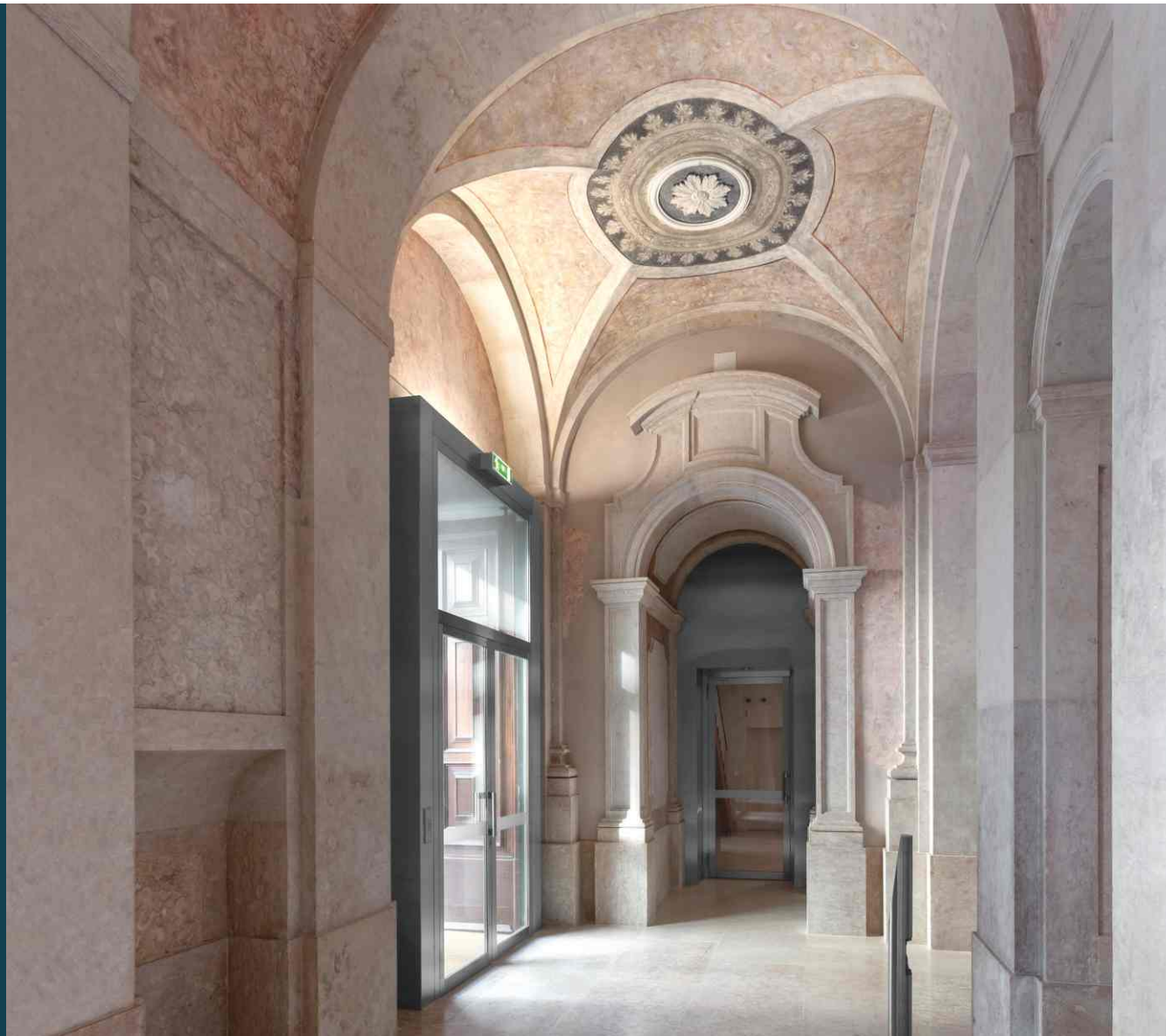
ECONOMIC BULLETIN

December 2015

BANCO DE PORTUGAL
EUROSYSTEM



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Contents

I Projections for the portuguese economy: 2014-2016 | **5**

Box 1 | Projection assumptions | **12**

Box 2 | Impact of the fall in oil price on economic growth | **23**

Box 3 | Impact of the devaluation of the euro exchange rate on economic growth | **24**

II Special issue

An interpretation of the low sovereign yields in the euro area | **29**

PROJECTIONS FOR THE PORTUGUESE ECONOMY: 2015-2017

Box 1 | Projection assumptions

Box 2 | Impact of the fall in oil price on economic growth

Box 3 | Impact of the devaluation of the euro exchange rate on economic growth

Projections for the portuguese economy: 2015-2017

1. Introduction

Projections for the Portuguese economy point to continued gradual recovery of economic activity over the 2015-2017 period (Table 1.1). This is likely to translate into average annual GDP growth of 1.6 per cent in 2015, followed by growth of 1.7 and 1.8 per cent in 2016 and 2017 respectively, suggesting that the momentum of economic activity will be close to that projected by the European Central Bank (ECB) for the euro area. Projections now released are based on the information available up to the middle of November and correspond to Banco de Portugal's contribution to the Eurosystem projections recently released by the ECB (Box 1. 'Projection assumptions'). Therefore the projections for 2016 and 2017 are surrounded by particular uncertainty, especially as the State Budget for 2016 is not known.

Table 1.1 • Projections of banco de portugal: 2015-2017 | Annual change, in percentage

	Weight 2014	December 2015 EB			October 2015 EB	June 2015 EB		
		2015(p)	2016(p)	2017(p)	2015(p)	2015(p)	2016(p)	2017(p)
Gross domestic product	100.0	1.6	1.7	1.8	1.7	1.7	1.9	2.0
Private consumption	65.9	2.7	1.8	1.7	2.6	2.2	1.7	1.7
Public consumption	18.5	0.1	0.3	0.1	0.1	-0.5	0.2	0.0
Gross fixed capital formation	14.9	4.8	4.1	6.1	6.2	6.2	4.4	6.0
Domestic demand	99.6	2.4	1.8	2.1	2.5	2.1	1.8	2.1
Exports	40.0	5.3	3.3	5.1	6.1	4.8	6.0	6.4
Imports	39.7	7.3	3.6	5.6	7.9	5.7	5.5	6.5
Contribution to GDP growth, net of imports (in p.p.) (a)								
Domestic demand		1.1	0.9	0.9	1.1	1.1	0.7	0.8
Exports		0.4	0.8	0.9	0.6	0.6	1.2	1.2
Current plus capital account (% of GDP)		2.4	2.5	2.3	2.3	3.0	3.2	3.4
Trade balance (% of GDP)		1.6	1.7	1.3	1.7	2.1	2.1	2.1
Harmonized index of consumer prices		0.6	1.1	1.6	0.5	0.5	1.2	1.3

Source: Banco de Portugal.

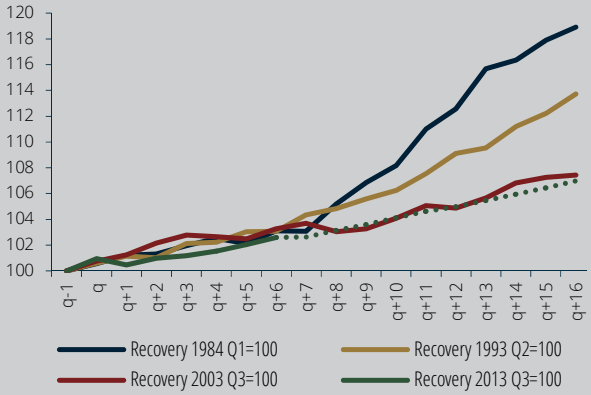
Notes: (p) – projected, (p.p.) – percentage points. For each aggregate, this table shows the projection corresponding to the most likely value, conditional on the set of assumptions considered.

(a) The demand aggregates net of imports are obtained by subtracting an estimate of the imports needed to meet each component. The calculation of import contents was based on data for 2005. For more information, see the Box entitled 'The role of domestic demand and exports in economic activity developments in Portugal', in the June 2014 issue of the *Economic Bulletin*.

The Portuguese economy's pace of recovery is relatively slow at present, particularly bearing in mind the severity of the contraction observed over the last few years (Chart 1.1). Over the projection horizon, the gradual recovery of economic activity is expected to continue, reflecting the need for further adjustment of the balance sheets of the public and private economic agents, in the wake of the international financial crisis and the sovereign debt crisis in the euro area. Continuing the behaviour of recent years, exports should grow robustly over the projection horizon, reinforcing the trend of transfers of productive resources to economic sectors more exposed to international competition. In turn, domestic demand should gradually recover, in line with the deleveraging of households and non-financial corporations. In this context, openness in the Portuguese economy should increase significantly (Chart 1.2). This comes as a result of a similar increase in both imports' and exports' share of GDP, in contrast to the last few years, in which increased openness reflected strong growth in exports. This projection is consistent with the maintenance of progress in correcting the macroeconomic imbalances accumulated in the past.

The Portuguese economy continues to face several major challenges. On the one hand it is essential to foster a significant increase in productivity, and to ensure a distribution of returns on economic growth that contributes to a high level of social cohesion. These goals require strengthened incentivisation of innovation, mobility of factors and investments in human and physical capital. On the other hand it is also important to continue the observed progress in the correction of accumulated macroeconomic imbalances still characterising the Portuguese economy. The current benign external financing conditions, reflecting inter alia the ECB's broad set of policy measures, represent an opportunity to steer public policy towards increasing the Portuguese economy's resilience to future adverse shocks (see the Special Issue, 'An interpretation of the low interest rates of public debt in the euro area', in this Bulletin). A sustained decline in public and private debt levels is paramount for this purpose. In this sense, the pursuit of a budgetary position close

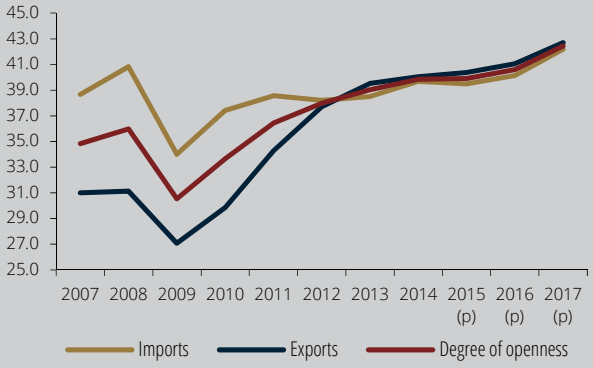
Chart 1.1 • GDP growth in the last four recoveries
| Index q-1=100



Sources: Portugal Statistics and Banco de Portugal calculations.

Note: The dotted values correspond to projectios. t-1 stands for the last quarter before the beggining of the economic recovery, measured by a positive quarter-on-quarter rate of change of GDP.

Chart 1.2 • Exports, imports and degree of openess
| In percentage of GDP



Sources: Portugal Statistics and Banco de Portugal.

Note: (p) – projected. The degree of opness is measured by the ratio of the average of exports and imports in GDP.

to balance over the medium term, in line with the rules of the European fiscal framework, is a desirable goal for the Portuguese economy.

2. Recent information

In the first half of 2015, GDP increased 1.6 per cent year-on-year, after a 0.9 per cent annual change in 2014 (with the two halves of 2014 showing similar year-on-year changes). The acceleration of activity in the first half of 2015 was characterised by more dynamic behaviour both in domestic demand and in exports. The strong growth in domestic demand components with higher import content – like private consumption of durable goods and GFCF in machinery and transport equipment – as well as the acceleration of exports, reflecting in part significant growth of the energy goods component, led to a significant acceleration of imports. Thus, year-on-year GDP growth for the first half of the year comprised a gross contribution of 2.6 percentage points (p.p.) from domestic demand and 2.9 p.p. from exports, with a negative contribution of imports to GDP of 3.9 p.p.. Considering the demand components net of imports (i.e. deducting from each demand component an estimate for the imports necessary to meet that demand), exports' contribution to GDP growth in the first half of the year is estimated at 0.6 p.p. and the contribution from domestic demand at 1.0 p.p., which implies a relative stabilisation of exports' contribution versus the previous semester and an increase in domestic demand's contribution. In this context, the goods and services account surplus as a percentage of GDP remained unchanged relatively to the previous six months period.

In regard to labour market conditions, the situation improved in the first half of 2015, with an increase in employment and a reduction in the unemployment rate, which was at 11.9 per cent in the second quarter (13.5 per cent in the fourth quarter of 2014).

Deceleration in economic activity in the third quarter of 2015

In the third quarter of 2015, according to the flash estimate released by Statistics Portugal (*Instituto Nacional de Estatística – INE*), economic activity stabilised versus the previous quarter. In year-on-year terms, GDP decelerated slightly in the third quarter of 2015, growing 1.4 per cent (Chart 2.1). The unemployment rate stabilised versus the previous quarter, with employment in relative stagnation.

The breakdown of the change in GDP into its main expenditure components was only released after the data cut-off date for this Bulletin. However, the evolution of the GDP components in the third quarter of 2015 may be analysed based on recent short-term indicators and the qualitative information contained in *INE*'s flash estimate. Thus, GDP behaviour in the third quarter of 2015 is estimated to result from a deceleration of domestic demand and exports, along with a deceleration of imports, reflecting the slower growth of global demand.

Part of this behaviour should prove temporary, and therefore quarter-on-quarter growth rates of activity close to that observed in the first half of the year are projected for the next few quarters.

Deceleration in domestic demand, more marked in components with higher import content

The evolution of certain drivers of private consumption, namely the improvement in the labour market, the fall in fuel prices and the reduction in interest rates, have contributed favourably to the recent developments in consumer expectations and private consumption. Despite the dynamic behaviour of private consumption, it decelerated in the third quarter, largely as a result of the deceleration

of durables consumption, in particular motor vehicles. Indeed, sales of motor vehicles, after strong growth in the first half of the year (32.8 per cent), grew more moderately in the third quarter of 2015 (18.9 per cent). Other consumption indicators, like the deflated retail turnover index and ATM withdrawals and payments, showed slower growth rates over the most recent months available compared to those of the first half of the year. On the other hand, the consumer confidence indicator (available up to October) remained at historically high and relatively stable levels since the start of the year.

In a context of relatively favourable financing conditions and consolidation of expectations of growth in domestic demand and in external demand of Portuguese goods and services, GFCF has been one of the most dynamic global demand components in 2015. However, in the third quarter, GFCF decelerated significantly from the previous quarter. This deceleration was particularly sharp in the machinery and equipment component, as suggested by the change in the capital goods imports indicator, excluding transport equipment, in the third quarter. In turn, investment in construction is estimated to have grown positively in the first three quarters of 2015, after successive falls in the annual average since 2002. The growth of this investment component in the third quarter was slower than that in the first half, partly reflecting a base effect from particularly adverse weather conditions in the first few months of 2014.

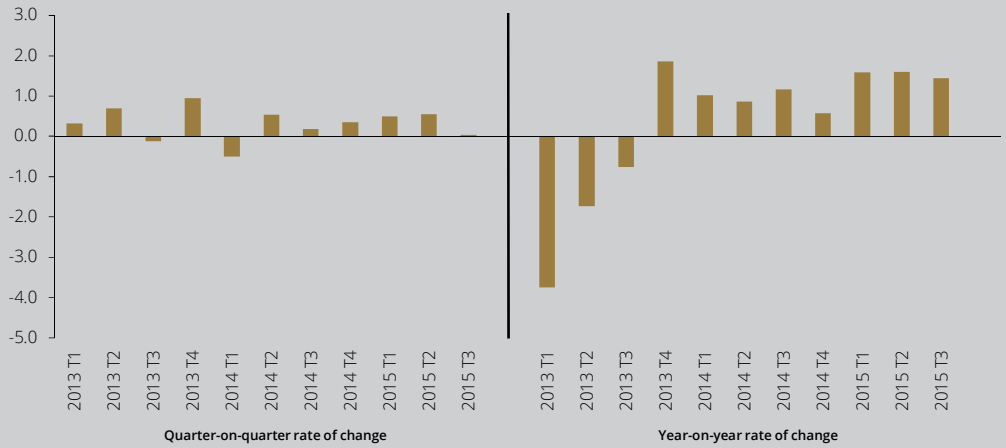
While the gross contribution of domestic demand to GDP growth fell in the third quarter versus the previous quarter, that contribution net of imports was relatively stable, as the deceleration of domestic demand resulted from the components with higher import content (private consumption of motor vehicles and GFCF of machinery and equipment). That behaviour contributed to the deceleration of imports in the third quarter. Regarding the components of global demand net of imports, the deceleration of GDP in the third quarter therefore resulted from exports' less favourable developments.

Deceleration of exports, with robust growth in goods exports

The information available for the third quarter indicates a deceleration of export volume

Chart 2.1 • Gross domestic product

| Real rate of change, in percentage



Source: *INE*.

versus the previous quarter and versus the first half of 2015. Both the goods and the services components contributed to this. A significant part of goods exports' deceleration was explained by the behaviour of energy goods. Energy goods' deceleration in the third quarter (maintaining however a very high growth rate) partly reflected a base effect resulting from the temporary closure of a refinery unit in early 2014, which led to very strong export growth in these goods in the first half of 2015. Goods exports excluding fuel also showed slower activity in the third quarter, largely resulting from the sharp decrease in exports to Angola (Chart 2.2.). Finally, services exports decelerated both in tourism and in the rest of the service industries. However, the two components still behave differently, with tourism maintaining high nominal growth rates and the other services showing a year-on-year decline.

Exports of goods and services to countries outside the euro area, excluding Angola, and to the euro area countries, developed favourably from January to September 2015. Overall, underlying these exports' behaviour are market share gains in the period, which were more pronounced in the first half of 2015. In turn, exports to Angola have fallen over 2015, most sharply in the third quarter (Chart 2.2.). The exports to this country have suffered from the negative effects of the sharp fall in oil prices on activity and financing conditions.

Imports grew more slowly in the third quarter of 2015 than in the first half, and much more slowly than in the previous quarter. The deceleration was more marked in goods but was also evident in services. Goods imports behaviour reflects the lower domestic demand and exports levels, particularly from global demand components with high import content. The robust growth in imports in the first half (in particular the second quarter of 2015) also reflected strong growth in pharmaceuticals imports.[1] In the case of services, slower growth is expected in the third quarter, resulting from deceleration in the other services, while tourism imports accelerated, thereby continuing their significant growth.

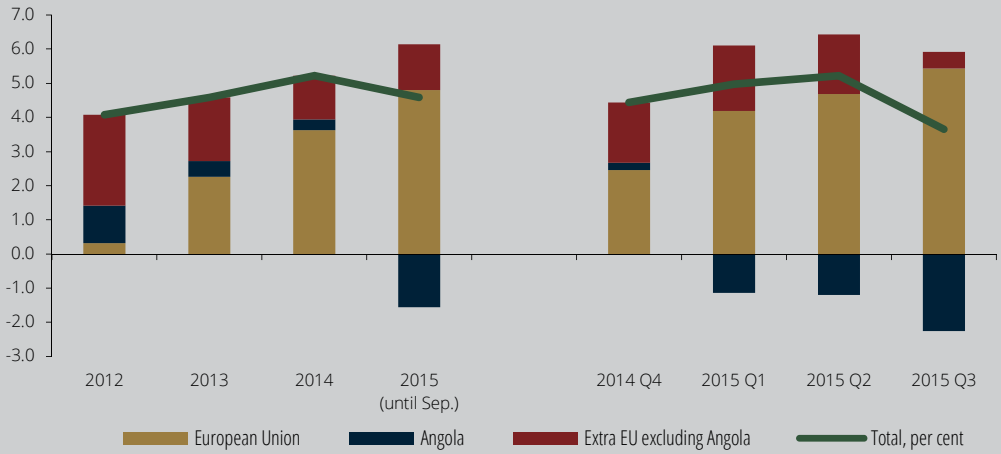


Chart 2.2 • Nominal exports of goods and services excluding energy by country of destination

| Contributions to year-on-year rate of change, in percentage points

Sources: *INE* (International Trade Statistics) and Banco de Portugal.

Box 1 | Projection assumptions

The projections in this Bulletin are based on a set of assumptions over the Portuguese economy's external environment. These assumptions reflect the information underlying the ECB's most recent projections, released on 3rd December (Table 1).

In regard to the international environment, GDP and global trade are currently presumed to recover in 2016 and 2017 after the observed deceleration in 2015. External demand for Portuguese goods and services should accelerate between 2015 and 2017, chiefly reflecting the acceleration projected in the markets outside the euro area, after the weak growth expected for 2015. Euro area demand should fall in intensity over the projection period, nevertheless remaining clearly more dynamic than the markets outside the area during this period. External demand for Portuguese goods and services during the projection period was revised downwards, versus the assumptions used for previous projections, mainly due to a downward revision of demand from markets outside the euro area.

The technical assumption for oil prices is based on implicit information in the futures market. Based on the most recent information, the sharp fall in oil prices in 2015 (both in dollars and in euro) should be even stronger than that projected in the previous exercises (of October and June 2015). Oil prices in euro are projected to stabilise in relative terms in 2016, and grow in 2017 to levels substantially below those of 2013 and 2014. The projected oil prices (both in dollars and in euro) in the three years of the projection horizon are below those assumed in the June and October 2015 projections.

The developments assumed for the three-month EURIBOR are based on expectations implicit in futures contracts. This methodology results in a zero interest rate in 2015 and a slightly negative rate in 2016 and 2017. These rates represent a downward revision of the assumptions implicit in the projections released in June for 2016 and 2017. The assumption for the long-term interest rate for Portuguese debt is based on an estimate for the rate implicit in sovereign debt, underlying which is an assumption for the interest rate for new issuances. The interest rate implicit for Portuguese debt was revised slightly upwards in 2016 and 2017 versus the assumption used in June, due to less favourable conditions in medium and long-term sovereign debt issuances.

The technical assumption for exchange rates is based on the maintenance throughout the projection horizon of the average levels observed over the two weeks prior to the data cut-off date. In annual average terms, after a significant depreciation of the euro in 2015, this technical assumption implies a slight depreciation in 2016. The change in the effective exchange rate in 2015 has been revised, reflecting a smaller depreciation.

The projections relating to the public finance variables follow the rule used in Eurosystem projections, to reflect only the policy measures that have already been or are very likely to be approved, and that have sufficient detail. As the State Budget for 2016 is not known on the cut-off date for these assumptions, this projection continues to reflect the measures included in the updated Stability Programme, as in the projection published in the June *Economic Bulletin*.

According to this projection, public consumption should almost stabilize in 2015, growing 0.1 per cent in real terms after several years of successive declines. Underlying these developments is the assumption of a smaller fall in the number of civil servants and an increase in goods and services expenditures. The relative stabilisation of public consumption in real terms is expected

to continue during the projection horizon. Regarding the public consumption deflator, the same technical assumption as the year before was used, i.e. a reversal of the 2011 wage cuts currently in place (20 per cent a year from 2015).

In 2015 public investment should change positively, breaking the falling trend of the last few years. Over the projection horizon, a deceleration is expected in public investment, arising from military procurement, especially in 2016. Correcting the effect of the sale of tangible assets, public investment's share in GDP is expected to stabilise in 2016 and 2017.

Table 1 • Projection assumptions

		EC December 2015			EC October 2015	EC June 2015		
		2015	2016	2017	2015	2015	2016	2017
Internacional environment								
World GDP	yoy	2.9	3.4	3.7	3.2	3.2	3.8	3.8
World trade	yoy	1.5	3.5	4.2	2.6	2.6	5.0	5.3
External demand	yoy	3.9	4.3	4.8	4.5	4.5	5.5	5.8
Oil prices in dollars	aav	53.8	52.2	57.5	55.3	63.8	71.0	73.1
Oil prices in euros	aav	48.4	48.1	52.9	49.9	57.1	63.5	65.4
Monetary and financial conditions								
Short-term interest rate (3-month EURIBOR)	%	0.0	-0.2	-0.1	0.0	0.0	0.0	0.2
Implicit interest rate in public debt	%	3.8	3.6	3.5	3.8	3.8	3.5	3.4
Effective exchange rate index	yoy	-9.3	-0.7	0.0	-9.8	-9.5	-0.2	0.0
Euro-dollar exchange rate	aav	1.11	1.09	1.09	1.11	1.12	1.12	1.12

Sources: ECB, Bloomberg, Thomson Reuters and Banco de Portugal calculations.

Notes: yoy – year-on-year rate of change, % – per cent, aav – annual average value. An increase in the exchange rate corresponds to an appreciation. The implicit interest rate on public debt is computed as the ratio between interest expenditure for the year and the simple average of the stock of debt at the end of the same year and at the end of the preceding year.

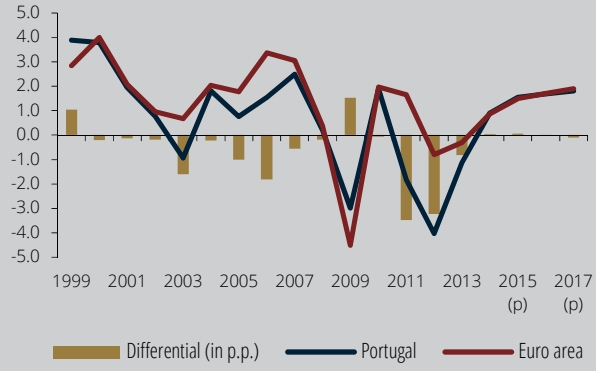
3. Demand, supply and external accounts

Recovery of domestic demand over the projection horizon and maintenance of robust export growth

After growth of 0.9 per cent in 2014, economic activity in Portugal should continue to grow slowly, at an average growth rate for 2015-2017 close to that projected for the euro area (Chart 3.1). GDP in Portugal at the end of the projection horizon should be close to that observed before the start of the international financial crisis in 2008 (Chart 3.2). The developments projected for the Portuguese economy are characterised by sustained domestic demand growth in parallel with robust exports growth, reflecting the continuation of the redistribution of productive resources to sectors more exposed to international competition, as has been the case in recent years. Exports' net contribution (i.e. less imported content) should increase from 0.7 p.p. in 2014 to 0.9 p.p. in 2017 (Chart 3.3). In turn, the net contribution of domestic demand should increase from 0.3 p.p. in 2014 to 0.9 p.p. in 2017.

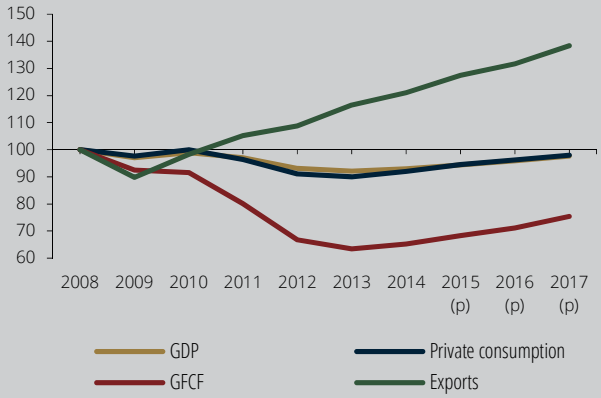
Per capita output should grow 1.8 per cent in annual average terms over the 2015-2017 period (Chart 3.4), underlying which is a decrease in the population of 0.2 per cent in 2015 and 2016.[2] The labour factor should make an annual average contribution of 0.9 p.p. to GDP growth over the projection horizon, after a period of negative contribution. Meanwhile, human capital is expected to continue its positive contribution to *per capita* output growth, as has been the case in recent periods. In turn, after a positive contribution over the 2000s decade, the capital factor should make a contribution near zero over the projection horizon. Finally, GDP growth from 2015 to 2017 should benefit from favourable developments in total factor productivity, with the continuation of the improvement process for distributing resources in the economy.

Chart 3.1 • GDP growth in Portugal and in the Euro Area | Rate of change, in percentage



Sources: ECB and *INE*.
Note: (p) – projected.

Chart 3.2 • GDP breakdow | Index 2008=100



Sources: *INE* and Banco de Portugal.
Note: (p) – projected.

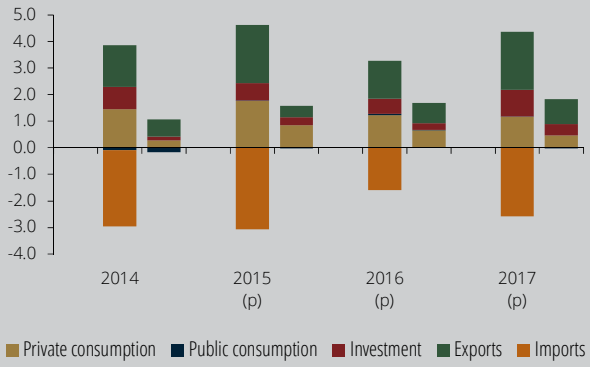
Continued reorientation of the economy towards sectors that are more exposed to international competition

Over the projection horizon, activity in the private sector should grow at an average annual rate of 2.2 per cent, whilst public sector activity will decline in 2015 and 2016.[3] In particular, further cuts in public employment in 2015 and 2016 and a stabilisation in 2017 are expected (Box 1. 'Projection assumptions').

Gross Value Added (GVA) is expected to recover moderately over the horizon, following an increase of 0.6 per cent in 2014. In this context, GVA in agriculture, manufacturing and services is forecast to recover, due to the growth in goods and services exports and the recovery in domestic demand. Following a long period of successive falls, activity in the construction sector should recover modestly, although the level at the end of the projection horizon is expected to be some 35 per cent below that registered in 2008.

According to the European Commission's business surveys, capacity utilisation in manufacturing has increased since the beginning of 2014, remaining slight below the values observed before the international financial crisis (Chart 3.5). In the same vein, capacity utilisation in services has also recovered somewhat since the end of 2013, returning to the level observed in the second half of 2011 (when this series started). Furthermore, according to the surveys, there has been an increase in those enterprises which consider that there are no limiting factors to their production, be it in terms of manufacturing or services. On the other hand, the number of enterprises considering insufficient demand to be a factor limiting production has fallen during recent quarters, especially in those sectors more exposed to international competition. In terms of the manufacturing sector, this indicator is in line with the values registered prior to the international financial crisis (Chart 3.6).

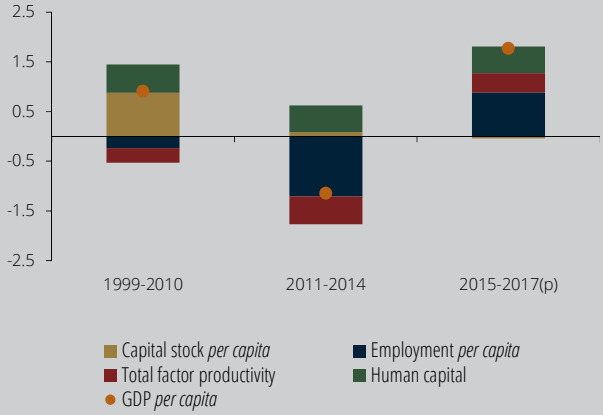
Chart 3.3 • Gross and net contributions to GDP growth | In percentage points



Sources: *INE* and Banco de Portugal.

Note: (p) – projected. For each year, the left-hand bar refers to gross contributions from each GDP component and the right-hand bar to the corresponding net contributions.

Chart 3.4 • Breakdown of the growth in real GDP *per capita* | Contributions in percentage points



Sources: Barro and Lee (2013), Quadros de Pessoal, *INE* and Banco de Portugal.

Notes: The growth accounting exercise of GDP *per capita* is based on a Cobb-Douglas production function. The measures of human capital were constructed from the data of Barro and Lee (2013) 'A new data set of educational attainment in the world, 1950-2010', *Journal of Development Economics 104*, pp. 184-198. For Portugal, these series were annualized and extended using the profile of the average years of education of employment of Quadros de Pessoal (until 2012) and of the Labour Force Survey of *INE*.

These enterprises also consider that, in the most recent period, financial restrictions have decreased in importance as a factor limiting production and are not considered very relevant.

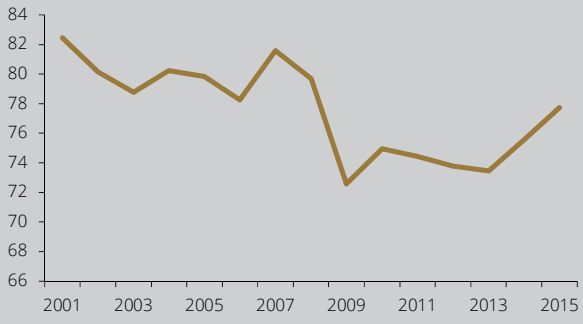
In the construction sector, the percentage of enterprises which consider that there are no production limiting factors is low, in comparison to enterprises in the manufacturing and service sectors, although the most recent figures suggest some improvement in this indicator. However, insufficient demand and financial restrictions continue to be the main limiting factors for the construction sector, notwithstanding a slight improvement observed since the beginning of 2013.

Finally, the question in the European Commission survey aiming to assess the importance of the insufficient labour force as a factor restraining production points to a negative differential in comparison to the years prior to the international financial crisis in the three sectors considered, which provides an additional indicator that unemployment is still above its structural level (Chart 3.7).

Moderate recovery of private consumption and investment

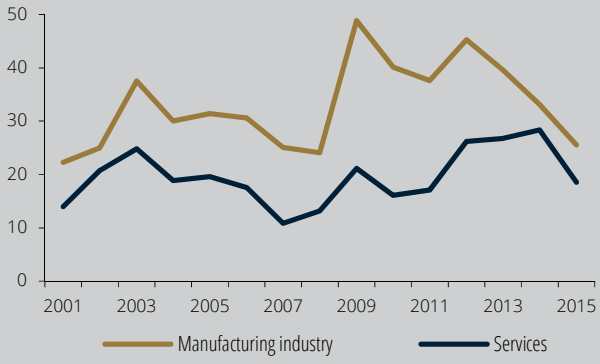
Private consumption is projected to grow by 2.7 per cent in 2015, slowing to 1.8 per cent in 2016 and 1.7 per cent in 2017, with the level at the end of the projection horizon being similar to that observed prior to the international financial crisis (Chart 3.8). Private consumption in 2015 has benefited from favourable developments in households' real disposable income and an improvement in expectations in terms of permanent income, against a background of consumer confidence remaining at historic highs. The increase in disposable income in 2015 reflects the improvement of labour market conditions and the unwinding of some of the budgetary consolidation measures implemented in recent years, in particular the elimination of the Extraordinary Solidarity Contribution and the gradual reversion of the wage cut in the public sector. Additionally, it also reflects the positive effect of the fall in oil prices (Box 2. 'Impact of the fall in oil prices on economic growth').

Chart 3.5 • Level of capacity utilization in the manufacturing industry | In percentage



Sources: European Commission and Banco de Portugal calculations.

Chart 3.6 • Firms that considerer insuficient demand as a factor limiting the business | Balance of responses



Sources: European Commission and Banco de Portugal calculations.

In 2016 and 2017, private consumption is expected to grow approximately in line with households' real disposable income, within a context of modest recovery in employment, moderate wage increases in the private sector, and an acceleration in consumer prices. In this context, over the projection horizon, households will maintain their net lending, although current forecasts point to a slight fall in the savings rate in 2015, stabilising in 2016-2017 at approximately 5 per cent.

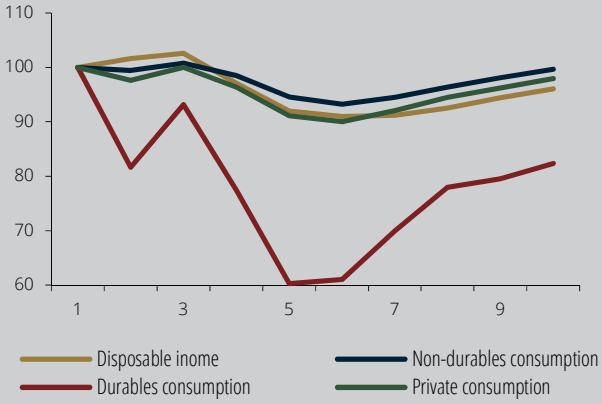
In terms of composition, consumption of durable goods is expected to grow approximately 11 per cent in 2015. This consumption component has grown significantly since the end of 2013, following considerable falls in 2011 and 2012, partly reflecting purchases postponed during the recession period for precautionary reasons. As stock levels of durable goods reach a new equilibrium, more moderate growth of this domestic demand aggregate is expected. Therefore, for 2016 and 2017, consumption of durable goods is projected to slow down, to an annual average growth rate close to 3 per cent, in line with the historical elasticity to households' real disposable income. Despite this recovery, at the end of the projection horizon, consumption of durable goods is forecast to be 20 per cent below that registered in 2008.

Following growth of 1.5 per cent in 2014, consumption of non-durable goods should grow 2.2 per cent in 2015. For 2016 and 2017, consumption of non-durables is projected to grow around 2 per cent. The recovery of private consumption during the projection horizon should also benefit from a reduction in households' debt servicing, in a context of continued low market interest rates combined with the continuing fall in levels of indebtedness and the progressive improvement in financing conditions. In fact, household indebtedness as a percentage of disposable income has fallen since 2011, which constitutes a fundamental characteristic of the Portuguese economy's adjustment process. The trend is forecast to continue throughout the projection horizon, such that the total reduction from 2011 to 2017 of household indebtedness as a percentage of disposable income should reach 22 percentage points (Chart 3.9).

Chart 3.7 • Firms that considerer labour force as a factor limiting the business
| Balance of responses

Sources: European Commission and Banco de Portugal calculations.

Chart 3.8 • Consumption and disposable income
| Index 2008=100



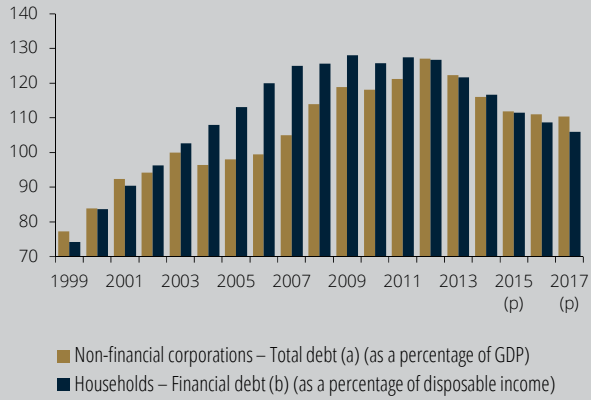
Sources: *INE* and Banco de Portugal.
Note: (p) – projected.

Following 2.8 per cent growth in 2014, GFCF is expected to grow by 4.8 per cent in 2015, followed by growth rates of 4.1 per cent and 6.1 per cent in 2016 and 2017 respectively (Chart 3.10). The recovery of GFCF along the projection horizon follows very sharp falls in the period 2009-2013, reaching approximately 35 per cent in cumulative terms. Notwithstanding the projected recovery of GFCF, its share of GDP in 2017 should reach around 17 per cent, which is substantially below that observed in past few decades. This reflects the recovery of business investment as a percentage of GDP to levels similar to those observed prior to the international financial crisis, combined with marked falls in public and residential investment, which should be of a persistent nature (Chart 3.11).

In addition, during this period of economic recovery, GFCF's share of GDP has grown much more slowly than in previous recoveries, which is a phenomenon that has also affected other developed countries and is one of the explanations for the economic recovery being slower than in previous cycles. Periods of economic recovery are generally characterised by a significant increase in GFCF's share of GDP, reflecting greater investment volatility, which has not been observed to the same extent in the current economic cycle, due in part to the aforementioned persistence of the reduction in government and housing investment.

Corporate investment is expected to grow by 4.6 per cent in 2015, and accelerate to 7.2 per cent in 2017, which is in line with the average growth of this aggregate as a percentage of GDP in previous periods of economic recovery (Chart 3.12). The recovery of corporate investment should benefit from some improvements in demand, both in the domestic and external markets, and financing conditions assisted by the ECB non-standard monetary policy measures with an impact on interest rates to non-financial corporations. Furthermore, there is a need to renew capital stock following significant

Chart 3.9 • Debt of the non-financial private sector | End of period figures



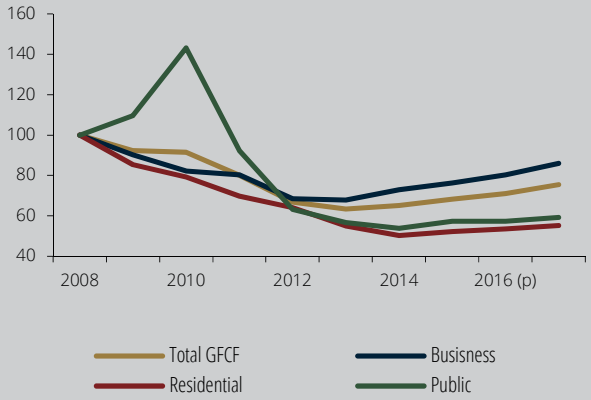
Sources: *INE* and Banco de Portugal.

Notes: (p) – projected.

(a) It includes loans granted to non-financial corporations by other institutional-sectors; commercial paper and bonds issued by non-financial corporations held by other sectors and trade credits received from other sectors.

(b) The financial debt corresponds to loans and debt securities issued by the sector.

Chart 3.10 • Breakdown of GFCF by institutional sectors | Index 2008=100



Sources: *INE* and Banco de Portugal.

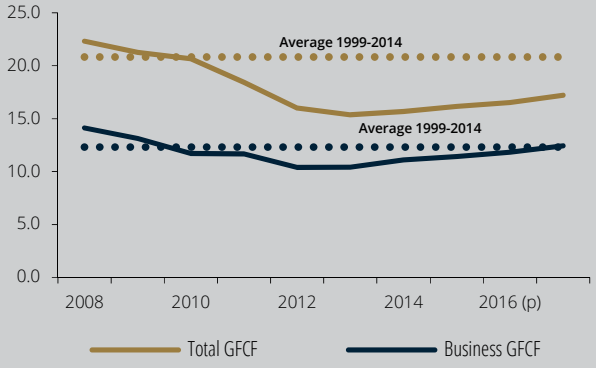
Notes: (p) – projected.

falls in investment during the 2009-2013 period, associated with the high uncertainty resulting from the adjustment process and expectations on developments in demand conditions. The recovery since the beginning of 2014 of the capacity utilisation in manufacturing is consistent with the need to renew capital stock. The increase in corporate sector confidence, against a background of increased global demand, should also contribute to investment recovery.

However, the evolution of business GFCF over the projection horizon is expected to remain affected by the need to further reduce levels of corporate indebtedness (Chart 3.9). Furthermore, the behaviour of credit to non-financial corporations since the beginning of the Portuguese economy's adjustment process has shown itself to be significantly heterogeneous, both in sectoral terms and in terms of corporation size. Therefore, lending appears to have been directed to the most dynamic sectors of the economy, and those with greater exposure to international competition, a trend which should continue in the coming years.

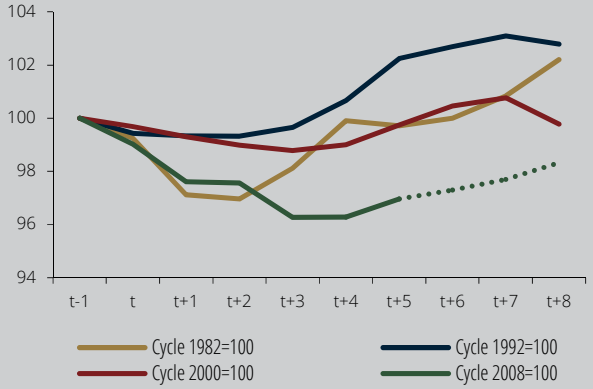
Following strong growth in the first quarter of 2015, associated in part with the temporary factors referred to in Section 2 'Recent information', residential investment is expected to recover slowly along the projection horizon. Developments in this component basically reflect the increase in disposable income and the progressive improvement in financing conditions, as well as an easing of the situation in the labour market, against a background of consumer confidence remaining high. The relatively moderate growth projected for residential investment reflects the fact that the steep fall registered since the beginning of the 2000s is part of a structural adjustment in housing stock, following high levels of investment during the 1990s. Developments in residential investment in the next few years are also affected by demographic factors associated with the recent downward trend of the resident population as well as the still high levels of household indebtedness. In this context, levels of investment in housing at

Chart 3.11 • Gross Fixed Capital formation
| In percentage of GDP



Sources: *INE* and Banco de Portugal.
Notes: (p) – projected.

Chart 3.12 • Ratio of business GFCF to GDP
| Index t-1=100



Sources: *INE* and Banco de Portugal.
Note: Dotted values correspond to projections. The reference t-1 corresponds to the last year of business GFCF growth before a recession.

the end of the projection horizon, in real terms, are expected to be 60 per cent below those recorded in 2000, the year prior to the beginning of the downward trend.

With regard to public investment, some recovery is anticipated along the projection horizon, following a fall of 60 per cent in the period 2011-2014. Growth of this component will probably remain influenced by the need for budgetary consolidation.

Continued robust export growth

Projections for goods and services exports point to growth of 5.3 per cent in 2015 (3.9 per cent in 2014), followed by rates of 3.3 per cent and 5.1 per cent in 2016 and 2017 respectively. Exports' acceleration in 2015 reflects, on the one hand, additional market share gains against a background of the euro's sharp depreciation (Box 3. 'Impact of the devaluation of the euro exchange rate on economic growth') and on the other, factors of a temporary nature associated with the export of energy goods, reflecting the base effect of the temporary closure of an important refinery unit in the first half of 2014.

In 2016 and 2017, exports should develop approximately in line with external demand for Portuguese goods and services, with no significant market share gains being predicted for the two-year period (Chart 3.13). Potential additional gains from lagged effects of the euro exchange rate depreciation are partially offset by temporary effects on the exports of energy and by the effect, presumed to be permanent, of the fall of exports to Angola. The developments forecast for exports include continued dynamic growth be it of goods or services, especially tourism, which has grown at a rate of slightly over 10 per cent since the beginning of 2014.

Exports' share of GDP should continue to grow in the coming years, reflecting the trend observed since 2010, representing approximately 45 per cent in 2017 (32 per cent in 2008). In this context, export growth in more recent years, in part associated with market share gains, has been one of the most significant aspects in the Portuguese economy's adjustment process, reflecting a notable degree of adaptation by Portuguese enterprises to international markets. In fact, over the last decade, a gradual change in the pattern of Portuguese exports has been observed, which has also translated the increased effort to find new markets into a context of strong adjustment of domestic demand.

Imports of goods and services are expected to grow by 7.3 per cent in 2015, in line with growth in 2014 (Chart 3.14). The growth in imports in 2015 partly reflects the evolution in the first half of the year, characterised by very strong growth in high import-content expenditure components, such as consumption of motor vehicles, investment in machinery and equipment, and exports of energy. It is also important to emphasise the significant growth in imports of pharmaceuticals, especially in the second quarter of the year, which should be temporary. Over the remaining projection horizon, imports are expected to evolve in line with the historical average elasticity to developments in global demand weighted by import content. Therefore, imports of goods and services are expected to grow by 3.6 per cent in 2016 and 5.6 per cent in 2017.

Maintenance of the economy's net lending over the projection horizon

According to current projections, the Portuguese economy's net lending, measured by the combined current and capital account, is expected to remain slightly higher than 2 per cent of GDP throughout the projection horizon. The maintenance of the economy's net lending results from the combination of slight increases in the rates of saving and investment in the economy (Chart 3.15).

Developments in the current and capital account balance in 2015 reflect an improvement in the goods and services account balance associated with the favourable effect of the fall in oil prices in euro (Box 1. 'Projection assumptions' and Chart 3.16). This effect is partly offset by a negative volume effect, resulting from the strong growth in imports during the first six months of the year. The favourable development of the goods and services account is offset by an increase in the primary income account deficit, due to lower receipts of transfers from European Union structural funds, according to the information contained in the State Budget for 2015.

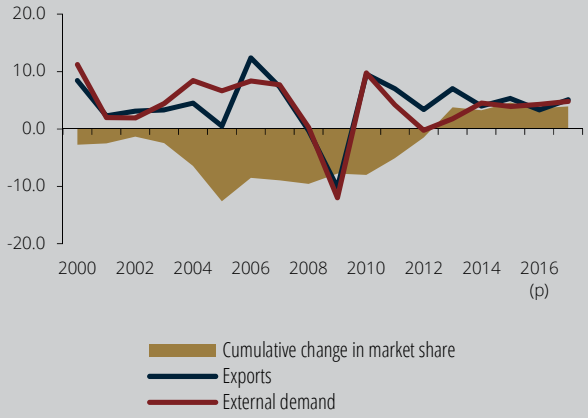
In 2016 and 2017 no significant changes to the main components of the current and capital account balance are expected.

GDP growth projections revised slightly downward in comparison with previous projections

In comparison with the last projections published by Banco de Portugal in the October edition of the *Economic Bulletin*, the current forecast for GDP growth in 2015 has been revised downward by 0.1 p.p. This revision is essentially a result of export growth in recent months being lower than expected, which is corroborated by the downward adjustment of assumptions relating to growth of external demand for Portuguese goods and services. Furthermore, corporate investment has also been adjusted downwards, especially in terms of machinery and equipment, as a result of the publication of the most recent indicators which suggest lower growth than that forecast in the October Bulletin. However, it is important to highlight that this investment component has a high import content.

In comparison with the projection published in the June 2015 Bulletin, the GDP growth rate for 2016 and 2017 has been adjusted downwards by 0.2 p.p. for each year. This revision is essentially a result of export behaviour, which shows less favourable development in the current projection, reflecting the new international environment assumptions which suggest significantly lower external demand for Portuguese goods and services than that considered in the

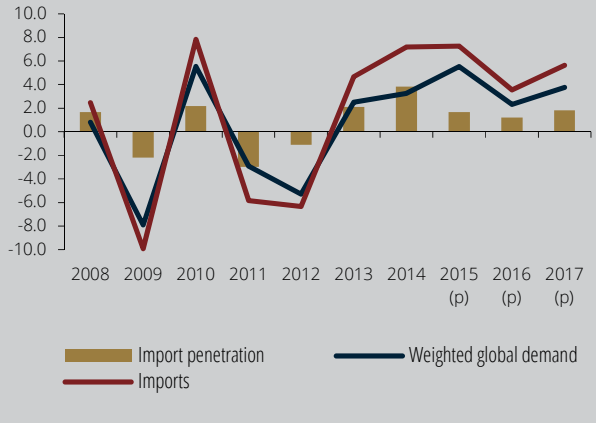
Chart 3.13 • Exports and external demand | Annual rate of change, in percentage



Sources: *INE*, ECB and Banco de Portugal.

Note: (p) – projected.

Chart 3.14 • Imports and global demand weighted by the import content | In percentage



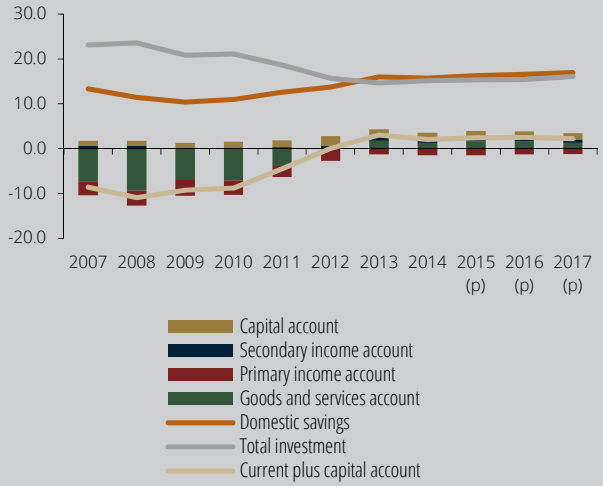
Sources: *INE* and Banco de Portugal.

Notes: (p) – projected.

June *Economic Bulletin*. This negative effect is reinforced by the fall in exports to Angola, both in terms of goods and services, which has intensified in recent months. Finally, it should be noted that exports of energy have been revised downwards for 2016, in accordance with the most recent information.

A comparison of the projections for GDP for 2015-2017 published in the most recent *Economic Bulletins* suggests that the slight adjustments to GDP growth along the projection horizon have largely reflected the changes to assumptions for external demand for Portuguese goods and services (Charts 3.18 and 3.19).

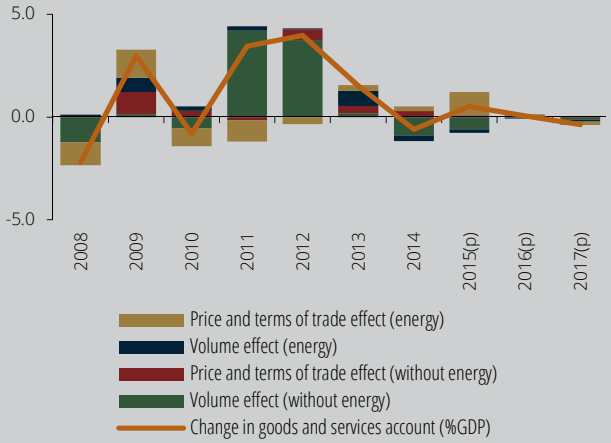
Chart 3.15 • Net lending or borrowing of the total economy | Percentage of GDP



Sources: *INE* and Banco de Portugal.

Note: (p) – projected.

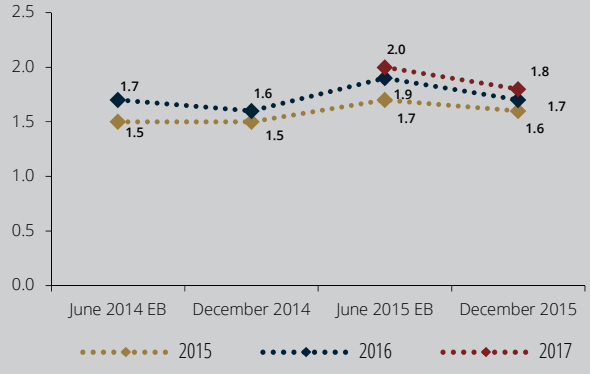
Chart 3.16 • Breakdown of goods and services account | In percentage of GDP



Sources: *INE* and Banco de Portugal.

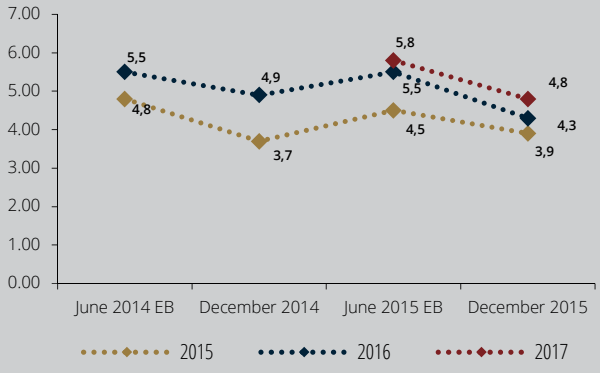
Note: (p) – projected.

Chart 3.17 • GDP projections published in the June and December *Economic Bulletins*



Source: Banco de Portugal.

Chart 3.18 • Assumptions for the external demand for portuguese goods and services implicit in the June and December *Economic Bulletins* | Year-on-year growth rates



Sources: ECB and Banco de Portugal.

Box 2 | Impact of the falling oil price on economic growth

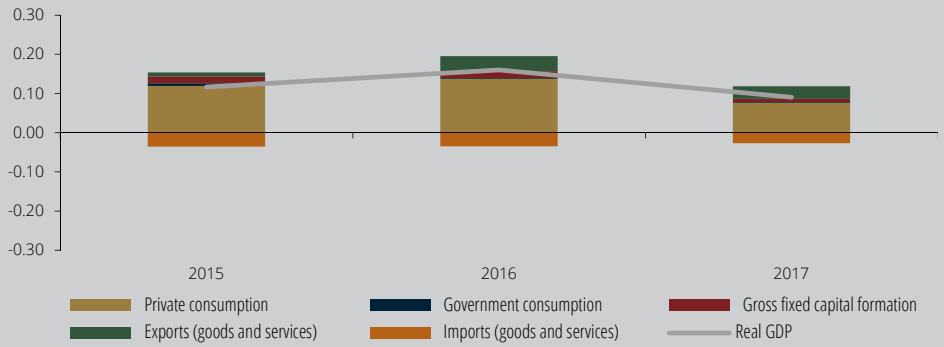
The oil price has fallen significantly since the second half of 2014, with an expected cumulative fall of around 43 per cent for the price in euro by the end of 2015. For oil-importing economies like Portugal's, the falling oil price has a positive impact on GDP growth, through the reduction of production and transport costs and its transmission to consumer prices. The impact on consumer prices reflects both the direct effect of the falling price of petroleum products and the indirect effect of the falling production cost of other goods. In addition, falling inflation due to the reduced oil price has a positive effect on households' real disposable income and thus on private consumption.

The recent developments in the fuel segment of the CPI point to a cumulative fall of 9.4 per cent from the second half of 2014 up to the end of 2015, which is a much smaller fall than that suggested by the recent decline in the oil price in euro. This largely reflects two key factors, aside from the natural effect of the tax on petroleum products being fixed and thus independent of oil price fluctuations. The first factor relates to the tax increase on petroleum products at the start of 2015, which contributed 2.5 p.p. to the rate of change of the fuel price index. The second factor regards the increase in the spread between the average retail price before tax and the oil price in euro, in a context of increasing refining margins in international markets.

According to the macroeconomic model used in the Banco de Portugal projections, a 9.4 per cent reduction of the CPI for fuels between the second half of 2014 and the end of 2015 should have an impact on GDP of between 0.1 and 0.2 p.p. per year over the 2015-2017 period (Chart 1). This positive impact on economic growth essentially arises from the increase in private consumption, and to a lesser extent from the increase in investment and exports.

Despite the above-mentioned direct effect of the falling oil price, there are non-negligible indirect effects that were not considered in the simulation, in particular the effect of the falling price of this commodity on net oil-exporting economies, through the significant reduction of exploitation revenue. A key example is the abrupt contraction of external demand from Angola, which has had significant repercussions on the developments of Portuguese exports (Section 2, 'Recent information').

Chart 1 • Contribution of the decline in energy goods price to GDP growth
| In percentage and percentage points



Source: Banco de Portugal calculations.
Note: The model used assumes that the international environment remains constant, except the oil prices.

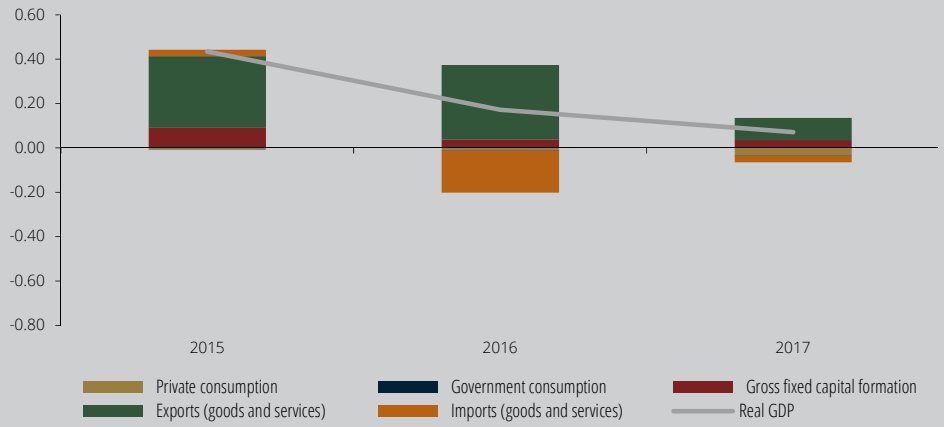
Box 3 | Impact of the devaluation of the euro exchange rate on economic growth

The euro effective exchange rate has depreciated significantly over the last few quarters, and should reach around 11 per cent in cumulative terms between the third quarter of 2014 and the end of 2015, according to the assumptions described in Box 1. 'Projection assumptions'.

Exchange rate fluctuations may affect an economy through different channels, including the price-competitiveness channel, with an impact on net exports. Indeed, over the last few quarters Portuguese exports have gain significant market shares over the countries outside the euro area. Nominal exports of goods and services to countries outside the euro area, excluding energy goods and exports to Angola, have increased around 6 per cent year-on-year over the first nine months of the year.

Chart 1 illustrates the impact on GDP of the euro effective exchange rate depreciation from the third quarter of 2014 to the end of 2015, using the Banco de Portugal projection model. According to these results, the euro's devaluation should have an impact of around 0.4 p.p. on the GDP growth rate in 2015, with a further impact of around 0.1 p.p. expected for the 2016 and 2017 GDP growth rates. The positive impact on GDP arises mainly from the increase in exports, which should contribute around 0.4 p.p. to GDP growth in 2015 and 2016 and 0.1 p.p. in 2017. Imports' developments may also be affected by the euro effective exchange rate depreciation, firstly through a reduction in imports (price effect) and in subsequent years through an increase in imports (quantity effect) arising from increased demand, in particular for exports.

Chart 1 • Contribution of the depreciation in the euro effective exchange rate to GDP growth | In percentage and percentage points



Source: Banco de Portugal calculations.

Note: (p) – projected. The model used assumes that the international environment remains constant, except the euro effective exchange rate.

4. Prices and wages

Inflation in Portugal has been low since 2013 against a background of reduced inflationary pressures, both domestic and external. Following a fall of 0.2 per cent in 2014, inflation measured by the annual rate of change in the Harmonised Index of Consumer Prices (HICP) is expected to rise by 0.6 per cent in 2015. The increase in prices in 2015 should reflect the development of the non-energy component (mainly unprocessed food and services), as the price of energy is expected to fall.

Slight increase in inflation expectations

The expectations for inflation published by *Consensus Economics* for the next 12 months have shown a progressive, albeit moderate, increase over the recent period, inverting the downward trend registered over the last three years. Contrary to that observed over the last year, inflation expectations in Portugal have been very much in line with those registered in the euro area in recent months (Chart 4.2). The recent increase in expected inflation should reflect expectations of modest economic recovery in the euro area and in Portugal, and a continuation of the ECB's expansionist monetary policy, notwithstanding some uncertainties, namely developments in oil prices and commodities.

Progressive increase in inflation over the projection horizon

A gradual increase in inflation is projected over the forecasting horizon, with the HICP growing 1.1 and 1.6 per cent in 2016 and 2017 respectively. Compared with projections for the euro area, published by the ECB on 3 December, following the negative differential of 0.6 p.p. registered in 2014, prices in Portugal should rise 0.5 p.p. above the euro area average in 2015. For 2016 and 2017, projections indicate an inflation differential virtually nil compared to the euro area average.

From January to October 2015, the positive inflation differential in comparison to the euro area was largely a result of a smaller fall in energy prices in Portugal, and to a lesser degree, a greater increase in food prices. The reduction in energy prices in 2015 is expected to be lower than that suggested by the fall in oil prices, reflecting on the one hand, the increase in the tax on oil products at the beginning of the year and, on the other, the widening in the differential between the average pre-tax retail price and the oil price in euro, in a context of increasing refining margins in the international markets (Section 7. 'Prices in the October 2015 *Economic Bulletin*'). Reflecting the assumptions for oil prices, energy prices are projected to show a variation close to nil in 2016 and grow by 3.6 per cent in 2017 (Chart 4.1).

The prices of services and non-energy goods are expected to accelerate moderately over the projection horizon. The gradual recovery expected for the Portuguese and international economies should translate into a progressive increase in domestic and external inflationary pressures, which are expected to remain low, however. Import prices excluding energy should grow modestly in 2015 and 2016 and increase a little more strongly in 2017.

In parallel with a gradual improvement in the labour market situation and an increase in productivity, wages per worker are expected to rise, which will be reflected in a gradual increase of unit labour costs over the projection horizon. With regard to the economy's profit margins, measured by the gross operating surplus per unit of output, a slight increase is forecast in 2015, resulting from the fact that the accentuated fall in oil prices is not entirely reflected in developments in consumer prices, and a relative stability is expected in 2016 and 2017.

Slight upward revision of projections for inflation in 2015 and 2017

The projection for consumer price developments in 2015 has been revised slightly upwards (0.1 p.p.) in comparison to the projections published in October, reflecting the inclusion of the information for the most recent period, which

revealed higher growth in prices than that forecast, especially in non-energy industrial goods and services.

The inflation projection for 2016 remains unchanged from that published in the June *Economic Bulletin*. In terms of 2017, the forecast was adjusted slightly upwards (0.1 p.p.), largely reflecting the upward revision of the assumptions for the growth (but not the levels) in oil prices.

5. Uncertainty and risks

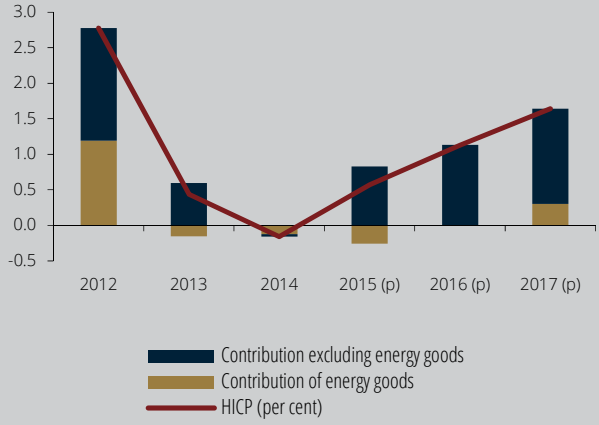
These projections represent the most likely scenario, conditional on the set of assumptions included in Box 1. 'Projection assumptions'. Should these assumptions fail to materialise, or should events occur that were not factored into the projections, risks and uncertainties arise. The quantified analysis of the risks and uncertainty surrounding the forecast is presented in this section.

The current projections are surrounded by particular uncertainty, given that, as at the cut-off date for the Bulletin, no information was available on fiscal measures to be implemented in coming years, in particular the State Budget for 2016. As a result, this analysis presents increased uncertainty over real economy and price developments in 2016 and 2017.

With regard to risk factors, the possibility of a slower recovery of global activity and international trade flows was deemed a key risk factor, in particular in the emerging market economies. As a result, lower growth in external demand for Portuguese goods and services in the 2016-2017 period was considered, with a 55 per cent probability of occurring (Table 5.1). In addition, the possibility of the ECB implementing further non-standard measures in the euro area was also considered as a risk factor, with a 55 per cent probability of occurring. The materialisation of this risk would further depreciate the euro effective exchange rate in 2016 and 2017, and would affect consumption and investment. Domestically, an increasing risk is deemed to arise from any positive impact of structural reform in 2016 and 2017, both in exports and in investment, with a 55 per cent probability of occurring.

In this context, risks to economic activity and inflation are broadly balanced (Table 5.2 and Chart 5.1 and 5.2). However, the projection is surrounded by particular uncertainty, reflected in the wide confidence intervals for the current projection.

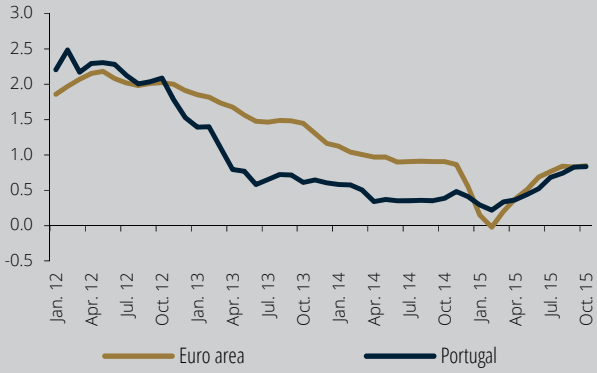
Chart 4.1 • Harmonized index of consumer prices | Contributions to the annual rate of change, in percentage points



Source: Eurostat and Banco de Portugal.

Note: (p) – projected.

Chart 4.2 • Inflation expectations for a 12-month horizon | In percentage



Source: *Consensus Economics*.

Table 5.1 • Risk factors – Probability of an outcome below the implicit in the projections | In percentage

	2015	2016	2017
Underlying variables			
External demand	50	55	55
Euro effective exchange rate	50	55	55
Endogenous variables			
Private consumption	50	47	47
Investment	50	45	45
Exports	50	47	47

Source: Banco de Portugal.

Table 5.2 • Probability of an outcome below the projections | In percentage

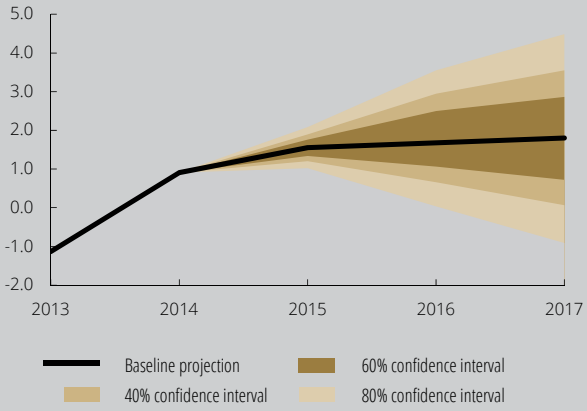
	Weights	2015	2016	2017
Gross domestic product	100	50	47	51
Private consumption	66	50	45	47
GFCF	15	50	43	45
Exports	40	51	50	54
Imports	40	49	45	46
HICP		51	50	50

Source: Banco de Portugal.

Notes

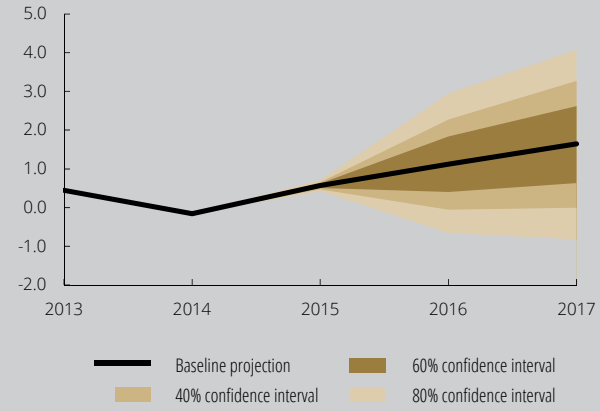
1. In nominal terms, pharmaceuticals imports grew 42.6 per cent year-on-year in the second quarter of 2015, resulting in a 1.1 p.p. contribution to overall goods imports growth for the quarter.
2. Assumes a constant population over the projection horizon, based on the level observed in the third quarter of 2015.
3. Compensation and the consumption of fixed capital are considered a measure of public sector activity.

Chart 5.1 • Gross domestic product | Rate of change, in percentage



Source: Banco de Portugal.

Chart 5.2 • Harmonized index of consumer prices | Rate of change, in percentage



Source: Banco de Portugal.

SPECIAL ISSUE

An interpretation of the low sovereign yields in the euro area

An interpretation of the low sovereign yields in the euro area

1. Introduction

In the recent past, sovereign yields[1] in developed economies reached minima levels without historical precedent.[2] This development was associated with a decline in real interest rates at a global level – which some economists interpret in light of a secular stagnation hypothesis[3] – coupled with low inflation expectations in the medium and long term. In the euro area, the wide range of unconventional policy measures of the ECB – especially the recent asset purchase programme – has contributed to lower sovereign yields even further in most area countries. In recent months, the yield curve in the euro area has remained at negative levels in short maturities. In Germany, negative sovereign yields are prevalent in maturities up to 7 years. In Portugal, sovereign yields on shorter maturities, up to 12 months, have hovered around zero.

This downward pressure on sovereign yields is the expected effect stemming from the recent ECB interventions in the euro area sovereign debt markets. In fact, the additional demand of government bonds by the Eurosystem leads in a first stage to an increase in the price of the bonds (i.e., to a decrease in yields). This price change corresponds to the incentive for bondholders to sell these assets to the Eurosystem. This process may be relatively protracted. Nevertheless, if the unconventional policy contributes to ensure the fulfilment of the central bank's mandate, the effect on bond prices will inevitably be temporary. Indeed, insofar as economic activity accelerates and inflation expectations rise, sovereign yields will tend to gradually increase, precisely reflecting the success of the policy.[4]

This Special Issue aims to estimate the contribution of a set of macroeconomic fundamentals – domestic and external – for determining the levels of sovereign yields in different euro area countries, including Portugal. The estimation allows identifying that the current levels of sovereign yields in the euro area are exceptional. Indeed, the observed macroeconomic fundamentals in the euro area – especially the public debt levels as a percentage of GDP – should be associated with significantly higher sovereign yields. These fundamental yields would tend to prevail in the absence of the non-conventional interventions of the ECB and in the absence of a sovereign debt crisis. Similarly, without changes in the macroeconomic fundamentals of the different economies, they will also tend to be the prevailing sovereign yields following the end of the asset purchase programme by the ECB, which will inevitably occur in a shorter or longer horizon.

The Special Issue is organized as follows. Section 2 presents the methodology adopted in the article. Section 3 analyses the main empirical results. Section 4 presents the main conclusions of the exercise.

2. Modelling strategy

In terms of methodology it is difficult to determine the long-term sovereign debt yield consistent with the fundamental macroeconomic indicators, which will be called the *fair yield*.

In the econometric approach, a first difficulty is the question of knowing what are the most informative indicators, as well as their statistical features, so that they can be used in the model estimation.

The second difficulty is deeper and stems from the classic problem of endogeneity in regressions. The idea is that in the case where one intends to model the long-term sovereign yield

in terms of basic macroeconomic indicators, the variable being explained is correlated, albeit in a limited way, with whatever is not accounted for by the explanatory variables (the so-called residuals of the estimation).

There are several reasons for this to happen. One possibility is the omission of important explanatory variables related to both the endogenous variable and at least one exogenous variable. Another possibility is the causality going from the yield to some of the explanatory variables, and not the other way around. A third hypothesis is that there are measurement errors in the variables or bias in the selection of the observations.

Although the difficulties mentioned above are relevant, in this work a purely statistical interpretation of the results will be made, without any attempt to infer what the direction of causality in the regressions might be. The essential criteria for selecting the appropriate model to describe the long-term sovereign yield as a function of key macroeconomic indicators were (i) the reasonability of the indicators chosen from a set of available explanatory variables, (ii) the consistency between these and the expected effects on yields and (iii) the consideration of relevant factors for determining interest rates but not directly related to the fundamentals of the economies.[5]

The sample selection was made based on the availability of data during the period of the European monetary union. The sample consists of ten countries of the euro area with data starting from January 2000, with monthly observations.[6] As from June 2014 the ECB initiated a set of unconventional monetary policy measures with the explicit aim of reducing public debt yields in the euro area, it was decided not to include the most recent period in sample; therefore, data spans the period from January 2000 until May 2014.

After a heuristic process of estimation of econometric models, a specification with the following equation is proposed:

$$i_{j,t} = \alpha_j + \beta_1 \mathrm{US10y}_t + \beta_2 \mathrm{HICP}_{j,t} + \beta_3 \mathrm{VSTOXX}_t + \beta_4 \mathrm{R3m}_t + \beta_5 \mathrm{Debt}_{j,t} + \gamma_j \mathrm{Red}_t + \varepsilon_{j,t}$$

where j designates the country and t designates the month of observation. In this specification, $i_{j,t}$ is the nominal ten-year sovereign yield, $\mathrm{US10y}_t$ is the nominal ten-year yield of US Treasury bonds, $\mathrm{HICP}_{j,t}$ is the forecast for inflation in the following year of country j, VSTOXX_t is an index volatility in the euro area, $\mathrm{R3m}_t$ is the three-month Euribor interest rate deflated by inflation in the euro area during the previous month, $\mathrm{Debt}_{j,t}$ is the forecast of public debt as a percentage of GDP for the following year, Red_t is an indicator of redenomination risk for the countries used in the sample, and $\varepsilon_{j,t}$ is a zero-mean residual without serial correlation. All the coefficients are estimated at the euro area level except the fixed effect of the country α_j and the effect of redenomination risk in yields, γ_j. The fixed effect of the country captures the secular level of interest rates in the country not explained by factors (idiosyncratic or at the level of the euro area) variable over time, and thus has a long-term interpretation. The redenomination risk effect expresses, for each country, the magnitude of the increase in long-term yields during periods when the redenomination risk was high.

The indicated specification includes variables that reflect various aspects relevant to the long-term yields of a sovereign. The first variable ($\mathrm{US10y}_t$) intends to capture the global level of interest rates; its inclusion is justified by the fact that the interest rate level prevailing in the United States is critical to global financial flows and financing conditions in the various countries.[7] As there is some global co-movement of interest rates, one should expect a positive coefficient.

Inflation measured by the Harmonised Index of Consumer Prices ($\mathrm{HICP}_{j,t}$) intends to capture the possibility of correlation between inflation and yields, regardless of the causality implied in this relationship.[8] The expected sign of this

coefficient is ambiguous, although some of the economic literature suggests a positive coefficient. On the one hand, the Fisher equation suggests that higher inflation rates should, in the long run, be associated with higher interest rates. Although one is dealing here with rates at different time horizons, these effects can be transmitted along the yield curve. Additionally, according to a monetarist or a neo-Keynesian view of monetary policy, an increase in inflation would induce the monetary policy authority to increase the short-term interest rate and, through transmission to the rest of the yield curve, also the longer-term rates.

The euro area risk index (VSTOXX_t) is justified by the role that risk aversion may have in yields.[9] The signal expected for this coefficient is positive in that the increased risk should correspond to higher yields required by investors.

The real short-term interest rate ($\mathrm{R3m}_t$) generally reflects the economic activity prospects in the euro area, which could in theory affect the longer-term expectations of nominal interest rates through monetary policy decisions and other channels. Because of the multiplicity of effects, the expected sign for the coefficient of this variable is ambiguous.

Finally, the forecast of public debt to GDP ratio ($\mathrm{Debt}_{j,t}$) is intended to express the effect of the degree of debt sustainability in its price, which is expressed by the dependent variable, through the distortions inherent to debt service and credit risk.[10] The expected sign for this coefficient is therefore positive.

2.1. Redenomination risk

The variable that measures redenomination risk (Red_t) reflects the possibility over time of any country of the sample being forced out of the euro area – or doing so voluntarily. Its presence is justified by the need to include in the estimation the period in which some of the countries have seen sovereign debt yields go up to very high values, which could hardly be justified by changes in the macroeconomic fundamentals of these countries. One possible interpretation of what happened during the sovereign debt crises that affected Cyprus, Greece, Ireland, Portugal and, to a lesser extent, Italy and Spain, was that investors feared the redenomination of these countries into a new devalued domestic currency, which severely diminished the expectations of full repayment of the respective sovereign debt.

The possible existence of multiple equilibria in debt markets has been the subject of a recent literature. In this literature it is shown that small differences in key macroeconomic indicators can lead to very different equilibria, typically in situations with high debt: in one equilibrium, interest rates are low in all countries (a 'pooling' equilibrium); in the other interest rates are high in countries with poor macroeconomic fundamentals, associated with higher probability of default on debt servicing (a 'separating' equilibrium).[11]

To measure this possibility, one starts with the assumption that countries tend not to default on very short-term debt (up to six months), partly because international investors are typically active in debt securities with maturities above one year. This behaviour was observed during the sovereign crises of the euro area, with the medium- and long-term sovereign yields widening the differential with respect to six-month yields. The variable Red_t is an indicator of periods in which the largest difference between the six-month yields of all countries in the sample was above 200 basis points (b.p.). It is therefore an indicator of the occurrence of a separating equilibrium in all the euro area countries considered.[12] In the sample, this variable takes the value 1 in the worst periods of the sovereign debt crises in the euro area and remained with the value 0 since late-2012.

3. Results

Column (1) of Table 1 shows the estimation results. A first observation is that sovereign yields in the United States are positively related to yields of the various countries of the euro area. This is consistent with the existence of international co-movement in interest rates – although by itself does not prove that. An increase of a 1 percentage point (p.p.) in the ten-year US Treasury bond yields will be associated with an increase of 60 b.p. in the ten-year yields of the euro area sovereigns.

The expected inflation coefficient is not statistically significant, suggesting that the channels that lead to a statistical association between short-term forecasts of inflation and long-term yields have an ambiguous cumulative effect.

In terms of risk, an increase in risk in the euro area will be associated with an increase in yields of the euro area sovereigns. The regression also suggests that the actual conditions of investment – approximated by the real three-month interest rate – are associated positively to the long-term sovereign yields.

3.1. The role of public debt

In the regression, the more interesting idiosyncratic factor – and the one that is the focus of this work – is the forecast for the following year of the ratio of government debt to nominal output of the country. This measure of debt repayment capacity on the part of a country is positively associated with the long-term sovereign yield. In particular, a reduction of 10 percentage points in the forecast for the debt ratio translates into an average reduction of ¼ p.p. in the ten-year sovereign yield. This effect is considerable.

There is an extensive literature linking economic growth and the level of debt of countries. Some of these results document a nonlinearity of economic growth as a function of the level of debt.[13] For the same increase in public debt, the countries with a high level of public debt will record a lower rate of economic growth than countries with a low level of public debt. To the extent that economic growth facilitates the payment of debt service, mitigating the possibility of default of a country, this literature can be useful in this context.

Table 1 • Empirical model

	(1)		(2)	
US 10-year yield	0.5894	***	0.6171	***
	0.0348		*0.0340*	
Inflation forecast	0.0266		-0.0577	
	0.0374		*0.0376*	
Vstoxx	0.0276	***	0.0288	***
	0.0022		*0.0022*	
3-month real rate	0.1470	***	0.1150	***
	0.0284		*0.0279*	
Debt/GDP forecast	0.0256	***	-0.0315	***
	0.0021		*0.0067*	
(Debt/GDP forecast)^2			0.00036	***
			0.00004	
No. obs	1,490		1,490	
No. countries	10		10	
R^2 overall	0.7190		0.7336	

Notes: Results of the panel data estimation with fixed effects by country-'good/bad' period. The 'good' and 'bad' periods are based on the existence of a redenomination risk in the euro area, which is proxied by a spread between countries' 6-month Treasury bills above 200 b.p. Inflation forecast is a combination of t+1 projections from ESCB, European Commission, IMF, OECD and Consensus. Vstoxx is the implied volatility of the equity index Eurostoxx. 3-month real rate is the 3-month Euribor deflated by the HICP inflation from the previous month. Debt/GDP forecast is a combination of t+1 projections from European Commission and OECD. The values in italics below the coefficients are the respective standard deviation. *, ** and *** mean that the coefficients are statistically significant with a confidence level of 90 percent, 95 percent and 99 percent, respectivelly.

Column (2) of Table 1 shows the results for a simple extension of the model when one allows for a nonlinear association between sovereign yields and the debt level. The non-linearity is introduced in the regression by including a quadratic term of the forecast of the debt ratio as a percentage of GDP. The statistically significant coefficients of the previous regression remain similar. The coefficients associated with the linear and quadratic terms of the debt ratio document a convex relationship between the sovereign yield and the debt ratio. This means that the higher the level of public debt of a country relative to its GDP, the greater the effect on the sovereign yield of the same increase (in percentage points) in the debt ratio. Because it incorporates non-linear effects, we will retain this specification until the end of this work.

Chart 1 shows the ten-year sovereign yields of the countries in the sample as a function of the debt ratio expected for October 2015. In the chart, the marginal effect of the debt ratio, according to the estimated model, is also represented.

Portugal has the highest ten-year public debt yield in the sample, with a value close to 2.5 percent. The lowest value corresponds to the German public debt, slightly above 0.5 percent. Although Italy has the highest debt ratio of the sample, the respective interest rate is lower than for example in Spain. These are the differences that the model seeks to analyse.

The marginal effect of the public debt ratio in the ten-year sovereign yield estimated for Portugal is about 6 b.p.,[14] which means that a reduction of 10 percentage points in the debt level would imply an approximate reduction of 60 b.p. in the sovereign yield. In contrast, a reduction of the same magnitude of the public debt of Austria, for example, would be associated with a reduction of about 35 b.p. in the respective ten-year sovereign yield. This convexity has important implications in terms of effort for the consolidation of public finances, a topic to be addressed later.

3.2. The fair yield

The statistical model shown above allows one to calculate a sovereign yield based solely on

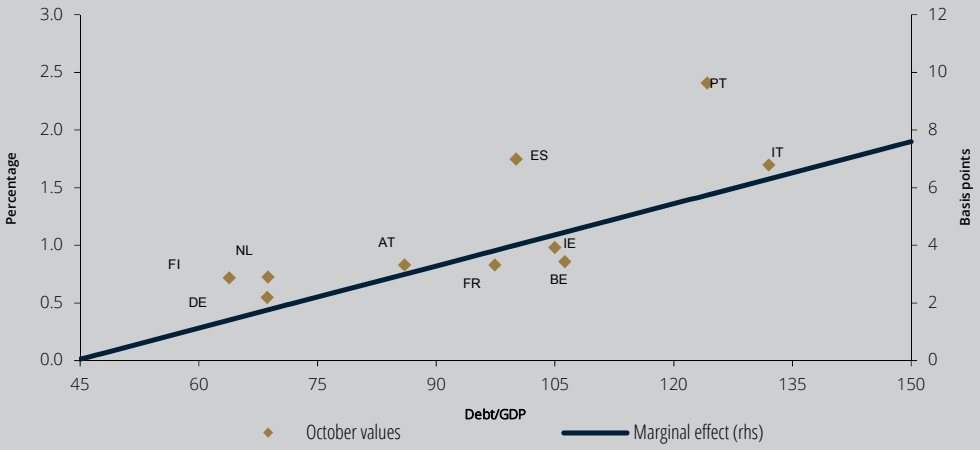


Chart 1 • Effect of the debt ratio on sovereign debt yields

Note: The line 'marginal effect' correponds to the change in the 10-year sovereign debt yields following a 1 percentage point change in the debt over GDP ratio, according to the empirical model of column (2) in table 1. The dots correspond to the monthly average by country observed in October 2015.

fundamental macroeconomic indicators, since the specification equation contains some of these indicators and also seeks to expunge the effect of the sovereign debt crises. Chart 2 illustrates the evolution of the ten-year sovereign yields for the different countries in the sample as well as the respective level predicted by the model, conditional on the absence of a separating equilibrium. This rate is called the fair yield. In fact, this is the interest rate consistent with the fundamentals of the different economies and the imposition of $\mathbf{Red}_t$ =0, which means that one is in the presence of a pooling equilibrium.

A first observation about this exercise is that during the sample period (until May 2014) and except for countries with sovereign debt crises (Spain, Ireland, Italy and Portugal), the fitted value is reasonably close to the actual yield. This implies that the econometric model can reproduce the essential features of the evolution of these sovereign yields before and during the financial crisis and until the beginning of the unconventional programmes of purchases of securities by the ECB.

The second interesting feature of Chart 2 is the sharp drop in yields that occurred from mid-2014 on. It is a common movement to all countries in the sample and should be, in particular, associated with the accommodative policy in terms of credit and liquidity pursued by the ECB. Chart 3 illustrates, for different countries and for the period from June 2014 to October 2015, the difference between the observed ten-year yields and the fair yield calculated using the model. Chart 4 shows the same information in October 2015. The estimate for the effect of these policies from June 2014 onwards is a reduction of around 2.1 percentage points in the ten-year yields relative to the value that would be consistent with fundamental macroeconomic indicators. In the Portuguese case, the estimate is the second highest in the sample: 2.7 p.p. In October 2015, the difference between the observed and the fair value is even higher in absolute terms.

The results that are obtained doing the same exercise for the yields of sovereign debt with a maturity of two years are similar. In this case, the Portuguese debt benefits from a reduction in yields of about 2.5 percentage points, the largest among the countries considered (Chart 5). For most of the countries in the sample, the yield at this horizon was negative as of October 2015.

While these estimates illustrate the operational success of the ECB's measures, it is also true that they emphasize an environment that is exceptionally conducive to reducing the debt ratio of the most vulnerable countries in terms of debt sustainability. In fact, the ECB's asset purchasing programme – strongly focused on public debt purchases – has significantly mitigated the effects which, in normal conditions, the level of public debt would have on the respective sovereign yields. Maintaining the current levels of public debt in Portugal, close to the maximum level observed in the sample, implies a situation of great vulnerability to internal or external shocks, either through the expected increase in the Portuguese sovereign funding rates, or the increased probability of occurrence of a separating equilibrium.

4. Conclusion

The ECB's unconventional monetary policy had a strong impact on the yield curves of the different euro area countries. In the case of Portugal, this article estimates that, in October 2015, 2-year and 10-year sovereign yields were about 2.5 percentage points below the level that would strictly result from the macroeconomic fundamentals characterizing the Portuguese economy. In the other countries analysed, this difference is also significant, ranging between 1 and 3 percentage points in the different maturities considered. In pursuit of its price stability mandate, the ECB has thus also promoted a decline in the debt service of euro area sovereigns.

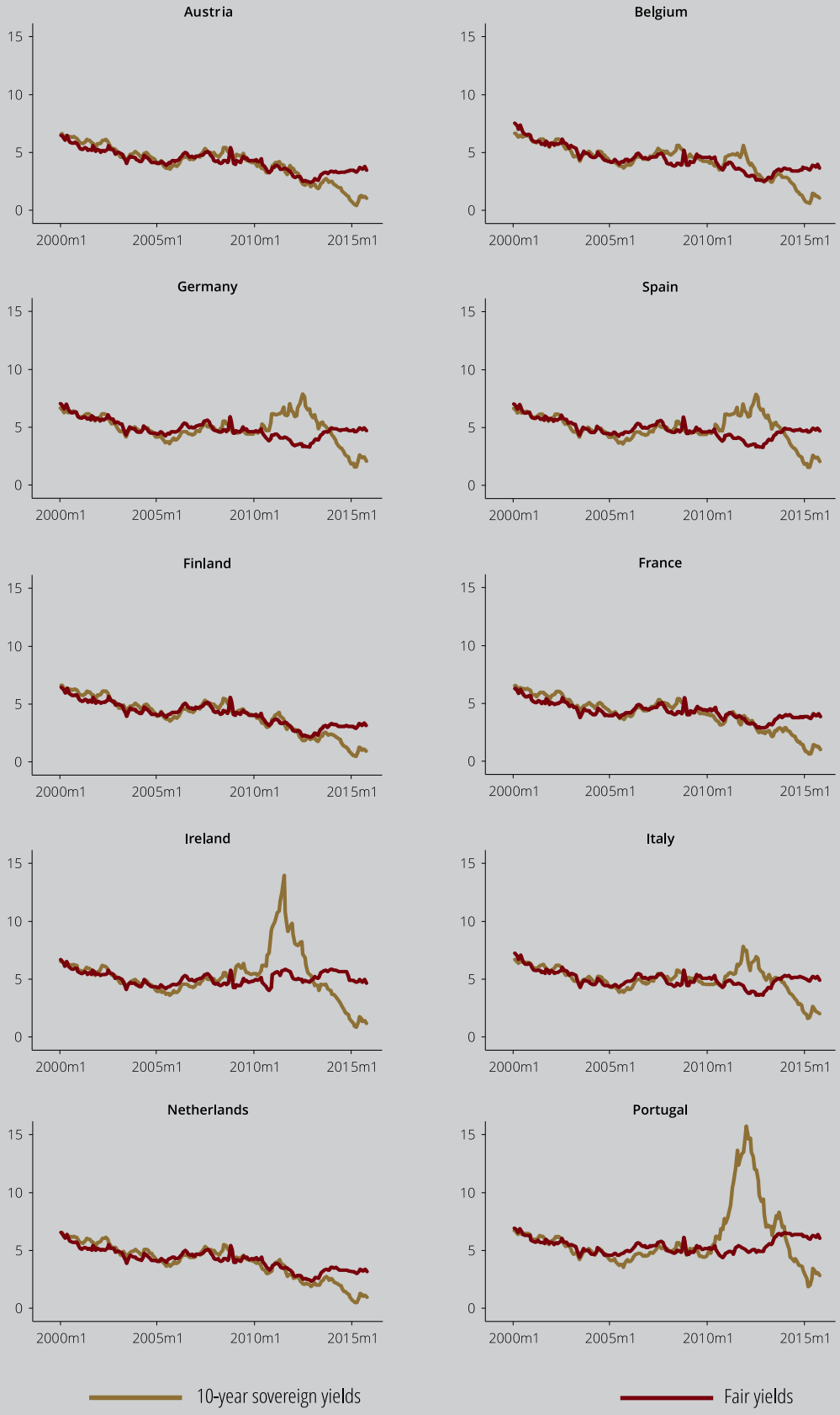
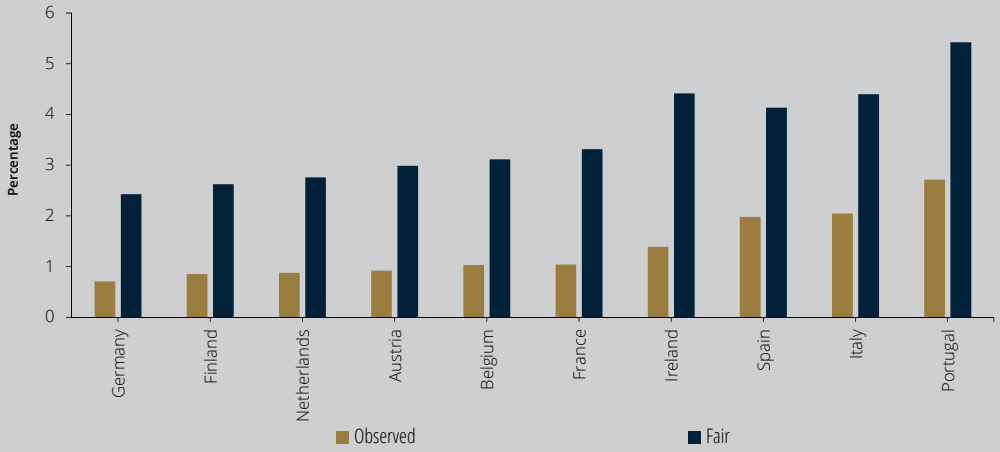


Chart 2 • 10-year sovereign debt yields for euro area countries: observed and fair values

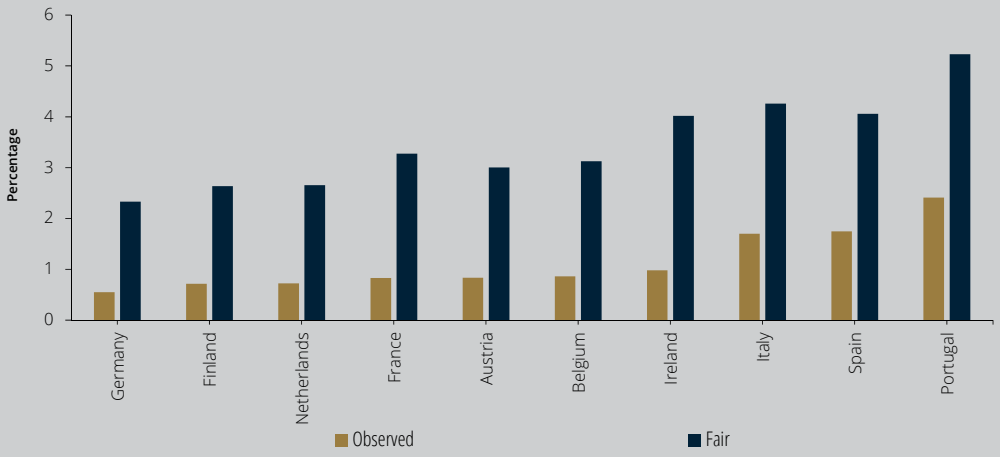
Note: Fair values based on the empirical model presented in the column (2) of table 1.

Chart 3 • 10-year sovereign debt yields for the period from June 2014 to October 2015: observed and fair values



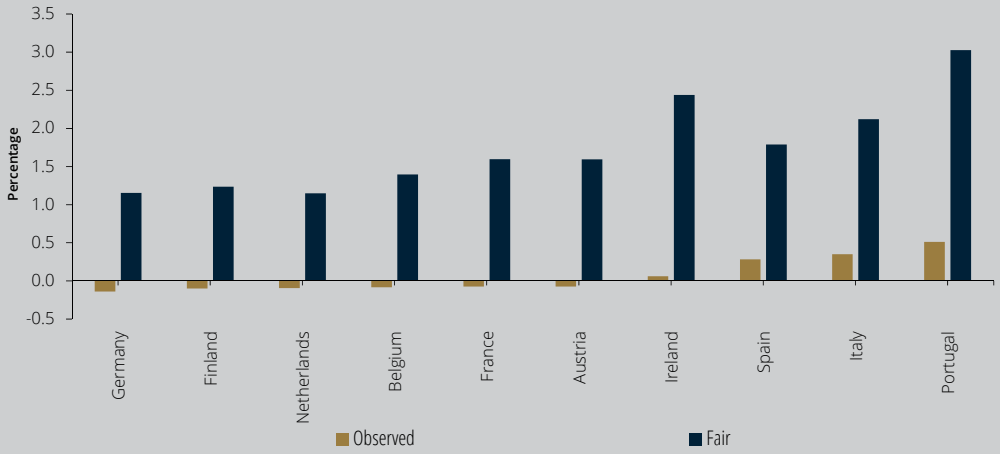
Note: Fair values based on the empirical model presented in the column (2) of table 1.

Chart 4 • 10-year sovereign debt yields for the period in October 2015: observed and fair values



Note: Fair values based on the empirical model presented in the column (2) of table 1.

Chart 5 • 2-year sovereign debt yields for the period from June 2014 to October 2015: observed and fair values



Note: Fair values based on an empirical model with a similar specification to the one presented in the column (2) of table 1 but for 2-year rates.

One of the key elements determining sovereign yields is the degree of public indebtedness. This article identified a nonlinear effect between public debt to GDP and sovereign yields in the secondary market: as the level of public debt increases, sovereign yields tend to increase more than proportionally. This increases the exposure of sovereigns with high indebtedness to situations of multiple equilibria and augments their vulnerability to sovereign debt crises. In these cases, which include Portugal, pursuing a structural downward trend for public debt is both a demanding and urgent challenge.

The ECB's non-conventional interventions in sovereign bond markets will not occur indefinitely. As announced by the Governing Council, the purchases of government bonds will take place until the Council sees 'a sustained adjustment in the path of inflation which is consistent with our aim of achieving inflation rates below, but close to, 2 per cent over the medium term'. Until then, the prevalence of exceptionally low sovereign yields is expected. This period represents a unique opportunity to improve – in a context of absence of market financing pressures – the macroeconomic fundamentals that determine the sustainability of the Portuguese public debt.

Notes

1. It is also common to find the term 'interest rates on bonds' issued by the sovereign. In this article we will prefer the designation 'sovereign yields'.

2. See Haldane, Andrew (2015) 'How low can you go?', speech in Portadown Chamber of Commerce, Northern Ireland, in September. According to Haldane, the current levels of long-term sovereign yields in advanced economies are the lowest in the last 5,000 years.

3. See Summers, Lawrence (2015) 'Rethinking Secular Stagnation Seventeen Months After', *IMF Rethinking Macro III Conference*.

4. See Banco de Portugal (2015) 'Unconventional monetary policy: what has been done and did it work?' Special Issue, *Economic Bulletin* June, and European Central Bank (2015) 'The transmission of the ECB's recent non-standard monetary policy measures' *ECB Economic Bulletin, Issue 7/2015 Articles*, for a detailed description of these transmission channels of unconventional monetary policy.

5. The proposed approach is a development of the method described in a featured theme entitled 'Monetary policy transmission in the euro area', *Economic Bulletin* of Banco de Portugal, Autumn 2012.

6. The countries of the euro area in the sample are: Austria, Belgium, Finland, France, Ireland, Italy, Netherlands and Portugal. In particular it was not possible to include Greece in the sample because of missing monthly data for some relevant periods of the analysis.

7. See Rey, Hélène (2013) 'Dilemma not Trilemma: The Global Financial Cycle and Monetary Policy Independence', paper presented at the *Jackson Hole Symposium*.

8. See a discussion of the type of correlation that can occur in García-Schmidt, Mariana and Woodford, Michael (2015) 'Are Low Interest Rates Deflationary? The Paradox of Perfect-Foresight Analysis', *Columbia University Working Paper*. In practice, however, this variable has little relevance in the results obtained.

9. See Rey, Hélène (2013), cited above.

10. The initial level of public debt is one of the most prominent variables in the analysis of sustainability of public debt by international organizations. See, for example, *International Monetary Fund* (2011) 'Modernizing the Framework for Fiscal Policy and Public Debt Sustainability Analysis', page 3.

11. See for example Catão, Fostel and Rancière (2012) 'Fiscal Discoveries, Stops and Defaults'; Teles (2014) 'Sovereign debt crisis', *Economic Bulletin* of Banco de Portugal, December; and Ayres, John Navarro, Gaston, Nicolini, Juan Pablo and Teles, Pedro (2015) 'Sovereign Default: The Role of Expectations', *Federal Reserve Bank of Minneapolis Working Paper 723*.

12. The use of a moderately different differential (higher or lower) does not produce major changes in the reported results.

13. For an example of non-linearity, see Rogoff, Kenneth and Reinhart, Carmen (2010) 'Growth in a Time of Debt', *American Economic Review 100 (2)*, pp. 573-578.

14. The calculation of this marginal effect is obtained based on the coefficients of the column (2) of Table 1. Specifically, the marginal effect of the indebtedness ratio as a percentage of GDP is obtained by derivation in order to that variable ($\text{Debt}_{j,t}$) in the expression. In the Portuguese case, the debt ratio of about 125 percent of GDP implies a value of -0.0315+2*0.00036*125=0.059 b.p., which can also be obtained in Chart 1 using the line.