestic product per head of population (GDP per-capita). This therefore forms the basis of the following empirical examination in which the synthetic control method is used on selected eurozone countries to determine how per-capita GDP would have developed if they had not joined the eurozone. Comparing this with the actual trend in per-capita GDP indicates the impact that accession to the euro has had on prosperity. The analysis can only be carried out on eurozone countries in which there was a long gap between EU accession and introduction of the euro as this is the only way to ensure that the result of the analysis has not been distorted by accession to the EU and its internal market.

The analysis has therefore only been carried out in relation to Belgium, France, Germany, Italy, the Netherlands, Portugal and Spain. Although, as EU founding members, Luxembourg and Ireland also

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[1] Speech by Mario Draghi, President of the European Central Bank, at the Global Investment Conference in London on 26 July 2012, online at: https://www.ecb.europa.eu/press/key/date/2012/html/sp120726.en.html, accessed on 15.01.2019.

[2] See e.g. Berger and Nitsch (2005) CesIfo Working Paper 1435, Bun and Klaassen (2007) Oxford Bulletin of Economics and Statistics, Faruqee (2004) IMF Working Paper 154, Rose and Stanley (2005) Journal of Economic Surveys or Baldwin (2006) ECB Working Paper 594.

have sufficient distance between EU accession and introduction of the euro, the available data does not allow for a reliable conclusion to be drawn for these two countries.[3]

Section 2 contains a brief explanation of the synthetic control method. Section 3 provides a summary of the effects that the introduction of the euro has had on prosperity in the eurozone countries considered. Section 4 contains profiles of these eurozone countries detailing the effects of the introduction of the euro between 1999 and 2017.

2   Methodology: The synthetic control method

The question we asked was: How high would the per-capita GDP of a specific eurozone country be if that country had not introduced the euro? This question is answered by means of the synthetic control method.[4]

The method allows the effects of a political measure - in this case the introduction of the euro - to be quantified on the basis of a specific measurement - in this case per-capita gross domestic product.[5] Using the synthetic control method, the actual trend in per-capita GDP of a eurozone country can be compared with the hypothetical trend assuming that this country had not introduced the euro (counterfactual scenario).

The counterfactual scenario is generated by extrapolating the trend in per-capita GDP in other countries, which did not introduce the euro and which in previous years reported very similar economic trends to that of the eurozone country under consideration (control group). In order to obtain the best possible picture of the eurozone country, an algorithm is used to allocate a specific weighting to each country in the control group between 0% and 100%, the sum of the weightings being 100%. In this regard, the specific weightings are selected so that the weighted average of the trend in per-capita GDP of the control-group countries most closely resembles the trend in per-capita GDP of the eurozone country before it introduced the euro.[6] The weightings are not based on considerations of plausibility but are determined by way of an econometric optimisation process.

The synthetic control method is far superior to other methods that only use a single non-euro-zone country for comparison, because the probability of obtaining a similar trend for the period prior to introduction of the euro and thus a realistic counterfactual scenario for the period after introduction of the euro, is much greater if, rather than just one country, a combination of several countries can be used each of which are allocated a different weighting.

Generating the weighted average of the control group is the core feature of the synthetic control method. It involves two steps. The first step is to select the countries worldwide that are to make up the control group for each individual eurozone country. They must fulfil the following conditions:

Firstly, only countries that have not been affected by major country-specific shocks during the whole of the relevant period – 1980 to 2017 – can be considered as such shocks may distort the results. Secondly, they cannot be a eurozone country. Thirdly, the per-capita GDP of a control-group country in the years prior to introduction of the euro (pre-intervention period) must not diverge significantly from the GDP of the eurozone country under consideration (either up or down).[7] This condition

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3   For details see Section 2.
4   Cf. Abadie and Gardeazabal (2003) The American Economic Review, Abadie et al. (2010) Journal of the American Statistical Association and Abadie et al. (2015) American Journal of Political Science.
5   The statistical package can be executed on MATLAB, STATA and R. We used STATA in our calculations. This package is available at: https://web.stanford.edu/~jhain/synthpage.html (last accessed on 15.01.2019).
6   For an overview of the control-group countries and their weightings, see Annex.
7   This condition for the selection of control-group countries was established by Puzzello and Gomis-Porqueras (2018). For details of this condition see Puzzello and Gomis-Porqueras (2018) European Economic Review.

ensures that countries with a significantly higher or lower level of development do not distort the results for the counterfactual scenario.

The longer the pre-intervention period chosen, the greater the reliability of the results. We base our calculations on the period 1980 to 1996. Ending the period in 1996 may seem surprising since the euro exchange rate was not irrevocably established until 1 January 1999 – three years later. It may be assumed, or at least not ruled out, however, that market operators – due to the impending introduction of the euro – had already changed their behaviour prior to 1999.[8]

As a result of the third condition, the control groups for the various eurozone countries considered, are each made up of different countries. The control groups for each of the examined eurozone countries are set out in the Annex.

The second step is to determine a weighting from 0% to 100% for each country in a control group, using an econometric algorithm, so that the weighted average of the control group reproduces as accurately as possible the trend in per-capita GDP in the examined eurozone country before introduction of the euro. The greater the similarity between a country in the control and the examined eurozone country, prior to introduction of the euro, the higher its weighting will be. To obtain the weighting, firstly the trend in per-capita GDP (prices from 2010 in US-$[9]) in the control group countries is compared with that of the examined eurozone countries. Secondly, additional economic figures with a major influence on per-capita GDP, are taken into account. These are specifically the inflation rate, output from industry and the construction sector (as a % of GDP), fixed capital formation (as a % of GDP) and total exports and imports from goods and services (as a % of GDP).[10]

When interpreting the results, the following must be considered: The synthetic control method implicitly assumes that no reforms were taken to increase per-capita GDP after introduction of the euro, either in the eurozone country under examination or in the countries in the relevant control group with a weighting of > 0, nor were any measures taken to reduce the per-capita GDP. In reality, this assumption is of course seldom true. This does not, however, invalidate the synthetic control method: Firstly, the results are so robust that minor reforms do not cast doubt upon them. Secondly, in the case of fundamental reforms, it depends how these were carried out. Where, for example, the examined eurozone country carried out a fundamental reform, after introduction of the euro, which increased per-capita GDP, but the countries in the control group did not, this may in principle result in an overestimation of the benefits of introduction of the euro. Experience has shown, however, that it was in fact the euro itself that prompted some eurozone countries to take reforms which in all likelihood they would not otherwise have carried out. In this case, the result is obviously not distorted by the reform.

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[8] For Greece, which introduced the euro two years later, the pre-intervention period extends from 1980 to 1998.
[9] In order to display the results in euro – using the World Bank's method – a $/€ exchange rate of 1.324 is used.
[10] All data comes from the World Bank (http://data.worldbank.org/).

3   Results summary on the effects of the introduction of the euro

For each of the examined eurozone countries, Table 1 indicates in euros how much higher or lower their per-capita GDP would have been, in 2017 (column 2) and overall (column 3), if they had not introduced the euro.

Tab. 1: Effects of the introduction of the euro on GDP in 2017

Eurozone country	Effect of euro-introduction on per-capita GDP in 2017	Effect of euro-introduction on GDP in 2017
Germany	+ 3,390 euro	+ 280 billion euro
Netherlands	+ 1,116 euro	+ 19 billion euro
Belgium	− 920 euro	− 10 billion euro
Spain	− 1,448 euro	− 67 billion euro
Greece	− 3,850 euro	− 41 billion euro
Portugal	− 5,482 euro	− 56 billion euro
France	− 5,570 euro	− 374 billion euro
Italy	− 8,756 euro	− 530 billion euro

In 2017, out of the examined eurozone countries, only Germany and the Netherlands gained from the euro. In Germany, GDP went up by € 280 billion and per-capita GDP by € 3,390. Italy lost out most. Without the euro, Italian GDP would have been higher by € 530 billion, which corresponds to € 8,756 per capita. In France, too, the euro has led to significant losses of prosperity of € 374 billion overall, which corresponds to € 5,570 per capita.

Table 2 shows the effects of the introduction of the euro on prosperity, per capita (column 2) and overall (column 3), for the entire period since the year of introduction – 1999 in all countries except Greece, for Greece 2001 – until 2017. The effects on prosperity are determined by adding the annual per-capita figures and multiplying the resulting amounts by the average national consumption rate[11] of the relevant eurozone country in the pre-intervention period.[12]

Tab. 2: Cumulative effects of the introduction of the euro on prosperity 1999 to 2017

Eurozone country	Effect of euro-introduction on prosperity 1999[13]-2017 per capita	Cumulative effect of euro-introduction on prosperity 1999[13] – 2017
Germany	+ 23,116 euro	+ 1,893 billion euro
Netherlands	+ 21,003 euro	+ 346 billion euro
Greece	+ 190 euro	+ 2 billion euro
Spain	− 5,031 euro	− 224 billion euro
Belgium	− 6,370 euro	− 69 billion euro
Portugal	− 40,604 euro	− 424 billion euro
France	− 55,996 euro	− 3,591 billion euro
Italy	− 73,605 euro	− 4,325 billion euro

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[11] Thus the following consumption rates were used: BE 77.55%, DE 77.83%, FR 77.86%, GR 81.88%, IT 77.59%, NL 72.52%, PT 81.09% and ES 78.7%. The data comes from the World Bank (http://data.worldbank.org/).

[12] At the same time, the values in column 2 were weighted according to the annual population figures, in order to neutralise fluctuations in the population which took place, particularly in Greece, during the period. The data comes from the World Bank (http://data.worldbank.org/).

[13] For Greece, the period covers the years 2001 to 2017 as Greece joined the euro area in 2001.

In Italy, therefore, the introduction of the euro led to a drop in prosperity of around € 74,000 per capita or € 4.3 trillion for the economy as a whole, over the period 1999 to 2017. For France, the loss amounts to almost € 56,000 per capita or € 3.6 trillion respectively. Germany achieved an increase in prosperity of € 23,000 per capita and € 1.9 trillion respectively.

The fact that the effects of the euro on prosperity in Greece are still just about positive is due to the fact that Greece gained hugely from the euro in the first few years after its introduction. This changed in 2011 after the bubble, created in previous years, burst in 2009. Since then, the euro has had a negative influence on Greek prosperity.

4   Results per country

This section contains profiles of the examined eurozone countries. Those are Belgium, Germany, France, Greece, Italy, the Netherlands, Portugal and Spain.

Each country profile begins by showing the effects of the introduction of the euro on the prosperity of each country over the whole period since introduction, both per capita and for the economy as a whole.

Each country profile also contains two graphs. The first graph shows the actual trend in per-capita GDP in the examined eurozone country since introduction of the euro (blue line) and the counterfactual scenario which shows the hypothetical trend in per-capita GDP if the country had not introduced the euro (orange line).

The second graph shows the influence that the introduction of the euro has had on per-capita GDP in the examined eurozone country, for each year since the introduction. Negative figures (red) show that introduction of the euro reduced per-capita GDP in the relevant year. Positive figures (green) show that introduction of the euro increased per-capita GDP in the relevant year. In addition, each country profile contains a conclusion which summarises the main results for the eurozone country concerned.

4.1   Belgium

Effect of euro-introduction on prosperity per capita 1999 – 2017	Effect of the introduction of the euro on prosperity overall 1999 – 2017
€ – 6 370	€ – 69 billion

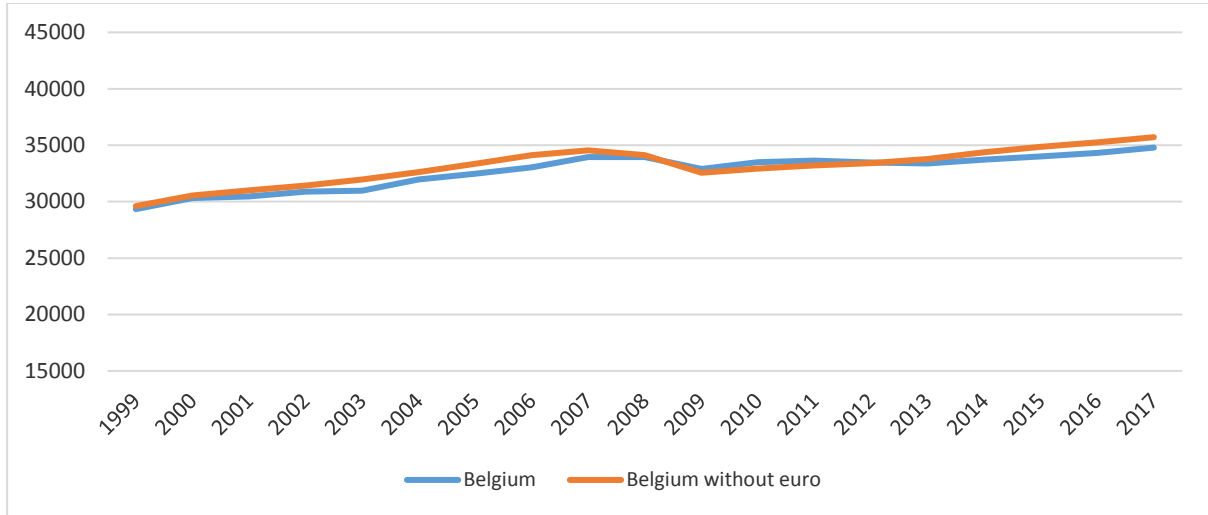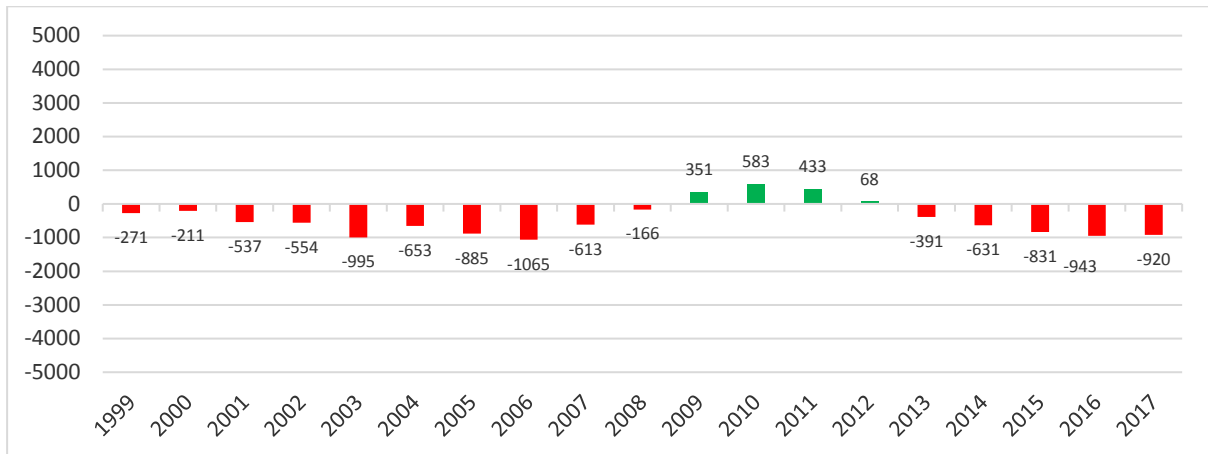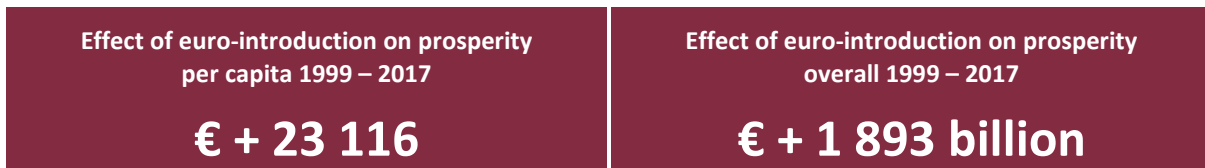**Fig. 1.1: Trend in per-capita GDP with and without euro (in euro)**

Fig. 1.2: Influence of the introduction of the euro on per-capita GDP (in euro)

Conclusion: From 2009 to 2012, Belgium gained from accession to the euro, before and after that period it sustained losses. Aggregated over the period 1999 to 2017, the euro has led to losses in prosperity of € 69 billion overall or € 6,370 per capita.

4.2   Germany

Effect of euro-introduction on prosperity per capita 1999 – 2017	Effect of euro-introduction on prosperity overall 1999 – 2017
€ + 23 116	**€ + 1 893 billion**

Fig. 2.1: Trend in per-capita GDP with and without euro (in euro)
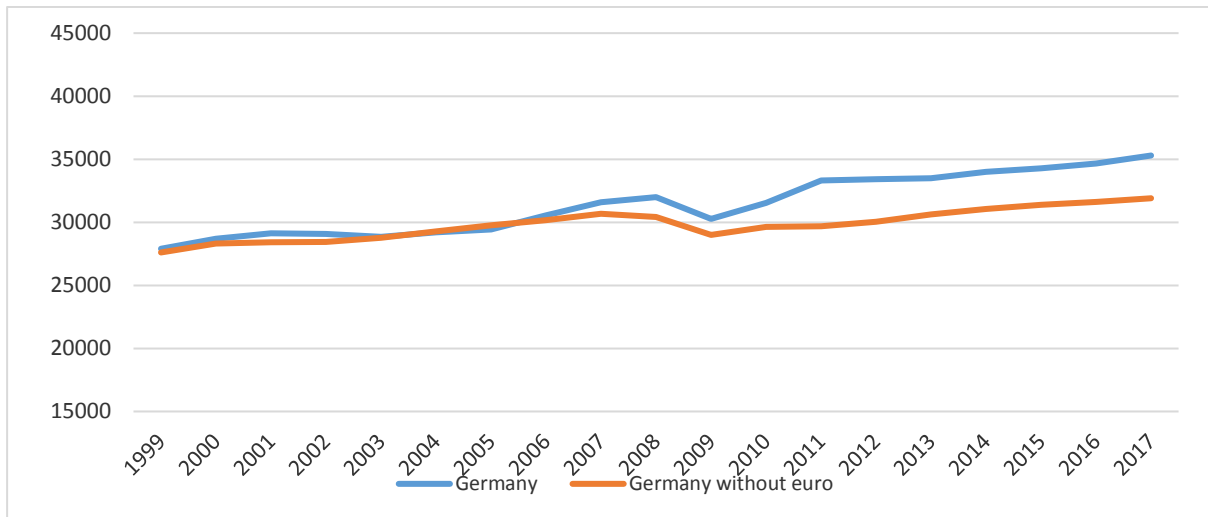
Fig. 2.2: Influence of the introduction of the euro on per-capita GDP (in euro)
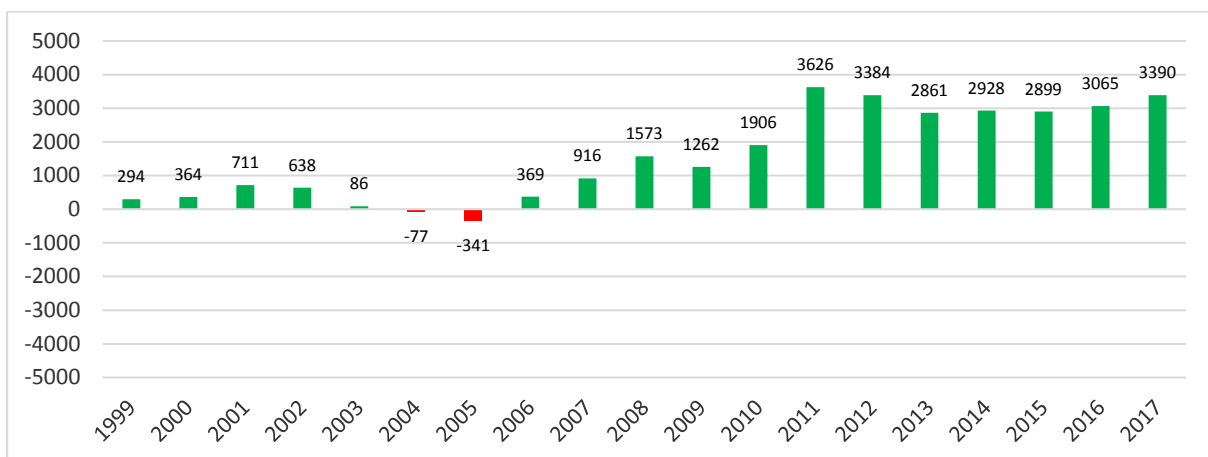
Conclusion: With the exception of 2004 and 2005, Germany has benefited every year as a result of the introduction of the euro, especially since the euro crisis in 2011. Aggregated over the period 1999 to 2017, the euro has led to increases in prosperity in Germany of € 1.9 trillion overall or € 23,116 per capita. Thus, out of the countries examined, Germany has gained most from the euro.

4.3   France

Effect of the introduction of the euro on prosperity per capita 1999 – 2017	Effect of euro-introduction on prosperity overall 1999 – 2017
€ – 55 996	€ – 3 591 billion

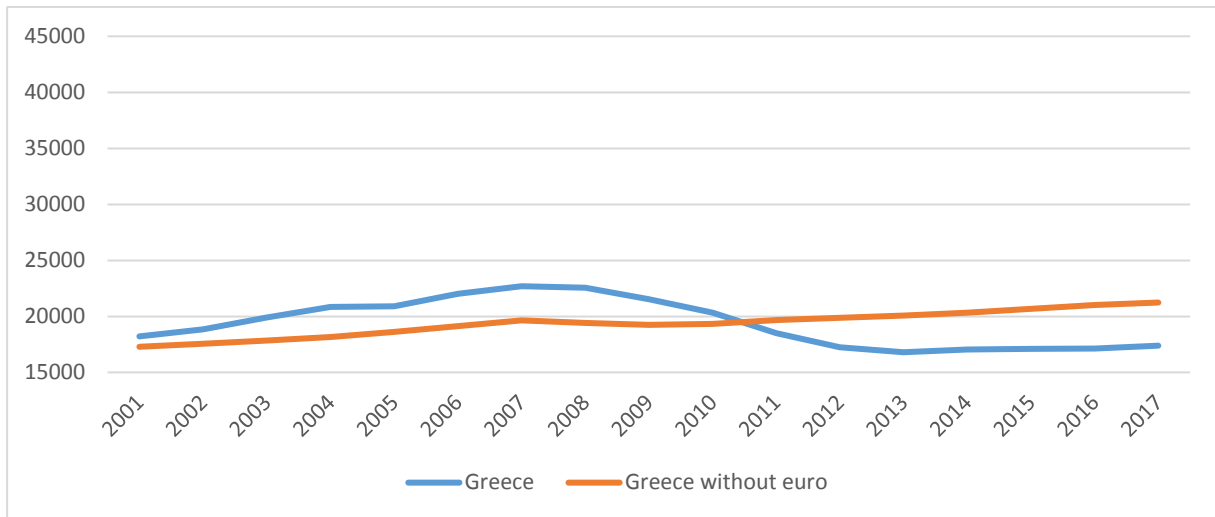**Fig. 3.1: Trend in per-capita GDP with and without euro (in euro)**
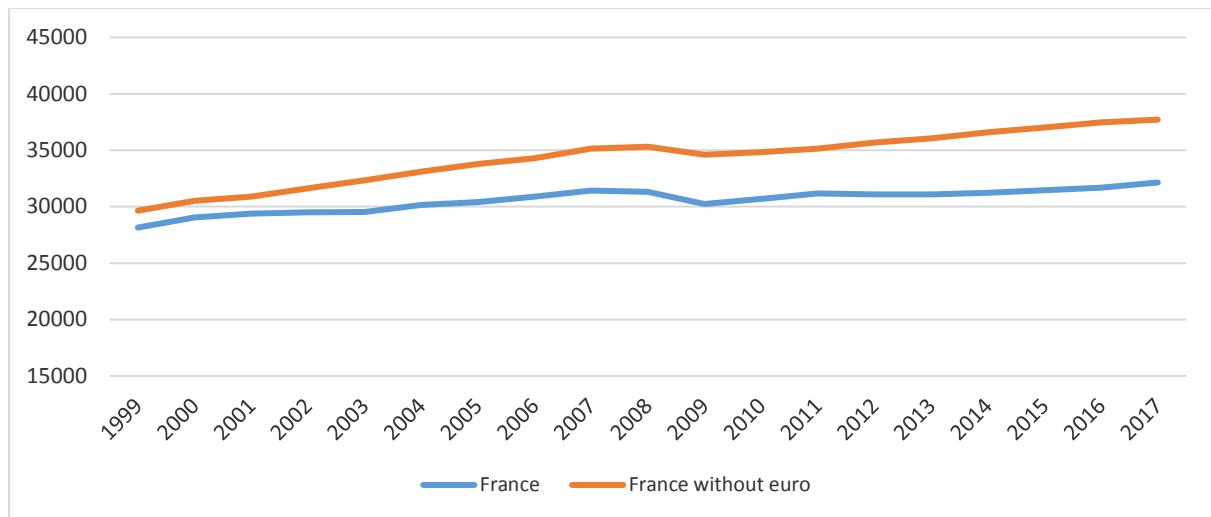
Fig. 3.2: Influence of the introduction of the euro on per-capita GDP (in euro)
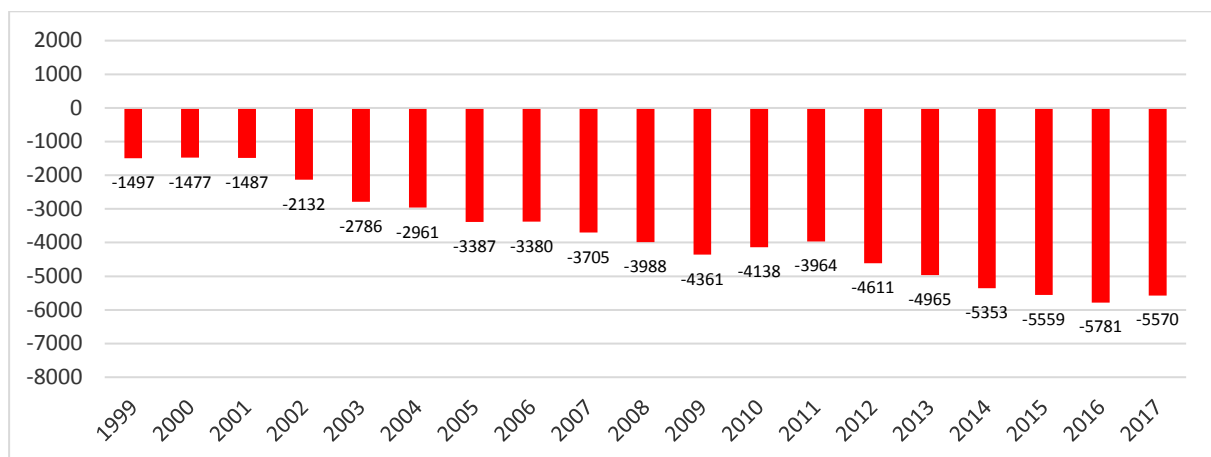
Conclusion: In France, accession to the eurozone has led to losses in prosperity every year. These losses add up to € 3.6 trillion since the introduction of the euro. This corresponds to a loss of € 55,996 per capita. After Italy, France is therefore the country in which the euro has led to the largest losses. This trend shows that France has still not found a way to strengthen its competitiveness inside the eurozone. In the decades prior to introduction of the euro, France regularly devalued its currency for this purpose. After the introduction of the euro, that was no longer possible. Instead, structural reforms were needed. In order to benefit from the euro, France absolutely has to stick to the path of reform that President Macron is pursuing.

4.4   Greece

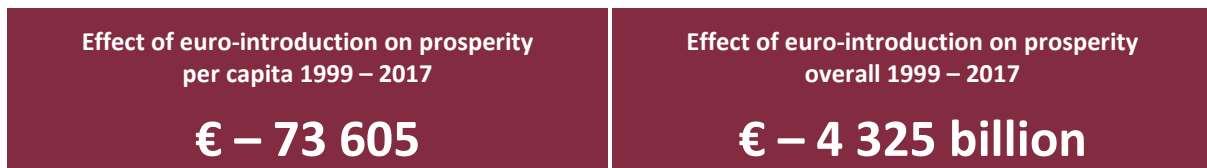| Effect of euro-introduction on prosperity per capita 2001 – 2017	Effect of euro-introduction on prosperity overall 2001 – 2017
€ + 190	**€ + 2 billion**

Fig. 4.1: Trend in per-capita GDP with and without euro (in euro)

Fig. 4.2: Influence of the introduction of the euro on per-capita GDP (in euro)
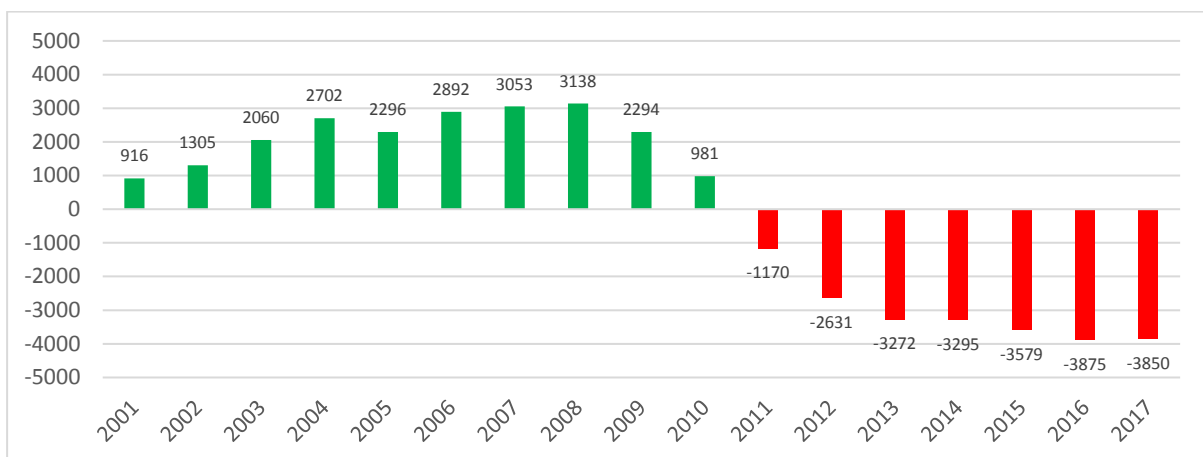
Conclusion: In Greece, accession to the eurozone led to large gains in prosperity between 2001 and 2010. This changed in 2011 after the bubble, created in previous years, burst in 2009. Since then, the euro has resulted in a fall in prosperity. As a result of the gains in prosperity in the early years after introduction of the euro, the overall balance at the end of 2017 was just about positive at € 2 billion overall or € 190 per capita. To ensure that this remains the case in the medium term, the Greek government must carry out reforms to increase per-capita GDP. This includes measures to increase competitiveness and to improve the investment climate. The example of Spain shows that structural reforms can reverse the negative trend of ever increasing losses in prosperity.

4.5   Italy

Effect of euro-introduction on prosperity per capita 1999 – 2017	Effect of euro-introduction on prosperity overall 1999 – 2017
€ – 73 605	€ – 4 325 billion

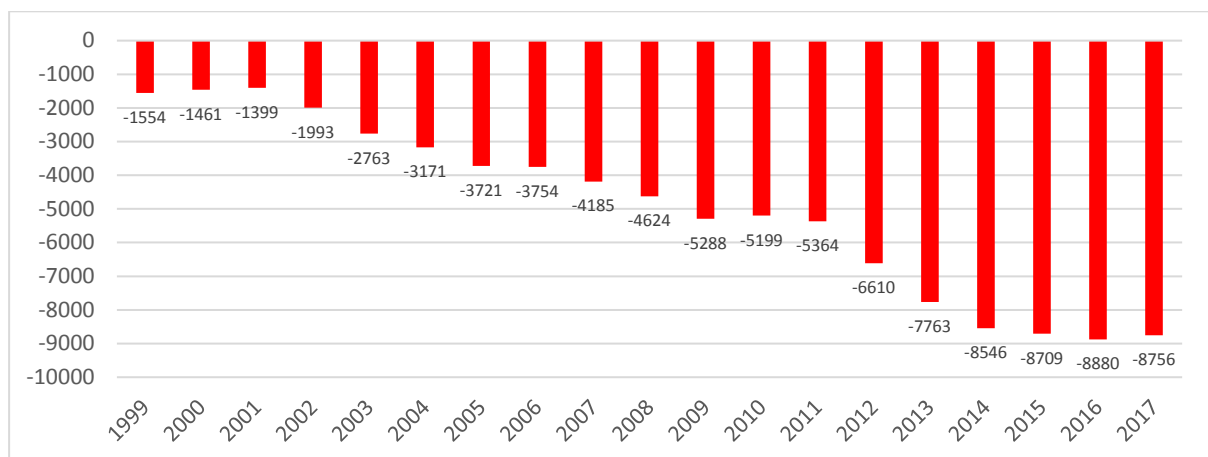**Fig. 5.1: Trend in per-capita GDP with and without euro (in euro)**
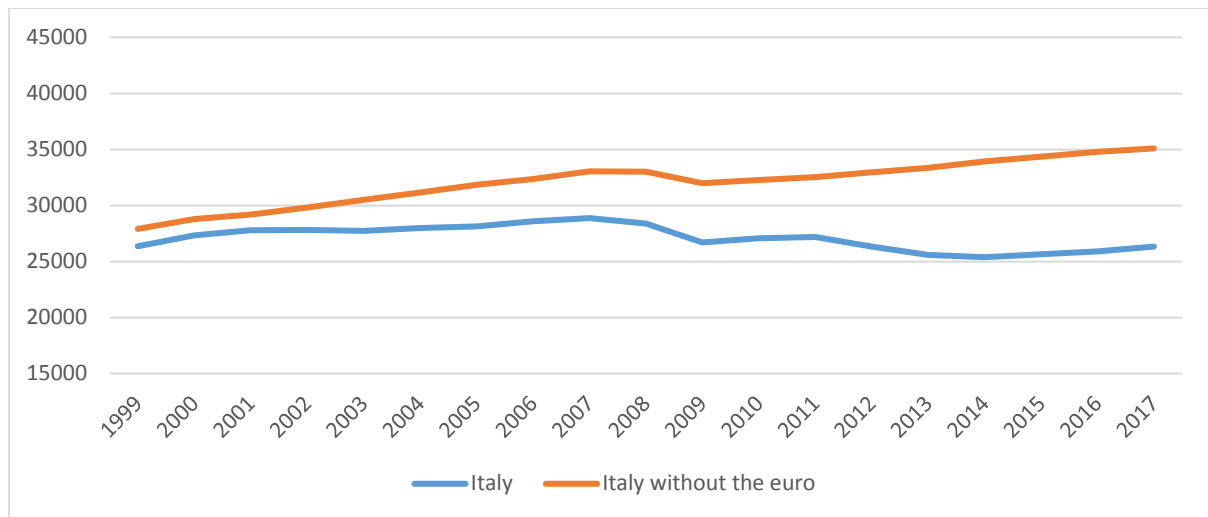
Fig. 5.2: Influence of the introduction of the euro on per-capita GDP (in euro)

Conclusion: In no other country of those examined has the euro led to such high losses of prosperity as in Italy. Losses incurred since the introduction of the euro add up to € 4.3 trillion overall or € 73,605 per capita. This is due to the fact that Italian per-capita GDP has stagnated since the euro was introduced. Italy has still not found a way of becoming competitive inside the eurozone. In the decades prior to introduction of the euro, Italy regularly devalued its currency for this purpose. After the introduction of the euro, that was no longer possible. Instead, structural reforms were needed. Spain shows how structural reforms can reverse the negative trend of ever increasing losses in prosperity.

4.6   Netherlands

Effect of euro-introduction on prosperity per capita 1999 – 2017	Effect of euro-introduction on prosperity overall 1999 – 2017
€ + 21 003	**€ + 346 billion**

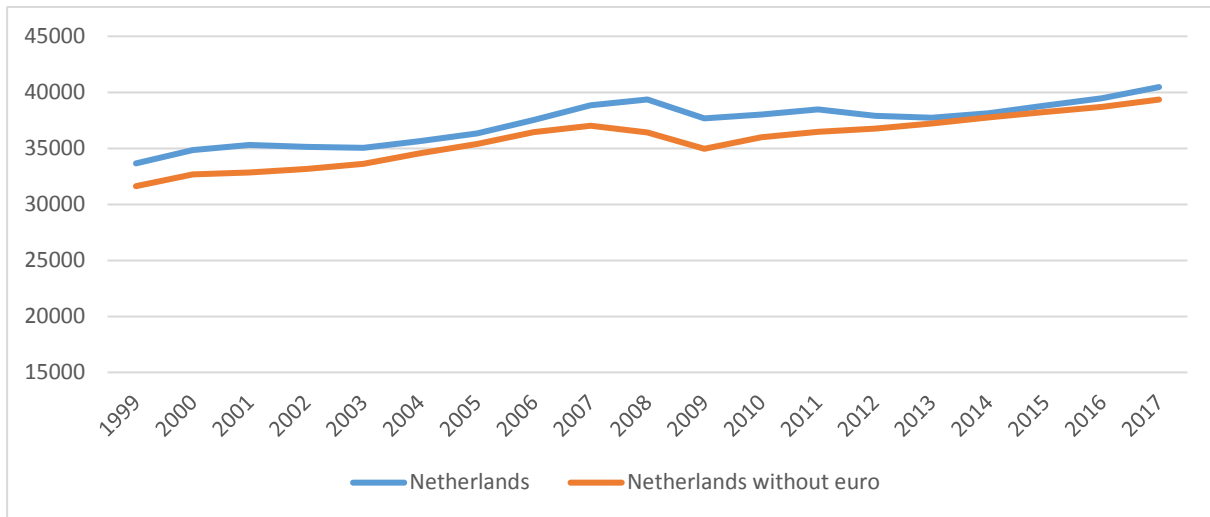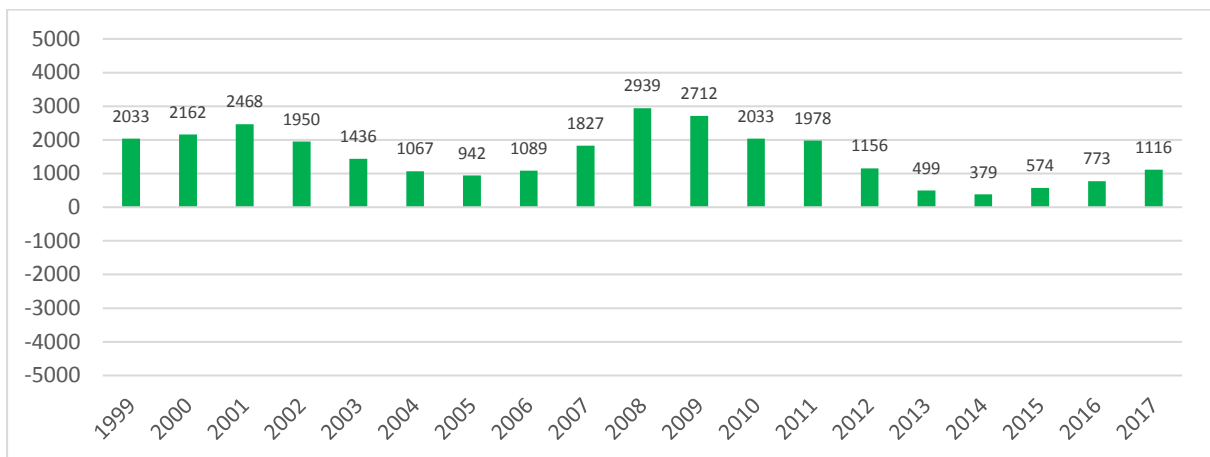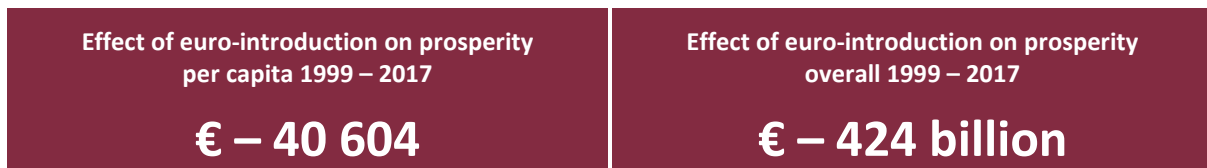**Fig. 6.1: Trend in per-capita GDP with and without euro (in euro)**

Fig. 6.2: Influence of the introduction of the euro on per-capita GDP (in euro)

Conclusion: The Netherlands has profited from the euro every year since its introduction, especially in 2008 and 2009. Aggregated, the euro has given rise to an increase in prosperity of € 346 billion overall or € 21,003 per capita. Of the eurozone countries examined, only Germany has gained more from the euro.

4.7   Portugal

Effect of euro-introduction on prosperity per capita 1999 – 2017	Effect of euro-introduction on prosperity overall 1999 – 2017
€ – 40 604	**€ – 424 billion**

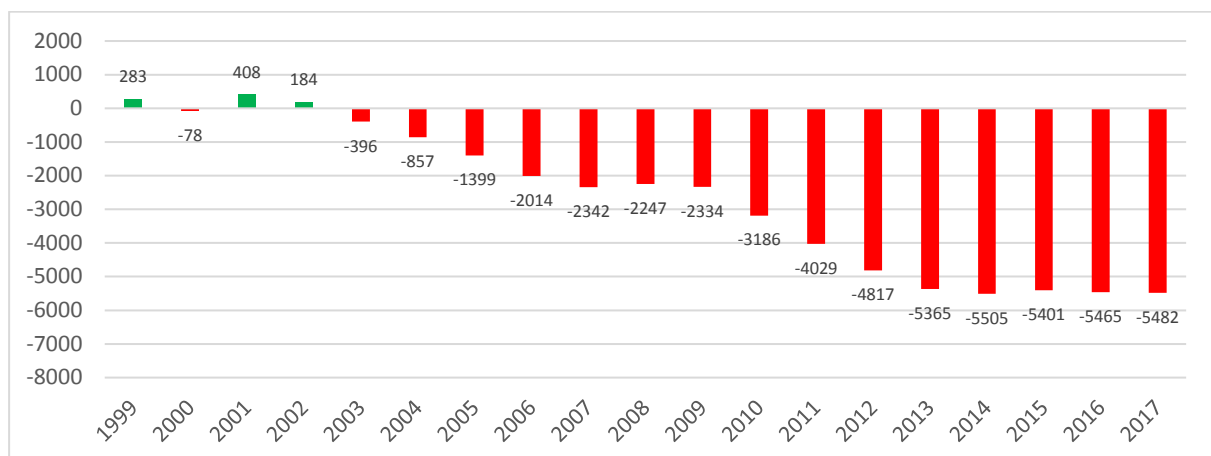**Fig. 7.1: Trend in per-capita GDP with and without euro (in euro)**
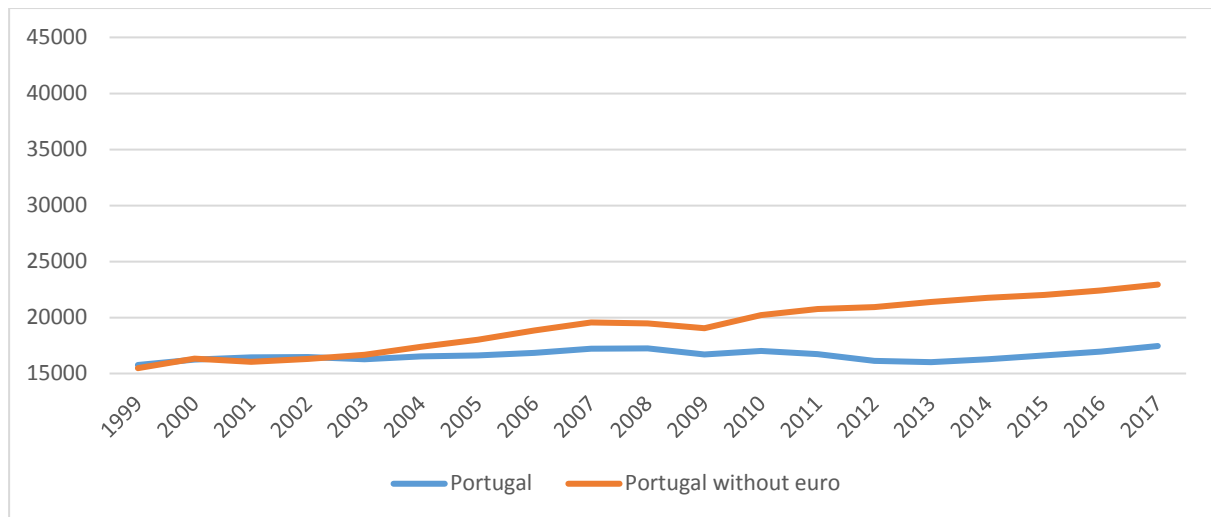
Fig. 7.2: Influence of the introduction of the euro on per-capita GDP (in euro)

Conclusion: Portugal only benefited marginally from the euro in the first few years after its introduction. In subsequent years, the euro increasingly led to losses of prosperity. Aggregated, it has given rise to a drop in prosperity of € 424 billion overall or € 40,604 per capita. Only in France and Italy were the losses greater. Portugal must carry out reforms to increase per-capita GDP as a matter of urgency if it wants to benefit from the euro in the medium term. Thus the framework conditions for investment should be improved and public spending used to a greater extent for investment rather than consumption.
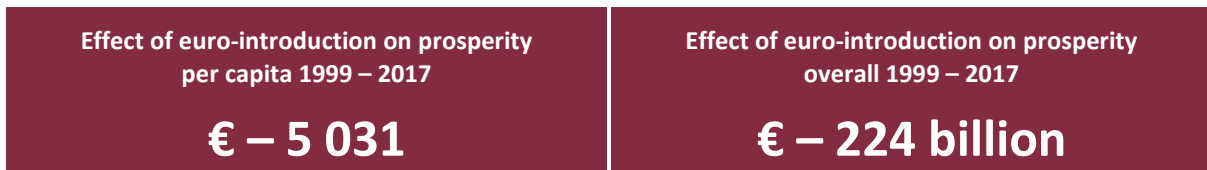
4.8 Spain

Effect of euro-introduction on prosperity per capita 1999 – 2017	Effect of euro-introduction on prosperity overall 1999 – 2017
€ – 5 031	**€ – 224 billion**

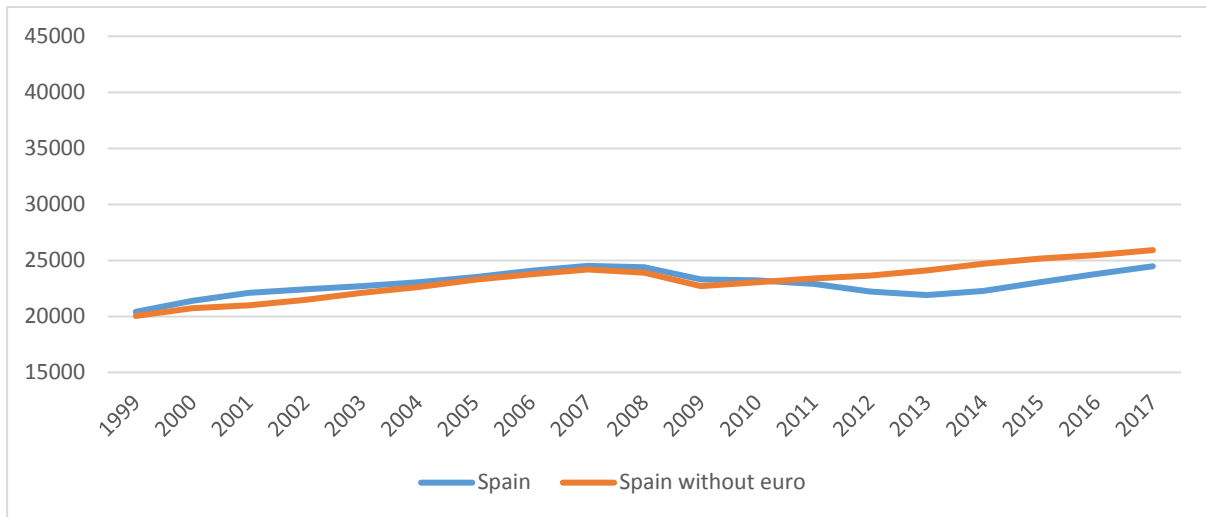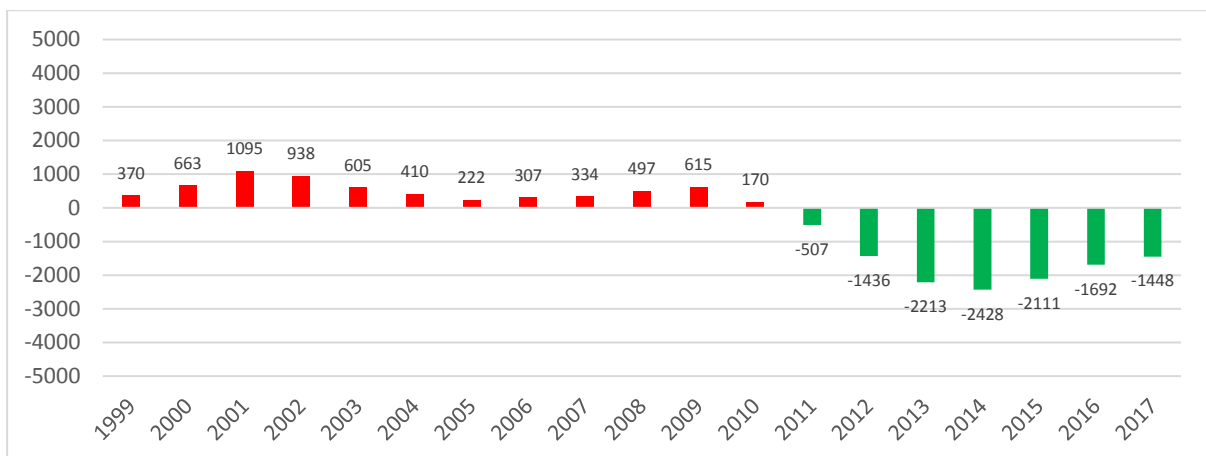**Fig. 8.1: Trend in per-capita GDP with and without euro (in euro)**

**Fig. 8.2: Influence of the introduction of the euro on per-capita GDP (in euro)**

Conclusion: From 1999 to 2010, Spain gained from the introduction of the euro. Since 2011, euro accession has resulted in a reduction in prosperity. Losses reached their peak in 2014. Since then, they have been falling steadily. The reforms that have been carried out, are paying off. However, since the annual reductions in prosperity between 2011 to 2017 were greater than the earlier gains, the overall balance currently remains negative at € 224 billion or € 5,031 per capita. This may be turned around in just a few years if Spain sticks firmly to its path of reform.

Annex

The tables below indicate which countries make up the control group for each of the examined eurozone countries, and the weighting that has been used to create the counterfactual scenario. The following graph shows the actual trend in per-capita GDP (blue line) and the hypothetical per-capita GDP (orange line) from 1980 to 2017.
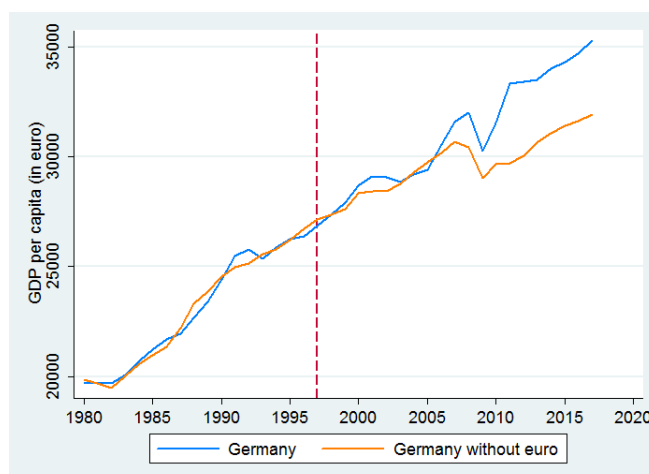
A.1 Belgium

Country	Weighting	Country	Weighting
Australia	0.0%	New Zealand	13.4%
Denmark	27.0%	Singapore	0.0%
Israel	0.0%	Sweden	0.0%
Japan	4.3%	UK	55.3%
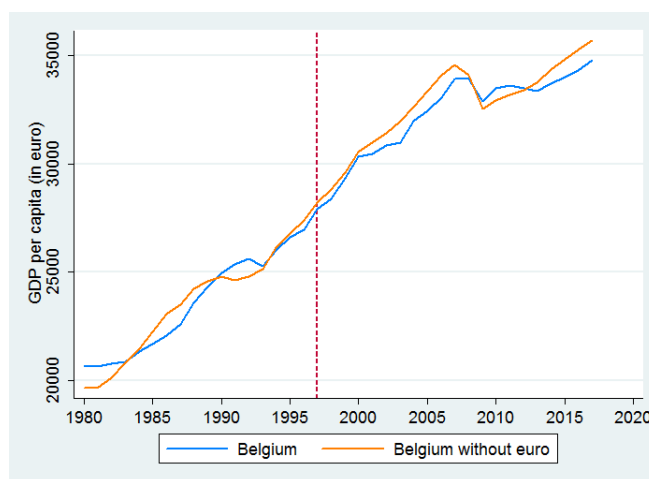
A.2 Germany

Country	Weighting	Country	Weighting
Australia	0.0%	Singapore	0.0%
Bahrain	28.1%	Sweden	0.0%
Japan	35.8%	Switzerland	9.7%
New Zealand	0.0%	UK	26.4%

A.3 France

Country	Weighting	Country	Weighting
Australia	55.4%	New Zealand	0.0%
Bahrain	0.0%	Singapore	0.0%
Israel	0.0%	Sweden	0.0%
Japan	0.0%	UK	44.6%
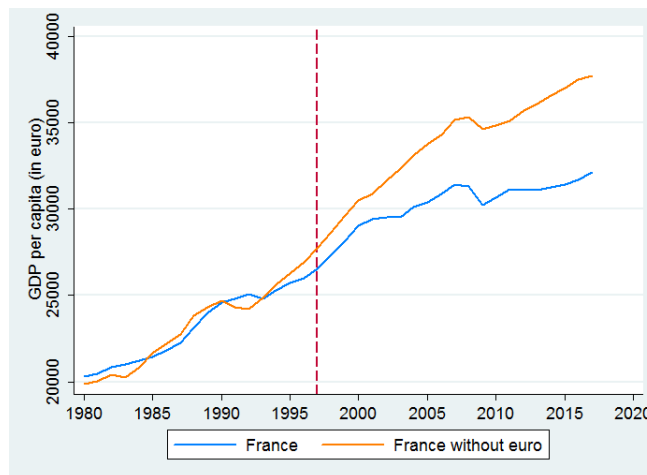
A.4 Greece

Country	Weighting	Country	Weighting
Bahrain	0.0%	Israel	17.1%
Barbados	42.4%	New Zealand	40.4%
Gabon	0.0%	Singapore	0.0%
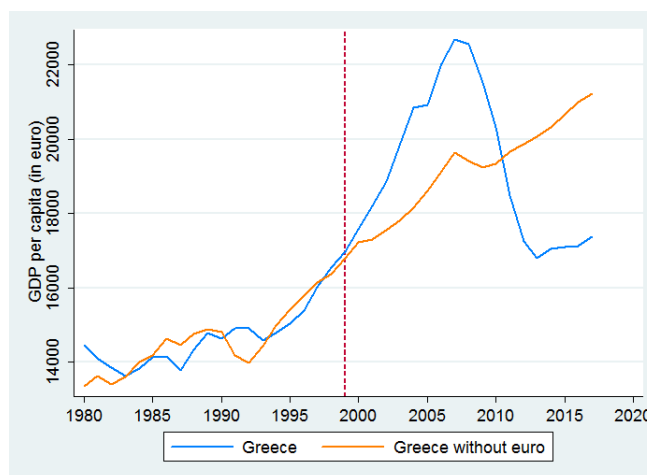
A.5 Italy

Country	Weighting	Country	Weighting
Australia	31.0%	New Zealand	0.0%
Bahrain	0.0%	Singapore	0.0%
Israel	3.8%	Sweden	0.0%
Japan	2.0%	UK	63.2%
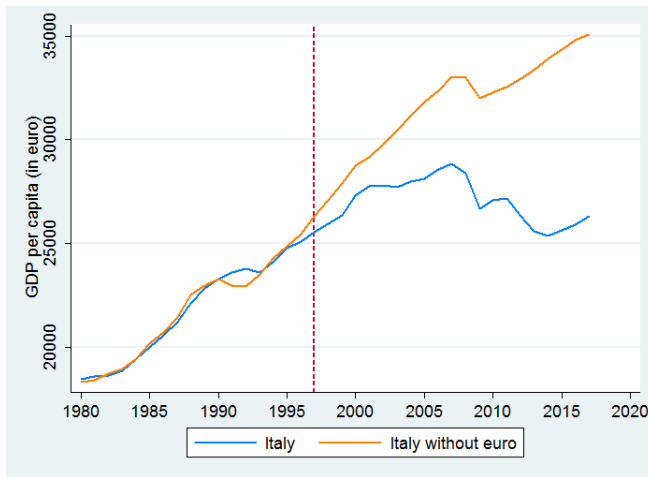
A.6 Netherlands

Country	Weighting	Country	Weighting
Australia	0.0%	New Zealand	27.7%
Denmark	43.3%	Singapore	13.3%
Israel	0.0%	Sweden	0.0%
Japan	15.7%	UK	0.0%
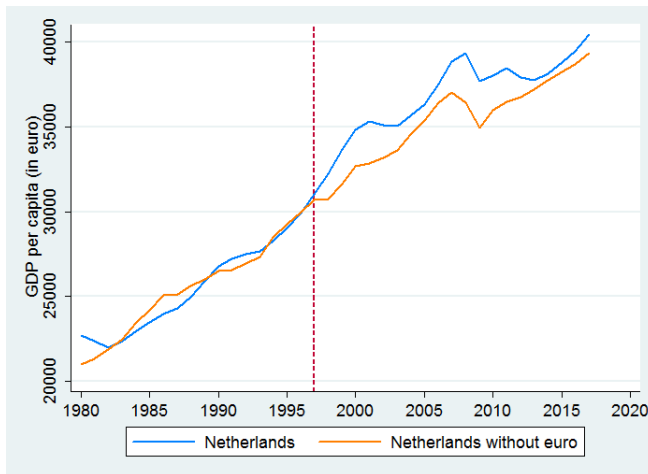
A.7 Portugal

Country	Weighting	Country	Weighting
Bahrain	0.0%	Israel	25.3%
Barbados	32.6%	New Zealand	23.7%
Gabon	0.0%	Singapore	18.4%
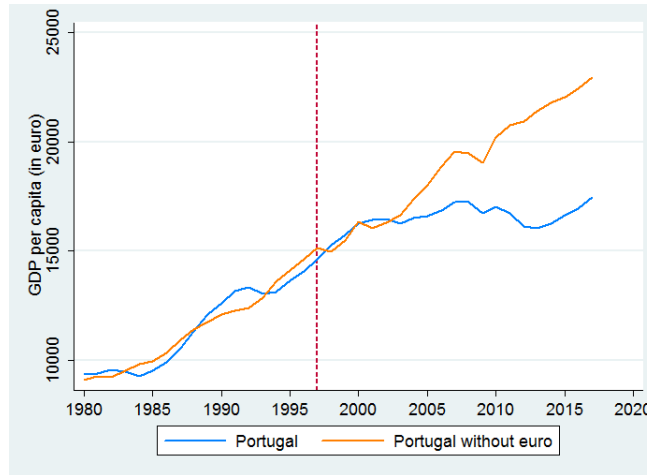
A.8 Spain

Country	Weighting	Country	Weighting
Bahrain	0.0%	Singapore	0.0%
Barbados	0.0%	Turkey	29.7%
Israel	0.0%	UK	70.3%
New Zealand	0.0%	–	–
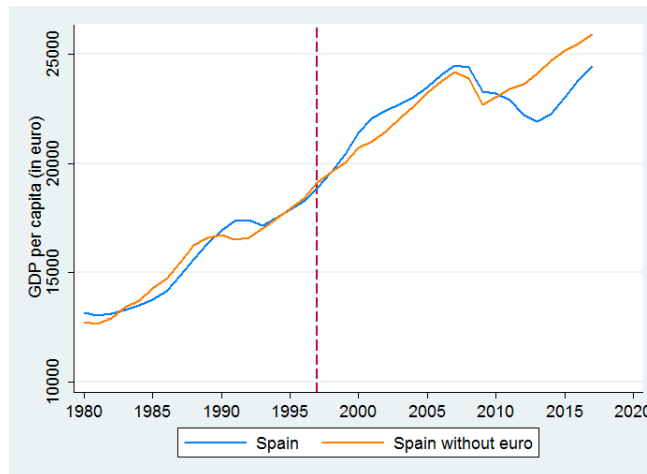
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