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THE PORTUGUESE ECONOMY IN 2013

I

EXECUTIVE SUMMARY

In 2013 the Portuguese economy continued to adjust the macroeconomic imbalances built up over the last decades. This process has involved the adoption of a set of fiscal consolidation measures and an orderly deleveraging of the private sector, which led to a strong contraction in domestic demand. The Economic and Financial Assistance Programme has been implemented in an adverse international environment, marked by the stabilisation of economic activity in the main trading partners and continued financial fragmentation in the euro area. Nevertheless, exports of goods and services have proved to be extremely robust, as reflected in very substantial market share gains that show the Portuguese productive sector's remarkable ability to adapt. In this context, domestic and external macroeconomic imbalances have been significantly corrected. In particular, the Portuguese economy moved to a net lending position, which is reflected in a surplus of the combined current and capital account balance, a very significant structural fiscal consolidation, as well as a sectoral reallocation of resources towards tradable goods and services sectors.

The adjustment process has entailed considerable costs in terms of economic activity and employment. Under the Economic and Financial Assistance Programme these costs are subdued compared to what they would be not only in the very short term but also over the medium to long term should, access to funding be interrupted. Compared to previous adjustment processes in Portugal, costs have been exacerbated in the current environment due to the systemic international financial crisis and the sovereign debt crisis in the euro area (see "Box *A comparison between the adjustment of the Portuguese economy and previous domestic and international experiences*", *Annual Report 2012*).

Current estimates point to a 1.6 per cent contraction in GDP in 2013, which implies a cumulative fall in economic activity in Portugal of around 6 per cent in the 2011-13 period. These developments are set against a background of low inflationary pressures, at both domestic and external level, and very high unemployment levels that have contributed to substantial wage moderation. Between 2011 and 2013, the Portuguese economy moved from a net borrowing position of approximately 10 per cent of GDP to a 3 per cent surplus, which is one of the most prominent features of the adjustment process.

The international economic environment in 2013 has been marked by the outlook for weak world economic growth, with a distinct deceleration in emerging economies and muted growth in advanced economies, including a contraction in the euro area. However, the latest data suggest some evidence of recovery in the euro area economy. Overall, monetary policy has remained accommodative, with the main central banks turning to non-standard policy measures, in a context of low demand that has contributed to reduce inflationary pressure. Financing conditions worldwide seem to have improved somewhat in 2013, as a result of policy measures aimed at restoring confidence in financial markets.

In the euro area, the monetary policy stance remained accommodative in 2013, with the ECB reducing key policy rates and announcing the maintenance of liquidity-providing operations at a fixed rate and with full allotment for a longer period of time. More recently, similarly to other central banks, the ECB announced its intention of keeping key rates at low levels for an extended period (see "Special Issue *Forward Guidance – communication about the future path of monetary policy*", in this Bulletin). Nevertheless, the monetary policy transmission mechanism in the euro area remains impaired and financing conditions in the non-financial sector remain tight and heterogeneous. Indeed, there is evidence of credit market fragmentation in the euro area, namely as regards differences in the financing conditions of non-financial corporations in highly rated countries and in countries under stress.

Monetary and financial conditions in the Portuguese economy have remained broadly tight in 2013, although they have improved somewhat. Domestic banks' access to market funding remains rather limited, while risk premia for banks and sovereign debt has dropped, on average, compared to the

previous year. In turn, bank funding sourced from household deposits has remained stable and its costs have declined further.

With regard to the financing of the non-financial sector in Portugal, risk premia decreased slightly while the credit standards stabilised. Total credit to non-financial corporations continues to fall at a moderate and relatively stable rate, mainly reflecting the continued gradual and orderly deleveraging process in the private sector and a contraction in aggregate demand. In this context, financing to non-financial corporations is highly heterogeneous, with smaller firms finding it more difficult to access funding, given that they are more geared towards the domestic market and their financial position is weaker. In turn, tradable goods firms more geared towards the external market face fewer obstacles when accessing funding.

The fiscal policy stance in 2013 remained broadly tight, and available data indicate that the fiscal deficit target of 5.5 per cent of GDP will be achieved. Current estimates point to an increase in the primary structural balance of approximately 1.5 p.p. in 2013, which indicates consolidation efforts of around 8 p.p. in the 2011-13 period. This reflects a contribution from a drop in primary expenditure equivalent to that of an increase in revenue. Fiscal consolidation over the 2011-13 period has been a key element in the ongoing adjustment process in the Portuguese economy, as it is crucial for sustainable growth in the medium term. In 2013 the primary structural balance will be improved via an increase in revenue, mainly stemming from a rise in the tax burden as proposed in the State Budget for 2013, which will strongly impact on households.

Labour market conditions continued to deteriorate in the course of the first half of 2013, with a substantial fall in employment and an increase in unemployment in year-on-year terms. This accompanied a significant fall in the labour force and a decline in the resident population, particularly across the younger segments, which are better qualified and more mobile. The decrease in employment affected both the self-employed and employees, although it was particularly marked in the case of employees subject to open-ended contracts. 60 percent of the total unemployed are now long-term unemployed, which is in line with a marked decrease in the number of new hirings. The labour market plays a key role in the efficient allocation of human capital and, as such, its smooth functioning and fluidity are a necessary condition for a faster reorganisation of the productive sector and a sustained reduction in unemployment. The marked deterioration in labour market conditions, namely the persistently high unemployment and unemployment duration, has been common to a number of European countries, where the labour market is rather segmented.

In 2013 economic activity in Portugal should contract further. Information for the second quarter of 2013 and indicators available for the third quarter suggest that a gradual process of economic recovery may be starting. Underlying current estimates is a continued increase in the year-on-year rate of change, which should return to positive territory towards the end of the year.

On the supply side, data on gross value added developments in the first half of the year suggests that the fall in economic activity has strongly impacted on sectors geared towards the domestic market, namely construction and some non-tradable services. Developments in sectors geared towards the production of tradable goods and services were mixed. Indeed, while manufacturing activity continues to drop markedly, despite strong exports of goods, the services component associated with tourism has fared very well.

Estimates point to a further contraction in domestic demand in 2013, albeit at a more moderate pace than in 2012. These developments are set against the ongoing fiscal consolidation process, the maintenance of tight credit standards, deteriorating labour market conditions and continued high uncertainty about future economic conditions and the outlook for demand in domestic and external markets. However, information for the first half of the year indicates that the pace of decline has slowed down, and domestic demand is expected to stabilise in the second half of the year, amid a gradual improvement of economic agents' confidence.

The contraction in domestic demand has played a key role in private sector deleveraging. However, the continued fall in corporate investment has raised concerns over economic growth in the future. The renewal of corporate capital stock plays a crucial role in the incorporation of more advanced technologies, which are essential for firms to improve the quality of goods and services produced and make production more efficient. These factors are important to ensure that the Portuguese economy remains competitive and the adjustment of macroeconomic imbalances continues.

Exports have continued to grow strongly in 2013, despite unfavourable developments in external demand for Portuguese goods and services. The maintenance of this dynamic should result in very significant market share gains of Portuguese exports for the third year in a row, which is one of the most positive features in the adjustment process of the Portuguese economy, reflecting how remarkably adaptable Portuguese firms are to current conditions in the markets where they operate. As regards 2013, there was a significant contribution from growth in exports of energy goods, associated with the increase in refining capacity. With regard to the substantial increase in exports of services, mention should be made of the remarkable developments in exports of tourism and related services. The volume of imports should increase somewhat in 2013, given that final demand components that grow more or decline less are the more import-intensive.

The very favourable behaviour of exports, together with a stabilisation in imports in nominal terms, should result in a significant increase in the goods and services account, which will lead to a rise in the Portuguese economy net financing capacity against the rest of the world to around 3 per cent of GDP in 2013. Due to their structural nature, these developments contribute to the sustainability of external indebtedness and are key to restore investors' confidence and, as such, ensuring a return to market financing in the near future.

Inflation is expected to drop below 1 per cent in 2013, after the dissipation of the effects on inflation of tax measures and increases in the prices of some administered goods and services in 2012. The maintenance of low inflationary pressures reflects substantial wage moderation stemming from the recessive environment and labour market conditions. Moreover, lower global demand has also determined a fall in commodity prices and imports of non-energy goods. Underlying such price developments is a widening of aggregate profit margins, which reflects significant changes to the Portuguese corporate structure and plays a crucial role in the rebalancing of corporate sector balance sheets.

In the near future, the Portuguese economy faces the enormous challenge of regaining full access to market financing. In order to complete this stage, Portugal must be able to credibly ensure that adjustment efforts will proceed over the next few years. Several elements should contribute to this. First, the fiscal consolidation strategy must increasingly take into account the need to guarantee sustainable economic growth in the medium run and efficient resource allocation. In this context, it is crucial that measures be taken to streamline public expenditure so as to allow for the gradual, but sustained, reduction in the household and corporate tax burden and to foster sustainable and balanced domestic demand growth, particularly as regards corporate investment.

Second, the programme of structural reforms is central to a more efficient functioning of both goods and services markets and the labour market and a better allocation of resources within the economy. More efficient markets and a lower tax burden will foster innovation and the incorporation of technical progress by firms, as well as investment in education and human capital by households, which are key components to a sustained growth in the Portuguese economy. Under the Programme, structural reforms have already been adopted that should have a positive impact on growth potential in the medium term. Finally, a stable institutional framework must be adopted so as to favour productive investment and ensure the maintenance of a balanced economic growth model in the future.

Although the above-mentioned conditions are imperative to make this process more credible, establishing medium to long-term timely commitments will also be crucial, so as to strengthen consensus around the institutional framework behind Portugal's return to stable market financing in the near future.

1. International Environment

The environment external to the Portuguese economy remained unfavourable in 2013, following a worldwide slowdown in economic activity in 2012. The latest OECD projections point to global economic growth of 3.1 per cent in 2013, unchanged from 2012 (Table 1.1) but well below the levels observed before the international financial crisis.

The disparity in growth patterns across economic regions remained, with the emerging market economies growing much faster than the advanced economies. Based on currently available data, GDP in the advanced economies as a whole is expected to grow 1.2 per cent in 2013. As in the previous year, there was a notable divergence between the United States and Japan, which showed stable though moderate growth, and the euro area, where GDP is projected to contract 0.6 per cent. Emerging and developing economies will continue to play a major role in world economic growth, with GDP expected to grow around 5.5 per cent. However, these economies have slowed down markedly against an international environment characterised by low demand in advanced economies, a drop in commodity prices and growing concerns about financial stability.

Following a slowdown over the past few years, world trade growth increased in 2013, reflecting improved economic conditions worldwide. Projections indicate that the volume of world trade in goods and services will grow 3.6 per cent in 2013 (2.7 per cent in 2012). However, world trade growth remains well below the levels seen before the international financial crisis. Between 1998 and 2007, world trade increased on average by 7.5 per cent annually, and the elasticity of trade to global activity was 1.7. Since the onset of the international financial crisis in 2008, this elasticity has stood close to 1.0. These developments are likely to relate to the weak contribution to growth of demand for higher import-intensive expenditure components, namely investment, inventories and consumption of durable goods, as well as the lower availability of funding for international trade.[1]

Over the past few years, the international environment has been characterised by exceptionally high levels of uncertainty, associated with the sovereign debt crisis in the euro area and a disagreement over the pace of fiscal consolidation in the United States. Several empirical studies have shown that economic and political uncertainty in the United States and Europe has significant effects on other economies, mainly via trade and investment (Chart 1.1).[2] In this context, a number of measures were adopted to help reduce uncertainty, namely the announcement of the OMT (Outright Monetary Transactions) programme by the ECB and the beginning of the establishment of a banking union in the euro area, as well as the postponement of a sudden fiscal consolidation scenario in the United States.

Activity in the euro area remained weak, but there are tentative signs of recovery

Activity in the euro area contracted in the first half of 2013, amid fiscal consolidation efforts, the maintenance of tight credit standards in countries under stress and persistently high uncertainty. Domestic demand continued to contribute negatively to GDP growth, reflecting higher unemployment, weak disposable income growth, high government debt and a fall in real estate prices. OECD projections point to a 3.0 per cent reduction in gross fixed capital formation in the euro area in 2013 (-4.1 per cent in 2012). Net exports contributed marginally to growth in the first half of the year, as a result of a significant fall in imports and a slight contraction in exports.

After six quarters of contraction, euro area GDP returned to growth in the second quarter of 2013. Most leading indicators suggest some moderately positive growth during the second half of the year,

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1 See the ECB Annual Report.

2 See, for instance, Daria Taglioni and Veronika Zavacka, 2012, "Innocent bystanders: How foreign uncertainty shocks harm exporters", *Working Paper No 149*, European Bank for Reconstruction and Development, as well as the IMF report "Multilateral Policy Issues", August 2013.

Table1.1

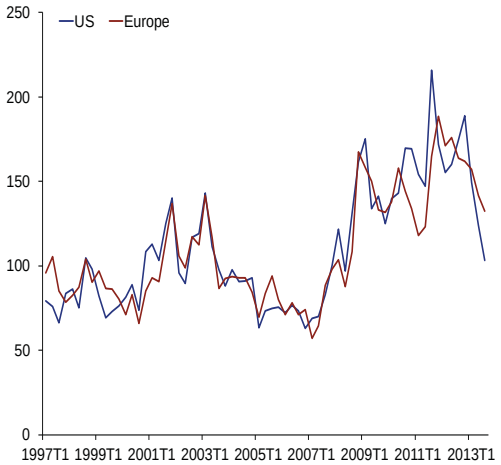
GDP | REAL PERCENTAGE CHANGE

	2010	2011	2012	2013
World Economy	5.0	3.7	3.0	3.1
OECD economies	3.0	1.9	1.4	1.2
United States	2.4	1.8	2.2	1.9
Japan	4.7	-0.6	2.0	1.6
Euro Area	1.9	1.5	-0.5	-0.6
Germany	4.0	3.1	0.9	0.4
France	1.6	1.7	0.0	-0.3
Italy	1.7	0.5	-2.4	-1.8
Spain	-0.3	0.4	-1.4	-1.7
Netherlands	1.6	1.1	-1.0	-0.9
United Kingdom	1.8	1.0	0.3	0.8
Non-OECD economies	8.2	6.3	5.1	5.5
China	10.4	9.3	7.8	7.8
Brazil	7.5	2.7	0.9	2.9

Source: OECD (Economic Outlook nº 93, May 2013).

Chart 1.1

ECONOMIC POLICY UNCERTAINTY INDEX



Source: Economic Policy Uncertainty Project.
Note: The indices are calculated following Baker, Scott, Nicholas Bloom, and Steven J. Davis, 2012, "Measuring Economic Policy Uncertainty" (unpublished). Paper and indices are available at www.policyuncertainty.com

sustained by growing external demand, progressively more favourable financing conditions and added flexibility in meeting fiscal deficit targets in a number of euro area countries. Consumer and corporate confidence has shown signs of gradual recovery (Chart 1.2).

Economic conditions in the euro area continue to differ considerably between countries. As regards Portugal's two main trading partners, Spain should remain in recession, while Germany is expected to continue to grow at a reduced rate.

OECD projections point to a 1.7 per cent contraction in GDP in Spain in 2013 (-1.4 per cent in 2012). Domestic demand will continue to be negatively affected by private sector deleveraging, the maintenance of tight credit standards and fiscal consolidation efforts. In turn, export growth has been robust, particularly to extra-EU markets, with some improvements in competitiveness against a background of wage moderation. Unemployment is expected to increase further, despite its already high levels.

According to the same projections, the German economy should expand by 0.4 per cent in 2013 (0.9 per cent in 2012). This slowdown is mainly due to a deceleration in exports, particularly to the intra-EU market. Prevailing high uncertainty will continue to affect investment, which is expected to contract by 0.3 per cent in 2013 (-1.9 per cent in 2012). In turn, favourable financing conditions, higher wages and low unemployment will continue to support private consumption growth. In this context, imports of goods and services are expected to increase by 1.9 per cent in 2013 (Table 1.2).

A number of large euro area economies, which are major destination markets for Portuguese exports (in particular, France, Italy and the Netherlands), are expected to contract in 2013 (Table 1.1). Imports are expected to decline in the case of France and Italy, while they should increase in the case of the Netherlands (Table 1.2).

In the United States, economic activity is expected to grow 1.9 per cent in 2013, driven by an upturn in private demand, which will more than offset the negative impact of government expenditure cuts earlier this year. US household balance sheet adjustments were sizeable, with the ratio of debt to disposable income standing at its lowest level since 2003 (Chart 1.3). In the same vein, the ratio of financial obli-

Chart 1.2

ECONOMIC SENTIMENT INDICATOR FOR THE EURO AREA

Source: European Commission.

Table 1.2

IMPORTS OF GOODS AND SERVICES | PERCENTAGE CHANGES FROM PREVIOUS YEAR

	2010	2011	2012	2013
Spain	9.2	-0.9	-5.0	-3.7
Germany	12.4	8.0	2.2	1.9
France	8.2	4.7	-0.9	-0.1
Italy	10.3	1.0	-7.8	-1.4
Netherlands	10.2	3.6	3.1	2.4
United States	12.5	4.8	2.4	2.4
United Kingdom	8.0	0.0	2.7	0.5
China	20.6	10.2	6.3	11.6
Brazil	36.0	9.9	0.4	0.7

Source: OECD (Economic Outlook nº 93, May 2013).

gations to household disposable income has declined from more than 18 per cent in 2008 to around 15 per cent in 2013. The marked increase in stock prices and real estate prices has contributed to an increment in household wealth, which, together with more favourable financial conditions and greater confidence levels, has stimulated private consumption and residential investment. Corporate investment has increased considerably, although the strong growth levels seen earlier this year were associated with the expiration of some tax incentives.

After a substantial recovery at the end of 2012, GDP growth in China dropped markedly in the first half of 2013. The main factor behind the weaker growth was the considerable slowdown in domestic demand, particularly investment, stemming from a cooling of the real estate market. The limited response from authorities to a deceleration in the Chinese economy suggests that they have become more tolerant of a lower and more sustainable growth rate, as the economy moves from export-based, capital-intensive growth to a domestic demand-driven growth model.

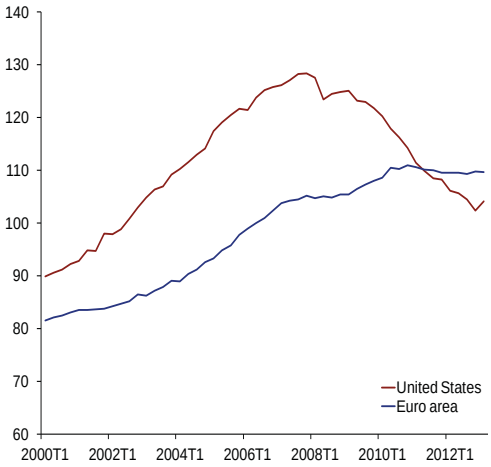
Subdued inflationary pressures, amid a decline in commodity prices

International industrial commodity prices have been decreasing since 2012, reflecting weaker demand from emerging economies. International food commodity prices have also dropped moderately, in view of the growing optimism about harvests from major producers, after an increase in 2012. Oil prices started an upward path in the third quarter of 2013, after a decline during most of the first half of 2013. This was due to lower supply stemming from disruptions in production in a number of major producers, as well as growing geopolitical tensions in Egypt and Syria.

Inflationary pressures remain low, against a background of weak economic growth, low capacity utilisation and high unemployment. On average, inflation in OECD countries as a whole declined in the first half of 2013 (Table 1.3). As regards emerging economies, inflation has been subdued in China, but remains high in India, Brazil and Russia.

Chart 1.3

HOUSEHOLD DEBT | AS A PERCENTAGE OF DISPOSABLE INCOME



Sources: Federal Reserve Board and ECB.

Table 1.3

INFLATION RATE | ANNUAL PERCENTAGE RATE

	2011	2012	2013 Q1	2013 Q2
OECD-Total	2.9	2.3	1.7	1.5
Euro area	2.7	2.5	1.9	1.4
United States	3.2	2.1	1.7	1.4
United Kingdom	4.5	2.8	2.8	2.7
Japan	-0.3	-0.0	-0.6	-0.3
Brazil	6.6	5.4	6.4	6.6
China	5.4	2.6	2.4	2.4
All Commodities				
Non-Energy	34.0	-3.1	-4.9	-5.4
Energy	19.6	-10.4	-1.9	-4.8
Crude Oil	39.0	-0.9	-5.6	-5.6
Petróleo	40.0	0.3	-4.9	-5.2

Sources: OECD (Main Economic Indicators, Volume 2013/8 country data) and HWWI (commodities).

Monetary policy became even more accommodative with recourse to non-standard measures

Since the onset of the financial crisis, major central banks have reduced their key rates to levels close to zero. As a consequence, monetary policy has focused on non-standard measures over the past few years. More recently, against a background of weak economic growth, high unemployment and low inflationary pressure, several central banks have decided to expand their non-standard policies.

The US Federal Reserve and the Bank of England have maintained their key rates at exceptionally low levels, between 0.0 and 0.25 per cent in the United States and 0.5 per cent in the United Kingdom. These central banks have also maintained their asset purchase programmes, aimed at influencing long-term interest rates. The Bank of Japan announced its plan to purchase bonds (including government debt) and double its monetary base, so as to reach 2 per cent inflation up to the end of 2014.

In addition to other standard and non-standard measures, major central banks communicated forward guidance in an attempt to influence market expectations about the future path of monetary policy (see the "Special Issue: *Forward Guidance – communication about the future path of monetary policy*", in this *Bulletin*). At the end of 2012, the Federal Reserve pioneered state-contingent form of forward guidance, specifying explicit thresholds for unemployment and inflation rates, and indicating that the policy rate will remain low until unemployment is above and inflation is below the respective threshold. A very similar approach was adopted in August 2013 by the Bank of England, while the Bank of Japan announced that it will maintain its new policy for as long as it is necessary to reach its inflation rate target.

During the first half of the year, central banks of many emerging economies have also made their monetary policy more accommodative, in response to weak growth projections and pressure for currency appreciation. One exception was Banco do Brasil, which, due to inflationary pressures, increased its key interest rate three times over this period, by a total of 125 basis points.

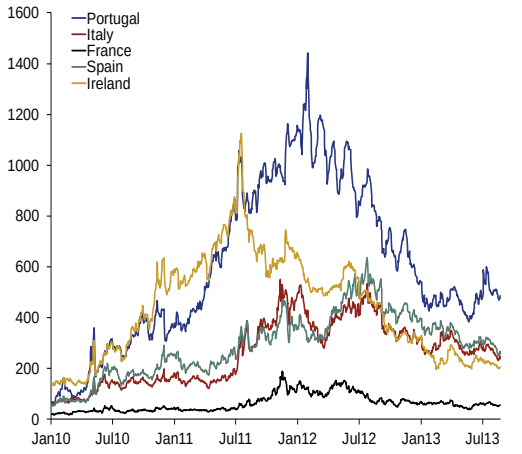
Financial market conditions improved, as a result of additional policy support and lower uncertainty

In the first half of 2013, financial markets continued to benefit from the substantial reduction in uncertainty about economic policies in the United States and Europe, between the end of 2012 and the beginning of 2013. Together with more favourable monetary conditions, these developments led to a drop in the risk aversion of investors, increasing demand for euro area sovereign debt, including from countries under stress.[3] The assessment by the markets improved, leading to a decrease in both default probabilities of euro area countries, implied in the price of credit default swaps,[4] and interest rate spreads vis-à-vis German debt (Chart 1.4). Moreover, the governments of countries under stress managed to issue debt under more favourable conditions. Ireland and Portugal undertook significant securities issuance in international debt markets, which shows that their ability to raise funds in the market has improved (Chart 1.5).

Lower uncertainty and the accommodative monetary policy also had an impact on stock markets, which posted gains in the first months of the year, despite negative news that indicated a prolonged weakness in most advanced economies (Chart 1.6). Political uncertainty surrounding Italian elections earlier this year and the banking crisis in Cyprus also had a relatively limited impact. Volatility in major stock markets remained subdued (Chart 1.7). However, at the end of the first half of the year, the main stock market indices fell and volatility increased, reflecting growing concerns among investors about a reversal of monetary policy in the US.[5] Yields on long-term government bonds increased, especially those of the US Treasury. The sovereign bond yields of euro area countries were also affected and spreads vis-à-vis

Chart 1.4

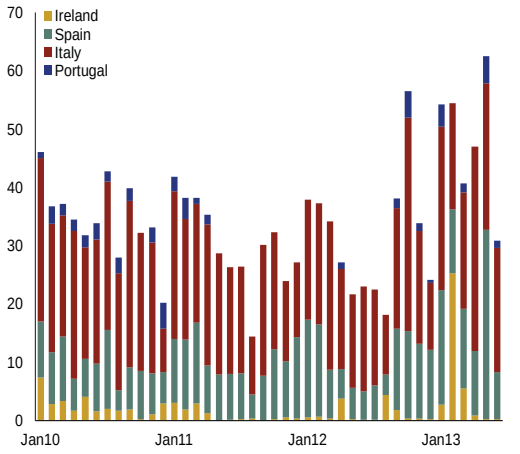
SELECTED EURO AREA 10-YEAR SOVEREIGN BOND YIELD SPREADS OVER GERMANY | BASIS POINT



Source: ECB.
Note: The rates used to compute the spreads are secondary market yields of government bonds with a remaining maturity close to ten years.

Chart 1.5

DEBT ISSUANCE | BILLION EURO



Source: ECB
Note: Gross debt issuance of euro-denominated securities with original maturity of one year or more by central government.

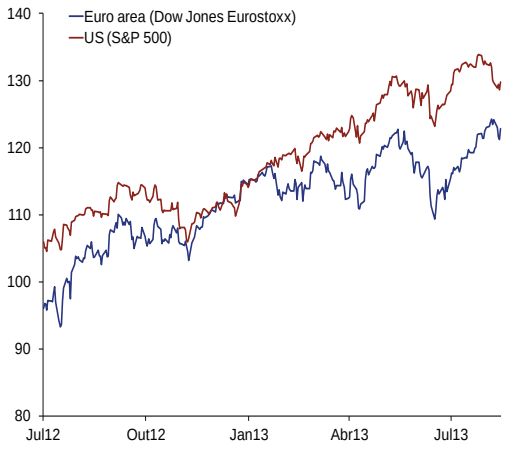
3 Germany, France, the Netherlands, Finland, Austria and Belgium are considered to be high-rated countries. Spain, Italy, Portugal, Ireland and Greece are deemed countries under stress.

4 A credit default swap (CDS) is a derivative financial instrument used to control exposure to credit risk over a given period of time. In a typical agreement, the seller of a CDS agreement repays the buyer in the event of default in the credit transaction underlying the contract.

5 In their recent study, "The Ins and Outs of LSAPs", Arvind Krishnamurthy and Annette Vissing-Jorgensen argue that excess volatility in asset prices may be prevented and policy effectiveness may be improved if central banks clearly communicate the conditions under which large scale asset purchases will commence or be unwound.

Chart 1.6

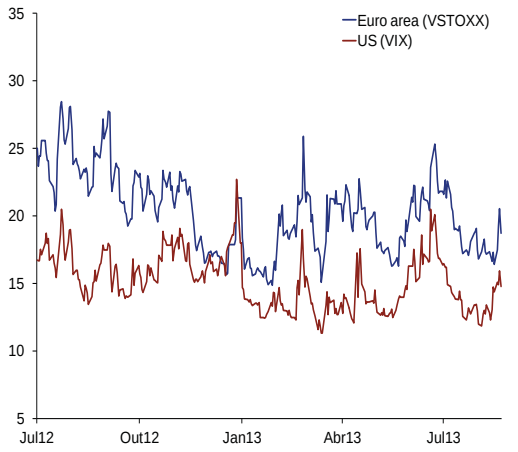
STOCK MARKET INDICES | JANUARY 2012 = 100



Source: Bloomberg.

Chart 1.7

IMPLIED STOCK MARKET VOLATILITY | PER CENT



Source: Bloomberg.

German bonds widened. The spreads continued to increase up until the ECB meeting in July, when the Governing Council announced forward guidance on its key rates. Emerging economies with substantial current account deficits, such as India, Brazil, South Africa and Turkey were also affected in a particularly significant manner by speculation on changes to Federal Reserve policies. In these countries, asset prices dropped markedly and their currencies depreciated as capital flows reversed to safer assets.

Fiscal policy in the euro area remained tight in 2013

Fiscal policy in the euro area remained tight in 2013, and a structural adjustment of 0.8 per cent of GDP is expected (1.4 per cent of GDP in 2012). In several euro area countries, fiscal deficits have already been reduced significantly over the past few years. Fiscal deficit in the euro area as a whole is expected to decline to 2.9 per cent of GDP in 2013, after peaking at 6.4 per cent in 2009 (Table 1.4). At the same time, euro area debt-to-GDP ratio is expected to increase to 95.5 per cent of GDP in 2013, as a result of both higher interest expenditure and weak nominal GDP growth.

Several euro countries have failed to meet their medium-term structural balance targets, and are not expected to do so before 2016, while further fiscal adjustments are still needed. In June, the EU Council extended the deadline for the correction of their fiscal deficits by two years for Spain and France, and by one year for the Netherlands and Portugal. The Treaty on Stability, Coordination and Governance in the Economic and Monetary Union (known as "fiscal compact") entered into force in the beginning of 2013, compelling euro area Member States to implement measures geared towards reaching a structural deficit of up to 0.5 per cent of GDP (for more details on the Treaty, see "Box 3.2: Developments in the budgetary surveillance mechanism of the European Union", in *Annual Report 2011*).

Table 1.4

GOVERNMENT DEFICITS | IN PERCENT OF GDP					
	2009	2010	2011	2012	2013
Euro area	-6.4	-6.2	-4.1	-3.7	-2.9
Belgium	-5.6	-3.9	-3.9	-4.0	-3.1
Germany	-3.1	-4.1	-0.8	0.2	-0.2
Ireland	-13.9	-30.9	-13.3	-7.5	-7.1
Spain	-11.2	-9.7	-9.4	-10.6	-6.5
France	-7.6	-7.1	-5.3	-4.9	-4.0
Italy	-5.4	-4.3	-3.7	-2.9	-2.7
Netherlands	-5.6	-5.0	-4.4	-4.0	-3.6
Austria	-4.1	-4.5	-2.4	-2.5	-2.2
Portugal	-10.2	-9.9	-4.4	-6.4	-5.5
Finland	-2.7	-2.8	-1.1	-2.3	-2.2

Source: European Commission.

2. ECB Monetary Policy and Economic and Financial Conditions in the Portuguese Economy

2.1. ECB monetary policy

In 2013 euro area inflation declined steadily from the high levels seen in 2012. The year-on-year growth in the Harmonised Index of Consumer Prices (HICP) stood, on average, at around 1.6 per cent in the first three quarters of the year (2.5 per cent in 2012). This decline in inflation chiefly reflected a deceleration in energy and food prices during the first months of the year and, to a lesser extent, the impact on prices of the prolonged weakness in economic activity. Moreover, the appreciation of the euro in effective terms has mitigated external inflationary pressures. According to the Governing Council of the ECB, underlying price pressures in the euro area should remain low in the medium term and inflation expectations are expected to remain firmly anchored at levels consistent with the definition of price stability.

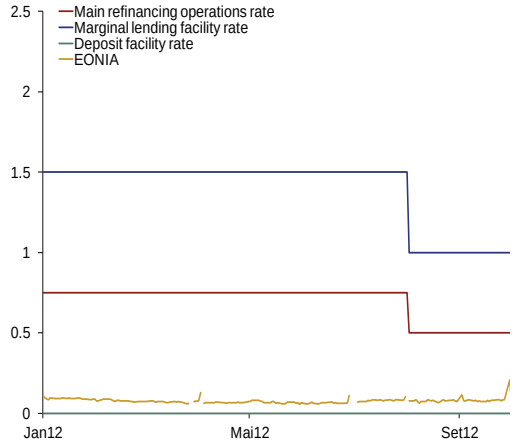
The monetary policy stance in the euro area remains accommodative, against a background of price stability

The monetary policy stance in the euro area remained accommodative in 2013, in an environment characterised by low and well-anchored inflation expectations, weak economic activity growth and the continued fragmentation in euro area financial markets. In its May meeting, the Governing Council lowered the interest rate on main refinancing operations by 25 basis points to 0.5 per cent and the rate on the marginal lending facility by 50 basis points to 1.0 per cent. The interest rate on the deposit facility remained unchanged at 0 per cent (Chart 2.1.1). Moreover, the Governing Council decided to continue conducting its main refinancing operations as fixed rate tender procedures with full allotment for as long as necessary, and at least until July 2014.

Although the Governing Council has stated its intention to maintain its key rate at the current levels for as long as necessary, money market developments have shown that expectations about the monetary policy stance continued to be vulnerable to shocks not associated with underlying economic and monetary conditions in the euro area. More specifically, in the period between May and July, money market rates followed a persistent upward path, partly reflecting expectations of a cut in liquidity by the US Federal Reserve. As a consequence, the effects of the cut in interest rates in May were partially

Chart 2.1.1

ECB INTEREST RATES AND THE OVERNIGHT INTEREST RATE



Source: ECB

annulled. These developments highlighted the need for transparent communication about the course of monetary policy, conditional on the outlook for price stability. Subsequently, in its July meeting, the Governing Council adopted a form of forward guidance, announcing that ECB key interest rates would remain at or below their current levels, for an extended period of time (see the "Special Issue: *Forward Guidance – communication about the future path of monetary policy*", in this *Bulletin*).

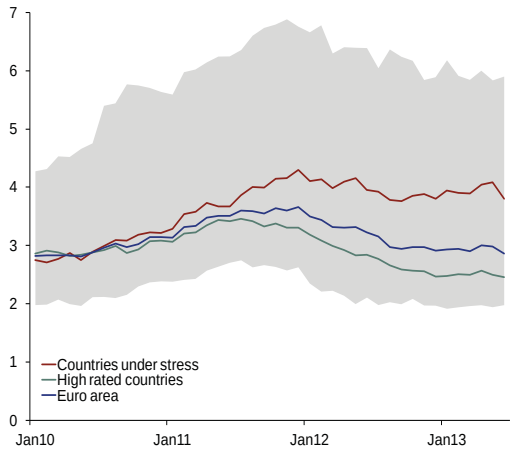
Financial market fragmentation continues to weaken monetary policy transmission

The transmission of ECB interest rate changes to lending rates on loans to households and non-financial corporations was diverse. Financial market fragmentation seen since the onset of the crisis continues to weaken monetary policy transmission across the various euro area countries. In particular, although financing conditions have become less dispersed over the past year, there are still significant disparities between high-rated countries and countries under stress. Substantial differences remain as regards interest rates on bank loans and corporate financing costs, as they are far higher in countries under stress than in the high-rated countries (Chart 2.1.2). This divergence reflects not only higher financing costs and weaker balance sheets in terms of banks, but also higher risk premia for firms in countries under stress.

According to the Bank Lending Survey, credit standards have tightened on an aggregate level, particularly as regards SMEs in countries under stress. Data released by the ECB[1] indicate that loan rejection rates are also higher for such firms, which suggests that interest rate spreads across euro area countries are, to some extent, a consequence of the tighter credit supply in the countries under stress. At the same time, demand for credit tends to be lower in these countries due to economic activity developments and the need to reduce the high debt levels. The combined effect of such factors has meant that growth rates in credit to the private sector continued to diverge between high-rated countries and countries under stress (Chart 2.1.3). In the euro area as a whole, growth of lending to the non-financial private sector has remained negative, largely reflecting a fall in loans to non-financial corporations. In high-rated countries, bank lending to the private non-financial sector increased, in particular in terms of loans to households, while in countries under stress loans to households and non-financial corporations conti-

Chart 2.1.2

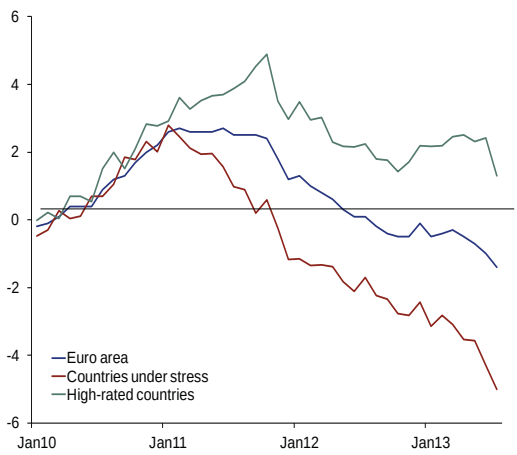
INTEREST RATES ON NEW EURO DOMINATED LOANS TO THE PRIVATE SECTOR | PER CENT



Sources: ECB and Banco de Portugal calculations.
Note: The grey area shows the dispersion of interest rates across the euro area.

Chart 2.1.3

BANK LOANS TO THE PRIVATE SECTOR | ANNUAL PERCENTAGE CHANGE, PER CENT



Sources: ECB and Banco de Portugal calculations.

1 See "*Survey on the Access of SMEs in the Euro Area*", http://www.ecb.europa.eu/stats/money/surveys/sme/html/index.en.html

nued to decline. According to the latest Bank Lending Survey results, the main factors behind the weak credit to non-financial corporations are, on the supply side, credit risk and macroeconomic uncertainty and, on the demand side, low fixed investment and the ensuing reduction in the sector's borrowing requirements. At the same time, loans to households have improved somewhat, with credit standards for home loans tightening slightly less than in previous quarters, while credit standards for consumer loans have eased, albeit only slightly, for the first time since 2007. On the demand side, net decreases in demand for housing loans and consumer loans recorded their smallest contraction since 2010.

2.2. Monetary and financial conditions in the Portuguese economy

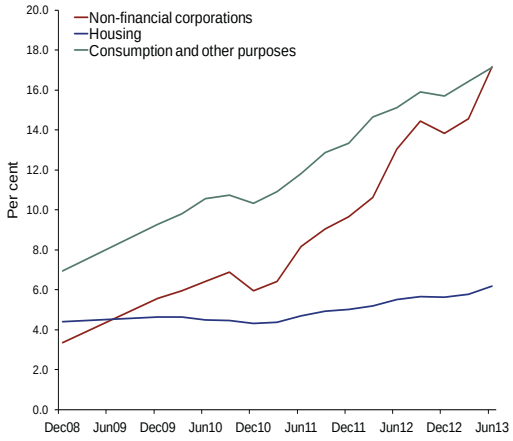
2013 has seen a slight improvement in financing conditions, which, however, remain tight. The decline in banks' financing costs and their improved liquidity position resulted in a relative stabilisation of credit standards and a slight narrowing of spreads. In turn, the prolonged recession of the Portuguese economy, amid the still high aggregate indebteness of non-financial corporations, continued to contribute to an increase in the materialisation of credit risk (Chart 2.2.1), with an impact on bank profitability. Uncertainty about the resolution of the sovereign debt crisis in the euro area continued to contribute to high uncertainty and risk aversion in the Portuguese economy. In fact, despite the substantial decrease in risk premia associated with Portuguese issuers since mid-2012, access to medium to long term market financing by the State and banks under sustainable price conditions remains substantially limited, having deteriorated in recent months.

Significant decline in the country risk premium up to May 2013, followed by a more recent increase

A distinction can be made between two periods in 2013 as regards developments in risk premia associated with domestic issuers (Chart 2.2.2). The beginning of the year was characterised by a relative

Chart 2.2.1

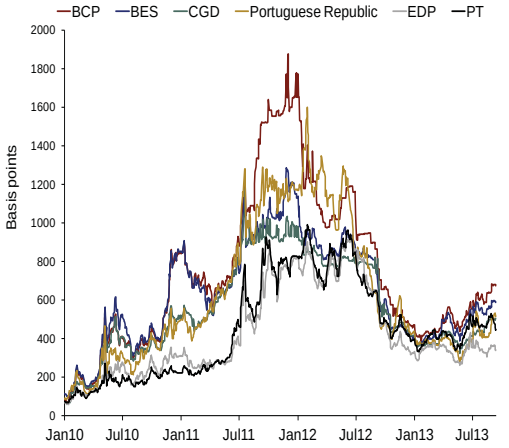
NON-PERFORMING LOANS RATIO



Source: Banco de Portugal
Notes: The non-performing loans ratio encloses there elements, the amount owed on credit with instalments of capital or interest overdue for a period of 90 days or more, the overdue amount of restructured credit with certain characteristics not included in the preceding item and, lastly, the amount of credit with instalments of capital or interest overdue for a period of 90 days or more, but in relation to which there is evidence which justifies its classification as non-performing credit, namely a debtor's bankruptcy or liquidation.

Chart 2.2.2

CREDIT DEFAULT SWAP SPREADS OF PORTUGUESE ISSUERS (5 YEARS SENIOR UNSECURED)



Source: Thomson Reuters
Note: Last observation: 12th September 2013

stabilisation of perceived country risk, followed by a decrease in risk premium as measured by the CDS spreads on Portuguese government debt and a relative risk differentiation across Portuguese issuers. As of end-May, when the US Federal Reserve announced that its asset purchase programme would be tapered, the premium associated with most European issuers increased. In the case of Portugal, this evolutionwas exacerbated by the high uncertainty stemming from institutional tensions, with an ensuing increase in differentiation across issuers. This deterioration was reflected in a higher average weighted interest rate on recent Treasury bill tenders.

Banks continued to adjust their balance sheets by reducing foreign assets and the portfolio of loans to residents, while maintaining a robust capital position

In 2013 Portuguese banks continued to adjust the size and composition of their balance sheets. Since the beginning of the programme, total assets of resident banks recorded a cumulative decline of approximately 14 per cent. This resulted inter alia from a reduction by 11 per cent in credit to the resident non-monetary sector and a decline in foreign assets by 30 per cent. The stability of customers' resources over this period and capitalisation operations conducted by the main Portuguese banks in 2011 and 2012 contributed to strengthening the banking system's solvency and helped banks to reach a more sustainable funding structure. In 2013 borrowing from the Eurosystem increased slightly. As of end-August it accounted for around 12 per cent of resident banks' total assets.

Reduction in banks financing costs, amid tight market access conditions

Portuguese banks' financing costs decreased across most available instruments. The decline in the interest rate on ECB's main refinancing operations to 0.5 per cent and the maintenance of money market interest rates at historically low levels resulted in a reduction of the average implicit interest rate on interbank liabilities (resources from central banks and other credit institutions). Interest rates on new deposits continued to fall, contributing to a drop in financing costs. In any case, the average cost of the stock of deposits continues to be influenced by longer-maturity operations conducted between mid-2011 and mid-2012 at high rates (Chart 2.2.3). In the same direction, contingent capital instruments associated with the government support to the capitalisation of some domestic banks has entailed substantial costs. Finally, despite debt issuances by some banks at the end of 2012 and the beginning of 2013, access to wholesale debt markets continues to be considerable restricted.

Financing conditions of the non-financial private sector have slightly improved

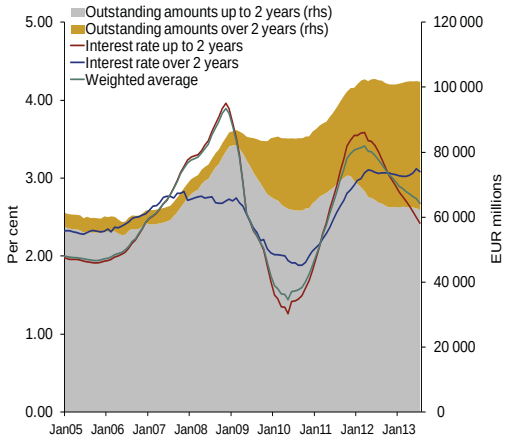
In the course of 2013, interest rates on new loans to the non-financial private sector maintained a slightly downward trend (Charts 2.2.4a and 2.2.4b), reflecting a reduction in loan spreads, in a context of a slight reduction in banks' financing costs and improved liquidity position. Interest rates fell more markedly for new loans to non-financial corporations, whose differential vis-à-vis the 3-month Euribor dropped by around 70 basis points from a peak between August and October 2012. These developments are in line with results for Portugal from the Bank Lending Survey, which point to a slight decrease in spreads applied to average-risk loans, particularly as regards loans or credit lines to SMEs.

Within the euro area, Portugal's relative position as regards the interest rate on new loans varies depending on the purpose of the loan. While in loans to households for house purchase the interest rate is relatively close to the average of the other euro area countries, in loans to households for consumption and other purposes and loans to non-financial corporations significant positive differentials are observed.

Indeed, despite the above-mentioned decrease in spreads, the interest rate on loans to non-financial corporations remains high, against the backdrop of the already referred impairment in the monetary policy transmission mechanism in the euro area and high perceived risk by banks (Chart 2.2.5). In

Chart 2.2.3

HOUSEHOLDS' DEPOSITS | INTEREST RATES AND AMOUNTS



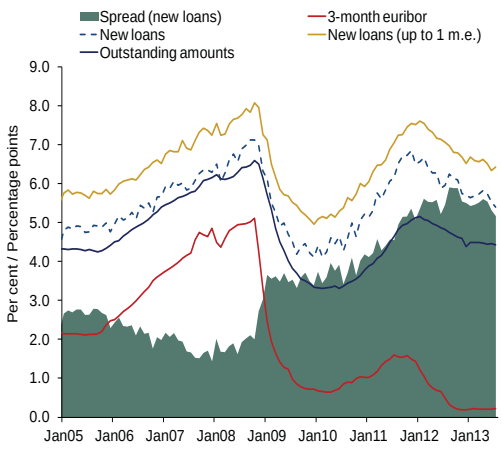
Source: Banco de Portugal
Note: Last observation: July 2013.

July, the spread vis-à-vis the interest rate on outstanding amounts in high-rated countries amounted to approximately 150 basis points (Chart 2.2.6). Nevertheless, it should be mentioned that banks' net interest margin has been at particularly low levels.

Interest rates on new loans to non-financial corporations point to slightly decrease in the dispersion of rates settled over the first half of 2013, compared with those of the second half of 2012. This decline has reflected a stronger reduction in higher interest rates and there is no evidence that the decrease in spreads is associated with a shortening in the maturities of these operations.

Chart 2.2.4 a

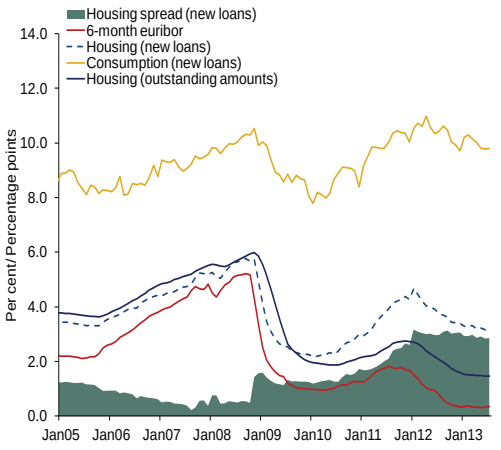
INTERESTS RATES ON BANK LOANS TO NON-FINANCIAL CORPORATIONS



Source: Banco de Portugal
Note: Last observation: July 2013.

Chart 2.2.4 b

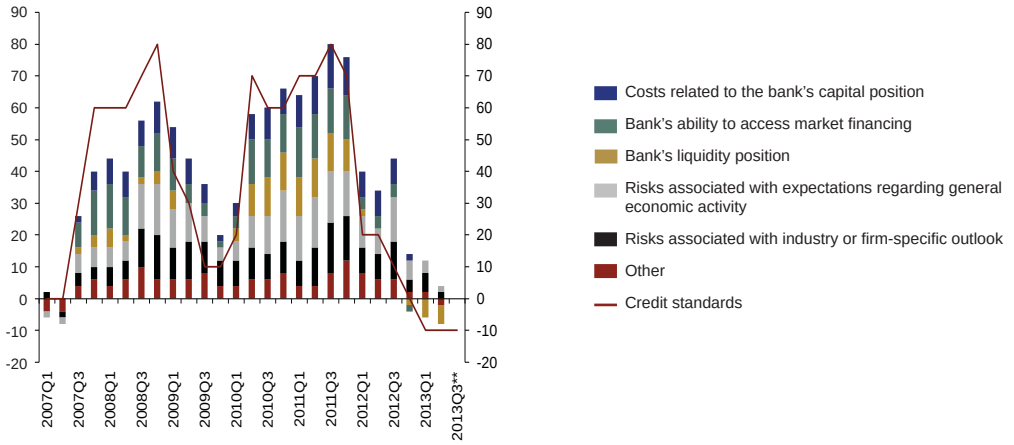
INTERESTS RATES ON BANK LOANS TO HOUSEHOLDS



Source: Banco de Portugal
Note: Last observation: July 2013.

Chart 2.2.5

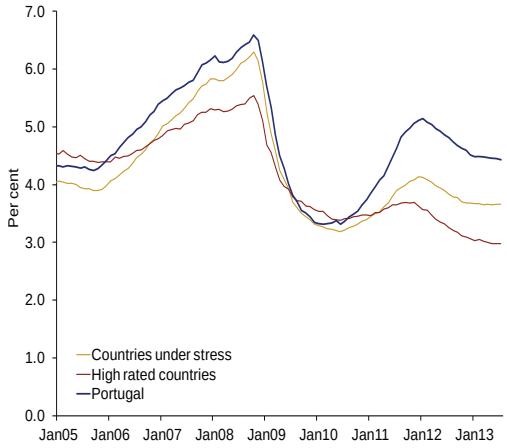
DEVELOPMENTS IN CREDIT STANDARDS APPLIED TO LOANS TO NON-FINANCIAL CORPORATIONS AND THE CONTRIBUTIONS OF THE UNDERLYING FACTORS



Source: Banco de Portugal – Bank Lending Survey
Notes: The red line corresponds to the diffusion index that aggregates the responses of the surveyed banks to the question "Over the past three months, how have the following factors affected your bank's credit standards as applied to the approval of loans or credit lines to enterprises?". The diffusion index takes values between -100 and 100, and, in matters relating to the supply, values below 0 indicate less restrictive criteria and values greater than 0 indicate more restrictive criteria. The series in column represent the contribution of the different factors included in the survey that typically influence the credit standards. In this case, values below 0 indicate that the factor contributed towards less restrictive criteria and values greater than 0 indicate that the factor contributed towards criteria more restrictive criteria. ** The value for the third quarter of 2013 represents the expectation formulated by the banks surveyed in late June.

Chart 2.2.6

INTEREST RATES ON OUTSTANDING BANK LOANS TO NON-FINANCIAL CORPORATIONS IN THE EURO AREA



Sources: ECB and Banco de Portugal
Note: Last observation: July 2013.

A faster decline in risk premia associated with interest rates would entail improvements in perceived aggregate macroeconomic risk, as well as a reduction in banks' financing costs. Such factors seem to have been behind the upward trend evidenced by risk premia over the past two years.[2]

Decrease in total credit to the non-financial private sector

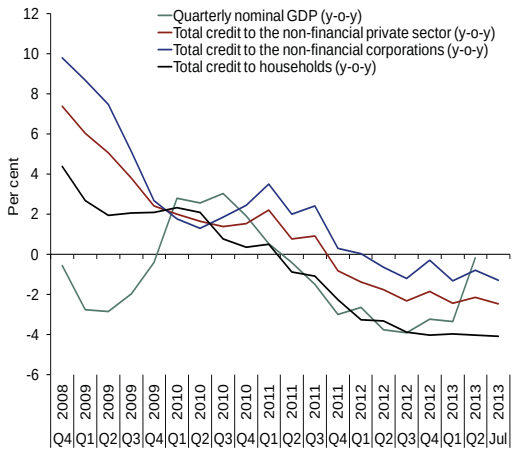
Total credit[3] granted to the non-financial private sector continued to decline in the course of 2013, although there was a relative stabilisation of the annual rate of change (-2.5 per cent in July) (Chart 2.2.7). The fall in credit to the private sector continues to be more marked in the case of households. The annual rates of change in loans for house purchase and for consumption and other purposes stabilised around -4 and -6 per cent respectively in the course of 2013. In the case of non-financial corporations, the decline in total credit was more subdued (-1.3 per cent in July), with a relative stabilisation in its pace of decline over 2013. At the same time, developments in total credit to private non-financial corporations, which continued to decline, continue to diverge from those in total credit to state-owned enterprises (non-consolidating in the general government),[4] which increased further in 2013. In particular, loans granted by resident banks to state-owned enterprises increased significantly, which offset the fall in financing granted by non-residents to such entities.

Developments in total credit continued to be broadly in line with adjustments in the economy although exhibiting an high degree of heterogeneity

Total credit to large private firms that are internationally active and/or are part of international groups continued to grow. These firms have found sources of financing beyond bank credit, namely by turning

Chart 2.2.7

CREDIT TO THE NON-FINANCIAL PRIVATE SECTOR AND NOMINAL GDP



Source: Banco de Portugal
Note: Total credit includes loans granted by financial institutions, debt securities and trade credits, regardless of the residence of the entity that granted the credit. It also includes loans from households and Treasury loans, in the case of state-owned enterprises non-consolidating in the General Government.

2 For more details, see Antunes A. and Martinho R. , (2012), "Access to credit by non-financial firms", Banco de Portugal, *Financial Stability Report – May 2012*.

3 Total credit includes loans granted by financial institutions, debt securities and trade credits, regardless of where the lender is based. It also includes household loans and Treasury loans, in the case of state-owned enterprises non-consolidating in the general government.

4 According to the definition of institutional sector used in financial national accounts and monetary and financial statistics, state-owned enterprises non–consolidating in the general government are part of the non-financial private sector.

to financing through debt securities issuance. The role of non-residents in this type of financing has become increasingly important.

Credit granted to the non-financial corporations remains highly heterogeneous, in terms of both size and activity sector. This is broadly in line with structural adjustments in the economy (Table 2.2.1). Indeed, credit was more directed towards the most dynamic economic sectors and less reliant on domestic demand, such as manufacturing and mining and quarrying, particularly towards exporting firms. Conversely, the contraction in credit has been particularly marked in the construction and real estate sectors, which are facing a permanent decline in demand.

As regards total credit by size of non-financial corporations, credit to small enterprises, which typically depend on bank credit, continues to decline. Neverthelss, the corresponding year-on-year rates of change have been stable throughout 2013. Against a background of financial fragmentation in the euro area and high perceived risk by banks, these developments should be partially conditioned by supply side restrictions in the credit market.

Table 2.2.1

CREDIT TO NON-FINANCIAL CORPORATIONS BY ACTIVITY SECTOR AND FIRM SIZE | ANNUAL RATE OF CHANGE

	Total credit			Weight of each sector in total credit to NFC	Bank credit			Weight of bank credit in total credit, by sector
	2011	2012	2013		2011	2012	2013	
	Dec.	Dec.	Jul.	(Dec. 2012)	Dec.	Dec.	Jul.	(Dec. 2012)
Total	0.3	-0.3	-1.3	100.0	-2.6	-6.2	-5.6	54.0
Total excluding construction and real estate	1.1	1.4	0.5	75.5	-1.8	-5.9	-3.3	50.2
Activity sector								
Manufacturing	-2.4	-1.2	3.8	10.9	-3.1	-7.8	-4.1	66.4
Electricity, gas, water and related	5.6	6.5	-4.4	9.0	5.3	-4.5	-13.3	32.9
Construction	-2.5	-6.8	-8.6	13.8	-3.9	-8.7	-8.6	68.9
Trade	-1.2	-5.0	-4.2	10.9	-6.0	-10.6	-7.3	57.3
Transportation and storage	8.5	2.6	10.9	8.9	5.2	7.5	20.4	48.2
Accommodation and food service activities	4.8	-3.1	-4.4	3.5	9.4	-4.0	-3.1	68.1
Information and communication	-25.8	24.7	7.6	2.8	-23.5	-8.6	-11.0	24.4
Non-financial holdings	5.3	5.4	3.2	18.2	-6.2	-6.1	-5.7	42.6
Real estate activities	-2.0	-3.8	-4.9	10.7	-5.4	-3.9	-4.8	62.0
Consulting and administrative activities	7.3	-5.0	-2.4	6.4	4.5	-14.2	-9.0	50.6
Education, human health, and other social services	-7.0	-1.8	-2.6	3.0	-4.2	-4.4	-3.1	65.6
Other	-27.0	0.5	-3.6	1.7	3.6	4.0	-4.3	60.3
Size								
Micro	-3.4	-4.3	-4.3	26.2	-3.8	-10.0	-6.6	56.0
Small	-1.3	-6.6	-6.4	14.7	-4.5	-9.8	-8.1	71.9
Medium	-5.6	-2.3	-4.0	17.0	-2.4	-4.3	-5.5	67.2
Large	5.1	4.3	3.9	23.8	3.0	-0.2	1.6	39.7
Non-financial holdings	5.3	5.2	3.0	18.2	-5.3	-6.6	-6.0	42.5

Source: Banco de Portugal.
Notes: Bank credit encompasses all credit granted by resident banks, which includes, in addition to loans (adjusted for securitisations), debt securities and commercial paper held by banks. There is no information on trade credit by firm size and activity sector.

3. Fiscal Policy and Situation

In 2013 the general government deficit is expected to decline in line with the official target and public debt will most likely continue to increase.

Following the seventh review of the Programme, the general government deficit target for 2013, on a national accounts basis, was set at 5.5 per cent of GDP. This figure was recently confirmed in the September Excessive Deficit Procedure (EDP) notification and its achievement requires a year-on-year deficit reduction of 0.9 p.p. of GDP. According to the estimates reported under the EDP, the public debt ratio will increase to 127.8 per cent at the end of the year (124.1 per cent at the end of 2012).[1]

Fiscal policy in 2013 continued to tighten, resulting in a structural consolidation of around 8 p.p. of GDP in the 2011-2013 period.

Fiscal developments in 2013 have been influenced by policy measures adopted in the State Budget for 2013 (SB2013). Among these policy measures it should be highlighted the increase in personal income taxation through changes in the tax brackets, the establishment of a surcharge, the increase in withholding taxation on capital revenue and the reduction in tax and personal benefits. There was also an increase in corporate income taxation and the contributory base for public employees in the *Caixa Geral de Aposentações* pension scheme was broadened to include all remunerations. The most important public spending reduction measures focus on social transfers and compensation of employees. The estimated impact of these measures on public accounts is clearly lower than that of measures on the revenue side. In this regard, it is worth highlighting the Constitutional Court's ruling at the beginning of April that determined the reversal of the partial suspension of the Christmas/summer bonuses, taking effect from the start of the year.[2]

In May a Supplementary Budget was presented to the Parliament accommodating the new fiscal deficit target, in a context marked by a downward revision of the macroeconomic environment and the above mentioned Constitutional Court decision. The main policy measures included in this document are cuts across several spending items, further savings on public-private partnership contracts and the rescheduling of EU funds. The measures contained in the public expenditure review programme with an impact on 2013 were also considered.

According to current Banco de Portugal estimates, the cyclical component should contribute by around ¾ p.p. of GDP to the deficit deterioration in 2013.[3] Based on the information available, the change in the impact of temporary measures and special factors[4] should be almost nil and interest expenditure as a percentage of GDP should also remain virtually unchanged. Thus the structural primary balance is expected to improve by around 1.5 p.p. of GDP, which puts the structural consolidation at around 8 p.p. of GDP in the 2011-2013 period (Chart 3.1).

Regarding the composition of the fiscal adjustment, and following the measures outlined above, the 2013 consolidation should result exclusively from the revenue side, as structural primary expenditure is

1 According to the Ministry of Finance, public debt net of central government deposits should reach 119.4 per cent of GDP at the end of 2013 (114.0 per cent at the end of 2012).

2 Ruling 187/2013 of 5 April 2013. This ruling also declared unconstitutional the new social security contributions on unemployment and sickness benefits as designed in the SB2013.

3 The cyclical component of the fiscal balance is calculated using the methodology adopted in the Eurosystem.

4 In 2013, the only effect considered was the reclassification of the *Banif* capital injection as a non-financial operation, which took place in the first quarter of the year and had an impact of 0.4 per cent of GDP.

expected to increase as a ratio to trend GDP (Chart 3.2).[5] It should be noted that in 2012 the suspension of the Christmas and summer bonuses increased the expenditure contribution to the fiscal adjustment (by around 2 per cent of GDP) but will have the opposite effect this year. Over the 2011-2013 period, the cumulative contribution of revenue and spending to structural consolidation is estimated to be approximately equal.

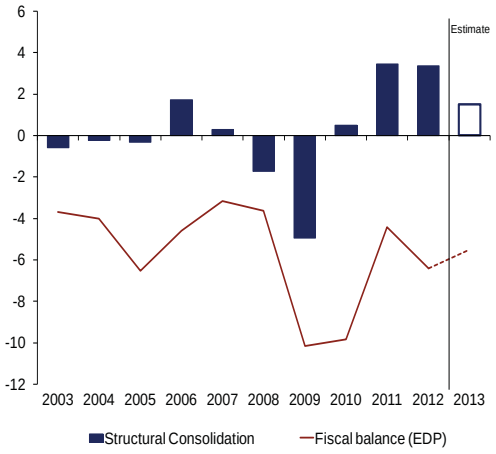
The fiscal deficit in the first half of 2013 reached 7.1 per cent of GDP, with increases in total expenditure and, more importantly, in total revenue.

According to the Quarterly National Accounts, the general government deficit reached 7.1 per cent of GDP in the first half of 2013 (Table 3.1). This result was influenced by the reclassification of the *Banif* capital injection as a non-financial operation, which took place in the first quarter of the year. Correcting for this effect, the deficit in the first half would have amounted to 6.2 per cent of GDP, which is compatible with achieving the official target for the year as a whole. It is important to note that the deficit for the third quarter is usually benefited by the specific seasonality of public accounts, an effect that should more than offset the impact on wages and salaries from the reinstatement of a bonus that will take place at the end of the year. In local and regional government, most of this reinstatement already took place in the second quarter of the year.

Total general government revenue grew 3.1 per cent in the first half of 2013. Regarding tax revenue, there was a significant increase in revenue from taxes on income and wealth, which stood above the estimated growth for the year as a whole. In the case of personal income taxation, revenues have been affected by the measures adopted under the SB2013, and although decelerating in the second half of the year, revenues should continue to grow very sharply. Regarding corporate income taxation, the increase

Chart 3.1

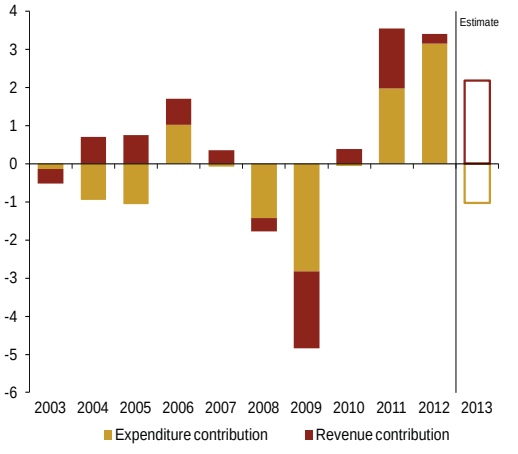
FISCAL BALANCE AND STRUCTURAL CONSOLIDATION | AS A PERCENTAGE OF GDP



Sources: *INE*, *Ministério das Finanças* and Banco de Portugal.
Note: The structural consolidation is measured as the change in the structural primary balance, also excluding the effect of special factors, as a percentage of GDP.

Chart 3.2

THE COMPOSITION OF STRUCTURAL CONSOLIDATION | PERCENTAGE POINTS OF TREND GDP



Sources: *INE*, *Ministério das Finanças* and Banco de Portugal.
Note: Expenditure contribution is the symetrical of the change in structural primary expenditure as a percentage of trend GDP while the revenue contribution is the change in total structural revenue as a percentage of trend GDP .

5 Note that the contributions of revenue and spending are based on the annual structural changes of revenue and primary spending as a percentage of trend GDP. The results arising from this approach, usually named "top-down" in the literature, necessarily differ from those obtained from summing the expected impact of the various measures adopted "bottom-up". Further detail and empirical application of the "bottom-up" approach to tax revenues is available in Pereira, M. and Wemans, L. "The macroeconomic effects of legislated tax changes in Portugal", in this Bulletin and Princen, S. *et al.* (2013), "Discretionary tax measures: pattern and impact on tax elasticities", *Economic Papers 499*, European Economy, European Commission.

Table 3.1

GENERAL GOVERNMENT ACCOUNTS: EXECUTION IN THE FIRST HALF OF THE YEAR AND FORECAST FOR THE YEAR AS A WHOLE | AS A PERCENTAGE OF GDP

	2012		2013		Year-on-year rate of change (%)	
	First half	Year	First half	Year (a)	First half	Year
Total revenue	38.6	40.9	40.5	43.0	3.1	5.4
Current revenue	37.4	39.4	39.8	41.7	4.5	6.1
Taxes on income and wealth	8.1	9.2	10.3	10.8	24.6	16.7
Taxes on production and imports	13.1	13.6	12.6	13.4	-5.4	-1.8
Social contributions	11.4	11.6	11.7	12.0	0.4	3.5
Other current revenue	4.7	4.9	5.2	5.6	7.5	14.3
Capital revenue	1.2	1.5	0.7	1.3	-40.2	-13.4
Total expenditure	46.3	47.4	47.6	48.5	0.9	2.7
Current expenditure	43.2	44.4	45.2	46.4	2.7	4.5
Social payments	21.5	22.5	22.8	23.3	4.2	3.8
Compensation of employees	10.1	10.0	10.5	10.5	2.2	4.8
Intermediate consumption	4.1	4.5	4.3	4.5	3.2	0.8
Subsidies	0.5	0.6	0.5	0.7	3.5	15.6
Interest	4.4	4.3	4.4	4.5	-0.5	4.6
Other current expenditure	2.7	2.6	2.7	2.9	-2.6	13.4
Capital expenditure	3.1	2.9	2.4	2.2	-25.1	-25.7
Gross fixed capital formation	1.5	1.7	1.1	1.9	-30.8	14.5
Other capital expenditure	1.6	1.3	1.3	0.3	-19.6	-79.0
Overall balance (EDP)	-7.8	-6.4	-7.1	-5.5	-	-
Memo: Primary expenditure	*41.9*	*43.0*	*43.2*	*44.0*	*1.0*	*2.5*

Sources: *INE* and *Ministério das Finanças*.
Note: (a) 2013 Suplementary State Budget.

n tax collection arising from the self assessment of the previous year income was much higher than the expected growth rate for the year as a whole. The opposite is observed for revenues from taxes in production and imports. Indeed, in the relevant period for the compilation of the first semester outturn on national accounts, most of these taxes performed unfavourably against the 2013 Supplementary Budget forecast. Both the significant growth in other current revenue, related with an increase in dividends, interests and transfers from the European Social Fund, and the strong fall of capital revenue, partially due to temporary effects affecting the budgetary outcome of the first semester of 2012, are noteworthy.[6]

Total general government expenditure grew 0.9 per cent in the first half of the year (1.0 per cent in the case of primary expenditure). Given the processing of the Christmas and summer bonuses in 2013, total spending on pensions should decelerate in the second half of the year, while the opposite is expected for compensation of employees. Regarding other primary expenditure, the breakdown by item does not yet rely on full accounting information (particularly for the local government). Even so, intermediate consumption growth is noteworthy, in contrast with the sharp fall in investment.

Maintaining the fiscal consolidation pace is crucial to ensure debt sustainability and full access to sovereign debt markets.

In order to meet the current deficit targets set under the Programme (4.0 and 2.5 per cent of GDP in 2014 and 2015, respectively) the fiscal adjustment effort must continue. At this point, this effort should focus on the programme of public expenditure reduction, which should contribute to the improvement of effectiveness/efficiency in the public sector. However, its implementation carries certain risks and should have a negative short term effect on economic activity.

6 Particularly the transfer of the *BPN* pension fund to the general government sector and part of the effect of the third Exceptional Regime of Tax Settlement (*RERT III*).

4. Supply

Strong contraction of economic activity in the first half of 2013, less intense in the second quarter

In the first half of 2013, gross value added (GVA) at basic prices declined by 2.2 per cent year-on-year. The year-on-year rate of change of GVA became less negative from the first to the second quarter of 2013. This quarterly behaviour of activity is consistent with the evolution of the coincident indicator of Banco de Portugal and of the economic sentiment indicator of the European Commission (Chart 4.1). The confidence indicators for the main sectors of activity also showed an upward trend throughout the year, remaining however at low levels, in terms of the past evolution of these indicators.

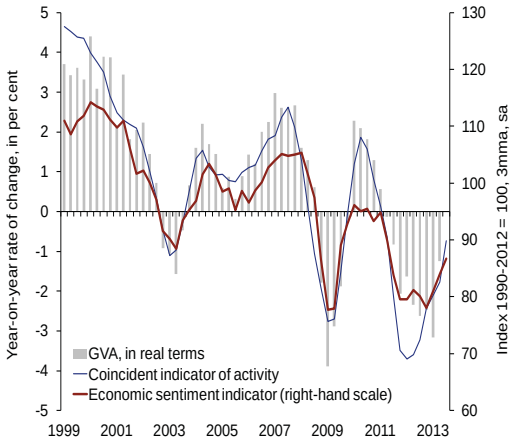
The evolution of activity at the sectoral level reflects the recomposition due to the process of correcting the economic imbalances accumulated over the last decades and that has led to a sharp decline of domestic demand. The construction sector presented again a very sharp fall of GVA in the first half of 2013 (19.2 per cent year-on-year). The trend of reduction of activity in this sector in recent years should reflect, namely, the structural adjustment of housing stock levels, after the strong investment in construction made in the nineties.

In the manufacturing industry, there was a year-on-year reduction of GVA of 2.5 percent in the first half of 2013, a decline similar to that seen in the whole of last year. The activity in this sector showed a very marked quarterly upward profile in the first semester, in line with the intra-annual evolution of global demand and accentuated by the calendar effect of Easter switching quarter. Furthermore, the rate of utilization of productive capacity in the manufacturing industry remained at historically low levels.

The GVA in the services sector fell by 1.3 percent year-on-year in the first semester, a decline similar to that observed in 2012 as a whole. The "trade and repair of motor vehicles and hotels and restaurants" sector stabilised in the first half of the year, after a reduction of 1.3 per cent in 2012. This evolution combines a sharp contraction of the expenditures of residents, as observed in 2012, with a significant growth of spending by non-residents, reflecting the increase in tourism exports.

Chart 4.1

GVA, COINCIDENT INDICATOR OF ACTIVITY AND ECONOMIC SENTIMENT INDICATOR



Sources: European Commission, *INE* and Banco de Portugal.
Note: The values of the qualitative indicators in the third quarter of 2013 refer to the average of the results of July and August 2013.

Further deterioration of the situation in the labour market

The evolution of the labour market in the first half of 2013 maintains the main features observed in the most recent period: reduction of the labour force, strong decline of employment, significant growth of unemployment and increase of long-term unemployment (Table 4.1). However, the deterioration of the situation in the labour market was less intense in the second quarter. Thus, the unemployment rate was 16.4 per cent in the second quarter of 2013, which represents a decrease from the value observed in the first quarter (17.7 percent) higher than the usual seasonal effect.

In the first semester of 2013 as whole, there was an intensification of the decline of the total population and of the labour force observed throughout 2012. The 2.0 per cent year-on-year decline of the labour force in the first half of the year is very significant in historical terms. In particular, there was a sharp reduction of the labour force in the age group up to 35 years, which should be linked with the recent dynamic of migration flows. The emigration of young individuals, typically with above-average human capital, is an adverse feature of the current adjustment process of the Portuguese economy and an important factor limiting the growth potential.

According to data of the Labour Force Survey of Statistics Portugal (*INE*), total employment declined by 4.4 per cent year-on-year in the first half of 2013, after a reduction of 4.2 per cent in 2012 as a whole. The year-on-year reduction of employment was lower in the second quarter in comparison to the first quarter (3.9 and 4.9 per cent, respectively). The evolution of employment in the first semester of this year reflected a decrease of both the number of employees and self-employment. The strongest contribution to the decline of the number of employees resulted from the reduction of the number of permanent contracts, as opposed to that observed in the whole of 2012 in which the contributions of fixed-term and permanent contracts were similar.

The total number of unemployed increased by 11.7 per cent year-on-year in the first semester of 2013, following a growth of 21.8 percent in the previous year. The growth of unemployment in the second quarter was much lower than in the first quarter (7.1 and 16.2 per cent year-on-year, respectively). The unemployment rate reached 17.1 per cent in the first half of the year, a level higher than in 2012. The

Table 4.1

POPULATION, EMPLOYMENT AND UNEMPLOYMENT | YEAR-ON-YEAR RATE OF CHANGE, IN PER CENT, UNLESS OTHERWISE STATED

	Year	Semesters		
	2012	2012H1	2012H2	2013H1
Population	-0.4	-0.4	-0.5	-0.9
Labour force	-0.9	-1.1	-0.6	-2.0
Labour force 15-34 years	-4.7	-4.0	-5.4	-6.5
Participation rate 15-64 years (in % of population)	73.9	74.0	73.9	73.4
Total employment	-4.2	-4.2	-4.2	-4.4
Employees	-4.9	-4.5	-5.3	-4.4
Permanent contract	-3.0	-2.1	-3.9	-5.6
Fixed-term contract	-12.6	-13.5	-11.7	-0.9
Self-employment	-1.7	-3.1	-0.1	-4.2
Total unemployment	21.8	20.7	22.8	11.7
Unemployment rate (in % of labour force)	15.7	15.0	16.3	17.1
Unemployment rate 15-34 years (in % of labour force)	22.9	21.7	24.1	24.6
Long-term unemployment (in % of total unemployment)	54.2	52.2	56.0	60.3
Discouraged inactives (in % of labour force)	4.2	3.8	4.6	4.9

Source: *INE*.
Notes: Long-term unemployment includes the unemployed workers that have been actively seeking work for 12 months or more. The discouraged inactives include the inactive individuals who were available for work but had not looked for a job during the period.

unemployment rate of the younger age groups continued to be much higher than average, with the unemployment rate of individuals aged between 15 and 34 years increasing to almost 25 per cent in the first semester.

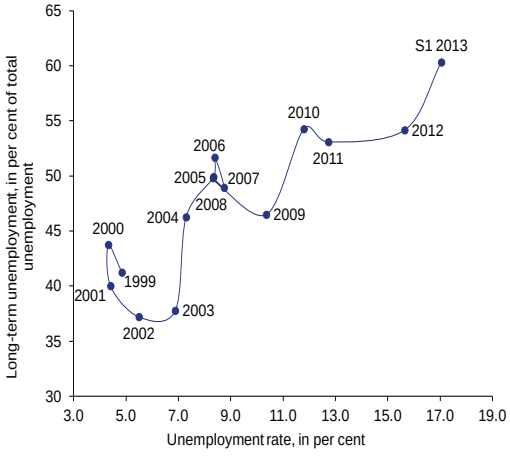
Long-term unemployment continued to increase in the first half of 2013, representing more than 60 per cent of total unemployment (Chart 4.2). Additionally, very long-term unemployment (lasting more than 25 months) continued to grow at high rates, representing more than 35 per cent of the unemployed in the first semester of 2013. On the contrary, the number of individuals seeking work for less than 12 months declined by 7.3 per cent year-on-year in this period.

The sharp rise in long-term unemployment is one of the most worrying elements of the recent evolution of the Portuguese labour market, being one of the consequences of the segmentation of this market.[1] Aside from the social stigma associated with long periods of unemployment, a sharp increase in the duration of unemployment leads to additional difficulties in terms of employability. The longer the duration of unemployment, the greater the likelihood that there is a mismatch of the professional skills of the unemployed in relation to the available job vacancies. This depreciation of human capital is especially relevant in a population with a low average educational level and in the context of the ongoing restructuring of the Portuguese economy.

A strong increase in the duration of unemployment also implies a higher wage penalty in the return to employment, not only due to the depreciation of the professional skills of the unemployed but also because reservation wages tend to decrease with the duration of unemployment.[2] The reduction of reservation wages is typically more pronounced at the end of concession period of the unemployment benefits and for the unemployed with lower income levels, whose liquidity constraints are especially active. In this sense, the system of unemployment benefits should allow the worker to finance the period of seeking a new job, maintaining the incentives to this search.

Chart 4.2

UNEMPLOYMENT RATE AND LONG-TERM UNEMPLOYMENT



Sources: *INE* and Banco de Portugal.
Notes: Long-term unemployment includes the unemployed workers that have been actively seeking work for 12 months or more. The Portuguese unemployment rate was corrected for the break in the series recorded in 2011. Data for 2013 refer to the first half of the year.

1 See Centeno, M. and Novo, A., (2012), "Segmentation", Banco de Portugal, *Economic Bulletin - Spring*.

2 See Carneiro, A. and Portugal, P., (2006), "Earnings Losses of Displaced Workers: Evidence from a Matched Employer-Employee Data Set", Banco de Portugal, *Working Paper 14* and Centeno, M. and Novo, A., (2008), "The Gains of Unemployment Insurance to Job Match Quality in the Portuguese Labour Market", Banco de Portugal, *Economic Bulletin - Winter*.

In addition to the large increase in unemployment, the available information also points to a strong growth of the number of discouraged individuals (individuals not actively seeking a job but available for work), which is an additional indicator of the worsening of the conditions in the labour market.[3] In the first half of 2013, these marginally inactive individuals, whose degree of attachment to the labour market is equivalent to the unemployed, represented 4.9 per cent of the labour force.

The analysis of quarterly transitions between the different states of the labour market reveals a job creation with a high incidence of non-permanent contracts, which is another symptom of the segmentation of the Portuguese labour market. In the first semester of 2013, the outflows from unemployment into situations of permanent contracts accounted for only 14.8 percent of the total number of transitions from unemployment to employment.

The limitation of the number of job offers, justified mainly by the reduction of the hiring and rotation rates of workers in Portuguese firms[4], has led to adjustments with important consequences on the wage distribution. According to the information available on nominal wages at the worker-firm level, there was an increase of the incidence of negative and zero wage changes since 2011, the latter associated essentially with the freezing of the minimum wage (see "Box 4.1: *Recent wage developments in Portugal*", in this Bulletin).

In a context of declining employment and activity, the year-on-year rate of change of the apparent labour productivity was again positive in the first half of 2013. These productivity gains should reflect, among other factors, the closure of uncompetitive firms and the exit of workers with lower levels of productivity. In fact, the trend of destruction of jobs with lower marginal productivity in the recessive phases of the cycle leads to a composition effect that will increase, *ceteris paribus*, the average productivity of workers.

3 See Centeno, M. and Fernandes, P. A., (2004), "Labour Market Heterogeneity: Distinguishing between Unemployment and Inactivity", Banco de Portugal, *Economic Bulletin - March*.

4 See "Special issue: *Hiring, rotation and job creation*", Banco de Portugal, *Economic Bulletin - Summer 2013*.

BOX 4.1 | RECENT WAGE DEVELOPMENTS IN PORTUGAL

Changes to the level and composition of employment go hand-in-hand with changes in the wage distribution during an adjustment process in the labour market. In Portugal, that process has resulted in a continuous decline in employment, a sharp increase in unemployment and a moderation in wages compatible with the deterioration of economic conditions. For companies, this adjustment has also led to a fall in worker turnover compared with the period before the crisis, due mainly to a sharp decline in the number of hirings.[1]

A wage adjustment in response to negative demand shocks may arise from the rotation of workers and/or the reduction in the wages of those workers remaining in the company in two consecutive periods. For these workers, the fall in wages may arise either from a lower number of hours worked (and overtime payments), or in a reduction in permanent or non-permanent components.

Initially, companies tend to freeze wages and maintain employment, reducing hirings and separations. Later, companies facing a persistent fall in demand tend to reduce labour costs by cutting wages, reducing employment and replacing workers on higher salaries with those on lower wages.[2]

Companies are dynamic entities, which adjust their wage structures to the economic conditions. These conditions vary from sector to sector, within sectors from company to company, and also at each point in time. Chart 1 presents the variations in total monthly wages between 2003 and 2012, based on wages declared to Social Security in the month of October of each year for workers that remained employed in the same firm. The chart shows the heterogeneity of the adjustments. Each year features negative, null and positive wage variations.

In the latest period, 2011 and 2012, the fraction of workers with negative wages variations increased, reaching 22.2 and 23.0 per cent respectively.[3] This increase is significant in so far as nominal reductions in wages can have a negative impact on productivity (there is extensive microeconomic, as well as macroeconomic, literature on this topic, *e.g.* Harris and Holmstrom, 1982 and Bewley and Truman, 1999[4]). In addition to these nominal reductions, there were also null nominal variations that affected a high number of workers employed by the same employer in two consecutive years, of 28.4 and 31.9 per cent in 2011 and 2012 respectively.

A decomposition of the wage variations in 2011 and 2012 shows that 15.4 per cent of workers had null variations in the two years and 39.4 per cent had at least a negative variation. Of the workers that remained employed by the same entity and whose wages remained constant in 2012, 18.6 per cent received the minimum wage.

Labour costs are also adjusted through worker rotation. For companies which had worker rotation (simultaneous hirings and separations), the average wages of workers entering in 2012 were lower, by around 110 euro or 11 per cent, than those of the workers whose contracts ceased in 2011. This rotation involved 776,000 workers, a considerable contribution to subdue labour costs.

The adjustment process in the 1980s was based on real wage flexibility in a context of high inflation. By contrast, in the low-inflation regime in the euro area, nominal flexibility dominates the current adjustment phase, demonstrating the adjustment capacity of private sector workers and companies. This flexibility arises not only from nominal adjustment of the wages of workers remaining in the company, but also from the impact of worker turnover on the wages.

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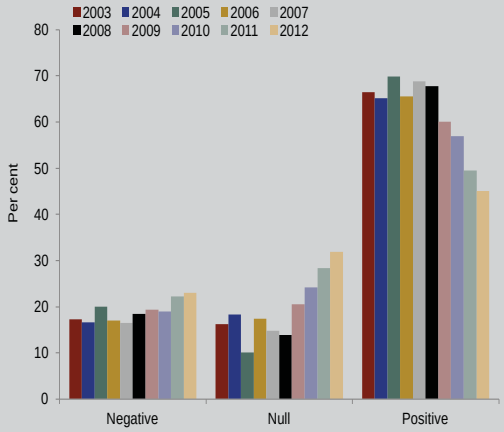
1 See "Special Issue: *Hiring, rotation and job creation*", Banco de Portugal, *Economic Bulletin - Summer 2013*.
2 See Bewley, Truman F., (1999), "Why wages don't fall during a recession.", *Harvard University Press*.
3 These reductions extend to the basic wage. For example, in 2012, they reached 15.9 per cent of the workers
4 M. Harris and B. Holmstrom, (1982), "A theory of wage dynamics", *Review of Economic Studies*, 315-33.

Chart 1

HISTOGRAM OF WAGE CHANGES | TOTAL WAGE



Sources: Social Security data and Banco de Portugal's calculations.

5. Demand

According to current estimates, economic activity is likely to decline by 1.6 per cent in 2013, *i.e.* more moderately than in 2012 (Table 5.1). Cumulatively, GDP is estimated to fall by 6.0 per cent between 2011 and 2013. The contraction of economic activity in Portugal in 2013 will be more pronounced than anticipated for the euro area. The macroeconomic projections released by the ECB in the September issue of the Monthly Bulletin show a growth differential between Portugal and the euro area of -1.2 percentage points (p.p.) (-2.6 p.p. in 2012). Hence, the process of real divergence between Portugal and the euro area average will continue, with a widening of the cumulative negative differential as of the start of the monetary union to over 10 per cent.

The current estimate for the annual rate of change in GDP in 2013 points to a 0.4 p.p. upward revision compared with the projection published in the Summer issue of the Economic Bulletin, reflecting the impact of stronger than anticipated developments in private consumption and exports in the second quarter of 2013.

Easing in the contraction of activity in the course of 2013

Current estimates point to a 1.6 per cent contraction of GDP in 2013. The smaller fall in economic activity in 2013 against the previous year reflects a gradually smaller contraction of domestic demand and the maintenance of a favourable performance of exports. These developments include a significant rise in the economic activity level in the second quarter against the previous quarter, following a fall in activity over 10 consecutive quarters. In the second half of the year the economic activity level is estimated to increase slightly, to which the recovery of household and corporate confidence is expected to contribute.

According to the Quarterly National Accounts released by *INE*, GDP fell by 4.1 and 2.1 per cent in the first and second quarters of the year respectively compared with the same period a year earlier.[1] The slight rise in economic activity in the second half of the year implies an upward trend of the year-on-year rate of change over the year, which should be positive in the last quarter.

Table 5.1

GDP AND MAIN EXPENDITURE COMPONENTS | CHAINED-VOLUME MEASURES, PERCENTAGE CHANGES

	Weights	EB Autumn 2013			EB Summer 2013	
	2012	2011	2012	2013(e)	2012	2013(p)
GDP at market prices	100.0	-1.3	-3.2	-1.6	-3.2	-2.0
Private consumption	64.0	-3.3	-5.4	-2.2	-5.6	-3.4
Public consumption	20.3	-5.1	-4.8	-2.0	-4.4	-2.1
Gross fixed capital formation	16.0	-10.5	-14.3	-8.4	-14.5	-8.9
Domestic demand	100.8	-5.1	-6.6	-3.0	-6.7	-4.4
Exports	37.2	6.9	3.2	5.8	3.2	4.7
Imports	38.0	-5.3	-6.6	2.0	-6.7	-1.7
Contributions to yearly growth of real GDP (p.p.)[(a)]						
Domestic demand		-5.6	-6.9	-3.1	-7.0	-4.4
of which: Change in inventories		-0.2	0.2	0.1	0.2	-0.3
Net exports		4.4	3.7	1.4	3.8	2.4
Memo:						
Euro area GDP at market prices		1.6	-0.6	-0.4		
Cumulative GDP growth differential between Portugal and the euro area (1999 = 0)		-7.1	-9.6	-10.7		

Sources: ECB, Eurostat, *INE* and Banco de Portugal.
Notes: **(e)** Estimate. **(p)** Projection. **(a)** Contributions may not sum to total due to chain-linking and rounding.

1 This may have been affected by calendar effects related to Easter, which in 2013 was in the first quarter, whereas in 2012 it had been in the second. These effects seem to have had a negative impact on year-on-year growth in the first quarter, which was particularly marked in external trade flows and reversed in the second quarter.

Continuing adjustment of private consumption, in a context of reduction of disposable income and deterioration of labour market conditions

Private consumption is likely to decline by 2.2 per cent in 2013, after a 5.4 per cent drop in 2012, with an estimated cumulative reduction of around 11 per cent in the 2011-2013 period. The decline in private consumption reflects a considerable reduction of real disposable income, which reflects the impact of fiscal consolidation measures, namely at the level of direct taxes, as well as a decline in labour income, in the context of a sharp decline in employment and maintenance of wage moderation.

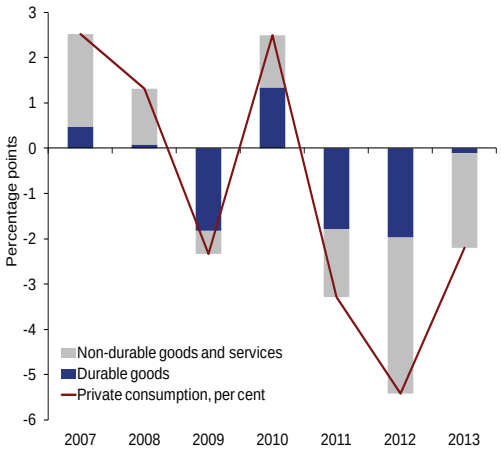
The reduction of consumption levels started in 2011 reflects a need for domestic demand to be adjusted to levels that are compatible with the resident agents' production and income. Consumption and saving decisions are associated with the reduction of disposable income, perceived as permanent, with a need for an orderly and gradual reduction of household indebtedness levels and the prevalence of strict financing conditions. In the most recent period there was a reversal of the trend of consumer credit, associated with private consumption growth in the period prior to the financial crisis. This translated into a decline in the household indebtedness level. The maintenance of a high degree of uncertainty about future income levels and the evolution of the economic situation seems to have induced significant changes in consumer behaviour and led to a rise in the savings rate, namely for precautionary reasons. In 2013 the savings rate is expected to remain above the average level observed in the pre-financial crisis period.

The adjustment of household consumption translated into a marked fall in the consumption of durables, which recorded a cumulative drop of about 37 per cent in the 2011-2013 period. In 2013 the reduction of this component is likely to be considerably less marked than observed in 2012 (Chart 5.1). There was in particular a 5.8 per cent year-on-year rise in passenger car sales from January to August 2013 (after a cumulative fall of about 57 per cent in the 2011-2012 period). However, the sales of this type of vehicle estimated for 2013 stand significantly below the average values observed in the past few decades.

The adjustment of household expenditure has also implied a reduction in the consumption of non-durables and services, likely to continue in 2013, albeit less sharply than in 2012. The lower level of current consumption is essentially observed in the non-food component, while the food component is estimated to have remained virtually stable since 2010, reflecting a lower elasticity of expenditure on food to income developments.

Chart 5.1

REAL PRIVATE CONSUMPTION



Sources: *INE* and Banco de Portugal calculations.

Reduction of the volume of public consumption for the third consecutive year

The continuation of the fiscal consolidation process should imply a 2.0 per cent reduction of public consumption in 2013.[2] Should this materialise, it will be the third consecutive year of decline in the volume of public consumption, corresponding to a cumulative reduction of 11.5 per cent in the 2011-2013 period. These developments in real terms appear to have been broadly based across staff costs and expenditure on the acquisition of goods and services. In the current context the decline in general government consumer spending has an inevitable recessionary impact in the short term. However, the fiscal consolidation process is a key component of the Portuguese economy's adjustment process, which is urgent and instrumental to ensure public debt sustainability and future access to market funding.

Investment declines in 2013, although less sharply than in 2012

Gross fixed capital formation (GFCF) is expected to decline by 8.4 per cent in 2013, following a 14.3 per cent drop in 2012. GFCF contraction in 2013 reflects developments in private GFCF. By type of investment, estimates for 2013 point to a relative stabilisation of GFCF in machinery and equipment and transport equipment, and a significant fall in GFCF in construction. The contribution of changes in inventories to the annual average growth rate of GDP in 2013 should be marginally positive.

The current estimate points to a slight increase in public investment, according to the data released in the Amending Budget for 2013, after a rather sharp decline in this expenditure component in the two previous years (around 53 per cent in real terms). Residential investment is likely to decline further, and the fall in 2013 will be more pronounced than in 2012. The downward trend of residential investment is part of a gradual adjustment of the Portuguese housing stock, after a considerable rise seen in the 1990s, and was reinforced in the current environment by a need to reduce household indebtedness levels, a prevailing high uncertainty as to future income and the maintenance of tight financing conditions.

Corporate GFCF is estimated to decline further in 2013, albeit at a more moderate pace than recorded in 2012. Corporate GFCF has been declining consecutively in the 2011-2013 period, with a cumulative fall of approximately 23 per cent in this period. The continued reduction of corporate GFCF is a cause for concern, given the key role played by investment in the incorporation of technological innovation, with an impact at the level of productivity and the economy's potential growth. This notwithstanding, developments in investment in machinery and equipment and transport equipment show some positive signs compared with the two previous years.

Data from the Investment Survey released by *INE* in July also show a lower contraction of corporate GFCF in nominal terms in 2013. With the exception of construction, whose GFCF in 2013 showed a stronger contraction than in 2012, all other economic activities seem to be contributing to this slowdown, especially manufacturing, transportation and storage and administrative and support service activities. In manufacturing it is worth mentioning the positive developments in the manufacture of coke and refined petroleum products, largely associated with the expansion of installed production capacity.

The postponement of investment decisions is probably due to a strong decline in domestic demand, the relative stabilisation of external demand, a need to pursue corporate deleveraging and the low level of capacity utilisation, as well as the uncertainty about demand prospects. According to the Investment Survey, the share of enterprises claiming to be limited investment-wise rose further, reaching around 62 per cent in 2013 (around 60 per cent in 2012), with a simultaneous decline in the share of enterprises that have invested or have the intention to do so. Among the enterprises which are experiencing investment constraints, the deterioration of sales prospects continues to be their main constraint (63.7

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2 The current breakdown of nominal public consumption between volume effect and deflator does not take into account a possible impact of an increase in the normal working time of general government employees from 35 to 40 weekly hours (envisaged in Law No 68/2013 of 29 August, which entered into force on 28 September).

per cent), and played a more relevant role in 2013 (Chart 5.2). The share of enterprises claiming that their main constraint is difficulties in obtaining bank credit is low, having declined from 2012. Among exporting enterprises as a whole, the share that identifies investment constraints is slightly higher than average (about 66 per cent), but only approximately 37 per cent of enterprises with constraints mention the deterioration of sales prospects as their main investment constraint.

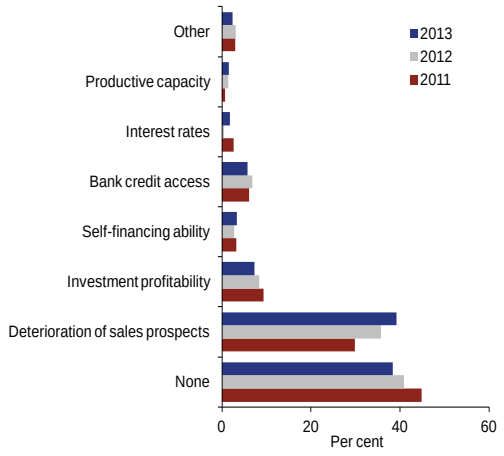
Considerable rise in exports accompanied by strong market share gains

Exports of goods and services are likely to continue to be remarkably buoyant in 2013, growing by 5.8 per cent, accounting for a 2.6 p.p. acceleration *vis-à-vis* 2012. Portuguese exports have shown a better performance than most euro area countries in the most recent period. These developments in exports contrast with the relative stabilisation of external demand for Portuguese goods and services, similarly to 2012, in a context of slowdown in activity in emerging market economies and a slight recession in the euro area. The current estimate implies a considerable gain in market share in 2013, reinforcing gains recorded in 2011 and 2012 (Chart 5.3). Ongoing gains in external market shares are one of the most positive aspects of the Portuguese economy's adjustment process, reflecting a remarkable degree of adaptability of Portuguese enterprises to current market conditions. The weight of exports in GDP is expected to increase again in 2013, to stand at approximately 40 per cent.

Against the current backdrop of structural adjustment, marked by a strong reduction of domestic demand, export growth reflects non-price competitiveness gains associated with an increased effort by Portuguese enterprises in the tradable goods and services sectors to search for new markets. With regard to price competitiveness, since early 2012 relative unit labour costs for the total economy stand at levels lower than those observed at the start of participation in the euro area, after a real cumulative appreciation of around 8 per cent up to 2009. In turn, the search for new markets has fostered diversification of the destinations of Portuguese exports, with a reinforcement of the relative importance of extra-EU markets whose economies have been relatively more buoyant.

Chart 5.2

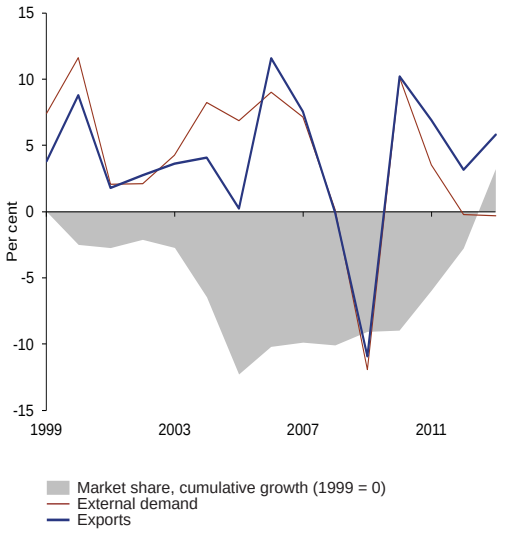
MAIN OBSTACLE TO INVESTMENT



Source: *INE*.
Note: Second estimate for each period (current year in July release).

Chart 5.3

PORTUGUESE EXPORTS AND EXTERNAL DEMAND | VOLUME ANNUAL RATE OF CHANGE



Sources: ECB, ONS, *INE* and Banco de Portugal calculations.
Note: External demand excluding the impact of VAT missing trader intra-community (MTIC) fraud.

The *IES* database (*Informação Empresarial Simplificada*) for 2010-2012 makes it possible to analyse sales growth in the domestic and foreign markets and hence evaluate market diversification dynamics at corporate level. This information suggests that enterprises with higher growth in the foreign market are also those with higher growth in the domestic market. In addition, individual data from international trade statistics show that the dynamics of goods exports relies essentially on the growth of enterprises that remain in the market for two consecutive years.[3] These structural features reflect a greater efficiency and average size of exporting enterprises, which simplifies redirecting their activity to the most dynamic margins of domestic or foreign markets.

Current estimates suggest that the acceleration of exports will be broadly based across the goods and services components. With regard to goods exports, energy exports increased rather significantly, reinforced by an increase in installed refining capacity. This increase accounts for quite a significant contribution to export growth in 2013, also echoing on the developments of the aggregate market share. Similarly, non-energy goods exports should rise further in 2013, albeit decelerating slightly from 2012.

Tourism exports in 2013 are expected to grow more than in 2012 (9.1 and 5.9 per cent respectively), largely associated with an increase in the number of tourists from within the EU, notably the United Kingdom, Germany and France. Although they accounted for less than 20 per cent of the total, non-EU tourist overnight stays have been growing quite significantly, contributing to the geographical diversification of the origin of tourists in Portugal seen in the past few years. According to the most recent data released by the World Tourism Organization (UNWTO), tourist arrivals at southern and Mediterranean European countries increased considerably in the first half of 2013. Such growth was sharper than in other typical competitor destinations, such as northern African countries.

Exports of other services are also likely to rise by around 7 per cent in 2013 (2.0 per cent fall in 2012). This rise in exports seems to be associated with tourism-related activities, namely transport and communication services, and with the entry into new markets of enterprises from the construction sector or those that provide technical and professional services.

Increase in imports in 2013, against a background of fall in global demand

In 2013 the volume of imports of goods and services is likely to rise by 2.0 per cent, after a 6.6 per cent fall in 2012. Although global demand is expected to decline by 0.6 per cent in 2013, demand components with a more positive evolution are precisely those that have higher import content, notably durable consumer goods, investment in machinery and transport equipment and goods exports, especially energy. In this context, the goods import volume will increase, after a drop in 2012, while imports of tourism and other services will decline, albeit less sharply than in the previous year. The slight increase in import penetration in 2013 contrasts with the decline observed in 2011-2012.

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3 See Amador and Opromolla, (2013), "Product and destination mix in export markets", *Review of World Economics*, vol. 149(1) for an identification of the contribution from the intensive and extensive margins in export growth from 1995 to 2005, based on transactions-level data.

6. Prices

The inflation rate, as measured by the annual average change in the Harmonised Index of Consumer Prices (HICP) is expected to stand at 0.6 per cent in 2013, *i.e.* 2.2 percentage points (p.p.) less than in 2012 (Table 6.1). Following year-on-year changes of 0.4 and 0.8 per cent in the first and second quarters of the year respectively, consumer price developments are expected to also be contained in the second half of the year. The current estimate accounts for an upward revision of 0.2 p.p. compared with that released in the Summer issue of the Economic Bulletin, largely reflecting higher than anticipated growth of energy and unprocessed food prices.

A comparison of the estimate for Portugal with the projection for the euro area released in the September issue of the ECB's Monthly Bulletin shows that the inflation differential will be negative again, similarly to 2009 and 2010, standing at -0.9 p.p., after positive values in 2011 and 2012 (0.9 and 0.3 p.p. respectively).

Decline in inflation in 2013 reflects the mitigation of the effect of fiscal measures

The decline in inflation in Portugal to 0.6 per cent in 2013 reflects the mitigation of the effect of fiscal consolidation measures with a significant impact on inflation in 2012, notably the rise in the VAT rate for some goods and services (such as electricity, cafés and restaurants and cultural services) and administered prices, especially public transport services and hospital services.

In 2013 there were no relevant changes in indirect taxes, except for a rise in the tobacco tax in January. In this context, administered prices increased by 2.2 per cent in year on year terms in the period from January to August, quite below the 4.3 per cent growth as observed in the previous year.

Low inflationary pressures, against a background of weak global demand and continued adjustment of the Portuguese economy

The estimate for price growth in 2013 incorporates a virtual stabilisation of energy prices. This reflects, on the one hand, a decline in energy import prices in 2013, due to a decline in international oil prices and the appreciation of the euro. On the other hand, electricity and gas prices are expected to rise, albeit less markedly than in 2012.

Table 6.1

HICP - MAIN COMPONENTS | PER CENT

	Weights	Annual rate of change			Year-on-year rate of change		
	2012	2011	2012	2013 up to Aug	12 T4	13 T1	13 T2
Total	100.0	3.6	2.8	0.6	2.0	0.4	0.8
Total excluding energy	86.2	2.3	1.7	0.8	1.5	0.4	1.1
Total excluding unprocessed food and energy	76.8	2.2	1.6	0.4	1.3	0.2	0.8
Goods	59.2	4.4	2.5	0.1	1.3	-0.4	0.5
Food	20.7	3.0	3.4	2.7	3.5	2.6	2.8
Unprocessed food	9.4	2.9	2.8	3.4	3.0	2.5	3.8
Processed food	11.3	3.1	4.0	2.2	3.9	2.6	2.1
Industrial	38.4	5.2	2.0	-1.6	0.1	-2.1	-0.9
Non-energy	24.6	1.4	-2.1	-1.9	-2.8	-3.3	-0.8
Energy	13.8	12.8	9.5	-0.1	5.5	1.5	-1.1
Services	40.9	2.4	3.2	1.3	3.1	1.6	1.4
Memo:							
HICP - Administered prices	-	5.4	4.3	2.2	0.5	1.2	2.6
CPI	-	3.7	2.8	0.4	2.0	0.2	0.6
HICP - Euro area	-	2.7	2.5	1.6	2.3	1.9	1.4

Sources: Eurostat and *INE*.

The non-energy component is likely to grow rather moderately, reflecting low domestic and external inflationary pressures. Non-energy import prices should decline further, amid weak global demand growth. In particular, the deceleration in international food commodity prices seems to have had repercussions on the downward profile of the change in processed food prices until August.

The contraction of economic activity and in particular of domestic demand, as well as the current situation in the labour market, have translated into moderate wage cost developments in 2013. Hence, in the period from January to August 2013 data on base wages stated to Social Security point to a -0.4 per cent change in wages.

In a context where the process of reorganising the production sector has meant a considerable fall in private employment, 2013 saw a further increase in apparent labour productivity. As a result, estimates point to a further reduction of unit labour costs in the private sector (1.9 per cent fall in 2013, following a 0.9 per cent decline in 2012).

Moderate increases in private domestic production prices and consumer prices along with a reduction of unit labour costs in the private sector led to a widening of the gross operating surplus per unit of output in 2013, which may be interpreted in a wider sense as a rise in corporate profit margins. These developments are an important element of the Portuguese economy's structural adjustment process, reflecting a readjustment of the corporate structure through an increase in the surplus of enterprises remaining on the market, chiefly resulting from an expansion of activity in foreign markets and the elimination of enterprises that are economically non-viable in current market conditions.

Inflation expectations remain anchored

In the medium to long term labour cost developments are significantly influenced by inflation expectations. The price stability policy followed by the ECB seems to have contributed to the low inflation rates observed in the past few years both in Portugal and in most euro area countries, and also to its relative low variability. In the course of 2013 inflation expectations for a 12-month horizon declined, remaining anchored at levels compatible with price stability (Chart 6.1).

A breakdown of the HICP leads to the conclusion that for a share of around 38 per cent of HICP components there are year-on-year price reductions (Chart 6.2).[1] The aggregate with the highest share of components with negative year-on-year rates of change is non-energy industrial goods, whose developments in 2013 continued to be marked by a decline in prices, similarly to 2012, in particular in clothing and footwear. As far as services are concerned, although the weight of the components with negative year-on-year rates of change increased in 2013, its contribution to changes in this aggregate's prices remained low.

1 The significant weight associated with HICP components with negative year-on-year rates of change is robust to the change in weights of the HICP basket introduced in January 2013.

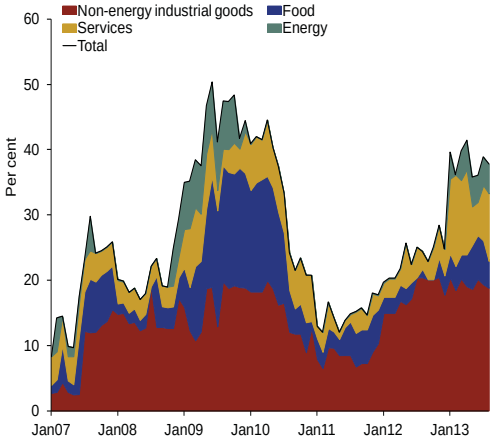
Chart 6.1

INFLATION EXPECTATIONS

Sources: Consensus Economics and Eurostat.
Note: (a) 12-month average rate of change.

Chart 6.2

HICP - ITEM WEIGHTS WITH NEGATIVE YEAR-ON-YEAR RATE OF CHANGE



Sources: Eurostat and Banco de Portugal calculations.

7. Balance of Payments

Increase in the Portuguese economy's financing capacity vis-à-vis the rest of the world

One of the most striking aspects of the Portuguese economy's current adjustment process is a very significant reduction of the external financing needs that as of 2012 gave rise to the Portuguese economy's net financing capacity. Hence, in the first half of 2013 such financing capacity, as measured by the combined current and capital account balance, rose to 2.3 per cent of GDP, with an estimated balance of 3.1 per cent of GDP for the year as a whole. This corresponds to a change of 12.5 percentage points (p.p.) between 2010 and 2013 (Table 7.1). The improvement in the external balance recorded in the past three years reflects simultaneously a decline in investment and more markedly a rise in domestic saving (Chart 7.1).

Considerable improvement in the combined current and capital account balance, largely reflecting the evolution of the goods and services account

The estimated improvement in the combined current and capital account balance in 2013, of around 2.3 p.p. from the previous year, largely results from the evolution of the goods and services account. Estimates point to a 2 p.p. increase in its balance from 2012 (Chart 7.2). This reflects a considerable reduction of the goods account deficit by 1.2 p.p. and an increase in the services account surplus by 0.8 p.p..

For 2013 a positive balance of 2.1 per cent of GDP is estimated for the goods and services account, which plays a very important role in the Portuguese economy's adjustment process. This evolution reflects a strong adjustment of domestic demand, with an ensuing reduction of imports, and strong export growth associated with considerable market share gains.

The sharp reduction of the goods account deficit reflects a positive volume effect associated with robust export growth (5 per cent in volume) and to a lesser extent a favourable terms of trade effect, partly linked to the decline in oil prices. As previously mentioned, a significant share of the volume effect results from strong energy export growth, reflecting an increase in installed refining capacity (Chart 7.3). Similarly to 2010, exports of other products (other than energy) have also contributed to the positive volume effect estimated for 2013.

Table 7.1

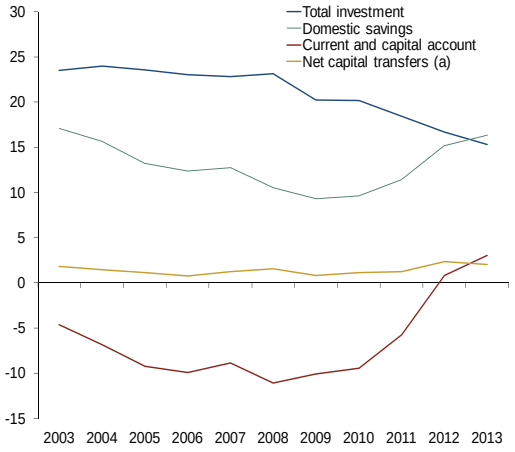
CURRENT AND CAPITAL ACCOUNTS | AS A PERCENTAGE OF GDP

					1st half of the year	
	2010	2011	2012	2013[a]	2012	2013
Current and capital accounts	-9.4	-5.8	0.8	3.1	-1.8	2.3
Current account	-10.6	-7.0	-1.5	1.0	-3.5	0.1
Goods and services account	-7.2	-3.8	0.1	2.1	-1.0	1.4
Goods	-11.1	-8.3	-5.2	-4.0	-5.1	-3.4
Services	3.9	4.5	5.3	6.1	4.1	4.8
of which:						
Travel and tourism	2.7	3.0	3.4	-	2.3	2.6
Income account	-4.6	-4.9	-3.9	-3.6	-4.4	-3.7
Current transfers	1.3	1.7	2.3	2.6	1.9	2.4
of which:						
Emigrants/immigrants remittances	1.1	1.1	1.3	-	1.2	1.4
Capital account	1.1	1.2	2.3	2.0	1.7	2.2

Sources: *INE* and Banco de Portugal.
Note: (a) Banco de Portugal estimates.

Chart 7.1

NET BORROWING/LENDING | AS A PERCENTAGE OF GDP

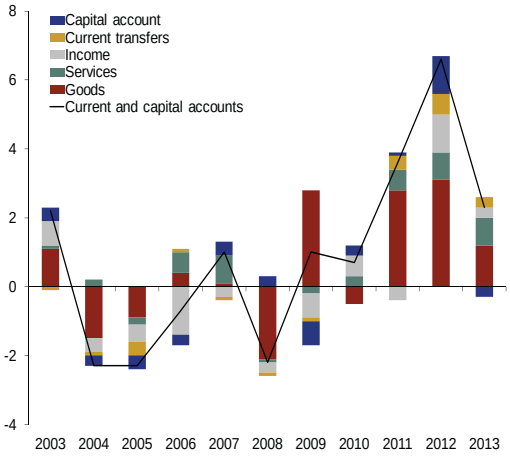


Sources: *INE* and Banco de Portugal.

Note: (a) Includes acquisitions less disposals of non-financial non-produced assets.

Chart 7.2

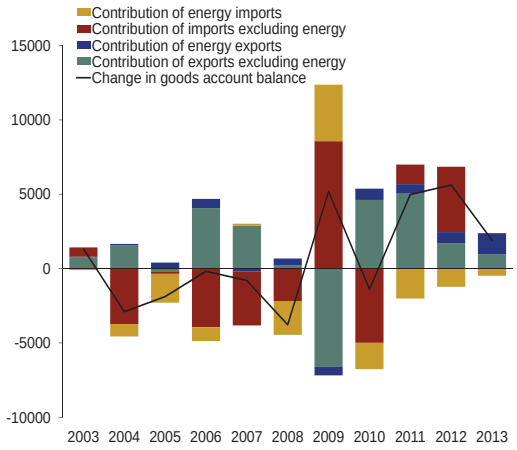
BREAKDOWN OF CHANGE IN THE CURRENT AND CAPITAL ACCOUT | AS A PERCENTAGE OF GDP



Sources: *INE* and Banco de Portugal.

Chart 7.3

CHANGE IN THE GOODS ACCOUNT BALANCE | CONTRIBUTION OF EXPORTS AND IMPORTS IN EUR MILLION



Sources: *INE* and Banco de Portugal.

Note: The contribution of imports corresponds to the symmetrical of its variation.

Narrowing of the income account deficit and reinforcement of the current transfers surplus

The change in the combined current and capital account balance in 2013 was also due to a decline in the income account deficit (by 0.3 p.p.), an increase in the current transfers surplus (0.3 p.p.) and conversely, to a reduction in the capital account balance (0.3 p.p.). The narrowing of the income account deficit reflects a slight decline in the Portuguese economy's financing costs, in a context of increasing financing under the financial assistance programme, to the detriment of funding in international markets, as well as a slight reduction of interest rates on short-term public debt securities auctions in the first half of the year. The income account balance also reflects developments in direct investment income in the first half of the year, particularly a rise in inflows of dividends and distributed profits.

The reinforcement of the current transfers surplus is associated with an increase in European Union transfers and the growth of emigrants' net remittances, in a context of reversal of migration flows compared with the period prior to the start of the adjustment. Finally, the decline in the capital account balance reflects a reduction of net transfers from the European Union.

Net outflows in the first half of 2013

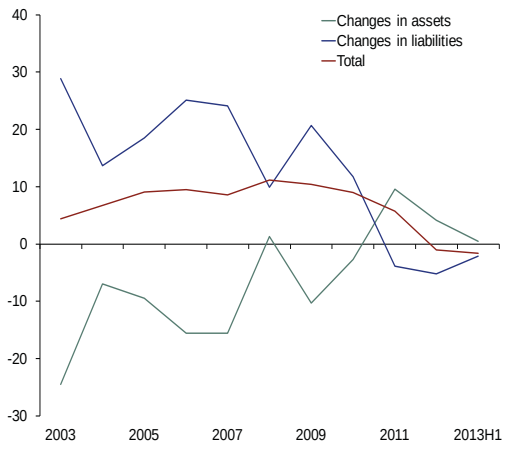
In the first half of 2013 net outflows were a consequence of the combined current and capital account surplus, which is a striking aspect of the current external imbalance correction process (Chart 7.4). Against this background, there was a decline in financial liabilities and claims to non-residents.

Developments in the financial account in the first half of 2013 reflected a slight improvement in resident economic agents' access to funding in international wholesale debt markets. In particular, portfolio investment liabilities increased in the first half of the year, compared with a considerable reduction since 2010 (Chart 7.5). This reflects the placement of short and long-term public and private debt securities of the non-financial sector in non-resident entities, as well as a greater share held by non-residents in the capital of Portuguese enterprises, through secondary market operations.[1] External financing was furthermore ensured by general government inflows associated with disbursements of the loan received under the financial assistance programme, although to a lower amount than observed in the same period in 2012.

Finally, bank recourse to the European Central Bank's monetary policy operations declined somewhat in the first half of 2013 by comparison with the same period in 2012, which translated into a decline in other investment liabilities of monetary authorities. This notwithstanding, the most recent period saw a slight increase in Eurosystem funding.

Gráfico 7.4

FINANCIAL ACCOUNT – BALANCE AND CHANGES IN ASSETS AND LIABILITIES | AS A PERCENTAGE OF GDP

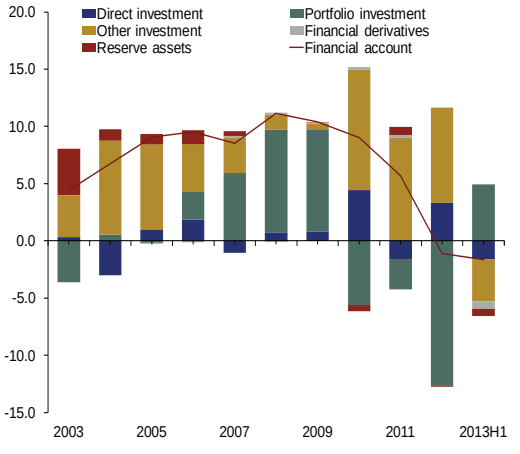


Sources: *INE* and Banco de Portugal.

Notes: A (+) sign means an increase in foreign liabilities or a decrease in foreign assets, *i.e.* a financial inflow. A (-) sign means decrease in foreign liabilities or an increase in foreign assets, *i.e.* a financial outflow. Figures for "Other investment" of monetary authorities and other monetary and financial institutions are adjusted for temporary end-of-year operations between these two sectors, which were reversed in the first days of the following year. The change in assets includes financial derivatives net of liabilities.

Gráfico 7.5

FINANCIAL ACCOUNT – BALANCE AND CHANGES IN ASSETS AND LIABILITIES BY INSTRUMENT | AS A PERCENTAGE OF GDP



Sources: *INE* and Banco de Portugal.

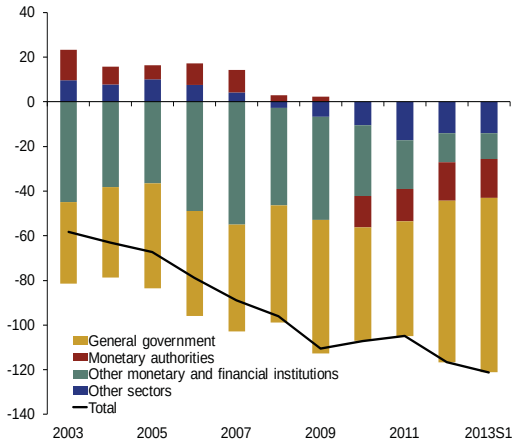
1 In 2013 general government resumed the issue of Treasury bonds. A total amount of €2.5 billion five-year Treasury bonds were issued in January and a 10-year issue totalling €3.0 billion was conducted in May.

Worsening of the Portuguese economy's international investment debt position in the first half of 2013

Despite a surplus recorded in the current and capital account in the first half of 2013, the Portuguese economy's (net) debt position *vis-à-vis* the rest of the world worsened (4.5 p.p. against 2012), to stand at 121.3 per cent of GDP at the end of the first half of the year (Chart 7.6). This difference results to a large extent from price changes, in particular gold devaluation, making a 2.6 p.p. contribution to the deterioration of the net external position.

Chart 7.6

INTERNATIONAL INVESTMENT POSITION – BY INSTITUTIONAL SECTOR | AS A PERCENTAGE OF GDP



Sources: *INE* and Banco de Portugal.
Note: (a) For 2013, it was used the GDP for the year ending in the first half of 2013.

FORWARD GUIDANCE – COMMUNICATION ABOUT THE FUTURE PATH OF MONETARY POLICY

In the wake of the 2007/08 global financial crisis, the central banks of the main advanced economies cut their key interest rates substantially and adopted non-standard measures with a view to strengthening the accommodative monetary policy stance. A growing number of banks have decided to provide forward guidance, *i.e.* to explicitly announce central banks' intentions as regards their future policy path.[1] The adoption of this policy by the European Central Bank (ECB) since 4 July 2013 will be the focus of this Article.

This type of monetary policy announcement will have a bearing on economic agents' expectations as regards future policy, usually when key interest rates have reached or are close to the zero lower bound. It may be designed to increase monetary policy effectiveness (for instance, maintaining the accommodative stance of monetary policy in situations of financial market instability) or provide additional monetary stimulus. In the former case, the central bank will seek to clarify either its assessment of future economic conditions or its reaction function.[2] To the extent that this announcement discloses information not previously available, the central bank will be able to better anchor the agents' expectations to the central bank's own intentions regarding the future policy path. In the latter case, the central bank will seek to change the agents' perception about its reaction function, *i.e.* convince them that, because interest rates have reached the zero lower bound, the monetary policy response to future economic developments will differ from that observed in the past. In particular, the commitment to tolerate higher inflation rates may reduce the expected real interest rate and induce the agents to raise aggregate demand today.[3]

According to recent practice in various central banks, the announcement of forward guidance, although always dependent on future economic developments, may be quite diversified. On the one hand, it may focus exclusively on the interest rate instrument, or may also apply to financial asset purchases by the central bank. On the other hand, it may be formulated in qualitative or quantitative terms. In the latter case, the central bank may specify the period of time or the economic conditions (thresholds for real and/or nominal variables) during which its monetary policy stance is expected to be maintained.[4] In designing forward guidance, central banks face a trade off between flexibility (which is higher in the case of qualitative guidance) and credibility (which is potentially higher in the case of quantitative thresholds).

Recent central bank practice in advanced economies

Although the central banks of different advanced economies have recently decided to announce their policy intentions through forward guidance, this announcement has differed both over time and among central banks, in line with the respective monetary policy strategy (Table 1).

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1 It should be mentioned that, in the past, some central banks have used this type of communication, such as the Bank of Japan in 1999 and the US Federal Reserve in 2003.

2 In the past few decades, several central banks have reported more clearly on their assessment of the economic outlook, and, in some cases, have published a forecast for their policy interest rate path (for instance, the central bank of New Zealand since 1997, or the central bank of Sweden since 2007). This forecast, however, does not correspond to a commitment regarding future action.

3 Economic literature has argued that this type of announcement may minimise the costs associated with the impossibility of reducing key interest rates when they reach the lower bound (for instance, Woodford (2012)). For such, it must be credible, which requires a clear and verifiable commitment mechanism. One of the mechanisms suggested is the central bank's adoption of objectives for the level of a nominal variable, such as nominal GDP.

4 According to Carney (2013), these formulations correspond to three generations of forward guidance, which become increasingly explicit and state-contingent over time.

Table 1

FORWARD GUIDANCE BY MAJOR CENTRAL BANKS SINCE THE GLOBAL FINANCIAL CRISIS

	European Central Bank	Bank of England	Federal Reserve		
Adoption/amendment date	July 2013	August 2013	December 2012	August 2011 / January 2012 / September 2012	December 2008 / March 2009
Key interest rate as at the decision date	MRO rate 0.5% Deposit facility rate 0.0%	Bank rate 0.5%	Federal funds rate 0-0.25%	Federal funds rate 0-0.25%	Federal funds rate 0-0.25%
Type of guidance	Open-ended	State-contingent	State-contingent	Time-contingent	Open-ended
Instrument	Key interest rates	Key interest rates Asset purchases	Key interest rates	Key interest rates	Key interest rates
Language on the instrument	"… key ECB interest rates to remain at present or lower levels …"	"… not to raise the Bank Rate at least until …" "… until … intends not to reduce the stock of asset purchases…" "… stands ready to undertake further asset purchases while … if it judges that additional monetary policy stimulus is warranted"	"… exceptionally low range for the federal funds rate will be appropriate at least as long as…"	"… likely to warrant exceptionally low levels of the federal funds rate…"	"… likely to warrant exceptionally low levels of the federal funds rate…"
Time period	Qualitative "…for an extended period of time"	Non-existent	Non-existent	Quantitative "… at least through mid-2013" "… at least through late 2014" "… at least through mid-2015"	Qualitative "… for some time" "… for an extended period"
Contingency in terms of economic variables	Qualitative " … based on the overall subded outlook for inflation extending into the medium-term, given the broad-based weakness in the real economy and sudued monetary dynamics"	Quantitative Unemployment rate >7%, as long as: a) Inflation projection 1.5 to 2 years < 2.5% b) Medium-term inflation expectations remain sufficiently well anchored c) Does not pose a significant threat to financial stability that cannot be contained by policy actions available to the Financial Policy Committee	Quantitative i) Unemployment rate >6.5% ii) Inflation projection 1 to 2 years ≤ 2.5% iii) Longer-term inflation expectations continue to be well anchored	Qualitative "… economic conditions, including low rates of resource utilization and a subdued outlook for inflation over the medium run, are likely to warrant …" " To support continued progress toward maximum employment and price stability, … a highly accomodative stance of monetary policy will remain appropriate for a considerable time after the economic recovery strenghtens"	Qualitative "… weak economic conditions are likely to warrant …" "… economic conditions, including low rates of resource utilization, subdued inflation trends, and stable inflation expectations, are likely to warrant …"
Withdrawal of policy accomodation (non-automatic)		" The action taken by the MPC … would depend upon its assessment at the time as to the appropriate setting of monetary policy in order to fulfill its remit to deliver price stability"	"… will also consider other information… When the Committee decides to begin to remove policy accomodation it will take a balanced approach with its longer-run goals of maximum employment and inflation of 2%"		

Sources: European Central Bank, Bank of England and Federal Reserve.

In July 2013, in contrast with its previous communication policy, the ECB decided to provide qualitative guidance on the future path of key interest rates, conditional on the medium-term outlook for inflation. This was adopted before the margin for further interest cuts was exhausted. Its purpose was to stabilise money market conditions and to better anchor market expectations.

Among the experiences of other central banks, the US Federal Reserve case is worth mentioning. In response to the challenges arising from reaching the federal funds rate lower bound in 2008, it decided to provide quantitative forward guidance on key interest rates.[5] Subsequently, its communication strategy was gradually changed to indicate the timing, and, more recently, the economic conditions in which the current accommodative monetary policy stance is to be maintained. In particular, in December 2012, the Federal Reserve announced that it intended to maintain the federal funds rate at current levels, conditional on numerical targets for unemployment and projected inflation. As regards asset purchases, guidance was only qualitative and indicated that it would be pursued until the outlook for the labour market improved substantially, in a context of price stability. In June 2013, the Federal Reserve decided to provide more specific guidance (in terms of timing and economic conditions) about a future tapering of the pace of asset purchases, but has been stressing that these are not on a preset course, but dependent on its assessment of economic prospects.

In addition to the Federal Reserve, only the Bank of England opted, in August 2013, for forward guidance contingent on quantitative thresholds for economic variables. Guidance – applicable to key interest rates and the stock of asset purchases – is based on a numerical threshold for the unemployment rate and applies while it does not threaten price stability[6] or financial stability. Through this type of announcement, the Bank of England intends to clarify its view on the appropriate trade-off between returning inflation to the target and the speed with which growth and employment recover, and reducing uncertainty about the future path of monetary policy.

Effects of forward guidance

The effects of this type of policy on the economy depend on how clear and credible central bank guidance is. The abovementioned different types of announcement share some channels through which they are transmitted to the yield curve and, ultimately, to the economy.[7] In particular, they may affect the economic agents' expectations as to the path of short-term interest rates, and reduce uncertainty around that path. In this context, longer-term interest rates, which also influence economic agents' decisions, may be affected downwards (including by reducing the term premium) although this effect may be offset by a possible improvement in expectations of recovery. In addition, guidance about asset purchases may affect the economy through different channels, including a signalling effect, thereby also influencing long-term interest rates.

The impact of the ECB's announcement of forward guidance may therefore be more directly assessed in the money market, and more indirectly in other financial market segments. If the announcement on policy rate developments contained new information that was not available to the markets, it may have affected both the level of interest rates expected by market participants and the uncertainty regarding that level. According to Reuters' monthly poll on the future changes of the ECB's key interest rate, between the poll carried out before the meeting on 4 July and those carried out before the two subse-

5 In addition to the cases under review in this Article, other central banks of advanced economies have opted for this type of communication, in the wake of the financial crisis. This is the case of the Bank of Canada which, in April 2009, announced that, conditional on the outlook for inflation, it would maintain the key policy rate unchanged through the second quarter of 2010. Furthermore, the Bank of Japan, in April 2013, indicated that it would maintain its policy accommodation programme for as long as necessary, in order to reach the inflation target of 2% in a stable manner.

6 In this case, a numerical threshold was also defined for projected inflation.

7 See Bank of England (2013) or Carney (2013) for a discussion on the different transmission channels.

quent meetings, there was in fact a rise in the number of analysts that did not expect the interest rate to increase before the end of 2014 (Chart 1).[8]

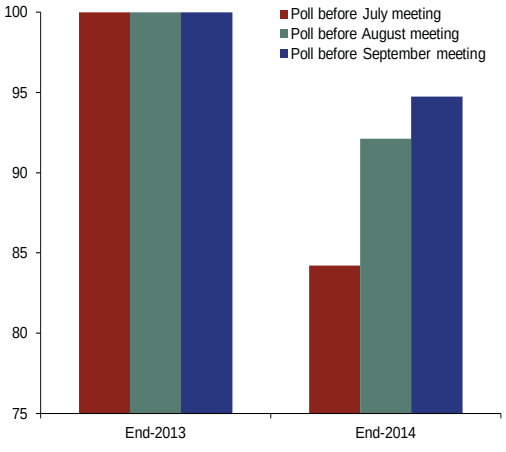
Turning to the impact on money market interest rates, the EONIA forward curve shifted downwards in the wake of the announcement (assessed at close of business on the announcement day), which was more marked for time horizons after early 2014 (Chart 2).[9] At the end of September, the EONIA forward curve stood slightly above its level before the meeting on 4 July, which may reflect a number of factors, including the publication of favourable macroeconomic data for both the euro area and the US. Considering interest rates with longer than overnight maturities, there was a decline in the level and uncertainty of expectations regarding the 3-month EURIBOR (Charts 3 and 4). In particular, expectations regarding the level of this rate during the next two years declined, and implied volatility in options on futures decreased to levels closer to the long-term average.

Considering other financial market segments, the announcement by the ECB was followed by some decline in government bond yields in most euro area countries, a rise in stock markets, and a slight depreciation of the euro, both against the USD and in nominal effective terms.

This analysis of the impact on money and financial markets is only indicative, as developments in these markets reflect not only the announcement by the ECB but also other events not controlled for in the analysis. For instance, during the subsequent weeks, favourable economic data were disclosed for the euro area, which had an opposite impact to that of the ECB announcement on a number of financial market segments. In order to minimise the impact of other events, the analysis considered only a one-day time frame. Even though empirical literature on this topic is still at an early stage, there some studies on the impact of forward guidance on non-euro area economies.[10] These studies show that, in general, this type of communication had a material impact on interest rate expectations, both on their level (for instance, Moessner (2013) for the US) and uncertainty (for instance, Chang and Feunou (2013) for

Chart 1

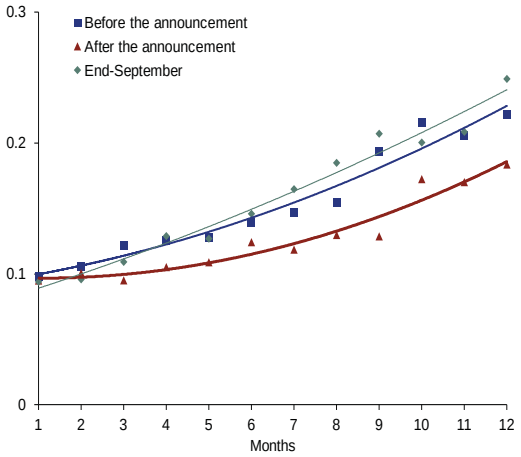
EXPECTATIONS OF UNCHANGED OR LOWER ECB POLICY RATE | AS A PERCENTAGE OF TOTAL ANSWERS



Sources: Thomson Reuters and Banco de Portugal computations.
Note: Considering only the analysts that answered the three monthly Reuters polls (for 2013 and 2014).

Chart 2

EONIA RATE FORWARD CURVE | PER CENT



Sources: Thomson Reuters and Banco de Portugal computations.
Note: Based on OIS. Considering the following days: 3 and 4 July and 26 September (close of business).

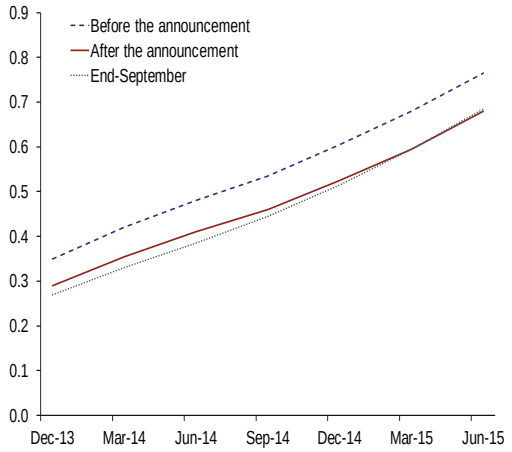
8 This only considers analysts responding to the three polls, who have reported expectations regarding interest-rate developments up to the end of 2014. According to this criterion, 38 replies were considered in each poll.

9 The EONIA rate expected for shorter maturities has not changed significantly, probably reflecting the continued high excess liquidity levels expected to prevail in the short-term.

10 See Bank of England (2013) for a summary of this literature.

Chart 3

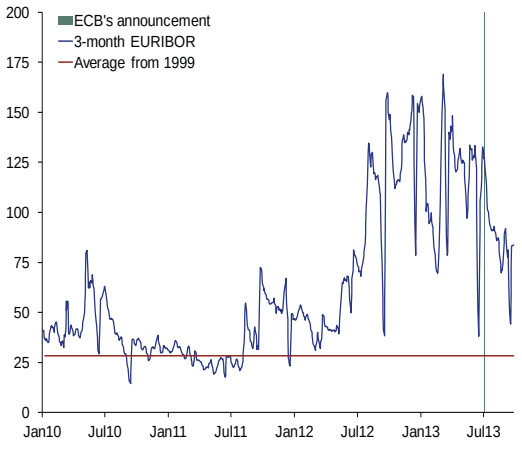
3-MONTH EURIBOR EXPECTATIONS | PER CENT



Source: Bloomberg.
Note: Based on 3-month EURIBOR futures. Considering the following days: 3 and 4 July and 26 September (close of business).

Chart 4

IMPLIED VOLATILITY ON THE 3-MONTH EURIBOR EXPECTATIONS | PER CENT, 5 DAYS MOVING AVERAGE



Source: Bloomberg.
Note: Annualised volatility in options on 3-month EURIBOR future contracts with the closest maturity.

Canada). There is also some evidence of impacts on asset prices (for instance, Campbell, Evans, Fisher and Justiniano (2012) for the US).

Analysis of forward guidance in structural models

In recent years there has been a widespread increase in the use of new-Keynesian general equilibrium models for analysing relevant issues for monetary policy. However, building a scenario to reflect the type of forward guidance recently adopted by different central banks presents a number of difficulties. Main central banks, including the ECB, in general, have used this communication policy as a means to clarify their assessment of future economic conditions and their reaction function. However, most of these models are linear, with no role for uncertainty (certainty equivalence holds), and are based on the rational expectations assumption, in which the agents accurately anticipate central bank actions (excluding unanticipated deviations from the usual policy rule).

In a general equilibrium model for the euro area, Coenen and Warne (2013) simulated the effect of a credible commitment on the part of the central bank to keep interest rates unchanged for a given period (not contingent on economic developments). This simulated scenario is implemented as a deviation from the usual central bank reaction function, which is perfectly anticipated by the agents and, as such, does not exactly correspond to the type of commitment by the ECB. The authors show that, once interest rates are close to the lower bound, a time-based conditional commitment can be successful in mitigating downside risks to short-term inflation. However, it may give rise to upside risks over the medium term, which may be mitigated by the introduction of a threshold condition concerning tolerable future inflation. In turn, simulations point to a significant expansionary impact on economic activity.

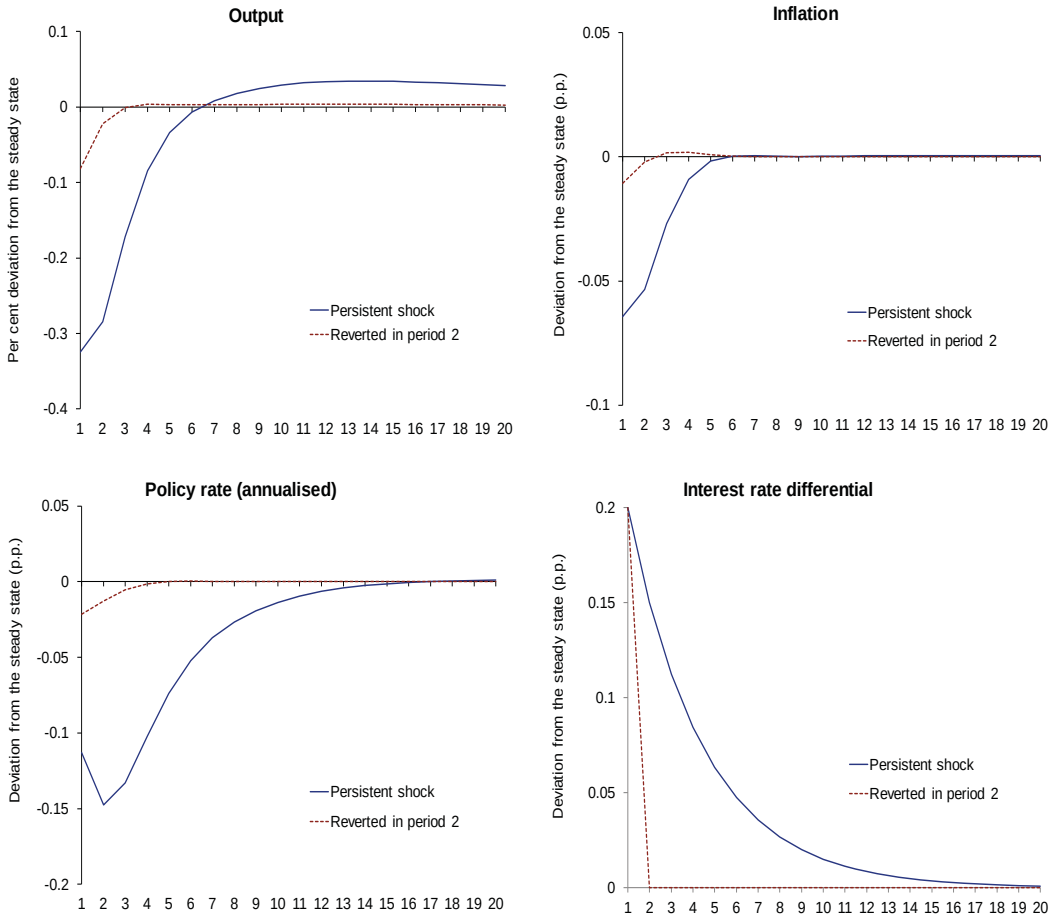
Taking into account that the type of announcement recently made by the ECB was intended to clarify the future path of the policy interest rate (in order to prevent private sector expectations from becoming too misaligned with the ECB's expected path) and did not correspond to a change in the usual way interest rates are set, a stylised exercise was conducted to illustrate the type of policy announced. In a general equilibrium model akin to Smets and Wouters (2003) and Christiano, Eichenbaum and Evans (2005) we considered the possibility that the relevant interest rate for private sector decisions may differ from the

policy interest rate obtained from a Taylor rule. This divergence would not be based on relevant macroeconomic information on output and inflation, as reflected in the interest rate underlying the Taylor rule (which in this literature is known as a shock).

Chart 5 shows the results of a scenario where, in the first quarter, a 20 basis-point unanticipated differential between the interest rate relevant for private sector decisions and the policy rate appears, which gradually fades away. In this scenario output contracts and inflation declines slightly. In parallel, the central bank responds to economic developments through a policy interest rate cut, which is the result of the Taylor rule. Since this interest rate differential is not based on fundamental data, the monetary authority should act in order to eliminate it. Should this differential arise in a situation where interest rates are at the lower bound, it seems particularly useful to resort to a communication policy that may reduce this spread.[11] In this sense, chart 5 presents a second scenario, where, as a result of a completely credible announcement from the monetary authority, the interest rate differential is fully eliminated in the following quarter. Given that the agents have rational expectations, they anticipate that the differential will fade out in the following quarter and adjust their behaviour from the starting period. In this case, the decline in both output and inflation is nearly prevented, as well as the need to reduce the policy rate.

Chart 5

GENERAL EQUILIBRIUM MODEL SIMULATION



Source: Banco de Portugal computations.
Note: The interest rate differential corresponds to the difference between the interest rate relevant to the private sector decisions and the interest rate set by the monetary authority (both annualised).

11 Since the model is linear, it is not relevant whether the simulations start at the steady state, or when, due to other shocks, interest rates are at the lower bound.

Even though this exercise may contribute to structuring the analysis of forward guidance made by different central banks, this is certainly a rather simplified attempt. In particular, the analysis would benefit from the use of more complex models (for instance, moving away from the rational expectations assumption) making it possible to analyse situations where the economic agents' expectations differ from the central banks', as well as their interaction with the restriction imposed by the interest rate lower bound.

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ARTICLES

II

SHORT-TERM MACROECONOMIC FORECASTS FOR THE U.S. ECONOMY USING NOWCASTS OF THE SURVEY OF PROFESSIONAL FORECASTERS*

*Inês Maria Gonçalves***

ABSTRACT

This paper proposes a forecasting strategy for a set of macroeconomic variables using information from surveys to professional analysts. Specifically, it is assumed that certain forecasts for the current state of the economy (nowcasts) are very difficult to beat in the short-term, so that there are benefits in including them in the time series of the variables to predict. For the U.S. economy, the Survey of Professional Forecasters (SPF) of the Federal Reserve Bank of Philadelphia is a renowned source of nowcasts and is therefore the starting point chosen to predict seven macroeconomic variables of interest. Using several models, both univariate and multivariate, it is possible to compare the forecasts that result from the use of this strategy with the predictions that would be obtained if the series did not include the additional information. Moreover, the performance of the models with nowcasts is compared with the predictions of the survey professional themselves. While the SPF asserts itself as highly reliable, the nowcasts appear to contribute for increasing the accuracy of the models used. Although sensitive to the choice of variables, the approach proposed in this paper proves to be quite promising and paves the way for further research, namely the application to other variables and/or economies.

1. Introduction

The development of sharper forecasting methods plays a key role in supporting the formulation of economic policy. Given the lag with which policies impact on the economy, the decision-making process involves evaluating the expected, rather than the present behaviour of the variables of interest. Central banks assume a major responsibility in the continuous improvement of these methods, as their forecasts provide analysts and policy makers with informed visions on the future evolution of the economy.

This paper describes a strategy for enhancing some standard forecasting models through the use of timely information about the variables to predict, in line with Faust and Wright (2007). Explicitly, the available time series are extended with forecasts for the current period, conferring to the models a non-negligible informational advantage. These forecasts are the so-called nowcasts, defined as forecasts produced in t for any given macroeconomic variable in t.[1]

* This paper is a summary of the most interesting findings of an Internship Project developed in the Economics and Research Department of the Bank of Portugal (Banco de Portugal) under the supervision of João Valle e Azevedo, to whom I thank for the helpful ideas and continual support throughout this work. I am also grateful to Ana Pereira for clarifications regarding the database and the *Mathematica* programming language. Finally, a special thanks to António Antunes for the motivation and confidence in this project. The opinions expressed in the paper are those of the author and do not necessarily coincide with those of Banco de Portugal or the Eurosystem. Any errors and omissions are the sole responsibility of the author.

** Banco de Portugal, Economics and Research Department.

1 The production of nowcasts, commonly referred to as nowcasting, falls outside the scope of this paper. For more information on the topic, see for instance Giannone *et al*. (2008) and Banbura *et al*. (2010).

The contribution of this paper is primarily to complement the research presented in Valle e Azevedo and Pereira (2013). That is to say, using the same models used in the foregoing, it is shown that the Low Pass Filter used by the authors has a generally superior performance compared with the other methods considered. A distinctive aspect of this paper is that it assesses the behaviour of the models in a context where the time series include additional observations, the nowcasts, comparing the results with those using only the observed data.

Beyond the Low Pass Filter, other univariate and multivariable models are used, as well as forecast combination methods, seeing that one should take advantage from forecasts containing different information. In this field, refer to the works of Chong and Hendry (1986), Diebold and Mariano (1995) and Harvey *et al*. (1998). Finally, based on the idea that there is a relatively limited set of factors that determine the behaviour of many macroeconomic variables, factor models are also used (see Stock and Watson (2002), for example).

The models are (re)estimated in each period t, in order to reproduce the data release calendar in real time. Thus, the paper simulates an out-of-sample forecasting context, wherein the models are estimated with the observed data up to t. This is common practice in the literature (see Angelini *et al*. (2011) or Valle e Azevedo and Pereira (2013), among others). More precisely, the approach of the paper may be characterised as pseudo out-of-sample, since it considers only final data vintages, therefore ignoring potential data revisions.

The article focuses on the U.S. because this is an extensively studied economy, to which the models used here have already been applied, thus ensuring their suitability. Additionally, the ease of access and availability of data favour the option for analysing this economy.

As regards the source of nowcasts, the paper chooses the Survey of Professional Forecasters (SPF) of the Federal Reserve Bank of Philadelphia, because it allows for making use of a publicly accessible and readily available set of predictions, which are considered reliable for the U.S. economy. This is a quarterly survey that includes a panel of financial analysts, whose anonymity is preserved thus ensuring their independence. According to Croushore (1993), these characteristics make the SPF very hard to beat when compared with other surveys. In fact, similar surveys have some disadvantages, such as disclosure only twice a year (Livingston Survey), forecasts in annual average terms (National Association of Business Economists Outlook), or the use of a panel of known analysts (Blue Chip Forecast). In addition, as shown by Stark (2010), the SPF tends to behave well at short horizons. Since the article focuses on forecasts up to four quarters, this survey was considered the most appropriate for the study.

In terms of variables, the article presents forecasts for real Gross Domestic Product (GDP), Consumer Price Index (CPI), GDP deflator, civilian unemployment rate, 3-month T-bill rate, residential investment and housing starts. The forecasts are evaluated based on the root mean square prediction error (RMSE), with the forecast error defined as the difference between the predicted value and the observed value of the variable. Additionally, the paper provides a qualitative description of the relative performance of the models over time.

The paper is organised as follows. The next section presents briefly the different types of models and methods used to produce forecasts. Then, section 3 describes the data, characterising the variables and the sample. Section 4 discusses the results. Finally, section 5 summarises the conclusions and points out ways for future research. In complement to section 2, the paper includes an appendix where the forecasting techniques are developed a little further, in particular with respect to the mathematical formalisation.

2. Forecasting Models and Methods

The forecasts are built based on standard models in the literature. In particular, the article follows the approach of Faust and Wright (2007) and Valle e Azevedo and Pereira (2013). In this section, the various types of models used in the production of forecasts are introduced, giving primacy to the intuitive explanation behind their use and referring the reader to the appendix for more details concerning the mathematical formalisation.

Firstly, the article considers models that produce forecasts based on the observed data, by means of a relationship between the past and future values of the variables to predict. These are called **Autoregressive Models** (or univariate models), since the future behaviour of the variables is explained by their behaviour in the past. The approach is therefore quite simple, as the variables depend only on themselves. Three alternative models are used: **Iterated Autoregression (IAR)**, **Direct Autoregression (DAR)** and **Random Walk (RW)**.

Secondly, some complexity is introduced, as the models are augmented with additional variables (indicators). It is therefore recognised that there are other elements likely to influence the behaviour of a given economic variable beyond itself. A mathematical model that establishes a relationship between the variables to predict, the same variables in previous periods (like in Autoregressive Models) and one of the indicators (for the current period) included a panel that is presented in the next section is then built. The approach taken in the article is to combine the forecasts obtained with each of the indicators, since it is believed that it is possible to obtain benefits from incorporating distinct information. These are therefore the **Forecast Combination Methods**, among which two specifications are considered: **Equal Weighted Averaging (EWA)**, which calculates a simple average of the forecasts, and **Bayesian Model Averaging (BMA)**, where the weights assigned to each prediction in the average are chosen according to Bayesian statistics.

A third type of models fine-tunes the technique described in the above paragraph, by summarising the effect of the indicators through their principal components. Explicitly, the information contained in the panel of indicators is synthesised based on the idea that the behaviour of those additional variables is largely determined by a more restricted set of common factors. These models are then called Factor Models and the paper also considers two specifications: **Factor Augmented Vector Autoregression (FAVAR)** and **Direct Factor Augmented Autoregression (DFAAR)**.

Finally, forecasts are computed using the **Low Pass Filter**. This method, used in Valle e Azevedo and Pereira (2013) seeks to capture the lowest frequencies of the time series of interest, since the high frequencies tend to contain a high level of noise, which makes them difficult to predict. Thus, the variables are estimated by means of a smoothed version of themselves obtained after the application of a filter that eliminates fluctuations over an optimal frequency. The specifications used can be classified within each of the classes of models previously described: **Univariate Specification (Filter)**, **Forecast Combination (Combination)** and **Specification with Factors (Filter with Factors)**.

3. Data

The forecasts cover seven U.S. macroeconomic variables, namely real GDP, CPI, GDP deflator, civilian unemployment rate, 3-month T-bill rate, residential investment and housing starts. Forecasts are computed quarterly for horizons from one up to four quarters, *i.e.*, up to one year after the initial forecasting period. The predictions are then compared with the median of the quarterly SPF forecasts. The sample ranges from the fourth quarter of 1968, corresponding to the first release date of the SPF, to the third quarter of 2012. In each quarter t, the models are estimated with the available data up to t, with the initial forecasting period set to the first quarter of 1984, the beginning of the "Great Moderation". Thus, the paper simulates a real time forecasting context (out-of-sample). However, the exercise is simplified

by using the existing vintages in the third quarter of 2012 (not annualised) extracted from the Federal Reserve Bank of Philadelphia database, regardless of later revisions.[2] With the exception of the civilian unemployment rate and the 3-month T-bill rate, to which level differences are applied, variables are transformed through the application of logarithm differences to ensure their stationarity.

The panel of indicators is essentially the same as in Valle e Azevedo and Pereira (2013), incorporating various activity indicators and monetary and financial variables.[3] However, it is worth noticing an important difference. The three-month averages that transform monthly variables into quarterly variables are calculated here from the last to the first available observation. This is done to align the information so that the data release calendar coincides with its availability to SPF analysts, allowing for recursive forecasts.

4. Results

This section discusses the results, granting particular attention to two key macroeconomic variables: real GDP, as a measure of economic activity, and the CPI, as a measure of price developments. For the sake of brevity, the results for the other variables are more concise.

The relative accuracy of the models is assessed based on the root mean square prediction error (RMSE), both in the case where the models use nowcasts as jump-offs and in the opposite.[4] To compare the forecasts, it then becomes necessary to ensure that the predictions refer to the same quarter. This implies that, at time t , the forecast for $t+1$ without nowcast is two quarters ahead, since the last available value of the time series usually refers to $t-1$. On the other hand, with the nowcast, the prediction for $t+1$ is only one quarter ahead, because in this case the forecast is computed with data up to t . This reasoning applies to forecasts for $t+h$, with $h \in \{1, 2, 4\}$ within the scope of this study.

To improve readability, the RMSE is presented as a ratio, calculated *vis-à-vis* the IAR model without nowcast, as this was considered both a simple and robust performance benchmark.[5]

The analysis is supplemented with a qualitative description of the behaviour of the models over time.

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2 Data are available online at http://www.phil.frb.org/research-and-data/real-time-center/survey-of-professional-forecasters/data-files/.

3 The panel is built with data from the Federal Reserve Bank of St. Louis, available at http://research.stlouisfed.org/. For a detailed account of the indicators included in the panel as well as the transformations applied, see Valle e Azevedo and Pereira (2013). The panel in the abovementioned paper contains 83 series, whereas in this article 78 series are used. The series "Non-Borrowed Reserves of Depository Institutions" and "Real Change in Private Inventories" were eliminated due to missing observations. The series "Real Personal Consumption Expenditures: Durable Goods","Real Personal Consumption Expenditures: Services" and "Real Personal Consumption Expenditures: Nondurable Goods" were also discarded, because of mismatches in the size of the series and their decomposition. Finally, the series "Real Federal Consumption Expenditures and Gross Investment", "Real State and Local Consumption Expenditures and Gross Investment", "Real Private Nonresidential Fixed Investment" and "Real Private Residential Fixed Investment" were replaced by equivalent series available through the Federal Reserve Bank of Philadelphia at http://www.phil.frb.org/research-and-data/real-time-center/survey-of-professional-forecasters/data-files/.

4 The RMSE is calculated as $\sqrt{\frac{\sum_{t=1}^{n}\left(\hat{y}_t - y_t\right)^2}{n}}$, where n stands for the number of forecasts and $\hat{y}_t - y_t$ represents the forecast error. The lower the RMSE, the greater the accuracy of the models.

5 For each model k , the relative RMSE is computed as $\frac{RMSE_k}{RMSE_{IAR\ without\ nowcast}}$. Whenever the relative RMSE is smaller than 1, model k generates more accurate predictions than the IAR model without nowcast. The smaller the ratio, the better the performance of model k .

4.1. Root mean square prediction error

The evaluation suggests that the proposed strategy translates into generally superior forecasts. This should not come as a surprise, as using the nowcasts confers an important informational advantage to the models compared with the predictions produced without nowcasts. Nevertheless, there is some sensitivity to the choice of variables. Another result is that the jump-offs appear to have an uneven effect, in the sense that the performance of the weakest models improves relatively more compared to the SPF.

Table 1 presents the results for real GDP. For $t+1$ and $t+2$, SPF forecasts outperform those of the models, even after the addition of nowcasts. However, for $t+4$, the IAR and DAR models with nowcasts generate more precise predictions, suggesting some dilution of SPF's advantage for longer horizons. Furthermore, excepting the DAR model (for $t+1$) and the Factor Models (for $t+2$ and $t+4$), the lengthening of the available time series results in smaller forecast errors. Thus, there are *de facto* gains from using this strategy, especially for models with poorer performances.

Table 1

RELATIVE ROOT MEAN SQUARE ERROR: REAL GDP

	$t+1$		$t+2$		$t+4$	
	Without nowcast	With nowcast	Without nowcast	With nowcast	Without nowcast	With nowcast
Autoregressive Models						
IAR	1.000	0.985	1.000	0.976	1.000	**0.994**
DAR	0.998	1.003	1.003	0.975	1.037	0.995
RW	1.138	1.037	1.282	0.997	1.369	1.084
Forecast Combination Methods						
EWA	0.996	0.978	1.005	0.980	1.055	1.024
BMA	1.028	0.983	1.059	1.005	1.074	1.045
Factor Models						
FAVAR	1.100	1.096	1.074	1.096	1.082	1.095
DFAAR	1.056	1.035	1.059	1.076	1.059	1.061
Low Pass Filter						
Filter	1.030	0.998	1.061	1.021	1.059	1.042
Combination	1.012	0.990	1.043	1.011	1.059	1.042
Filter with Factors	1.019	1.006	1.044	1.030	1.053	1.040
SPF	**0.949**	-	**0.970**	-	1.006	-

Source: Author's calculations.
Notes: For each horizon, the top three models are shaded and the best model is marked bold.

Turning to the CPI (Table 2), the relative RMSE is always lower for the models with nowcasts, indicating that the benefits from using the jump-offs are higher than those for real GDP. Still, the reduction in RMSE continues to be more pronounced in the models with poorer performance *a priori*. Despite the improvement, the forecasts produced by the models fail to overcome the SPF in any of the horizons studied. Nevertheless, it should be noted that the relative advantage of SPF decreases once again with the forecast horizon. In contrast to the experience for real GDP, the Low Pass Filter has a superior performance compared with the other models considered, positioning itself as the most serious challenger to the SPF.

Even if these results do not point to clear benefits in using the nowcasts, there were more visible gains for the other variables. Though not as fundamental, those variables are also very important for the analysis of the economy. Their results are now presented.

Table 2

RELATIVE ROOT MEAN SQUARE ERROR: CPI

	$t+1$		$t+2$		$t+4$	
	Without nowcast	With nowcast	Without nowcast	With nowcast	Without nowcast	With nowcast
Autoregressive Models						
IAR	1.000	0.878	1.000	0.953	1.000	0.953
DAR	0.981	0.878	0.999	0.954	1.142	1.022
RW	1.109	0.853	1.059	0.894	1.072	0.909
Forecast Combination Methods						
EWA	0.980	0.881	1.000	0.950	1.090	0.985
BMA	1.081	0.905	1.088	1.038	1.311	1.149
Factor Models						
FAVAR	1.049	0.932	1.067	0.970	1.045	1.002
DFAAR	1.043	0.898	1.034	1.017	1.057	1.031
Low Pass Filter						
Filter	0.834	0.799	0.798	0.798	0.801	0.794
Combination	0.830	0.800	0.811	0.803	0.832	0.815
Filter with Factors	0.828	0.797	0.827	0.808	0.862	0.834
SPF	**0.754**	-	**0.761**	-	**0.785**	-

Source: Author's calculations.
Notes: For each horizon, the top three models are shaded and the best model is marked bold.

Since the use of nowcasts in models for real GDP and CPI tends to increase forecast accuracy, the results for the other variables focus on these versions alone. At the same time, the group of models considered is also limited, maintaining the IAR model, as the benchmark, the EWA model, for the consistency in performance, and all versions of the Low Pass Filter, due to the superior behaviour in forecasts for the CPI. On the other hand, Factor Models are eliminated from the analysis as the results were somewhat disappointing for the variables already characterised.

Table 3 details the relative RMSE. As a rule, the Low Pass Filter now surpasses the SPF, whose primacy is not apparent anymore. In fact, although the specifications may vary, the Low Pass Filter becomes the preferred forecasting method, regardless of the variable or horizon. This result further strengthens the conclusions of Valle e Azevedo and Pereira (2013), where the use of this method, even without nowcasts, resulted already in very competitive predictions compared to the SPF.

As such, the experience of the whole set of variables studied leaves evidence that the quality of the predictions obtained when the models use the SPF nowcasts as a starting point, or jump-off, is higher than otherwise.

4.2. Behaviour over time

The analysis of the previous subsection, focused on the relative RMSE, was of a static nature, justifying the inclusion of a qualitative description of the overall performance of the models over time. Indeed, one needs to take into account the possibility that the preceding results may depend on the sample, meaning that there may be variations in the behaviour of different forecasts. This subsection tackles this issue, emphasising stability aspects throughout the sample.

A general result is the persistence of significant differences between variables. Another observation relates to the performance of the models during the financial crisis, particularly in the fourth quarter of 2008 and the first quarter of 2009, when the biggest differences relative to the SPF are recorded. In the case of real GDP, there is a high degree of instability over time and the relative performance deteriorates substantially with the crisis. As for CPI models, the profile is of great stability throughout the sample, but the crisis period also determines a degradation in the quality of the predictions against the SPF, particularly marked at shorter horizons. However, for the remaining variables the results are once again more

Table 3

RELATIVE ROOT MEAN SQUARE ERROR: OTHER VARIABLES (WITH NOWCASTS)			
	$t+1$	$t+2$	$t+4$
GDP Deflator			
IAR	0.994	1.009	0.990
EWA	0.964	0.981	1.133
Low Pass Filter			
Filter	**0.871**	**0.846**	**0.725**
Combination	0.872	0.875	0.799
Filter with Factors	0.904	0.901	0.863
SPF	1.002	0.986	0.896
Unemployment Rate			
IAR	0.929	0.924	0.989
EWA	0.929	0.911	0.972
Low Pass Filter			
Filter	0.927	0.885	0.917
Combination	**0.909**	**0.860**	**0.886**
Filter with Factors	0.931	0.879	0.908
SPF	1.052	1.077	1.254
3-Month T-Bill Rate			
IAR	0.881	1.092	0.979
EWA	0.875	1.131	1.008
Low Pass Filter			
Filter	0.812	0.965	0.979
Combination	**0.809**	**0.964**	**0.978**
Filter with Factors	0.824	0.985	0.990
SPF	0.953	1.308	1.431
Residential Investment			
IAR	0.964	0.980	0.997
EWA	0.940	0.936	0.992
Low Pass Filter			
Filter	0.948	0.921	0.897
Combination	0.920	0.911	0.892
Filter with Factors	0.928	**0.897**	**0.884**
SPF	**0.913**	0.953	0.973
Housing Starts			
IAR	0.980	0.981	1.002
EWA	0.971	0.971	1.002
Low Pass Filter			
Filter	0.943	0.941	0.959
Combination	**0.941**	0.938	0.959
Filter with Factors	0.943	**0.934**	**0.955**
SPF	0.949	1.047	1.063

Source: Author's calculations.
Notes: For each horizon, the top three models are shaded and the best model is marked bold.

encouraging, with performances equivalent or superior to the SPF and even improved accuracy during the quarters of the crisis. In fact, except for the GDP deflator (whose models consistently outperform the SPF and do not register significant breaks along the sample) and the unemployment rate (for which there is a deterioration only in the quarters of the crisis), the variables tend to improve over the SPF, a trend that is especially evident at longer horizons.

This analysis thereby confirms the results obtained with the relative RMSE in the considered sample.

5. Conclusions

This paper proposes a strategy that seeks to incorporate SPF nowcasts in short-term forecasting models for the U.S. economy. Generally, this approach proves to be quite promising, since there is a reduction

of forecast errors in models that make use of this additional information. Furthermore, the paper shows that, by lengthening the available time series, it is possible to compute more accurate forecasts than those of the SPF for the majority of variables, especially in longer horizons. The analysis of the stability of the results over the sample complements and confirms that of the RMSE, suggesting indeed a tendency of improvement against the SPF for most variables, yet not immune to shocks such as the episode of the financial crisis beginning in 2008.

With this paper, the findings of Valle e Azevedo and Pereira (2013) are reinforced, since the Low Pass Filter used by those authors proves to be a capable and consistent forecast method. Actually, except for GDP forecasts, the Low Pass Filter is the strongest candidate to beat the SPF, although the results do not allow for identifying a single specification for all variables. Among the other models studied, it is worth emphasising the good performance of the simplest models, particularly the IAR, and the EWA forecast combination method.

Two aspects, though, make the experience of the paper somewhat inconclusive. In fact, not only the results depend on the variable to forecast, but it seems that the nowcasts have an uneven effect on the models. Moreover, the asymmetry is contrary to what would be desirable, in the sense that the worst models take the greatest advantage, implying that the improvement of the best models, which would be the primary objective of the study, is comparatively smaller.

In any case, the paper justifies the extension of the analysis in order to fine-tune the results achieved, paving the way for further research, namely through the application to a larger set of variables and to other economies, such as the euro area, and also by using forecasts from other sources besides the SPF.

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Appendix: Forecasting Models and Methods (Mathematical Formalisation)

This appendix develops and complements section 2, by formalising the models and methods used to produce forecasts. The chosen specifications, in particular regarding the lag order criteria, are those that result in the best performance of the different models, and alternative specifications do not significantly alter the results.

AUTOREGRESSIVE MODELS

- **Iterated Autoregression Model (IAR)**: The equation $y_t = \rho_0 + \sum_{j=1}^{p} \rho_j \, y_{t-j} + \varepsilon_t$ is estimated by Ordinary Least Squares (OLS), with the lag order given by $p = 4$.

- **Direct Autoregression Model (DAR)**: For each horizon, h, $y_{t+h} = \rho_{0,h} + \sum_{j=1}^{p} \rho_{j,h} \, y_{t+1-j} + \varepsilon_{t+h}$ is estimated by OLS, with the lag order chosen according to the Akaike information criterion.

- **Random Walk Model (RW)**: The random walk model simply forecasts y_{t+h} as y_t.

FORECAST COMBINATION METHODS

- The forecast combination methods start by estimating the same model, given by the equation $y^i_{t+h} = \rho^i_{0,h} + \sum_{j=1}^{p} \rho^i_{j,h} \, y_{t+1-j} + \beta_{i,h} \, x_{it} + \varepsilon^i_{t+h}$, where $i = 1, \ldots, n$ and $\left\{x_{it}\right\}_{i=1}^{n}$ represents the panel of indicators described in the main text. The specifications used were the following.

- **Equal Weighted Averaging (EWA)**: This method calculates a simple average of the forecasts obtained with the estimation of the model just described, in which the lag order is fixed with $p = 4$.

- **Bayesian Model Averaging (BMA)**: In this method, the weights attributed to each of the predictions when calculating the average are chosen according to Bayesian statistics. As an assumption, each model M_i is assigned a constant probability, given by $P\left(M_i\right) = n^{-1}$. According to Fernandez *et al*. (2001), it is further assumed that $\varepsilon^i_{t+h} \sim N\left(0, \sigma^2\right)$ and that the prior distribution of $\lambda_{i,h} = \left[\rho^i_{0,h} \; \rho^i_{1,h} \; \ldots \; \rho^i_{p,h} \; \beta_{i,h}\right]$, conditional on σ, is given by $N\left(\overline{\lambda}_h, \phi\left(\sigma^2 \sum_{t=1}^{T}\left(w_{it} \; w'_{it}\right)^{-1}\right)\right)$, where $w_{it} = \left[1 \; y_t \; y_{t-1} \; \ldots \; y_{t+1-p} \; x_{it}\right]$ and the marginal prior distribution of σ is proportional to $1/\sigma$. ϕ is a hyperparameter that determines the level of information given by the prior. For each horizon, the value of ϕ is the same as in Valle e

Azevedo and Pereira (2013).[6] $\overline{\lambda}_h$ follows from the estimation of the parameters in a subsample ranging from the fourth quarter 1968 to first quarter of 1984.[7] After estimating each model, the mean of the posterior distribution of $\lambda_{i,h}$, given by $\tilde{\lambda}_{i,h} = \frac{\hat{\lambda}_{i,h\phi}}{1+\phi} + \frac{\overline{\lambda}_{i,h\phi}}{1-\phi}$ (where $\hat{\lambda}_{i,h}$ is the OLS estimate of $\lambda_{i,h}$ for each M_i), is used to compute forecasts for y_{t+h}, as $\hat{y}^i_{t+h|t} = \tilde{\lambda}'_{i,h}\, w_{it}$. The BMA forecast is finally given by $\hat{y}_{t+h|t} = \sum_{i=1}^{n} P\left(M_i / D\right) \hat{y}^i_{t+h|t}$, with $P\left(M_i / D\right)$ representing the probability, given the sample D, that model i is the true model.

FACTOR MODELS

- **Factor Augmented Vector Autoregression (FAVAR)**: This method estimates the FAVAR model presented in Bernanke *et al*. (2005), given by $\zeta_t = \phi_0 + \sum_{j=1}^{s} \phi_j\, \zeta_{t-j} + \varepsilon_t$, where $\zeta_t = \left(y_t, z_{1t}, z_{2t}, ..., z_{mt}\right)'$ and y_{t+h} is estimated by iterating the model. $\left\{z_{it}\right\}_{i=1}^{m}$ are the first m principal components of the set of indicators $\left\{x_{it}\right\}_{i=1}^{n}$. The lag order, s, is of one quarter and the first three principal components are used ($m = 3$).

- **Direct Factor Augmented Autoregression (DFAAR)**: This model corresponds to the DAR model presented previously, but augmented with factors. It should be noted that the factors used, $\left\{z_{it}\right\}_{i=1}^{m}$, are exactly the same entering the FAVAR model. For each horizon, $y_{t+h} = \rho_{0,h} + \sum_{j=1}^{p} \rho_{j,h}\, y_{t+1-j} + \sum_{j=0}^{p} \sum_{i=1}^{m} \gamma_i\, z_{it-j} + \varepsilon_{t+h}$ is estimated by setting the parameter m to 3. The lag order, p, is determined by the Akaike information criterion for both the dependent variable and the factors.

LOW PASS FILTER

This method proposes the estimation of y_{t+h} through a smoothed version, $y^{Low\ Frequency}_{t+h} = B\left(L\right) y_{t+h}$, where $B\left(L\right) = \sum_{j=-\infty}^{\infty} B_j\, L^j$ is the filter that eliminates fluctuations above an optimal frequency determined in Valle e Azevedo and Pereira (2013).[8] The specifications considered follow.

- **Univariate Specification (Filter)**: The forecasts are produced by solving the optimisation problem: $\min_{\alpha_0, \left\{\widehat{B}_j^p\right\}_{j=0,...,p}} E\left[\left(y^{Low\ Frequency}_{T+h} - \hat{y}^{Low\ Frequency}_{T+h}\right)^2\right]$, using the appropriate $\left\{\widehat{B}_j^p\right\}_{j=0,...,p}$ in $\hat{y}^{Low\ Frequency}_{t+h|t} = \alpha_0 + \sum_{j=0}^{p} \widehat{B}_j^p\, y_{t-j}$ and adjusting p so that $p = 50 - h$.

6 See Valle e Azevedo and Pereira (2013).
7 See section 3 of the main text for more details about the sample.
8 See Valle e Azevedo and Pereira (2013).

- **Forecast Combination (Combination):** Taking each of the $\left\{x_{it}\right\}_{i=1}^{n}$ indicators considered, n forecasts for y_{t+h} are calculated with the Low Pass Filter, and then combined using a simple average.

- **Specification with Factors (Filter with Factors):** Augments the model with the same $\left\{z_{it}\right\}_{i=1}^{m}$ factors used in the models outlined above.

THE MACROECONOMIC EFFECTS OF LEGISLATED TAX CHANGES IN PORTUGAL*

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ABSTRACT

This paper develops a new measure of quarterly discretionary tax shocks for Portugal that covers the period from 1996 to 2012 and was based on the so-called narrative approach. The main distinctive feature of this approach is that tax shocks are dated and quantified on the basis of a comprehensive analysis of tax policy measures, and not by econometric estimations. The findings point to strongly negative and persistent effects of legislated tax increases on GDP and private consumption, in line with narrative studies for other countries that yielded comparatively high tax multipliers.

1. Introduction

The interaction between fiscal policy and economic activity is a recurrent topic of economic research. In a period when large fiscal policy shifts have been enacted both in Europe and in the US, in the aftermath of the financial and sovereign debt crisis, this topic remains fully relevant. This is particularly so for Portugal, as the country is facing a significant fiscal tightening under the Economic and Financial Assistance Programme while, at the same time, a consensus has been reached that economic growth is of paramount importance in facing the fiscal sustainability challenges ahead.

There is an open discussion about the size of tax multipliers, i.e. the impact on economic activity of each euro of shift in taxes. The difficulties in measuring these multiplier effects stem firstly from the two-folded character of the relationship between taxes and GDP, as not only changes in taxes have an impact on economic activity, but also GDP swings affect tax revenues. In addition, the two variables may be simultaneously influenced by many factors that when omitted cause biased estimations of the impacts of taxation. Another problem relates to the uncertainty about the time of reaction to fiscal measures and time horizons considered by economic agents.

There are mainly two empirical approaches to estimate the impact of fiscal shocks on output, the Structural Vector Autoregressive (SVAR) and the narrative. The SVAR approach, followed for example in Blanchard and Perotti (2002), uses fiscal (normally national accounts) data and relies on assumptions regarding their automatic contemporaneous reaction to movements in economic activity, in order to isolate the non-systematic component of fiscal policy. An application of this methodology for Portugal can be found in

* See Pereira and Wemans (2013b) for full details on the methodology used in this article and additional results. This article benefited from an exchange of views about the characteristics and quantification of some of the tax measures in the sample with Ana Filipa Correia, Vanda Cunha, José Pereira and Hélder Reis and from information of this kind already available at Banco de Portugal. Furthermore, the authors are grateful for the comments and suggestions made by Nuno Alves, João Amador, Mário Centeno, Jorge Correia da Cunha and Maximiano Pinheiro. The opinions expressed in this article are those of the authors and do not necessarily coincide with those of Banco de Portugal or the Eurosystem. Any errors and omissions are the sole responsibility of the authors.

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Pereira and Wemans (2013a). By contrast, the derivation of shocks in the narrative approach, followed in this paper and envisaged in Romer and Romer (2010), is more direct and intuitive, as tax policy shocks are dated and quantified according to legislation and contemporary budgetary analyses.[1] In fact, this approach relies on a very comprehensive study of the most important tax changes that occurred in a given country, including the examination of implementation details and expected revenue effects, in order to construct the series of shocks. Although time-consuming, this approach has the advantage of not depending on assumptions regarding the automatic response of fiscal variables to GDP.

The narrative approach also looks into the motivation behind tax policy actions. The aim of this analysis is to isolate and exclude from the shock measure the actions that result from the willingness of government to influence economic activity and that could bias the estimates. As discussed in the paper, measures of this kind are anyway rather infrequent in Portugal during the period considered.

Another challenge when measuring the impact of fiscal policy is posed by the fiscal data available. The narrative approach has the advantage of being independent of accounting rules (and their widely known limitations), while having the disadvantage of depending on information that partly emanates from the political process and is subject to noise. Gathering comprehensive and consistent narrative information about tax changes is very demanding and this has limited the number of studies in this vein. In fact, there are still few works in the wake of Romer and Romer, Cloyne (2010) for the UK being one of the exceptions. Other papers such as Devries *et al.* (2011) take a related approach that considers annual data and major fiscal policy shocks only, while covering a wide range of countries. There is an older strand of narrative studies started by Ramey and Shapiro (1998) that look into the effect on economic activity of military spending shocks. Note that this method is hard to extend to other types of expenditure shocks that are more difficult to track and quantify (see European Commission 2013, Part III, for a discussion of this issue).

The paper is organized as follows. Section 2 describes the sources, and presents a list tax of measures implemented in Portugal between 1996 and 2012 and the type of information gathered about them. The motivation behind these actions as a potential source of endogeneity is analysed in section 3.

Section 4 explains the implementation details in converting the tax measures into a quarterly series of tax shocks. This procedure is not straightforward and depends, for example, on assumptions regarding economic agents' response to anticipated changes in income. An alternative series of shocks is derived on the basis of different underlying assumptions. This section ends with an analysis of the series of tax shocks.

Section 5 uses the constructed series of shocks to measure the effects of discretionary tax policy on output. The benchmark response of GDP to a positive tax shock is strongly negative with a multiplier that reaches -1.3 one year out. This response is statistically significant, but surrounded by sizeable uncertainty. As extensions to the main findings, this section assesses in particular the robustness of the results to the exclusion of particularly large measures from the sample and controlling for public expenditure. The end of section 5 compares these multipliers with the findings in Pereira and Wemans (2013a).

Section 6 discusses evidence from considering alternative assumptions in the derivation of the shocks, while section 7 focuses on the response of some output components to changes in taxation. Finally, section 8 presents the concluding remarks.

2. Legislated tax changes from 1996 to 2012

The estimation of the impact of tax policy on economic activity presented in this paper relies on a series of shocks especially constructed for the purpose. The starting point in this work is a list of all major

1 The identification of tax shocks in the narrative approach is thus fundamentally different from the standard method used to identify discretionary tax policy that consists in cyclically adjusting fiscal variables.

legislated tax changes enacted in Portugal since 1996, along with their approval and implementation dates[2], quantification and assignment to broad categories of revenue such as direct and indirect taxes and social contributions. Detailed information on such dates and the magnitude of tax policy measures is very scarce as it was only recently, in the wake of the euro area sovereign debt crisis, that a systematic reporting and quantification of tax changes became entrenched in budgetary documents. Consequently, the series of shocks is confined to a relatively recent period, from 1996 to 2012, and even for this period its construction required gathering information from several sources. These sources primarily included budget reports, legislation documents and the annual reports of Banco de Portugal. Another important source of information about the revenue effect of tax measures was the data collected under the so-called disaggregated approach for the analysis of fiscal policy within the European System of Central Banks (see Kremer *et al.* (2006) for a description of the data that serve as an input to this approach). Finally, the treatment of particularly complex issues benefited from discussions with experts.

As far as quantification is concerned, conceptually one wants an estimate of revenue effects holding GDP constant in the sense that these estimates should not consider the feedback effect of GDP on tax revenues. Measures were generally quantified this way in the sources. This is particularly important for measures with a large potential influence on economic activity, such as changes in the value added tax rate, as a consideration of feedback effects would typically lead to an overestimation of the response of economic activity. Tax changes are quantified in nominal terms.

When different estimates for the magnitude of a particular tax change were available in the sources, information about the implementation details in the legislation and other documents was used in deciding what figure to take. The confrontation of several sources helped cross-checking estimates in order to reduce the noise that could be introduced by the political process. At the same time, inconsistencies can arise from the methods for quantification of revenue effects used in different sources (or in the same source over time), but in practice the fact that the sample is restricted to recent years helps mitigate this issue.

The legislated tax changes considered are confined to measures with an expected effect on economic activity. This criterion led in particular to the exclusion of the securitization of tax revenues, implemented by the Portuguese government in 2003. This was a financial operation enacted in order to fulfil the budget deficit target and, although it affected tax revenues as recorded in national accounts, it did not impact the amounts actually paid by economic agents.[3] Consequently, it is unlikely to have directly affected economic activity.

For the purpose of deriving the quarterly shocks in the next sections, it is useful to distinguish between three types of measures according to the nature of their revenue effects. Firstly, there are measures with a permanent effect on receipts and for these the annualised long-term (*i.e.,* on-going) figure is retained.[4] Occasionally some tax changes of this type, such as those regarding the value added tax rates, are quantified in the sources for less than a full year and taking into consideration the seasonality of the relevant macroeconomic base. Such seasonal effects must be undone in the calculation of the annualised figure. Secondly, our sample comprises measures that affect revenue only temporarily, and these are quantified on the basis of the overall variation in receipts resulting from the measure. Finally, a third category consists of measures that switch revenue from one year to the other: for instance, an increase in prepayments of the corporate income tax, or in the amounts withheld at source in the personal income tax, offset by a decrease in balances due or an increase in refunds in the following year. These measures while taking

2 Many of these changes were part of the State Budget, although there were several exceptions. In Portugal the State Budget for the next year is usually submitted to Parliament in October and, after approval, it comes into force in January.

3 In the subsequent years, however, there is some evidence that the securitization operation may have pressured for a more efficient tax collection.

4 Note that some of these measures may have additional temporary short-term revenue effects which have to be considered when a time of payment perspective is adopted in the compilation of shocks - see section 4.1.

effect permanently have a yearly revenue profile akin to that of measures with a temporary nature, in that revenue changes initially but goes back to the original level after some time.

Recent decades featured frequent modifications in tax legislation and this made it possible to compile a comprehensive list of around 70 measures with a potential effect on economic activity over the period 1996-2012. This list is shown in Appendix A and it includes the year of implementation, the tax concerned, a brief description of the measure and its quantification (as a percentage of nominal GDP). Moreover measures are classified according to their effects into permanent, temporary and revenue-switching.

3. The role of motivations behind tax changes and endogeneity concerns

The adequate estimation of the effects of tax changes on GDP growth requires a series of tax shocks that are exogenous, i.e. do not respond to current and future economic developments, in order to avoid the so-called simultaneity bias. In order to understand this bias, consider the effects on GDP of an endogenous policy measure, say, deliberately taken to prevent a recession. If this measure was successful, output would grow «normally» following it and an econometrician would have wrongly concluded that it had no impact on output.

Previous studies using the narrative method focused on the motivation behind tax measures as a way to concentrate on exogenous actions. Tax measures deemed endogenous in Romer and Romer (2008) are taken in response to information about current or prospective economic developments and include countercyclical policy and spending-driven tax changes. In contrast, measures classified as exogenous include namely those targeted at fostering long-term growth and reducing inherited fiscal imbalances. The relevance of these criteria in the Portuguese case is now discussed.

As to countercyclical policy, in the sample period there is only one episode that can be considered as a discretionary government action aimed at stabilising the economy, comprising a few measures taken around the international financial crisis that erupted in 2008. The Portuguese action plan (Iniciativa para o Investimento e o Emprego) within the 2009 European Economic Recovery Plan, along with other measures already implemented in 2008 and described in the documents as having a countercyclical motivation (see, for example, Ministério das Finanças, 2009, Chapter II.4), had nevertheless a rather modest size (annualised effect of around 0.1 percent of GDP). Note that the major fiscal measures enacted under this action plan were on the expenditure side. Other measures that brought down the tax burden in the same period, such as the reduction of the standard rate of the value added tax, were not part of the official documents related to the fiscal stimulus and thus cannot be classified as pursuing macroeconomic stabilisation.

Such a lack of importance of the countercyclical motive, unlike previous studies using the narrative approach for the US and the UK, is also related to the sample period. Those studies are based on extended samples that start shortly after WWII, and thus include the «golden age» of fiscal policy as a tool for demand management. Also in the US and the UK there were hardly any countercyclical tax measures after 1980 until recently.

Regarding spending-driven tax policy, there is no evidence in the documents analysed for Portugal of changes in taxes responding to measures on the expenditure side. In fact, the conduct of fiscal policy in Portugal and the approach followed in setting-up the budget may not favour such a direct link between expenditure and revenue measures.

While some measures in Table 1 - for example the reductions of the corporate income tax rate - can be seen as motivated by the desire to promote long-term growth, the major motivation behind tax changes in Portugal over the last decade has been the need to comply with the Stability and Growth Pact rules. Measures intending to curb deficits and enhance fiscal sustainability generally qualify as exogenous in the Romer and Romer (2008) typology. Nevertheless, the Portuguese and European contexts have

specificities that follow from the emphasis on a target defined by reference to the actual deficit in the Stability and Growth Pact. This may establish a link between downturns in economic activity and the need to implement fiscal tightening.

There is evidence of pro-cyclical discretionary fiscal policy in Portugal (Cunha and Braz, 2009) as the European Monetary Union integration process required keeping the deficit below the reference level in a period of low GDP growth. More generally, Agnello and Cimadomo (2009) find evidence of a pro-cyclical behaviour of legislated revenue changes prior to the recent financial crisis for European Union countries, indicating that this was not a peculiarity of the Portuguese fiscal policy. However, besides macroeconomic developments, many other factors may trigger episodes of budgetary slippage such as hikes in health- or age-related expenditure. In any case, when measuring the effects of tax shocks, a specification controlling for past economic conditions is used and this accounts for the possibility of a response to them.

Finally, some of the tax changes considered were part of fiscal consolidation packages involving simultaneously measures on the expenditure side. This tends to bring about a contemporaneous correlation with spending shocks (Pereira and Wemans, 2013, find this kind of evidence for Portugal) and is taken into account in the robustness exercises.

4. Transforming the measures into a quarterly series of tax shocks

4.1 The benchmark approach: focusing on the time of payment

The construction of a quarterly series of tax shocks requires that the effect on revenue of each measure is assigned to a particular quarter (or quarters). This is far from a mechanical procedure and in many cases a deep knowledge of each measure's particularities is necessary. For instance, the way a change in personal income tax rates or deduction rules affects the behaviour of economic agents may depend on whether such change modifies the amounts withheld at source or, instead, the tax refunds in the following year. The principle followed in deriving the benchmark shock measure was to date tax changes in accordance with the time taxes have to be paid.

This focus on the implementation date is also adopted by Romer and Romer (2010) and Cloyne (2011) for their benchmark analysis. In fact, there is strong microeconomic evidence mainly for the United States that anticipated changes in taxes influence the behaviour of economic agents at time they take effect (e.g. Johnston et al., 2006), suggesting the impact on disposable income as a key channel of transmission of tax shocks to economic activity (see Jappelli and Pistaferri (2010) for a review of the literature on consumption responses to changes in income). In the Portuguese case this approach is further justified by the existence of a significant share of liquidity constrained income.[5] Moreover the importance of the implementation date may reflect other factors, such as a lack of detailed information on tax policy measures that would allow economic agents to accurately predict the change in future tax payments they entail.

The time of payment rule applies as follows. The most straightforward case consists of measures with permanent effects, affecting tax payments made in a continuous way, for example, concerning the value added tax rates or the personal income tax, if fully reflected on the withholding tables. Such actions are recorded once, in the quarter of implementation, by 1/4 of the annualised revenue change. Note that they represent a permanent level shift in revenues from that quarter onwards and our shock measure tries to capture changes in taxation.

5 Castro (2006) estimates a 40 per cent share of liquidity constrained income for Portugal between the mid-nineties and 2005. In addition, this study finds a positive relationship between this share and the unemployment rate, a fact that could support an increase of liquidity constrained income in recent years.

Some legislated tax changes affect revenue in a temporary way. These are recorded by the variation in the amounts raised in each quarter, and are cancelled by a symmetrical shock in the following quarter, reflecting the return of receipts to the original level.

A particularly difficult case concerns permanent measures that affect intermittent tax payments, in the sense that they occur only in specific quarters of the year. This is especially the case of payments of the corporate income tax[6] and the annual refunds of the personal income tax. On the one hand, in order to adhere strictly to the time of payment principle, shocks should be recorded in the quarter of payment and cancelled in the next (given the absence of a payment). However, such a recording would have to go on forever. On the other hand, these tax payments generally concern previous year's income or wealth, and therefore a certain smoothing behaviour by agents appears plausible. In particular, corporations are typically in a good position to forecast tax their liabilities and, in addition, face less liquidity constraints than households and adopt an extended horizon in their investment decisions. Therefore, for these measures the time of payment approach is applied taking the year (instead of the quarter) as a reference. We assume that economic agents consider the change in the payments for the year as a whole owing to the measure and incorporate this information in their behaviour from the first quarter[7] (for measures coming into force in January, which is usually the case). Such change is thus spread uniformly over the four quarters, and 1/4 of it is recorded in the first quarter.

Measures switching revenue from one year to the other - see section 2 - are, in the first year, recorded following the rules for permanent measures. This typically leads to assigning to the first quarter 1/4 of the change in revenue for the year as a whole. In the next year (first quarter) there is a symmetrical cancellation recording, given the return of revenues to the original level.

4.2 An alternative approach: focusing on approval dates and cumulative liabilities

The idea behind the construction of the benchmark series of shocks is that the relevant moment for measuring the macroeconomic effects of taxation is when agents have to pay their taxes. However if the behaviour of consumers was primarily influenced by their permanent income expectations, the relevant moment would instead be when they learned that their future disposable income would change. In this case, they would modify their behaviour at the time of credible announcement of the measure. Similarly, firms may adopt a multi-year horizon for some of their investment decisions, particularly large scale ones[8], the relevant piece of information being in this case the long-run change in tax liabilities.

This approach brings the timing of the shock closer to the moment of announcement of the underlying measure, and in this sense is also more adequate to capture possible impacts on economic activity through the expectations channel (for instance, a positive impact of measures that enhance the soundness of the fiscal stance). The time of credible announcement of a measure is approximated by the date of approval of the respective legislation[9] (the exact date considered was that of publication in the *Diário*

6 The corporate income tax code foresees prepayments equal to between 70 and 90 per cent of the previous year's tax liability that take place in three instalments in July, September and December. The settlement of the final tax liability occurs in May of the following year.

7 In the case of changes in the corporation income tax rates, further assumptions have to be made (see Pereira and Wemans, 2013b).

8 In contrast, the recording of the tax shock taking as a reference the amount to be paid over the one-year horizon, in the time of payment approach, may provide a better basis for assessing the effects of taxes on small-scale investment decisions (such as acquisition of transportation equipment).

9 It is very difficult to construct a shock measure that goes beyond this. Agents usually learn about a measure before approval, but the moment this happens is hard to establish. At the same time, many measures are dropped or strongly modified in the course of the legislative procedure, and one would need an assessment about the probability agents attach to the approval of each proposal.

da República). In calculating the cumulative change in liabilities, short-term revenue effects related to pre-payments or refunds do not matter.

In the case of permanent measures affecting continuous tax payments, the time of payment and cumulative liabilities approaches differ only to the extent that there is a lag between approval and implementation. Note that, in this case, there are no short-run revenue effects that originate a difference *vis-a-vis* the long-run figure. In the cumulative liabilities approach measures that affect taxes paid intermittently are recorded once, by 1/4 of the annualised long-run revenue change. For measures temporarily affecting receipts, the shock is assigned to the quarter when the respective legislative change was approved, by the overall change in revenue, and cancelled in the following one. Finally, measures switching revenue from one year to the other are disregarded, as it is assumed that economic agents realise that these have no effect on their net tax liabilities.

4.3 An overview of the series of tax shocks

The series obtained in the time of payment approach are illustrated in Chart 1 for shocks to direct taxes (including social security contributions), and in Chart 2 for shocks to indirect taxes. The shaded areas signal the periods when GDP contracted for at least two consecutive quarters.

In the case of direct taxes, there is a first major negative shock in the initial quarter of 2001, resulting from the combination of a reduction in the corporate income tax rate and the reform of the personal income tax coming into force in 2001 (the shock measure also reflects the cancellation of the temporary effect of the increase in the corporate income tax prepayments in 2000). The special scheme for the payment of tax arrears («perdão fiscal»), in the last quarter of 2002, gave rise to a particularly noticeable shock affecting both direct and indirect taxes, matched by a negative one in the following quarter. This programme allowed tax arrears with a legal collection date until 31 December 2002 to be settled without paying interest or fines.[10] After that, there is a significant negative shock in 2005 that reflects the lagged

Chart 1

SHOCKS TO DIRECT TAXES | AS A PERCENTAGE OF GDP

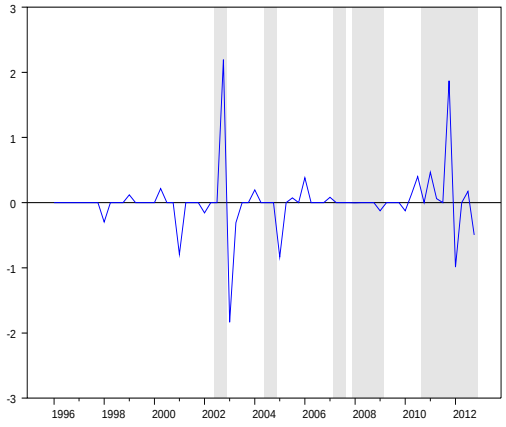
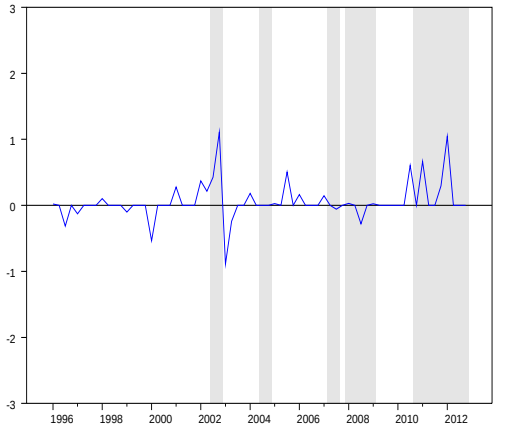


Chart 2

SHOCKS TO INDIRECT TAXES | AS A PERCENTAGE OF GDP



Source: Authors' calculations.
Note: Shaded areas are the periods when GDP contracted for two or more consecutive quarters.

10 This shock has a specific nature in that it does not concern taxes to be paid but instead taxes that ought to have been paid. Still it captures a unique episode of a very large change in the amount of tax payments mostly concentrated in one quarter. Therefore it was considered in the estimation - but in a robustness section we show how results change when this episode is excluded.

effects of the corporate income tax rate reduction of 2004. In the later sample years, several measures led to a series of positive shocks to direct taxes, the largest one being the 2011 personal income tax surcharge, impacting chiefly the last quarter of that year and, given its temporary nature, originating a cancelation in the subsequent quarter.

Regarding indirect taxes, besides the special scheme for the payment of tax arrears, already mentioned, several increases in the value added tax rates translated into significant positive shocks. The change in the average rate of the tax on oil products in 2000 was the most significant tax reduction in the sample period. More recently, in 2012, there is another large positive shock, brought about by the application of the standard value added tax rate to goods previously subject to the reduced or intermediate rates.

To conclude, the special scheme for the payment of taxes in 2002 clearly stands out as the most significant shock in the sample. Moreover, the measures taken in the period before and in the course of the Economic and Financial Assistance Programme also give rise to a prominent sequence of shocks. Note further that there is a positive contemporaneous correlation between direct and indirect tax shocks (the correlation coefficient is about 0.45). This mirrors the fact that many tax policy measures were aimed at fiscal tightening, and were not, in particular, shifts between different types of taxation. This is in contrast with the evidence in Princen et al. (2013), who analyse discretionary tax measures between 2001 and 2012 in several EU countries and find evidence of increases in indirect taxes, matched by cuts in direct taxes, targeting a shift to growth-friendlier tax bases.

5. Effects of tax policy on output

5.1 Benchmark results

The macroeconomic impacts of the tax shocks derived in the previous section can be assessed on the basis of reduced-form specifications, under the assumption that the shocks do not respond to contemporaneous or prospective changes in economic activity. As explained in section 3, within our set of legislated tax changes only very few have a countercyclical motivation: these are identified and can be easily excluded from the estimation. We come back to this issue below.

The specification used (see Pereira and Wemans, 2013b) regresses output growth ($\Delta ln\, y_t$) on the contemporaneous value and on 4 lags of the shock measure (ΔT_{t-i}) and 4 own lags:

$$\Delta ln\, y_t = \alpha + \sum_{i=0}^{4} \beta_i \Delta T_{t-i} + \sum_{i=1}^{4} \gamma_i \Delta ln\, y_{t-i} + e_{t.} \qquad (1)$$

The regression is in first differences because the shock measure captures changes in taxation. The shock series starts in 1996:Q1. Given that 4 lags of the variables are included, the estimation, by ordinary least squares, uses a sample between 1997:Q1 and 2012:Q4. GDP and all the other macroeconomic variables considered are seasonally adjusted prior to estimation. The effect of the shocks is determined as a cumulative dynamic multiplier. As it is plausible that some components of GDP, notably private investment, react to tax shocks with a lag greater than one year, we also report the results considering 8 lags of the shock measure.

Chart 3 presents the effects on output of an increase in taxes of 1 percentage point of GDP and one-standard-deviation confidence bands[11] for the benchmark tax shock measure. The response of GDP is negative and builds up steadily, attaining -1.3 percent after one year, and -2.7 percent after three

11 The bands for this and the other dynamic multipliers throughout the paper were obtained by a standard Monte-Carlo procedure, drawing 1000 vectors of coefficients from a multivariate normal with mean and variance-covariance given by the least squares point estimates. An output response for each draw was computed; the standard deviation across all responses is presented.

years. In the subsequent period it strengthens a bit further, to around -3.0 percent, and remains thereafter at this level, being thus highly persistent. This effect on output is statistically significant, although the confidence bands are wide. These findings indicate that legislated tax increases (decreases) have a powerful recessive (expansionary) impact on economic activity. The high persistence of the output response suggests a possible role of incentives and other factors on the supply side in the transmission of tax policy to economic activity. However, the uncertainty surrounding the estimates for longer horizons does not allow clear conclusions in this respect.

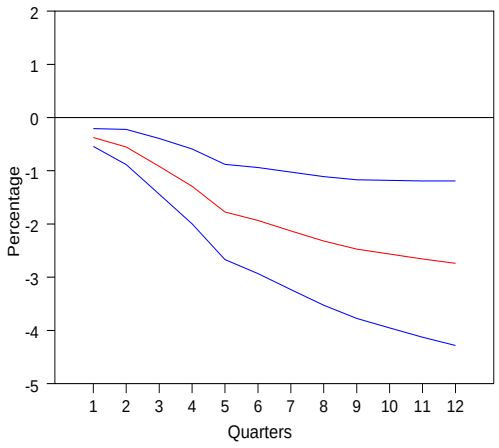
Excluding from the shock series the few tax changes that have a countercyclical motivation, the output response remains virtually the same. Therefore in the remainder of the paper the full set of legislated changes is considered. Furthermore, if the lag length of the shock measure is increased to 8 in equation (1), the trajectory of output deviates only slightly from that presented in Chart 3, decreasing by 1.2 percent one year out and 2.9 percent three years out.

Comparing with previous studies using the narrative approach, Romer and Romer (2010) and Cloyne (2011) report negative impacts on output which take between two to three years to build up and reach maxima, respectively, around -3.0 and -2.5 percent of GDP. Moreover, the first of these studies also finds a rather persistent output response. Such magnitudes for the impact of taxes are much in line with the ones for Portugal.[12]

Breaking down taxes into direct and indirect[13], the point estimates (not shown) indicate a fall in output by 0.7 percent after one year and 2.2 percent after three years, following a 1 percent of GDP change in direct taxes and by, respectively, 2.3 and 3.0 percent, following an identical change in indirect taxes. Therefore, as far as point estimates are concerned, there is a sizeable negative impact on economic activity for both categories of taxes. However, the confidence bands widen noticeably in comparison to Chart 3 and, albeit still clearly indicating a negative sign, encompass a zero response (see Pereira and Wemans, 2013b).

Chart 3

OUTPUT RESPONSE TO DISCRETIONARY TAX POLICY



Source: Authors' calculations.
Note: The shocks amount to 1 percent of GDP.

12 Cloyne notes that the similarity of the results for the UK and for the US is surprising, given the very different tax systems in the two countries, as well as sources used and procedures followed to obtain the shock series. It is interesting to note that we have reached the same type of findings for Portugal.

13 In estimating the effects of direct and indirect taxes separately, it is necessary to take into account that shocks to the two types of taxes are contemporaneously correlated (see section 4.3) and thus each series has to be included in the equation used to measure the other's effect on output.

5.2. Robustness: outliers and controlling for expenditure

As seen in section 4.3 a number of tax policy actions stand out for their size, notably the special scheme for the payment of tax arrears in 2002 («perdão fiscal») and several measures taken during the recent period of fiscal consolidation, from 2010 to 2012. Such large tax changes are legitimate observations to consider. Nevertheless one may ask whether they are driving the large negative effects of taxation on GDP documented above, given that our sample is small and the mentioned tax increases (albeit partly temporary) coincided with periods of contraction in economic activity (see Charts 1 and 2).

In order to address this issue, we (i) dropped the amounts related to the special scheme for the payment of tax arrears from the shock series, and (ii) considered a sample ending in 2010:Q2. Note that this last exercise implies the loss of about 1/5 of the degrees of freedom available. The GDP responses are shown, respectively, in Charts 4 and 5 (the benchmark response from Chart 3 is also shown, for comparison). As far as the point estimates are concerned, the impact on GDP remains virtually unchanged when the special scheme for the payment of tax arrears is dropped, and weakens but only to a small extent when the last two and a half years are excluded from the sample. The most visible change consists in the widening of the confidence bands, particularly in the second case, which is not surprising given the reduction in the number of degrees of freedom. Overall these robustness exercises indicate that the benchmark results are not being driven by particular episodes of legislated increases in taxes, although they also underline the great uncertainty surrounding a precise quantification of the impact they have on output.

As referred to in section 3, some of the changes in taxation were part of consolidation packages including measures on the expenditure side. Assuming a conventional effect of public spending shocks on GDP, a negative correlation of the latter shocks with tax shocks would tend to overstate the measured depressive impact of taxation. A possible way to assess whether this is causing a substantial bias is to include government expenditure and its lags in equation (1).

The response of output to changes in taxes controlling for spending[14] (not shown) is indeed less negative than the benchmark response, but without making much of a difference (they almost coincide for the first four quarters and three years out the fall in GDP is now 2.3 instead of 2.7 percent). It is worth

Chart 4

OUTPUT RESPONSE TO DISCRETIONARY TAX POLICY, DROPPING «*PERDÃO FISCAL*»

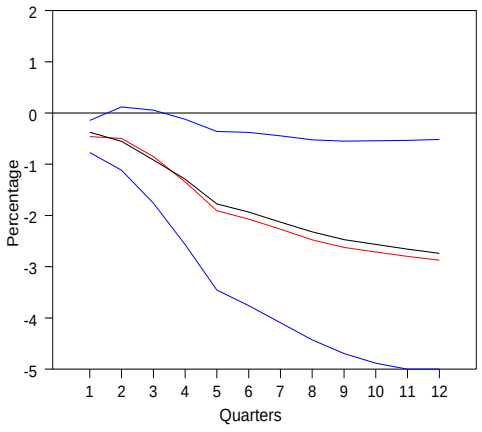
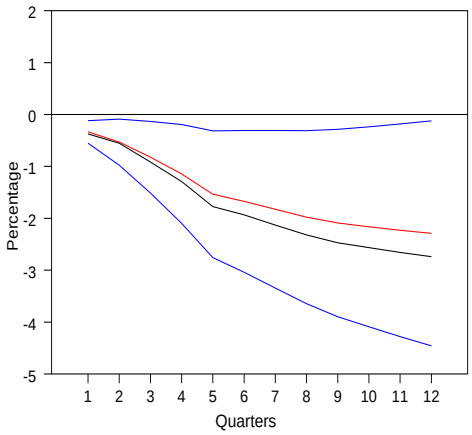


Chart 5

OUTPUT RESPONSE TO DISCRETIONARY TAX POLICY, SAMPLE ENDING IN 2010:Q2



Source: Authors' calculations.
Note: The shocks amount to 1 percent of GDP. The benchmark response is shown in black.

14 Government spending is defined as the sum of government consumption and investment plus social transfers. Moreover, like GDP, it enters the equation in growth rates.

noting that the inclusion of expenditure in equation (1) allows controlling for shocks to this variable but has the unwanted consequence of holding fixed the trajectory of the variable following tax shocks (expenditure may react to them both directly or indirectly, following the GDP response). This may exaggerate the reduction in the recessive effect of tax shocks when expenditure is taken on board, given the pro-cyclical behaviour of important expenditure categories - see Pereira and Wemans (2013a) - which is likely to override the countercyclical response of some others, like unemployment benefits. In any case, our findings clearly indicate that the inclusion of expenditure is relatively unimportant for the measured effects of discretionary exogenous taxation on GDP.

5.3. A comparison with SVAR results

The narrative approach has most commonly led to larger tax multipliers than the SVAR approach. For example, the multiplier estimated for the US post-war economy by Romer and Romer (2010) reaches -3, while SVARs multipliers for the US usually do not come much beyond -1.[15] The findings of Cloyne (2010) indicate a GDP response similar to the one in Romer and Romer, associating the narrative approach with high negative tax multipliers. Such a tendency is confirmed by the results obtained for Portugal. In fact, the effects of tax shocks presented above are much stronger than the ones estimated in Pereira and Wemans (2013a) using an SVAR.

A direct comparison of the SVAR results with the benchmark results derived from equation (1) would ignore the fact that the two experiments mimic different situations. In fact, in the benchmark analysis above the experiment is a permanent change in taxes. In contrast, in SVARs shocks may decay, i.e. these models yield the output response following a typical tax shock. In order to have more comparable experiments, an alternative to equation (1) is considered, in the form of a bivariate VAR including our shock measure and output growth (see Pereira and Wemans, 2013b). Chart 6 shows the results obtained for this last specification and the SVAR results.[16]

Although both methodologies yield negative effects on GDP, the difference between the results is statistically significant, with the GDP response in the SVAR reaching a maximum of -0.3 percent against -2.4 percent in this study. When taxes are broken down, the point estimates of the GDP responses diverge both for direct and indirect tax shocks. However, more so in the second case as the response hovers around zero in the SVAR while the point estimates are always strongly negative in the narrative approach (though also lacking statistical significance).

Some possible reasons for the different findings in the two methodologies for expenditure shocks have been put forward in the literature. Ramey (2011), focusing on the impact of military spending on GDP and private consumption, has blamed the failure of SVARs to capture the anticipation of fiscal policy measures by economic agents for the differences vis-a-vis the narrative approach. Recall that SVARs generally date tax shocks when revenue is affected, while in the narrative approach, for the reasons given in section 4.1, the benchmark analyses have been based on a time of payment rule. The latter rule corresponds approximately (though not exactly - this point is further discussed below) to the moment revenue changes, taken in the SVARs. Therefore the gap between the GDP responses to tax shocks presented in the empirical work under each methodology cannot be ascribed to anticipation effects.

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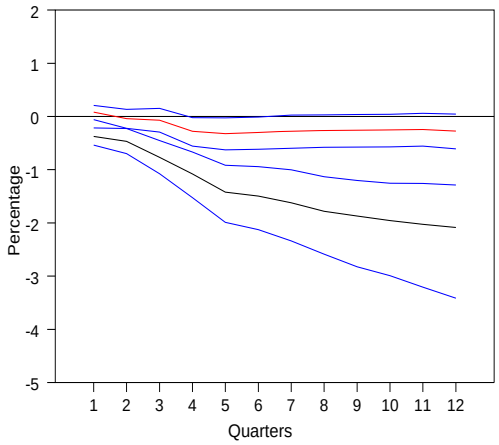
15 This is the general trend although in each of the two methodologies the measured impact on economic activity depends on the precise specification used. In addition there is important subsample sensitivity, which further complicates the comparison.

16 Given that in Pereira and Wemans (2013a) the sample ends in the last quarter of 2011, we have replicated the SVAR methodology extending the sample to the last quarter of 2012, in order to eliminate the gap to the sample period in the narrative method. This makes, however, little difference.

Chart 6

OUTPUT RESPONSES TO DISCRETIONARY TAX POLICY FOR THE SVAR (IN RED) AND THE NARRATIVE (IN BLACK) METHODOLOGIES



Source: Authors' calculations.
Note: The shocks amount to 1 percent of GDP.

Naturally tax shocks in the two methodologies differ in many other ways. In particular, in SVARs they are extracted from the series of total tax revenues, assuming a given elasticity to GDP in order to isolate automatic contemporaneous movements in taxation. The elasticity calibrated into the SVAR model - being only an approximation - is a first reason for the divergence in the findings. Indeed some studies have stressed the sensitivity of SVAR results to changes in calibrated elasticities. For Portugal, however, Pereira and Wemans (2013a) show that their main findings are quite robust to the elasticities assumed, which does not support this particular hypothesis.

The content of shocks is also intrinsically different, as SVAR shocks capture all deviations from systematic policy, while the narrative approach concentrates on discretionary legislated policy (not responding to economic activity), i.e. usually significant and clearly acknowledged actions. Thus SVAR shocks include many changes in revenue that may not be perceived as changes in taxation by economic agents, or at least be perceived as relatively less important ones, such as improvements in the efficiency of tax collection. Moreover, the dating of the shocks in the SVAR approach will depend on accounting rules that can deviate from the date taxes have to be paid, relevant for the narrative approach. This can happen especially in the case of the value added tax as there is a significant lag (albeit partly corrected in national accounts) between the time consumers pay the tax and when companies pass on the amounts collected to the tax authorities. Furthermore, fluctuations in refunds of this tax bring about an important variation in revenues that is irrelevant for consumers. This could help justify the particularly big discrepancy in the findings for the indirect tax multiplier.

The quantitative importance of changes in tax revenues not explained by the business cycle nor legislative actions can be large. Kremer *et al.* (2006) estimate that for Portugal in the period 1998-2004 such changes, in absolute average and annual terms, stood at 0.4 percent of GDP, above the figure for the legislated changes (0.3 percent). This phenomenon is likely to be even more pronounced when quarterly data are used as they are more affected by short-run volatility in revenues. Consequently the differences in the content of shocks might be the most important single explanatory factor for the larger tax multipliers found in the narrative approach vis-a-vis SVARs.

6. Output response in the cumulative liabilities approach

The benchmark results are based on a shock measure derived assuming that the time of payment is the correct timing for the transmission of discretionary fiscal policy to economic activity. This emphasis on the implementation date is justified by the evidence that consumers respond to changes in current disposable income. Nevertheless, alternative assumptions cannot be ruled out, in particular, that economic agents modify their behaviour at the time a given measure is passed and consider at once the cumulative change in liabilities for the future. The approach put forward in section 4.2 brings the shock measure closer to these assumptions.

As it turns out the output response for the cumulative liabilities series comes rather close to the one for the time of payment series, both in terms of level and profile (Chart 7). The same holds as regards the statistical significance (not shown). This is likely to stem from an important correlation between the shocks in the two approaches. In particular, these coincide for most permanent measures affecting revenues collected continuously over the year. Furthermore, in Portugal the approval of tax changes often does not take place much before implementation, and there are almost no examples of important multi-year tax plans, factors that could amplify the differences between the shocks in the two approaches.[17] Lastly, owing to the inclusion of a number of lags of the shock measure in equation (1), this specification may in some cases still capture the effect of shocks on economic activity reasonably well, as a lagged impact, even if the right timing is missed.

Given the limited variability in terms of characteristics of tax measures in our dataset, a more interesting experiment is to consider the GDP response in a regression where one includes both shock series at the same time. This regression captures only the effects on economic activity of those parts of the shocks which do not overlap (as the other shock measure is held constant in the regression). The confidence bands around the GDP responses (not shown) become rather wide, in such a way that they comprise a zero response in both cases. This is likely to reflect the fact that the focus is now on the effects of a portion of the full shocks. Taking into account such lack of statistical significance, the conclusions that follow must be essentially read as hints.

Chart 7

OUTPUT RESPONSES TO DISCRETIONARY TAX POLICY FOR DIFFERENT SHOCK MEASURES

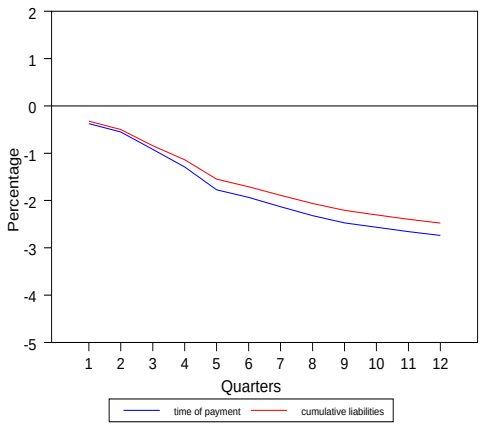
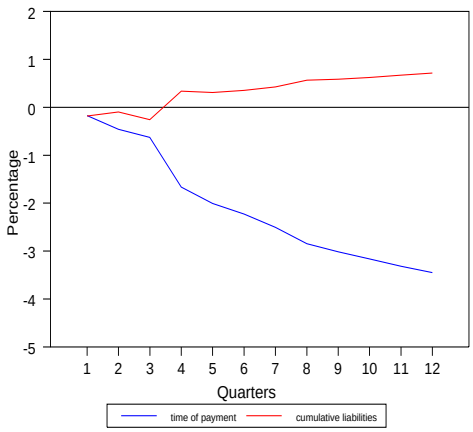


Chart 8

OUTPUT RESPONSE TO DISCRETIONARY TAX POLICY CONTROLLING FOR THE ALTERNATIVE SHOCK MEASURE



Source: Authors' calculations.
Note: The shocks amount to 1 percent of GDP.

17 Multi-year tax measures are recorded sequentially under the time of payment approach, but only once at the date of approval, for the global amount, under the cumulative liabilities approach.

The trajectory of output following shocks dated in accordance to the time of payment, controlling for the cumulative liabilities series, comes close to that observed for the shock measure as a whole (Chart 8). This provides support to the assumption that output responds to tax changes at the time of implementation. The response of output for the cumulative liabilities measure, holding constant the time of payment series, is initially nil and after about one year it becomes positive albeit small. As said the cumulative liabilities approach is comparatively more suitable for measuring the effects on the economy operating through expectations. Such evidence goes thus against the permanent income theory, but it would be compatible, among other hypotheses, with a positive impact on the confidence of economic agents of tax increases reflecting a prospective improvement in the fiscal stance. Romer and Romer (2010) also document a positive - statistically non-significant - relationship with economic activity for their present-value measure (which bears similarity to our cumulative liabilities measure) when controlling for their benchmark series. Consistently, Mertens and Ravn (2011) find that the tax changes in the Romer and Romer dataset that could be anticipated (in the sense that were announced at least one quarter prior to implementation) have before implementation a positive relationship with output (reversed after implementation).[18]

7. Response of output components

This section studies the trajectory of some GDP components, namely private consumption and private investment, following legislated tax changes, for the benchmark shock measure. The specification used in doing so is similar to (1), but replacing GDP by the relevant demand component. Following a rise of 1 percent of GDP in taxes, private consumption falls by about 2.0 percent after one year, and 3.5 percent after three years (Chart 9). This is slightly more than the fall in GDP, but overall the responses of the two variables are very much in line with each other. The responses of consumption of non-durables and durables (Chart 10) differ, as expected, by showing a much more pronounced fall for the latter, which stands at 8.3 and 10.6 percent, respectively, one and three years out. In contrast, the corresponding

Chart 9

RESPONSE OF PRIVATE CONSUMPTION TO DISCRETIONARY TAX POLICY

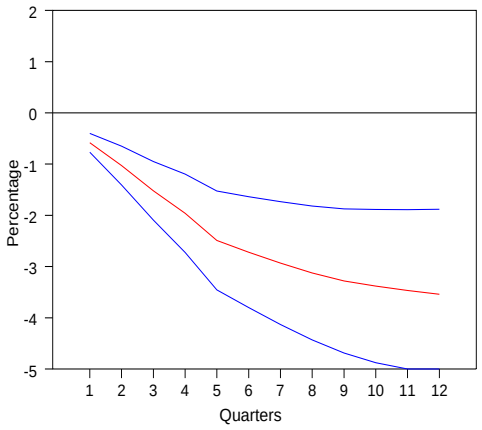
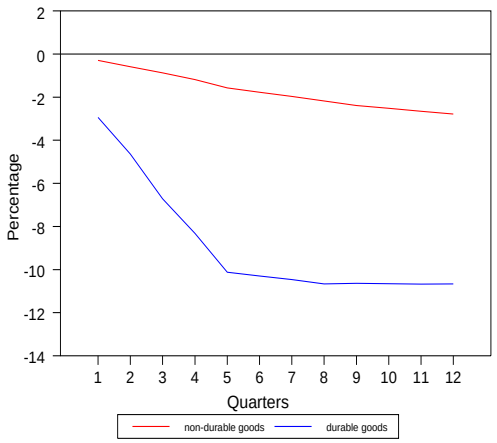


Chart 10

RESPONSES OF CONSUMPTION OF NON-DURABLE AND DURABLE GOODS TO DISCRETIONARY TAX POLICY



Source: Authors' calculations
Note: The shocks amount to 1 percent of GDP.

18 Note however that the experiment in Mertens and Ravn is not fully comparable with what is done in our study and Romer and Romer. In fact Mertens and Ravn take the Romers' benchmark series and split it into two sub-sets: anticipated and non-anticipated shocks. But note that the Romers' benchmark measure differs from their present-value measure not only as regards timing but also the amounts recorded (similarly to the two alternative shock measures in our study).

reductions in the consumption of non-durables are 1.2 and 2.8 percent. The confidence bands (not shown) indicate that both responses are statistically significant.

Tax policy may have distinct impacts on corporate investment depending on the transmission channel. While the traditional interest rate channel implies a rise in investment following a tax increase, negative effects are also possible, e.g. indirectly through the recessionary impact on output or, in the case of the corporation income tax, the reduction in prospective profitability. Unfortunately the response of private investment to the measure of tax shocks developed in this paper does not shed light on this issue for Portugal. In fact, except for the quarter of impact, in which the response (not shown) is positive, from the second quarter on the confidence bands are approximately symmetrical around a zero response. We increased the number of lags of the shock series up to 8, and used the shock measure based on cumulative liabilities, which could be more adequate in this context, but without coming to very different conclusions. When broken down between investment of households and corporations the responses remain statistically non-significant. For the latter variable, there is a sign change from positive to negative after about two years but, given the degree of uncertainty, it is difficult to assess whether this is meaningful in any way.

While for Portugal the depressing effect of tax shocks appears essentially linked to private consumption, the abovementioned studies for the US and the UK also report a strong recessionary impact on private investment.

8. Concluding remarks

This study develops a quarterly series of discretionary tax policy shocks for Portugal, based on the legislation and contemporary budgetary analyses. It covers the period from 1996 to 2012. Moreover the sample period is characterized by a high density of measures that have been mostly exogenous, in the sense that they were independent from current and prospective macroeconomic conditions. The benchmark analysis is based on the assumption that economic agents respond to changes in taxes when their current income is affected.

The estimated multiplier effects of tax shocks on economic activity are negative and high, in line with the results of other studies belonging to the same strand of the literature. Legislated tax changes of 1 percent of GDP reduce output by 1.3 percent one year out. These estimates are statistically significant, although surrounded by a reasonable degree of uncertainty, and are robust to a number of variations in the specification used to measure the impacts and to the exclusion of abnormally large measures. The evidence thus suggests that legislated increases (decreases) in taxes have considerable recessionary (expansionary) effects. A shock of the same magnitude has an effect on consumption of around -2.0 percent after one year. Consumption of durables responds particularly strongly to changes in taxation.

This paper also considers an alternative shock measure better suited for capturing a possible role of expectations in the transmission of fiscal policy. Note that the conduct and implementation of tax policy in Portugal does not provide a good setting for studying the issue, as most measures affect income close to the date of approval. With this caveat, there is a hint of a positive relationship between the expectations component of tax changes and economic activity. This could theoretically stem from beneficial effects on economic growth coming from the prospect of fiscal consolidation.

The estimated impact of changes in taxation on economic activity for Portugal is much stronger in this paper than in previous work using the SVAR methodology, as it has been the case for other countries. This gap can be ascribed to many differences in the two methodologies, where the content of the shock figures prominently. While in the narrative approach shocks come strictly from discretionary exogenous government policy, in SVAR they reflect many other factors to which economic agents may respond differently. In fact the two methodologies embody exercises that are not exactly equivalent.

Note finally that the narrative shock measures, as the one developed in this study, fit in with the alternative indicators of fiscal effort recently put forward by the European Commission (2013, Part III).

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Appendix A (continues)

LIST OF TAX POLICY MEASURES IN PORTUGAL, 1996 TO 2012

Year	Tax	Brief Description	Quantification (% GDP)
1996	IVA	Introduction of an intermediate rate (12%) in July (p.e.)	-0.32
1996	ISP	Change in the average tax rate (p.e.)	0.02
1997	IRC	Tax rate reduction from 36 to 34% (p.e.)	-0.17
1997	ISP	Change in the average tax rate (p.e.)	-0.12
1998	ISP	Change in the average tax rate (p.e.)	0.1
1999	ISP	Change in the average tax rate (p.e.)	-0.1
2000	IRC	Increase in the prepayment rate from 75 to 85% for high-profit firms (r.s.e.)	0 (+/-0.26)
2000	IRC	Introduction of lower rates for companies located on inland regions and for small companies plus a reduction in the tax rate from 34 to 32% (p.e.)	-0.22
2000	ISP	Change in the average tax rate (p.e.)	-0.52
2001	IRS	Reductions on the tax rates and inclusion of an additional bracket (p.e.)	-0.24
2001	ISP	Change in the average tax rate (p.e.)	0.27
2002	IRS	Especially strong update of bracket limits on withholding tables (r.s.e.)	0 (-/+0.25)
2002	IRS	Special scheme for the payment of tax arrears (t.e.)	0.17
2002	IRC	Special scheme for the payment of tax arrears (t.e.)	0.33
2002	IRC	Tax rate reduction from 32 to 30% (p.e.)	-0.14
2002	IVA	Standard tax rate increase from 17 to 19% in June (p.e.)	0.64
2002	IVA	Special scheme for the payment of tax arrears (t.e.)	0.23
2002	ISP	Change in the average tax rate (p.e.)	0.37
2002	Other indirect	Special scheme for the payment of tax arrears (t.e.)	0.11
2002	Social contributions	Special scheme for the payment of tax arrears (t.e.)	0.13
2003	IRC	Increase in the special advanced payment rate (p.e.)	0.1
2003	ISP	Change in the average tax rate (p.e.)	-0.03
2004	IRC	Tax rate reduction from 30 to 25% (p.e.)	-0.45
2004	ISP	Change in the average tax rate (p.e.)	0.18
2005	IRS	Decline in tax rates compensated by a reduction of tax credits (r.s.e.)	0 (-/+0.12)
2005	IVA	Standard tax rate increase from 19 to 21% in July (p.e.)	0.51
2005	ISP	Change in the average tax rate (p.e.)	0.03
2005	Social contributions	Increase of self employed social contributions in July (p.e.)	0.07
2006	IRS	Reintroduction of tax credits (p.e.)	-0.08
2006	IRS	Introduction of a new top bracket (p.e.)	0.02
2006	IRS	Gradual increase in the taxation of income from pensions (p.e.)	0.04
2006	ISP	Rise in the tax rate (p.e.)	0.13
2006	IT	Multi-year increase of the unitary tax component (p.e.)	0.09
2007	IRS	Elimination of the different treatment of married and single taxpayers (p.e.)	-0.02
2007	IRC	Changes in the taxation of dividends (p.e.)	0.02
2007	ISP	Rise in the tax rate (p.e.)	0.12
2007	Other indirect	Reform of the taxation of vehicles in July (p.e.)	-0.04
2007	Social contributions	Increase of the public employees and pensioners contribution to their health system (p.e.)	0.06

Appendix A (continuation)

LIST OF TAX POLICY MEASURES IN PORTUGAL, 1996 TO 2012

Year	Tax	Brief Description	Quantification (% GDP)
2008	IRS	Increase in tax credits (p.e.)	-0.04
2008	IRC	Introduction of tax benefits (p.e.)	-0.01
2008	IRC	Change in the calculation of taxable income (p.e.)	0.04
2008	IMI	Reduction in top tax rates by mid-year (p.e.)	-0.04
2008	IVA	Decline in the standard tax rate from 21 to 20% in July (p.e.)	-0.28
2009	IRS	Raise in tax benefits to people with disabilities (p.e.)	-0.02
2009	IRC	Rate cut from 25 to 12.5% applied to low values of taxable income (p.e.)	-0.1
2009	IRC	Changes in the rules for prepayments (r.s.e.)	0 (+/-0.03)
2009	IRC	Reduction in the special prepayment limit (p.e.)	-0.03
2009	IT	Increase in the tax rate (p.e.)	0.01
2010	IRS	Special surcharge on the income from pensions and labour of 1% for the 3rd and 4th income brackets and 1.5% for the higher brackets in July (p.e.)	0.39
2010	IRS	Increase of withholding rates on capital income in July (p.e.)	0.02
2010	IRS	Introduction of a new bracket with a marginal rate of 45% to be applied to taxable income exceeding 150.000 euros (p.e.)	0.01
2010	IRC	Increase of 2.5 p.p. in the rate applied to high taxable profits	0.12
2010	Other direct	Special taxation scheme for undeclared income from capital held abroad (t.e.)	0.05
2010	IVA	Increase in all rates by 1 p.p. in July (p.e.)	0.61
2011	IRS	New ceilings for tax benefits; higher taxation of capital gains and reduction of the deduction applicable to pensions' income above 22.500 euros (p.e.)	0.11
2011	IRS	Extraordinary surcharge of 3.5% on 2011's taxable income (t.e.)	0.58
2011	IRC	Introduction of a ceiling to tax benefits (p.e.)	0.06
2011	Other direct	Effect of the introduction of a new tax on the banking sector (p.e.)	0.09
2011	IVA	Increase in the standard rate from 21 to 23% (p.e.)	0.6
2011	IVA	Increase of the rate applied to electricity and natural gas in October (p.e.)	0.29
2011	ISP	Reduction of tax benefits (p.e.)	0.08
2011	Social contributions	Entry into force of the new contributory code; increase in the contributory rate for public employees from 10 to 11% (p.e.)	0.16
2012	IRS	Reduction of tax benefits (p.e.)	0.37
2012	IRS	Increase in the taxation of pensions (p.e.)	0.07
2012	IRS	Solidarity surcharge on highest pensions (p.e.)	0.01
2012	IRS	Increase of the taxation on capital income (p.e.)	0
2012	IRC	Surcharge initiated in 2010 extended to profits exceeding 1.5 million euros plus introduction of a surcharge on profits exceeding 10 million euros (p.e.)	0.11
2012	IMI	Increase of top and bottom tax rates and elimination of exemptions (p.e.)	0.03
2012	Other direct	Special taxation scheme for undeclared income from capital held abroad (t.e.)	0.16
2012	IVA	Changes in the lists of goods and services subject to reduced rates (p.e.)	0.99
2012	IT | IABA	Increase in excise taxes (p.e.)	0.06
2012	ISV	Update of the tax (p.e.)	0.01

Sources: Banco de Portugal and Ministério das Finanças.
Notes: IVA-Value Added Tax; ISP-Tax on Oil Products; IRC-Corporate Income Tax; IRS-Personal Income Tax; IT-Tax on Tobacco; IABA-Tax on Alcohol and Alcoholic Beverages; ISV-Tax on Vehicle Sales; IMI-Municipal Tax on Real Estate; p.e.-permanent effects; t.e.-temporary effects; r.s.e.-revenue switching effects.

THE DETERMINANTS OF DOWNWARD WAGE RIGIDITY: SOME METHODOLOGICAL CONSIDERATIONS AND NEW EMPIRICAL EVIDENCE*

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ASBSTRACT

This article discusses the identification of the determinants of downward wage rigidity and illustrates empirically its importance in Europe. It is shown that the models estimated so far in the literature suffer from econometric problems that prevent the contributions of those determinants to be correctly identified or precisely estimated. An empirical exercise, along the lines discussed in this article, using survey data for 15 European Union countries, shows that the results may significantly differ from the ones previously obtained in the literature. Together, the theoretical considerations and the estimated results suggest that new empirical evidence is required before definite conclusions on the determinants of downward nominal or real wage rigidity can be drawn.

1. Introduction

There now is an extensive empirical literature aiming at identifying the factors that explain why the importance of downward nominal and/or real wage rigidity may differ across firms, sectors or countries. The estimated models usually regress a measure of downward nominal or real wage rigidity, computed at the firm, sectoral or country level, on a number of variables the theory suggests as potentially important to explain such differences (see, among others, Dickens *et al.*, 2007, Holden and Wulfsberg, 2008, Caju *et al.*, 2009, Messina *et al.*, 2010 and Babecky *et al.*, 2010).

In this article, we pinpoint some methodological issues involving existing empirical literature on downward nominal or real wage rigidity and provide empirical evidence on the importance of downward nominal wage rigidity and its determinants in some European countries. Hereafter, we will denote downward nominal wage rigidity as DNWR and downward real wage rigidity as DRWR.

As regards the existing empirical literature, we argue that in some cases the regressors used may not be defined in a proper way (*e.g.*, Dickens *et al.*, 2007, Holden and Wulfsberg, 2008, Caju *et al.*, 2009 and Messina *et al.*, 2010), and that, in some others, the estimated models may not be specified correctly (*e.g.*, Babecky *et al.*, 2010). The first situation may imply potential important biases for the estimated parameters. The second has the implication that the model parameters cannot be interpreted as measuring the importance of the regressors for downward wage rigidity.

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Using survey data for 15 European Union countries, we perform an empirical exercise, taking into account some of the remarks made in the article. It is shown that downward rigidity in nominal base wages is pervasive in Europe.

A probit model, estimated over the firms scheduled for a base-wage cut, suggests that the degree of downward nominal base-wage rigidity increases with the proportion of "high-skilled white-collar workers" and the importance of "wage agreements negotiated outside the firm", and decreases with the "degree of competition" faced by the firm. The "incidence of permanent contracts", the "labour share", the "tenure" or the "proportion of workers covered by collective agreements", suggested by the economic theory as potential relevant factors, do not emerge as having a significant impact on downward nominal base-wage rigidity. These results differ significantly from the ones previously obtained in the literature, suggesting that, at least, some of the methodological considerations raised in this article have important practical implications.

The article is organised as follows. Section 2 briefly reviews the empirical literature on downward wage rigidity. Section 3 discusses some methodological issues involving the literature that has tried to identify the relevant determinants of wage rigidity. Section 4 illustrates these issues by estimating a model using survey data for several European countries. Section 5 concludes.

2. Empirical evidence on the determinants of downward wage rigidity

The literature on wage rigidity has suggested several statistics to gauge the importance of DNWR and DRWR. Here, we focus on the measures used, for instance, in Dickens and Goette (2006), Dickens *et al.,* (2007), Holden and Wulfsberg (2008), Caju *et al.,* (2007), Caju *et al.* (2009), Messina *et al.,* (2010), and Babecky *et al.,* (2010).

The measures of DNWR or DRWR suggested in Dickens *et al.* (2007), attempt to capture the fraction of workers who would receive a (nominal or real) wage freeze when they were scheduled for a (nominal or real) wage cut, whether due to individual performance or to external conditions. More specifically, for DNWR it is assumed that everyone who had a nominal wage freeze would have had a nominal wage cut in the absence of downward nominal rigidity and the authors suggest using the following statistic:

$$dnwr_1 = \frac{A}{A+B} \tag{1}$$

where A is the number (or fraction) of workers whose wages have been frozen and B the number (or fraction) of workers whose wages have been cut.

This measure of DNWR differs from the one discussed in Dickens and Goette (2006), and used for instance in Caju et al., (2007), Caju *et al.* (2009), and Messina *et al.* (2010), in that it does not exclude the number of wage freezes that would have taken place in the absence of any DNWR. This alternative measure may be written as:

$$dnwr_2 = \frac{A-C}{A-C+B} \tag{2}$$

where C stands for the number (or fraction) of workers whose wages would have been frozen in the absence of DNWR. This is usually estimated by assuming an underlying "counterfactual or notional distribution" that would have been observed under fully flexible wages.[1] Taken together, A-C+B stand

1 In order to identify the notional or counterfactual distribution, it is usually assumed that such distribution is symmetric and that the upper half of the distribution of observed wage changes is unaffected by wage rigidities (see, for instance, Card and Hyslop, 1997, Altonji and Devereux, 2000, Fehr and Goette, 2005, Goette *et al.*, 2007, and Dickens *et al.* 2007). However, the assumption that the upper half of the distribution of observed wage changes is unaffected by wage rigidities, *i.e.*, that DNWR (or DRWR) operates only at zero nominal (or real) wage growth has been challenged in the most recent literature. See Holden and Wulfsberg (2009), Elsby (2009) and Stüber and Beissinger (2012).

for the number (or fraction) of workers for whom there was the intent of reducing the base wages. The use of $dnwr_2$ addresses one important limitation of $dnwr_1$, given that this last measure assumes that all the firms that freeze their wages would have cut them in the absence of DNWR, *i.e.* $C=0$. Henceforth, for simplification, we will refer to A-C+B or only to A+B as the workers scheduled for a wage cut.

These two measures of DNWR are usually computed at the sectoral, industry or country level by aggregating data on wages at the worker level (see, Messina *et al.*, 2010, Caju *et al.*, 2009, Holden and Wulfsberg, 2008, and Dickens *et al.*, 2007) and may be interpreted as measuring the fraction of wage cuts prevented by downward nominal wage rigidity.

Statistics similar to $dnwr_1$ and $dnrw_2$, denoted below as $drwr_1$ and $drwr_2$, have been constructed to gauge the importance of DRWR, where A now stands for the fraction of workers with real wage freezes (wage changes equal to inflation or expected inflation), B for the fraction of workers with real wage cuts and C for the fraction of workers who would have received a real wage freeze in the absence of any downward real wage rigidity (again computed by assuming a counterfactual or notional distribution for the real wage changes distribution).[2]

The bulk of the literature on wage rigidity has tried to identify the factors that may explain why some sectors, countries or firms display higher downward wage rigidity than others, based on the previous measures of wage rigidity. Examples for DNWR are Dickens *et al.* (2007) who use $dnwr_1$, and Holden and Wulfsberg (2008) and Messina *et al.* (2010), who use $dnwr_2$. Examples for DRWR are Dickens *et al.*, (2007), who use $drwr_1$, and Caju *et al.,* (2009) and Messina *et al.,* (2010), who use $drwr_2$.

Using data at the country level, Dickens *et al.,* (2007) compute the correlation between $dnwr_1$ (and $drwr_1$) and a very large set of factors that may potentially explain the differences in the degree of wage rigidity across countries. Such factors include union density, union coverage, degree of coordination in bargaining, the fraction of temporary workers, index of employment protection legislation, a corporatism index, etc. As regards $dnwr_1$, for none of the regressors was the relationship statistically significant at the 5 percent level, while for $drwr_1$ only the relationship with union density was significant at the 5 percent level. Strangely enough, however, the union density and the union coverage emerged as negatively correlated with nominal wage rigidity.

A similar exercise was performed in Holden and Wulfsberg (2008). The authors compute a $dnwr_2$-type measure for 19 countries and test whether inflation, unemployment, union density and the EPL (employment protection legislation index) help explaining differences on DNWR across countries. Messina *et al.*, (2010) for Belgium, Denmark, Spain and Portugal and Caju *et al.,* (2009) for Belgium, using sectoral data, also evaluate whether the workforce and firms' characteristics (as measured by firm size, the proportion of high-skilled white and blue collar workers, the incidence of firm-level wage agreements, the degree of competition, etc.) may help explaining why DNWR or DRWR is higher in some countries or in some sectors than others.

An important feature common to all these empirical contributions is that the regressors defined, either at the sectoral or country level, are computed using all the workers in the sample (*i.e.*, in the corresponding sector or country) and not just the workers scheduled for a wage cut (*i.e.*, workers whose wages were frozen or cut). This, as we shall argue below, may have important implications for the estimates of the parameters of the regressions used in those papers.

Recently, Babecky *et al.,* (2010) used the proportion of firms in the economy that have frozen base wages as a statistic to gauge the importance of DNWR and identify its determinants. We denote such a measure by:

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2 See, for instance, Dickens and Goette (2006), and Dickens *et al.* (2007).

$$dnwr_3 = \frac{D}{N} \tag{3}$$

where D is the number of firms whose wages have been frozen and N is the total number of firms in the sample. This measure differs from $dnwr_1$ in that it uses the firm as the relevant unit (not workers) and, more importantly, in that it compares the number of firms that have frozen their base wages with the total number of firms rather than with the firms that have frozen or cut their wages, as the previous statistics do.

Babecky *et al.,* (2010) use firm-level survey data for 15 European countries to identify the factors that might explain why some firms display higher DNWR or DRWR than others. These authors consider that firms that froze their base wages show evidence of DNWR, while firms that have an automatic indexation mechanism linking base wages to (past or expected) inflation are subject to DRWR. Some issues concerning the contribution by Babecky *et al.,* (2010) will be discussed further below.

3. Identifying the determinants of downward wage rigidity: Problems with the empirical literature

As we have seen above, the definitions of DNWR and DRWR, as well as the statistics suggested in the literature, namely $dnwr_1$, $dnwr_2$, $drwr_1$ and $drwr_2$, involve only the workers whose wages have been scheduled for a wage cut, i.e., have been frozen or cut, leaving aside the remaining workers whose wages have increased. However, this important fact seems to have been overlooked by the models estimated in the literature aimed at identifying the factors that may explain why DNWR or DRWR is higher in some countries, sectors or firms than others. In fact, for those statistics, all the regressions (including simple correlations) estimated in the literature use regressors that involve the full set of workers and not just the workers scheduled for a wage cut. Similarly, in the case of $dnwr_3$, used in Babecky *et al.*, (2010), the model is estimated using all the firms in the sample and not just the firms for which wages have been frozen or cut.

This section discusses the implications for the parameters of the estimated models stemming from these facts. We distinguish between the use of $dnwr_1$, $dnwr_2$, $drwr_1$ and $drwr_2$, on the one side, and of $dnwr_3$ on the other side.

3.1 Use of $dnwr_1$, $dnwr_2$, $drwr_1$ and $drwr_2$

In order to make the presentation more intuitive, let us take the union coverage (proportion of workers covered by collective wage agreements) as an example of a regressor, which is commonly used in the regressions that involve $dnwr_1$, $dnwr_2$, $drwr_1$ and $drwr_2$ as dependent variables.

According to the literature, it is expected that unionised workers will exhibit higher downward (nominal and real) wage rigidity (see, for instance, Holden, 2004, Dickens *et al*., 2007, Holden and Wulfsberg, 2008 and 2009). Thus, for sector (or country) j let us define:

S_{1j} = Number of workers covered by collective agreements whose wages have been frozen;

S_{2j} = Number of workers covered by collective agreements whose wages have been cut;

S_{3j} = Number of workers covered by collective agreements whose wages have increased;

$S_j = S_{1j} + S_{2j} + S_{3j}$ =Total number of workers covered by collective agreements;

N_{1j} = Total number of workers whose wages have been frozen;

N_{2j} = Total number of workers whose wages have been cut;

N_{3j} = Total number of workers whose wages have increased;

$N_j = N_{1j} + N_{2j} + N_{3j}$ =Total number of workers.

As regards measure $dnwr_1$ for sector (or country) j, which we denote by $dnwr_{1j}$, we note that from equation (1) we have

$$dnwr_{1j} = \frac{A_j}{A_j + B_j} = \frac{N_{1j}}{N_{1j} + N_{2j}} \tag{4}$$

so that the identification of $dnwr_1$ in sector (or country) j involves the workers that have their wages frozen or cut, but not the workers in the sample that have their wages increased. The same goes for $dnwr_2$, $drwr_1$ and $drwr_2$.[3]

However, in the empirical literature, union coverage in sector or country j is computed using all the workers in the sector or country j:

$$\text{coverage}_j = \frac{S_j}{N_j} = \frac{S_{1j} + S_{2j} + S_{3j}}{N_{1j} + N_{2j} + N_{3j}} \tag{5}$$

where the correct measure, that follows directly from the definitions of DNWR and DRWR, should be given by:

$$\text{coverage}_j^* = \frac{S_{1j} + S_{2j}}{N_{1j} + N_{2j}} \tag{6}$$

that is, the proportion of workers covered by collective agreements among those scheduled for a wage a cut (*i.e.*, those who had their wages frozen or cut).

According to the theory, $coverage_j$* is expected to have a positive impact on $dnwr_{1j}$ because the higher the proportion of workers covered by collective agreements, among those scheduled for a wage a cut, the higher the degree of DNWR, *i.e.*, the higher the number of workers whose wages are frozen (as opposed to being cut). To put it slightly different: out of the population of workers scheduled for a wage a cut, for two otherwise identical workers, the worker covered by a collective agreement will display higher probability of having his wage frozen (or a lower probability of having his wage cut).

But what about $coverage_j$, the measure used so far in the empirical literature? We notice that we may decompose $coverage_j$ as:

$$\text{coverage}_j = \alpha_j.\text{coverage}_j^* + \beta_j. \tag{7}$$

where α_j stands for the fraction of workers scheduled for a wage cut and β_j for the coverage of workers not scheduled for a wage cut in sector (or country) j, *i.e.*:

$$\alpha_j = \frac{N_{1j} + N_{2j}}{N_{1j} + N_{2j} + N_{3j}}, \qquad \beta_j = \frac{S_{3j}}{N_{1j} + N_{2j} + N_{3j}} \tag{8}$$

According to equation (7), by using coveragej, instead of $coverage_j$*, we are permitting that variations in coverage in other parts of the economy as captured by β_j (workers of the same sector or country not scheduled for a wage cut) affect the coverage variable without affecting the fraction of wage cuts prevented by downward wage rigidity, *i.e.*, without affecting the measures of DNWR or of DRWR. The same goes for α_j, the fraction of workers scheduled for a wage cut, which is expected to vary across sectors or across countries. Thus, the use of $coverage_j$, instead of $coverage_j$*, is likely to have important consequences for the estimate of the parameter aimed at measuring the impact of coverage on DNWR or DRWR.

3 More precisely, in the case of the statistics $dnwr_2$ and $drwr_2$, N_{1j} should be computed by excluding the fraction of workers whose wages would have been frozen in the absence of downward wage rigidity.

This problem applies to all the regressors considered in the empirical literature that has used the statistics $dnwr_1$, $dnwr_2$, $drwr_1$ and $drwr_2$ at the sectoral or country level to identify the relevant determinants of DNWR and DRWR, and may explain why such studies have found it so difficult to get significant correlations with the expected sign. This is an issue deserving further empirical investigation, as soon as appropriate worker-level data become available.

3.2 Use of $dnwr_3$

We now consider the case of $dnwr_3$ used in Babecky *et al.* (2010). These authors use survey data to investigate the causes of DNWR and DRWR at the firm level.[4] In order to identify the factors that may explain why some firms are subject to DNWR while others are not, Babecky *et al.* (2010) estimate a probit model where the dependent variable, yi, is a dummy variable which equals one, if the firm answers in the survey that the base wages of their workers have been frozen ($\Delta w_i=0$), and is zero otherwise. If we denote this model by Model A, we have:

Model A:

$$y_i=1 \ if \ \Delta w_i=0, \qquad y_i=0 \ if \ \Delta w_i\neq 0$$

We notice that this model is estimated over the full sample, *i.e.*, including not only the firms that have frozen or cut their wages, but also the firms whose wages have increased.[5]

To better understand the implications of model A for the estimated parameters we start by introducing two additional models which we denote by models B and C:

Model B:

$$y_i=1 \ if \ \Delta w_i=0, \qquad y_i=0 \ if \ \Delta w_i<0$$

Model C:

$$y_i=1 \ if \ \Delta w_i=0, \qquad y_i=0 \ if \ \Delta w_i>0$$

We notice that model B is obtained by restricting model A to firms whose wages have been frozen or cut, *i.e.*, to firms whose workers were scheduled for a wage cut, and that model C is obtained by restricting model A to firms whose nominal base wages were frozen or raised.

From the discussion above it should now be clear that Model B is the model to be estimated if one wants to correctly identify the factors that explain why some firms are subject to DNWR while others are not. Notice that it implies estimating a model using just the firms whose workers were scheduled for a wage cut. In this model, it is expected that the parameter associated with "coverage" will have a positive impact on the probability of a firm having their wages frozen as opposed to have them cut, *i.e.*, of being subject to DNWR.[6]

In contrast, the estimates for the parameter associated with "coverage" in model C may be expected to

4 Further details on the approach by Babecky *et al.,* (2010) are provided in the next section.

5 In rigour, the authors estimate a bivariate probit model to account for the interdependence between their measures of DNWR and DRWR which are investigated together in their paper. This, however, is not relevant for the point made in this section which concerns the sample used and not the type of model estimated. Moreover, as we shall show below, the empirical results are basically the same when a univariate or a bivariate model is used.

6 Notice that now "coverage" is a firm-level variable defined as the proportion of workers covered by collective wage agreements, because the endogenous variable is a binary variable which assumes that either all the workers in the firm have their wages frozen or none have.

be either negative or zero depending on the assumptions about the shocks that might have hit the firms in the sample. If we assume that all the firms in the sample were hit by similar negative shocks, one may expect the estimate of the coefficient associated to coverage to be negative: the higher the coverage in the firm, the lower the probability of having its wages frozen (as opposed to have them increased). If we assume that firms not scheduled for a wage cut were not hit by (large enough idiosyncratic) negative shocks and that such shocks were randomly distributed across firms (the implicit identifying assumption that underlies the statistics $dnwr_1$, $dnwr_2$, $drwr_1$ and $drwr_2$ discussed above), then the parameter associated to ``coverage" in model C is expected to be equal to zero.

The estimates for the parameters of model A, used in Babecky *et al.,* (2010), are a weighted average of those estimated for models B and C. Ultimately, the sign and the magnitude of the estimated parameters in model A would depend on the proportion of firms with positive and negative wage changes, as well as on the distribution of shocks across the firms in the sample. In most samples, the proportion of wage increases is much higher than the proportion of wage cuts, so that in model A one should not be surprised if some parameters turn out not to be significantly different from zero or even wrong signed. More importantly, however, parameters in model A cannot be interpreted as measuring the impact of DNWR on wages, *i.e.*, they do not measure the importance of DNWR in preventing wage cuts.

4. Evidence on the importance of DNWR and its determinants

We now investigate the extent and the determinants of DNWR in Europe, taking into account the discussions of the previous section concerning the use of $dnwr_3$. The dataset used is based on the results of a survey of firms conducted by the National Central Banks of 15 European Union countries between 2007 and 2008. The full sample covers around 14,600 firms from different sectors of activity (manufacturing, energy, construction, market services, non-market services, trade, and financial intermediation).

Our dataset matches closely the one used in Babecky *et al.,* (2010), though they differ in some respects. Ours is an updated version of the original dataset, whose major difference is the inclusion of the information for Cyprus, which was not available to be used in Babecky *et al.* (2010). In turn, in contrast with Babecky *et al.,* (2010), our dataset excludes the Greek data, given that the survey conducted in Greece has no information on base-wage cuts, which is a variable of interest for us. Finally, we have also excluded from our original sample the firms that have not answered one of the two questions on wage freezes or wage cuts. The final set of countries includes Austria, Belgium, Cyprus, Czech Republic, Estonia, France, Hungary, Ireland, Italy, Lithuania, Netherlands, Poland, Portugal, Slovenia and Spain.[7]

In the survey, firms were asked the following two questions pertaining to downward nominal wage rigidity: a) "Over the last five years, has the base wage of some employees in your firm ever been frozen?" and b) "Over the last five years, has the base wage of some employees in your firm ever been cut?"

Besides these questions on base-wage freezes and base-wage cuts, the survey also contained information on a large number of worker and firms' characteristics. These include information on the composition of the labour force (tenure, share of white collar vs. blue collar workers, share of low skilled *vs*. high skilled workers, share of workers with permanent contracts), the percentage of workers covered by collective wage agreements, the type of collective wage agreement prevailing at the firm (firm-level or outside agreement), the degree of competition faced by the firm, the number of employees, the labour cost share, etc.

The responses to the two questions on wage freezes and wage cuts are used to define the endogenous variable in the model to be estimated below, while the remaining information is used to construct the corresponding exogenous regressors.

7 For further details on the design of the survey, see Druant *et al.,* (2012) and Babecky *et al.,* (2010).

4.1 Wage freezes, wage cuts and DNWR

A summary of the responses to the two questions pertaining to downward nominal wage rigidity is presented in Table 1. Columns (2) and (3) present the fraction of firms that froze or cut base wages and column (4) presents an estimate of $dnwr_1$, *i.e.*, the fraction of base wage cuts prevented by DNWR (see equation (1)).[8]

From the table, we see that the prevalence of base-wage cuts is extremely rare. On average, for the 15 countries only 1.6 percent of the firms cut base wages of some employees over the last five years. In turn, 7.1 percent of the firms froze base wages. The Czech Republic, Netherlands and Estonia stand out with the highest incidence of base-wage freezes (around 20 percent of the firms).[9]

From Table 1, we also see that our aggregate measure of DNWR, as defined in equation (1), is about 82 percent. This means that, on average, downward wage rigidity prevented scheduled base-wage cuts from taking place in about 82 percent of the firms in the 15 European Union countries in our sample.

Table 1

BASE-WAGE FREEZES, BASE-WAGE CUTS AND DNWR | COUNTRY BREAKDOWN

	Base-wage freezes	Base-wage cuts	DNWR
	(2)	(3)	(4)
Austria	0.079	0.036	0.689
Belgium	0.053	0.017	0.758
Cyprus	0.147	0.041	0.784
Czech Republic	0.221	0.076	0.744
Estonia	0.195	0.025	0.887
France	0.066	0.018	0.787
Hungary	0.057	0.022	0.722
Ireland	0.074	0.016	0.818
Italy	0.038	0.008	0.833
Lithuania	0.149	0.073	0.671
Netherlands	0.209	0.014	0.936
Polan	0.078	0.042	0.647
Portugal	0.147	0.012	0.924
Slovenia	0.023	0.032	0.417
Spain	0.020	0.001	0.946
Total[(a)]	0.071	0.016	0.823

Source: Author's calculations.
Notes: Columns (2) and (3) are the proportions of firms that froze or cut their base wages. DNWR corresponds to the measure dnwr1 for base wages as defined in equation (1). With the exception of the last line, it is obtained by dividing column (2) by the sum of columns (2) and (3). **(a)** Weighted average for the 15 countries (GDP weights).

8 Some of our figures on the incidence of wage freezes differ from the ones presented in Babecky *et al.* (2010). We believe that the main source of divergence stems from the fact that figures in Babecky *et al.* (2010), are employment-weighted while our figures in Table 1 are not. The fact that we are using a slightly different sample may also help explaining the differences.

9 The use of the fraction of wage freezes as a measure of DNWR has been criticized in the literature. Dickens *et al.,* (2007) pointed out that "the fraction of workers with nominal wage freezes in a year varies with the expected rate of inflation and so could be a misleading basis for thinking about the extent of wage rigidity". More generally, the incidence of wage freezes observed in a given year depends on the sign and magnitude of the shocks that hit the firms in the sample in that particular year, so that there might be firms potentially subject to downward wage rigidity that did not freeze or cut wages because they were not hit by large enough negative shocks. This limitation does not necessarily apply to $dnwr_1$ in column (4) of Table 1. Even though the fraction of workers scheduled for a wage cut is expected to depend on the sign and magnitude of the shocks, the fraction of wage freezes prevented by downward nominal wage rigidity may be largely independent of economic conditions.

From the table, we also see that Spain, the Netherlands and Portugal rank among the countries with the highest degree of DNWR (base-wage cuts prevented in between 92 and 95 percent of the firms), while Slovenia, Poland, Lithuania and Austria stand out as the countries with the lowest DNWR (base-wage cuts prevented in between 41 and 69 percent of the firms).

Despite the differences in the method and in the datasets used, it might be interesting to compare the figures in Table 1 with the estimates of DNWR computed in Dickens *et al.* (2007) for the 7 countries common to the two datasets: Austria, Belgium, France, Ireland, Italy, Netherlands and Portugal.[10] With the exception of Ireland which shows up with the lowest DNWR in Dickens *et al.* (2007), the rankings for the other six countries closely match in the two datasets: Portugal, Netherlands and Italy define the group with the highest DNWR, while France, Belgium and Austria the group with the lowest DNWR.

It is important to stress that, these estimates should be read with particular care because, as referred before, they are based on a measure that assumes that wage freezes would not exist in the absence of DNWR. In addition, these estimates are based on firm-level data and not on worker-level data, *i.e.*, it is implicitly assumed that all the workers in the firms involved are scheduled for a wage cut, regardless of the share of workers covered by the wage cuts or freezes.

4.2 An econometric model for the determinants of downward nominal wage rigidity

In order to identify the determinants of DNWR, we estimate a probit model restricting the original sample to firms scheduled for a wage cut. Thus, our dependent variable, yi is defined such that $y_i=1$ if the firm has frozen wages and $y_i=0$ if the firm has cut wages. For comparability reasons, we also present the results when all the firms in the sample are used as in Babecky *et al.* (2010). In this case, the dependent variable is defined such that $y_i=1$, if the firm has frozen wages, and $y_i=0$, otherwise, thus including firms where base wages were cut, as well as firms where base wages were not frozen nor cut.

The choice of the exogenous regressors used in the empirical model was guided by the literature on downward wage rigidity. These include firm-level regressors aimed at measuring the importance of workers' and firms' attributes such as the tenure, the proportion of high- and low-skilled white- and blue--collar workers, the importance of labour costs, the proportion of permanent employees, the proportion of employees covered by collective wage agreements (coverage), the type of union contracts (firm-level or outside agreement), the degree of competition and the size of the firm. The Appendix describes how these regressors were constructed.[11]

Table 2 presents the results of the estimated models and Table 3 the average marginal effects of each of the covariates on the probability of a firm freezing wages. As data for the full set of regressors is not available for the 15 countries we estimate two variants of the model. The first variant, in columns (2) and (3), includes the regressors available for the full sample composed of 15 countries. The variant in columns (4) and (5) includes 4 additional regressors (coverage, tenure between 1 and 5 years, tenure above 5 years and competition) which are available for 8 countries only (Austria, Czech Republic, Estonia, Hungary, Ireland, Lithuania, Poland and Portugal).[12]

The first important point to notice is that the estimates for the average marginal effects in column (2) of

10 The estimates of DNWR in Dickens *et al.,* (2007) use the statistic $dnwr_i$ (see equation (1)) based on worker-level data taken from households surveys or administrative data on individuals.

11 For a review of the literature underlying such regressors, see Babecky *et al.,* (2010).

12 The four regressions include country dummies to account for fixed effects whose estimated coefficients are not reported in Tables 2 and 3. These country dummies enable us to control for variations in any country-specific omitted factor, such as differences in the survey design across countries, different degrees of employment protection legislation, different inflation rates, etc.

Table 2

PROBIT MODEL | ESTIMATED COEFFICIENTS

Regressors	Full sample	Restricted sample	Full sample	Restricted sample
	(2)	(3)	(4)	(5)
Low-skilled blue collar	-0.2875***	-0.0102	-0.2191***	-0.0466
	(0.0693)	(0.1808)	(0.1031)	(0.2461)
High-skilled blue collar	-0.1326*	-0.3403*	-0.1804*	-0.4465
	(0.0773)	(0.2080)	(0.1097)	(0.2858)
Low-skilled white collar	-0.1347	0.0376	-0.0538	-0.0987
	(0.0966)	(0.2670)	(0.1392)	(0.3523)
Labour cost share	0.2175***	-0.1347	0.2558**	-0.0421
	(0.0844)	(0.2060)	(0.1270)	(0.2766)
Permanent workers	0.1761	0.0940	0.1740	0.0424
	(0.1086)	(0.2783)	(0.1410)	(0.3482)
Only firm level agreement	0.0121	0.0039	0.0563	0.5525
	(0.0633)	(0.1449)	(0.1809)	(0.4884)
Only outside agreement	-0.0443	-0.0357	0.3044	0.9117*
	(0.0541)	(0.1489)	(0.1976)	(0.5611)
Both agreements	-0.0833	-0.2044	-0.0473	0.5054
	(0.0722)	(0.1792)	(0.1977)	(0.5387)
Coverage	-	-	-0.1813	-0.6452
			(0.1911)	(0.5173)
Tenure 1-5 years	-	-	0.3636**	0.4552
			(0.1737)	(0.4215)
Tenure above 5 years	-	-	0.4635***	0.3162
			(0.1523)	(0.3535)
High competition	-	-	0.0125	-0.2715**
			(0.0519)	(0.1253)
Size=20-49	0.1019**	0.0106	0.0913	0.0611
	(0.0510)	(0.1246)	(0.0791)	(0.1745)
Size=50-199	0.1818***	-0.1460	0.1654**	-0.2021
	(0.0489)	(0.1173)	(0.0755)	(0.1734)
Size=200+	0.1521***	-0.1920	0.1777*	-0.2361
	(0.0575)	(0.1420)	(0.0922)	(0.2118)
Construction	-0.2255***	-0.1406	-0.2042**	-0.0533
	(0.0686)	(0.1610)	(0.0893)	(0.2177)
Trade	-0.0873*	-0.0820	-0.0673	-0.0365
	(0.0504)	(0.1206)	(0.0719)	(0.1576)
Other services	-0.0660	-0.0512	-0.1057	-0.1599
	(0.0441)	(0.1096)	(0.0692)	(0.1555)
Number of observations	12855	1381	4799	696
Number of countries	15	15	8	8
	X^2=573.68	X^2=120.87	X^2=165.83	X^2=61.81
	p-value=0.00	p-value=0.00	p-value=0.00	p-value=0.00
	R^2=0.0815	R^2=0.100	R^2=0.0511	R^2=0.0939

Source: Author's calculations.
Notes: Robust standard errors in parentheses. R_2 stands for the Pseudo R_2, and X_2 for the test statistic on the overall significance of the estimated coefficients. ***, ** and * stands for significance at 1, 5 and 10 percent levels, respectively.

Table 3 do not significantly differ from the estimates presented in Babecky *et al.,* (2010). The observed differences seem compatible with the differences in the two datasets and the model used (bivariate vs. univariate probit model). The second point to notice regards the models for the restricted sample in columns (3) and (5). In these models, the number of observations is drastically reduced because the sample is constrained to firms whose workers were scheduled for a wage cut, and wage cuts in the sample are extremely rare, as we have seen.

In the model for the full sample (columns (2) and (4)), there are several regressors whose coefficients are significantly different from zero namely the proportion of low-skilled and high-skilled blue-collar workers, the labour cost share, the tenure and the size.

However, as we argued before, these coefficients cannot be interpreted as gauging the probability of a firm being subject to DNWR, *i.e.*, they do not measure the importance of DNWR in preventing base--wage cuts. The fact that in the full sample we are comparing firms that have frozen base wages with firms that have either cut or increased base wages, makes the estimated parameters uninterpretable.[13]

For the model with the restricted sample, given the relatively small number of wage cuts, one should not expect to find many regressors with statistically significant coefficients. Indeed, it is well known that the estimators of the parameters in probit or logit models are biased in finite samples. Moreover, King and Zeng (2001) show that these biases become especially acute and the conventional variance estimators significantly magnified in the presence of rare events, *i.e.*, when Prob($y_i=1$) (or Prob ($y_i=0$)) is very small. In our case, the small proportion of wage cuts in the population of firms scheduled for a wage cut (around 20 percent), is likely also to make it more difficult to get unbiased and statistically significant coefficients for the parameters of the model.

If we look at the model with the full set of regressors (column (5) in Tables 2 and 3) we see that two regressors emerge with a significant impact on the probability of a firm being subject to DNWR: the existence of (only) outside agreements and high competition. According to Table 3, the probability of a firm being subject to DNWR is about 24 percentage points higher if their wages are negotiated with unions at a level outside the firm (and there are no firm-level agreements). In turn, for a firm operating in a highly competitive environment the probability of being subject to DNWR is about 7 percentage points lower than for an otherwise identical firm. These results are in line with the theory. Cutting base--wages when these are negotiated outside the firm with unions is a difficult task because wages may be changed only by mutual consent (Holden, 2004). In contrast, wages in firms with no union contracts (the reference or baseline group) are expected to be easier to cut in bad times. In turn, firms operating in a highly competitive environment are likely to feel stronger pressure to reduce costs and thus one may expect a more intense adjustment of wages in reaction to shocks.[14]

The estimated results also suggest that the workforce composition is related to downward wage rigidity. The proportion of high-skilled blue-collar workers emerges as a significant regressor in the model with the restricted sample in column (3) and closely to being statistically significant in the model in column (5), despite the strong reduction in the number of observations. In general, according to Table 3, we may say that firms with a larger proportion of high-skilled white-collar workers (the baseline category) are more likely to be subject to DNWR, in line with the efficiency wage theory (the effort of high-skilled workers is more valuable and more difficult to monitor so that firms may be more reluctant to cut their wages).

Interestingly, the share of workers covered by collective wage agreements and the proportion of permanent contracts are not significant in any regression. In contrast to what is found when the full sample is used, the degree of DNWR does not also seem to vary significantly with the labour cost share, the tenure or the size of the firm.

Overall, the estimations in this article show that the empirical evidence on the determinants of downward wage rigidity changes significantly according to whether or not the sample used in the estimation is

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13 Babecky *et al.* (2010), explicitly assume that there are three types of firms in the dataset: 1) firms that have frozen wages are considered as subject to DNWR; 2) firms that apply an automatic wage indexation mechanism are considered as subject to DRWR; 3) firms that do not show signs of DNWR or DRWR are considered as firms with flexible wages. In our view, by bunching together in the third group firms that have cut wages and firms that have increased wages the authors end-up estimating a model where the parameters do not seem to have any obvious interpretation.

14 We consider that a firm is subject to "high competition" if it answered in the survey that it will likely or very likely decrease its price in reaction to a decrease in the price of its main competitor.

Table 3

PROBIT MODEL | AVERAGE MARGINAL EFFECTS

Regressors	Full sample	Restricted sample	Full sample	Restricted sample
	(2)	(3)	(4)	(5)
Low-skilled blue collar	-00417***	-0.0026	-0.0400***	-0.0124
	(0.0100)	(0.0454)	(0.0188)	(0.0657)
High-skilled blue collar	-0.0192*	-0.0855*	-0.0330*	-0.1192
	(0.0112)	(0.0520)	(0.0201)	(0.0758)
Low-skilled white collar	-0.0195	0.0094	-0.0098	-0.0264
	(0.0140)	(0.0671)	(0.0254)	(0.0941)
Labour cost share	0.0315***	-0.0338	0.0467**	-0.0112
	(0.0123)	(0.0518)	(0.0232)	(0.0739)
Permanent workers	0.0255	0.0236	0.0318	0.0113
	(0.0157)	(0.0699)	(0.0258)	(0.0929)
Only firm level agreement	0.0018	0.0010	0.0103	0.1475
	(0.0092)	(0.0364)	(0.0331)	(0.1300)
Only outside agreement	-0.0064	-0.0090	0.0556	0.2435*
	(0.0078)	(0.0374)	(0.0361)	(0.1492)
Both agreements	-0.0121	-0.0513	-0.0086	0.1349
	(0.0105)	(0.0450)	(0.0361)	(0.1436)
Coverage	-	-	-0.0331	-0.1723
			(0.0349)	(0.1376)
Tenure 1-5 years	-	-	0.0664**	0.1215
			(0.0317)	(0.1122)
Tenure above 5 years	-	-	0.0847***	0.0844
			(0.0278)	(0.0943)
High competition	-	-	0.0023	-0.0725**
			(0.0095)	(0.0332)
Size=20-49	0.0153*	0.0027	0.0172	0.0161
	(0.0079)	(0.0312)	(0.0153)	(0.0454)
Size=50-199	0.0276***	-0.0372	0.0312**	-0.0549
	(0.0077)	(0.0303)	(0.0147)	(0.0478)
Size=200+	0.0234***	-0.0502	0.0346*	-0.0657
	(0.0093)	(0.0385)	(0.0191)	(0.0611)
Construction	-0.0290***	-0.0369	-0.0340**	-0.0150
	(0.0077)	(0.0440)	(0.0134)	(0.0599)
Trade	-0.0122*	-0.0210	-0.0120	-0.0098
	(0.0068)	(0.0314)	(0.0126)	(0.0426)
Other services	-0.0094	-0.0129	-0.0189	-0.0436
	(0.0062)	(0.0278)	(0.0121)	(0.0433)
Number of observations	12855	1381	4799	696
Number of countries	15	15	8	8

Source: Author's calculations.
Note: ***, ** and * stands for significance at 1, 5 and 10 percent levels, respectively.

restricted to firms that would have their wages cut in the absence of DNWR. Most of the regressors that emerge with a significant impact when the full sample is used are not significant when the analysis is restricted to firms scheduled for a base-wage cut (labour cost share, tenure and size) while the coefficients that emerge with a significant impact in the restricted sample, with the exception of the skill distribution, are not important when the full sample is used (type of wage level agreement and competition). These results suggest that the methodological considerations raised in this article can have important empirical implications.

5. Conclusions

This article discusses some methodological issues involving the existing empirical literature on downward nominal and real wage rigidity and presents empirical evidence that illustrates its importance and identifies its determinants in some European countries.

As regards the existing empirical literature, it is shown that in some cases the regressors used may not be correctly defined, and that, in some others, the estimated models may be specified properly. The first situation may imply potential important biases for the estimated parameters. The second implies that the model parameters cannot be interpreted as measuring the importance of the regressors for downward wage rigidity.

Using survey data for 15 European Union countries, we perform an empirical exercise, taking into account the remarks made in the article. It is shown that downward rigidity in nominal base wages has played an important role in those countries: on average, it has prevented scheduled base-wage cuts from taking place in about 82 percent of the firms. Nominal base-wage rigidity emerges as especially important in Spain, Netherlands and Portugal and less significant in some eastern countries (Slovenia, Poland and Lithuania).

However, these estimates should be read with particular care because they are based on a measure that assumes, on the one hand, that wage freezes would not exist in the absence of DNWR and, on the other hand, that all the workers in the firms involved are scheduled for a wage cut, regardless of the share of workers affected by the wage cuts or freezes.

A probit model, restricted to firms that would have their base wages cut in the absence of downward nominal wage rigidity, suggests that the importance of downward nominal base-wage rigidity increases with the proportion of "high-skilled white-collar" workers and the importance of "wage agreements negotiated outside the firm", and decreases with the "degree of competition" faced by the firm. The incidence of "permanent workers", the "labour cost share", the "tenure" or the "proportion of workers covered by collective agreements", suggested by the economic theory as potential relevant factors, do not emerge as having a significant impact on downward nominal base-wage rigidity in those countries. These results differ significantly from the ones previously obtained in the literature, suggesting that, at least, some of the methodological considerations raised in this article have important practical implications.

Appendix - Variable Definitions

In this Appendix, we describe the covariates used in the probit models whose results are presented in section 4. The details are as follows:

Low-skilled blue-collar – Proportion of low-skilled blue-collar workers on firm's total employment;

High-skilled blue-collar – Proportion of high-skilled blue-collar workers on firm's total employment;

Low-skilled white-collar – Proportion of low-skilled white-collar workers on firm's total employment;

Labour cost share – Proportion of labour costs on total costs;

Permanent workers – Proportion of workers with permanent contracts on the firm's total workforce;

Only firm level agreement – Dummy variable which equals 1 if the firm applies only an agreement concluded inside the firm;

Only outside agreement – Dummy variable which equals 1 if the firm applies only an agreement concluded outside the firm;

Both agreements – Dummy variable which equals 1 if the firm applies both firm-level and outside wage agreements;

Coverage – Proportion or workers covered by collective wage agreements;

Tenure 1-5 years – Proportion of workers with tenure between one and five years;

Tenure above 5 years – Proportion of workers with tenure above five years;

High competition – Dummy variable equal to one if the firm answers in the survey that it will likely or very likely decrease its price in reaction to a decrease in the price of its main competitor;

Size=20-49 – Dummy variable equal to one if the number of employees is between 20 and 49;

Size=50-199 – Dummy variable equal to one if the number of employees is between 50 and 199.

Size=200+ – Dummy variable equal to one if the number of employees is equal or larger than 200;

Construction – Dummy variable equal to one if the firm operates in the Construction sector;

Trade – Dummy variable equal to one if the firm operates in the Trade sector;

Other services – Dummy variable equal to one if the firm operates in any other services.

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THE IMPORT CONTENT OF GLOBAL DEMAND IN PORTUGAL*

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ABSTRACT

The analysis of the importance of imports in global demand is crucial for a better understanding of the behaviour of the main macroeconomic variables. In this article we assess the import content of global demand over the last three decades, highlighting the heterogeneity across demand components and across products.

1. Introduction

The analysis of the role of imports in global demand is relevant for a better understanding of the economic evolution, namely to assess the impact of changes in the demand components on other variables, such as GDP or trade balance. A typical example concerns the impact of exports growth on GDP as this impact depends on the use of imports in the production oriented to the foreign market. That is, the effect on domestic production resulting from an increase of the Portuguese exports is certainly lower if it is driven by a product such as fuels (wich have a high import content) than tourism (since services related with hotels and restaurants present a low import content). Therefore, the monitoring of the evolution of exports should take into account not only its aggregate behaviour but also its sectoral decomposition.

For an analysis of the import content of exports and corresponding implications in the economic activity see, for example, Cross (2002) for Canada, Loschky and Ritter (2006) for Germany, Koopman *et al.* (2008) for China and di Mauro *et al.* (2005), Breda *et al.* (2008) and European Commission (2012) for several european countries. For a more compreheensive analysis of the import content of the several components of global demand see, for example, Herzberg *et al*. (2002) for the United Kingdom, Heitz and Rini (2006) for the French case and Claus and Li (2003), Kranendonk and Verbruggen (2008) and Bravo and Álvarez (2012) for a set of countries.

In this article, we focus on the analysis of the import content of global demand in Portugal over the last three decades. In particular, we characterize its temporal evolution and assess how the role of imports to cope with global demand behaviour has changed throughout time in the period post 25th April.

In Chart 1, it is presented the import penetration in global demand for the longest period for which there is available data (1953 - 2012), resorting to the Historical Series for the Portuguese Economy [Pinheiro *et al.* (1997, 1999)] for the period before 1995.

Since 1953 up to the end of the 70's, it was not recorded an increase of the import penetration, in real terms. It was only after joining the European Economic Community that there was a significant increase of this indicator.

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* The opinions expressed in this article are those of the authors and do not necessarily coincide with those of Banco de Portugal or the Eurosystem. Any errors and omissions are the sole responsibility of the authors.

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Note that, in nominal terms, the weight of imports in the global demand recorded an increase after the end of the first half of the 70's, reflecting the oil shocks, and a decrease in periods where the oil price declined substantially, as for example in 1986. Therefore, the nominal indicator did not present a sustained increase as the one recorded by the indicator at constant prices. Nevertheless, it should be noted that since the end of the 90's the import penetration has been similar in nominal and real terms, while presenting an upward trend although interrupted during the low phases of the business cycle. Additionally, the import penetration presents a pro-cyclical behaviour recording an elasticity higher than one *vis-à-vis* the global demand (Chart 2). In general, the increase of the import content of global demand over the last decades as well as the pro-cyclical feature have been observed in most advanced economies.

In this article, we address the evolution of the import content providing detail, in terms of the main components of global demand as well as its decomposition at a more elementary level, highlighting the heterogeneity across the several economic activity branches. Besides contributing to a better understanding of the aggregate evolution of the import content of demand, the results obtained also allow improving the assessment of the impact of such differentiated behaviour on GDP and trade balance.

The article is organized as follows. The data is presented in the next section. In section 3, the main results are discussed whereas in section 4 such results are used to estimate an econometric model for the Portuguese imports. Finally, in the last section, a summary of the main findings is provided.

2. Data

In this article, we intend to analyze in a systematic way the evolution of the import content of global demand for a period of time as long as possible, considering a breakdown by product comparable over time and as detailed as possible. The calculation of the import content was based on symmetric matrices of domestic output (at basic prices) and imports containing information both of intermediate consumption (by product and homogeneous branch of production) and of final uses by product. These matrices correspond to a breakdown of the data of national accounts (input-output tables), but not available with the same regularity. In recent years, the compilation of these matrices, designated integrated system of input-output matrices was provided by the Department of Prospective and Planning (DPP) and is planned to be updated every five years, approximately.

Chart 1

IMPORT PENETRATION

Weight of imports in global demand

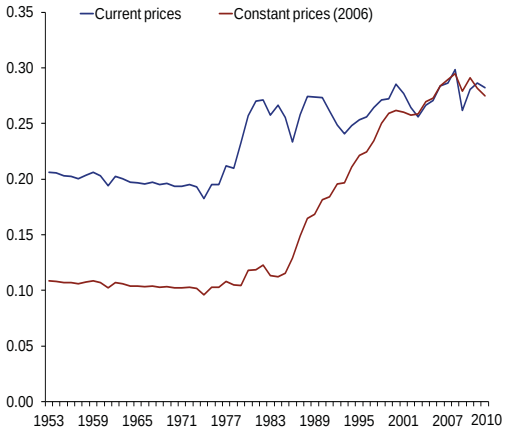
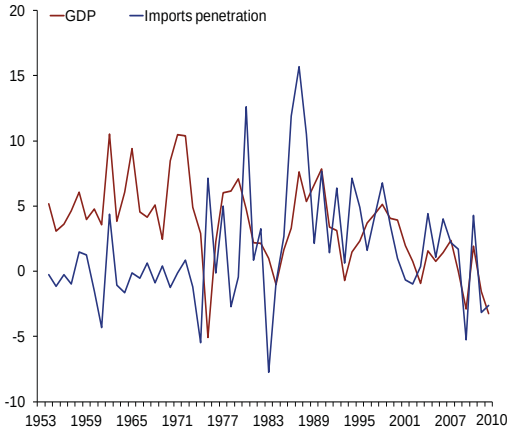


Chart 2

EVOLUTION OF IMPORT PENETRATION AND ECONOMIC ACTIVITY

Annual growth rates in volume



Source: INE and a Historical Series for the Portuguese Economy [Pinheiro *et al.*(1997) and (1999)].

Therefore, the sampling period considered in the analysis includes all years for which information is available, that is, 1980, 1986, 1992, 1995, 1999, 2005 and 2008. Matrices for 1980, 1992 and 1995 were provided by the INE, while from 1995 onwards the compilation of these matrices was done by the DPP (based on data from INE).[1] Based on this information it is possible to calculate the content of primary inputs to satisfy demand and in this study we focus on the input associated with imports.[2]

Note that the data for 1980, 1986 and 1992 are according to ESA 79 while the remaining years are according to ESA 95, which should be taken into account and justifies some caution in the analysis over time. In particular, we highlight the following points. Firstly, in ESA 79, the concept of private consumption concerns to the territory (includes expenses of non-residents in the country but does not include the expenditure of residents outside the national territory) while in SEC 95 private consumption concerns to residents (that is, it includes imports and excludes exports of tourism). Secondly, the FISIM (Financial Intermediation Services Indirectly Measured, called Imputed Production of Banking Services in ESA 79) was previously registered exclusively as intermediate consumption of a fictitious branch while from the base 2000 in ESA95 the FISIM became allocated to intermediate consumption (imputed to the respective branch) and final uses.[3] To ease the comparison, the FISIM was allocated to branches/products as done in Reis and Rua (2009).

Additionally, one should note that over the period considered there were three nomenclatures of products (one in ESA79 and two in ESA95). Thus, for comparability over time an aggregation was performed by keeping as far as possible the most detailed level, resulting in 29 products similarly to Reis and Rua (2009).[4] This resulted in matrices of imported and domestically produced intermediate consumption for 29 products and 29 homogeneous branches, as well as the final uses of these 29 products (for each component of final demand) from imports and domestic production.

Note that the calculations are performed based on the matrices at basic prices, so the import contents obtained are not affected by taxes, and trade margins are not allocated to each product.

3. Results

Table 1 presents the total import content of the different components of global demand in Portugal over the last three decades (see the Appendix for a description of the methodology). Note that the total import content reflects both the direct import content (which arises from the final demand of imported goods) and the indirect import content (resulting from the use of imported goods in domestic production). Chart 3 shows this decomposition for each of the components of global demand.

Analyzing the results obtained at basic prices, we conclude that the import content of global demand has been relatively stable over time and stood at around 30 per cent, although it has increased slightly since 1986 after joining the EEC.

The component that typically presents a higher import content is GFCF, recording a value of around 40 per cent. However, exports registered a significant increase since 1995 attaining values similar to those of GFCF at the end of the period considered. This increase is associated with the start of production of

1 The matrices from 1999 onwards were published in Martins (2004a), Martins (2004b), Dias (2008) and Dias and Domingos (2011).

2 For example, an analysis of the content of primary inputs for the various components of final demand in 2005 and detailed by product can be found in Dias (2010).

3 The FISIM was considered as a whole as intermediate consumption of a fictitious sector/branch, which, since it had no production, registered a negative value added in the same amount. This negative value added was fully deducted from the value added of all institutional sectors and branches of activity, wherefore the level of GDP was not affected by the figure registered as FISIM production (see, for example, "Box 3.1: *The Base 2000 of Portuguese National Accounts*", Banco de Portugal, *Annual Report 2005*).

4 The correspondence between ESA79 and ESA95 first nomenclature is provided in Reis and Rua (2006) and the correspondence with the current nomenclature can be obtained from the authors.

Table 1

TOTAL IMPORT CONTENT							
	1980	1986	1992	1995	1999	2005	2008
(at basic prices)							
Private consumption	0.26	0.24	0.25	0.26	0.29	0.28	0.30
Public consumption	0.09	0.09	0.06	0.08	0.09	0.09	0.11
GFCF	0.41	0.39	0.45	0.36	0.39	0.37	0.41
Exports	0.38	0.33	0.31	0.36	0.37	0.40	0.42
Global demand	0.30	0.27	0.28	0.28	0.30	0.29	0.32
(at purchasers' prices)							
Private consumption	0.24	0.22	0.23	0.23	0.25	0.25	0.26
Public consumption	0.09	0.09	0.06	0.08	0.09	0.09	0.11
GFCF	0.39	0.38	0.44	0.34	0.37	0.35	0.39
Exports	0.38	0.33	0.31	0.36	0.37	0.40	0.42
Global demand	0.29	0.26	0.26	0.26	0.28	0.27	0.29

Source: Author's calculations.

Autoeuropa, a large company of auto industry with significant impact on exports. It is worth noting, more recently, the growing importance of fuel exports, characterized by a high import content. In the case of exports, the total import content reflects essentially the indirect import content. This reflects the phenomenon of fragmentation of the supply chain at the international level (see, for example, Amador and Cabral (2008)).

In turn, private consumption presents an import content slightly below global demand and increased gradually since 1986 standing at 30 per cent in 2008. The evolution of the import content of private consumption reflects distinct behaviors in terms of the direct and indirect import content. In fact, the direct import content of private consumption presented a significant increase over time (14 per cent in the 2000s compared to 4 per cent in 1980) while the indirect component showed a declining trend. This indicates that private consumption has been increasingly satisfied by direct recourse to imported consumer products.

Additionally, we should mention that the component of global demand with lower import content is public consumption, registering a value close to 10 per cent.

Naturally, when considering the components of demand at purchasers' prices, the import content is reduced. This is particularly visible in the case of private consumption given the level of taxation on this component of global demand (notably tobacco, fuels and motor vehicles).

The following subsections present a more detailed analysis of the import content of the main aggregates of global demand, particularly private consumption, gross fixed capital formation and exports.

3.1 Private Consumption

Table 2 presents the import content for private consumption breakdown by product. As can be seen, the products which have higher import content are durable goods (especially machinery and transport equipment) and fuel (see Chart 4). Note that in the case of transport equipment and machinery the very high import content reflects mainly imports addressed directly to private consumption. On the contrary, in the case of fuel, the high import content stems largely from the indirect effect, reflecting the fact

Chart 3

TOTAL, DIRECT AND INDIRECT IMPORT CONTENT | PER UNIT

Source: Author's calculations.

Table 2

IMPORT CONTENT OF PRIVATE CONSUMPTION BY PRODUCTS

	Weights in 2008	1980	1986	1992	1995	1999	2005	2008
Private consumption	100.0	0.26	0.24	0.25	0.26	0.29	0.28	0.30
Agriculture	1.7	0.21	0.19	0.22	0.25	0.33	0.42	0.50
Fishing	0.5	0.26	0.27	0.46	0.20	0.29	0.36	0.44
Fuel and mining	2.1	0.83	0.69	0.66	0.73	0.73	0.86	0.85
Food and beverages	9.3	0.34	0.30	0.31	0.41	0.44	0.49	0.59
Tobacco	0.2	0.38	0.07	0.06	0.38	0.32	0.44	0.44
Textiles and clothing	2.6	0.34	0.33	0.54	0.58	0.64	0.62	0.72
Leather	0.7	0.35	0.53	0.43	0.60	0.71	0.65	0.78
Wood and cork	0.1	0.23	0.25	0.34	0.38	0.43	0.45	0.54
Paper	0.3	0.30	0.59	0.43	0.47	0.53	0.45	0.57
Chemicals	1.9	0.65	0.61	0.60	0.75	0.83	0.82	0.84
Rubber and plastics	0.4	0.58	0.76	0.84	0.71	0.75	0.70	0.75
Other minerals	0.2	0.42	0.68	0.59	0.68	0.77	0.47	0.56
Metals	0.2	0.47	0.50	0.62	0.74	0.79	0.69	0.80
Machinery	1.4	0.61	0.75	0.85	0.90	0.95	0.93	0.94
Transport equipment	3.2	0.62	0.69	0.84	0.96	0.99	0.99	0.99
Other manufacturing	1.6	0.83	0.84	0.70	0.51	0.60	0.60	0.71
Electricity, gas and water	3.6	0.33	0.21	0.12	0.14	0.18	0.34	0.36
Construction	0.1	0.24	0.21	0.23	0.20	0.21	0.22	0.24
Trade	19.2	0.14	0.11	0.10	0.12	0.14	0.12	0.15
Hotels and restaurants	10.9	0.14	0.13	0.12	0.20	0.20	0.20	0.18
Transportation	3.2	0.32	0.19	0.17	0.16	0.18	0.31	0.37
Communications	3.2	0.05	0.05	0.11	0.13	0.11	0.18	0.19
Financial Intermediation	6.9	0.04	0.08	0.07	0.07	0.06	0.10	0.06
Real estate	10.6	0.05	0.11	0.04	0.05	0.05	0.04	0.03
Renting and business activities	2.4	0.07	0.06	0.10	0.13	0.14	0.15	0.19
Education	2.0	0.03	0.02	0.02	0.04	0.04	0.03	0.04
Health and social work	6.1	0.11	0.13	0.08	0.13	0.14	0.14	0.16
Public administration	0.2	0.11	0.11	0.08	0.05	0.05	0.07	0.07
Other services	5.3	0.12	0.10	0.12	0.11	0.10	0.14	0.12
Memo								
Food consumption	11.5	0.31	0.28	0.30	0.38	0.42	0.48	0.57
Durables consumption	6.6	0.61	0.70	0.80	0.83	0.89	0.86	0.90
Non-food non-durable consumption	82.0	0.22	0.19	0.18	0.18	0.19	0.20	0.21

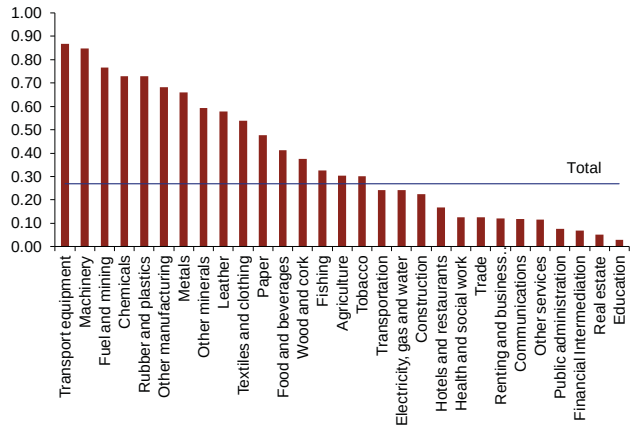
Source: Author's calculations.

that this sector includes the activity of domestically refining the associated raw materials. In turn, the consumption expenditures concerning services are those that have a lower import content.

Concerning the temporal evolution of the import content in the last 30 years, one should note that food consumption has been increasingly satisfied by imported goods, resulting in a substantial increase in the direct import content (see Chart 5). There was also a significant increase in the share of imports (via the direct component) in the consumption of goods associated with so-called traditional sectors such as textiles, clothing and footwear. This phenomenon of reorientation of private consumption to external production implies a less favorable impact in GDP of increased demand for these goods.

Chart 4

IMPORT CONTENT OF PRIVATE CONSUMPTION BY PRODUCTS | AVERAGE IN THE YEARS CONSIDERED



Source: Author's calculations.

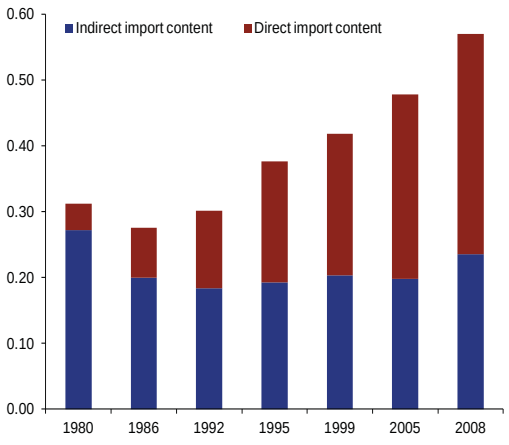
3.2 GFCF

As mentioned before, the weight of the imported component in GFCF has been relatively stable at around 40 per cent. Considering the main components of GFCF, one should note that transport equipment and machinery and equipments are those with the highest import content, having registered in 2008 a value of 97 and 83 per cent, respectively (see Table 3). Note that this type of investment is largely satisfied directly by imports which translates into a high direct import content (see Chart 6). In turn, GFCF in construction shows a relatively low import content (slightly more than 20 per cent) reflecting only the indirect import content.

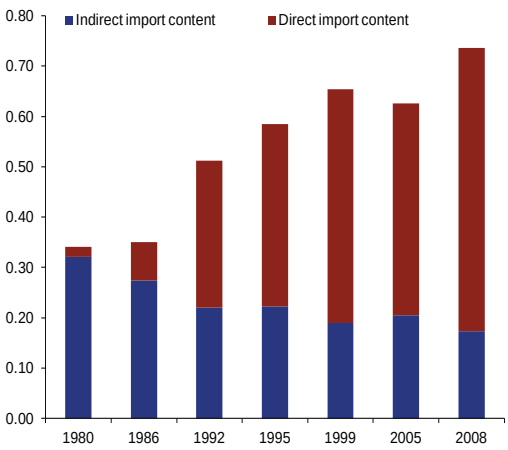
Chart 5

IMPORT CONTENT OF PRIVATE CONSUMPTION

Food



Textiles, clothing and leather



Source: Author's calculations.

Table 3

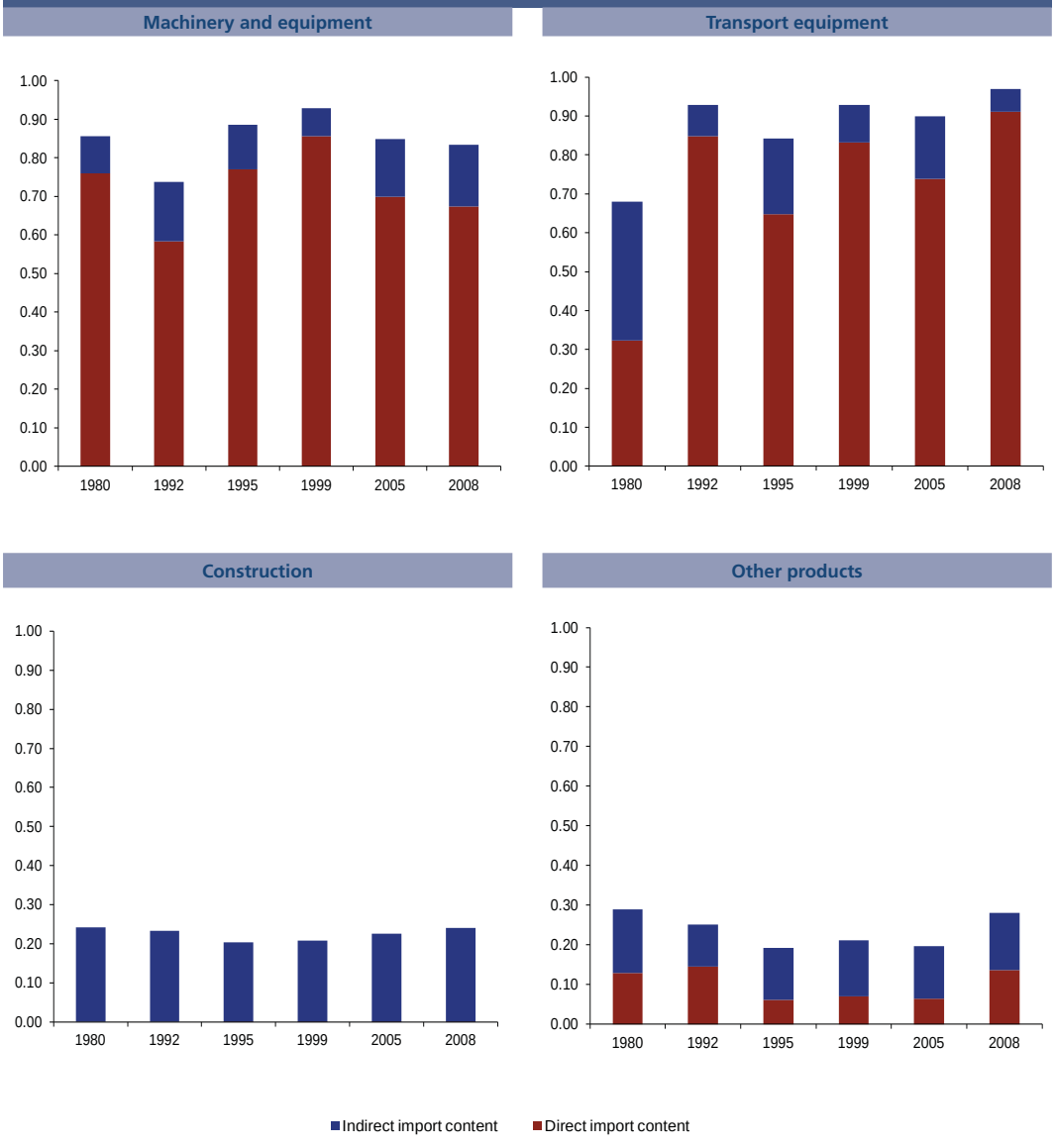
IMPORT CONTENT OF GFCF BY PRODUCTS

	Weights in 2008	1980	1986	1992	1995	1999	2005	2008
GFCF	100.0	0.41	0.39	0.45	0.36	0.39	0.37	0.41
Machinery and equipment	22.0	0.86	0.89	0.74	0.89	0.93	0.85	0.83
Transport equipment	6.5	0.68	0.80	0.93	0.84	0.93	0.90	0.97
Construction	50.4	0.24	0.21	0.23	0.20	0.21	0.22	0.24
Other products	21.0	0.29	0.19	0.26	0.19	0.21	0.20	0.28

Source: Author's calculations.

Chart 6

IMPORT CONTENT OF GFCF BY MAIN AGGREGATES



Source: Author's calculations.

3.3 Exports

Regarding exports, the goods component presents a substantially higher import content than the services component (about 50 and 20 per cent in 2008, respectively) (see Table 4). It should be noted that, since Portugal joined the European Community in 1986, exports of goods have presented an increase in terms of import content, in line with international evidence. Naturally, the higher the import content the lower the positive impact of an increase in exports in the economy.

Exports of goods that incorporate a higher import content include fuels and transport equipment (see Chart 7). In the first case, it reflects the fact that Portugal is not an oil producing country by which the raw material has to be imported to enable refining and subsequent export. It should be noted that the importance of these exports has been increasing in the most recent period, amounting to about 8 per cent of the total nominal exports of goods in 2012 compared to 2 per cent in the early 2000s. In the case of vehicles, despite the positive externalities arising from the AutoEuropa in Portugal, whose production is intended primarily for export, this activity implies a significant imported component. In turn, not surprisingly, agricultural products and fisheries are those with lower import content.

4. An econometric model for the Portuguese imports

Besides improving the understanding of the aggregate evolution of the import content of demand and its implications, namely in terms of GDP and trade balance, the assessment of the import content of the several components of the global demand is relevant for the econometric modelling of imports (see, for example, Bussière *et al.* (2011), Laxton *et al.* (1998) and Herzberg *et al.* (2002)).

In this section, we provide an illustration for the Portuguese case. In particular, we consider the main determinants of the behaviour of imports of goods and services, in real terms, namely the global demand

Table 4

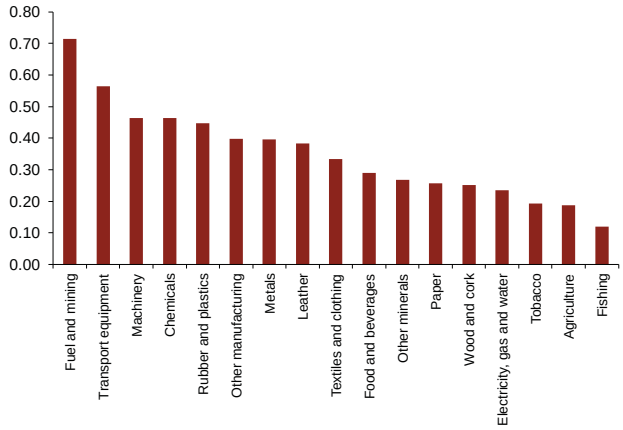
IMPORT CONTENT OF EXPORTS BY PRODUCTS

	Weights in 2008	1980	1986	1992	1995	1999	2005	2008
Exports of goods and services	100.0	0.38	0.33	0.31	0.36	0.37	0.40	0.42
Exports of goods	76.5	0.41	0.35	0.34	0.40	0.41	0.45	0.49
Agriculture	1.3	0.17	0.15	0.15	0.12	0.14	0.27	0.30
Fishing	0.3	0.19	0.14	0.14	0.07	0.06	0.11	0.14
Fuel and mining	5.1	0.79	0.63	0.58	0.68	0.68	0.82	0.82
Food and beverages	5.9	0.32	0.24	0.22	0.27	0.29	0.30	0.38
Tobacco	0.5	0.36	0.07	0.06	0.17	0.20	0.29	0.22
Textiles and clothing	7.9	0.32	0.28	0.31	0.34	0.35	0.35	0.38
Leather	2.9	0.34	0.42	0.32	0.39	0.39	0.38	0.44
Wood and cork	2.6	0.22	0.21	0.25	0.22	0.24	0.28	0.34
Paper	3.2	0.25	0.22	0.20	0.24	0.26	0.28	0.35
Chemicals	5.2	0.57	0.51	0.39	0.42	0.43	0.45	0.47
Rubber and plastics	3.4	0.51	0.44	0.43	0.42	0.42	0.44	0.46
Other minerals	3.2	0.32	0.23	0.19	0.23	0.23	0.31	0.36
Metals	7.5	0.38	0.35	0.32	0.39	0.39	0.48	0.45
Machinery	14.0	0.42	0.39	0.39	0.50	0.50	0.51	0.53
Transport equipment	11.1	0.53	0.47	0.53	0.56	0.58	0.62	0.67
Other manufacturing	1.7	0.56	0.47	0.38	0.33	0.33	0.37	0.35
Electricity, gas and water	0.7	0.29	0.21	0.12	0.14	0.18	0.34	0.36
Exports of services	23.5	0.27	0.17	0.12	0.11	0.12	0.15	0.20

Source: Author's calculations.

Chart 7

IMPORT CONTENT OF EXPORTS OF GOODS | AVERAGE IN THE YEARS CONSIDERED



Source: Author's calculations.

(weighted by the import content) and the relative price of imports. Regarding the global demand, each component is weighted by the corresponding import content, that is,

$$PG^{*} = c_{C}C + c_{G}G + c_{I}I + c_{X}X$$

where PG* denotes the global demand weighted by the import content, C corresponds to private consumption, G is public consumption, I denotes investment, X refers to exports of goods and services and c_{C}, c_{G}, c_{I} and c_{X} are the corresponding import contents (at market prices). By its turn and in line with the literature, the competitiveness price indicator for imports is defined as the ratio between the deflator of imports of goods and services and GDP deflator (see, for example, Fagan *et al.* (2001, 2005)).

The estimation of a macroeconometric model of the type ECM (Error Correction Mechanism), for the period running from the first quarter of 1980 up to the fourth quarter of 2012, resulted in the following specification:

$$\Delta \ln M_{t} = \underset{(4.48)}{0.39} + \underset{(14.5)}{1.48}\,\Delta \ln PG_{t}^{*} - \underset{(-3.68)}{0.15}\,\Delta \ln Def_{t} - \underset{(-4.92)}{0.13}\left(\ln M_{t-1} - \ln PG_{t-1}^{*}\right) - \underset{(-4.50)}{0.08}\,\ln Def_{t-1}$$

$$\hat{\sigma} = 0.015 \qquad R^{2} = 0.75 \qquad \mathrm{F}\left(4,126\right) = 94.55\left[0.000\right]$$

where M denotes the imports of goods and services, in real terms, Def is the relative price between imports and GDP. For the estimated coefficients, we report in brackets the HACSE t-ratios (based on standard errors robust to heteroscedasticity and autocorrelation). Additionally, we report the standard error, the R^{2} and the F statistic for testing the overall fit of the model along the corresponding $p\text{-}value$.

Concerning the estimated model one should highlight the following. Firstly, the relative price of imports affects negatively the behaviour of real imports, both in the short-run (with a coefficient of -0.15) and in the long-run (with an elasticity of -0.65). Likewise in other countries (see Laxton *et al.* (1998)), the long-run elasticity is higher than the short-run one. Regarding the global demand weighted by the import content, it was imposed a unitary elasticity in the long-run as usual in the literature that addresses the estimation of this kind of models (see, for example, Laxton *et al.* (1998), Herzberg *et al.* (2002) and Fagan *et al.* (2001, 2005)). Note that this assumption is not rejected when one takes into account the fact that the

import content has changed throughout time.[5] However, it is rejected if one uses the historical average of the import content. This finding highlights the sensitivity of the long-run relationship to structural changes, which are potentially more relevant as the sample period used for estimation purposes increases.

In what concerns the short-run elasticity *vis-à-vis* the global demand weighted by the import content, the estimated value is around 1.5, which is line with previous literature. The finding of an elasticity higher than one goes back to the seminal work of Houthakker e Magee (1969) (see, for example, more recently Bussière *et al.* (2011)).

There are some arguments that can support a short-run elasticity higher than one. On the one hand, in line with Herzberg *et al.* (2002), imports are more cyclical than global demand because national firms, due to adjustment costs, are not able to change instantaneously the production capacity and therefore imports accommodate the demand fluctuations. On the other hand, the components of global demand that present typically a more pronounced cyclical behaviour are also the ones that have higher import content. Therefore, the fact that the weighting is not performed at the most elementary level results in measurement errors which can explain a short-run elasticity above one. For example, in the above equation, if one had used the global demand (weighted directly by its import content, that is, $c_{PG}PG$) as the short-run indicator it would result in an elasticity close to 1.8. In contrast, considering a higher level of disaggregation of the several components of global demand would result in an elasticity closer to one.

5. Conclusions

In this article we assess the evolution of the import content of the different components of global demand over the last three decades.

In particular, the import content of the global demand recorded an increase after Portugal joined the European Community. The component that presents the highest import content is GFCF, although exports have registered a noteworthy increase since 1995 attaining similar figures to GFCF at the end of the sample period. By its turn, private consumption presents an import content slightly below global demand despite the gradual increase since 1986. Public consumption is the component of global demand that records the lowest import content.

The results obtained allow for a better understanding of the aggregate behaviour of the import content of global demand and its implications, namely in terms of the evolution of GDP and trade balance. Additionally, resorting to the import content results, it was estimated a model for the Portuguese imports so as to illustrate its usefulness in terms of macroeconometric modelling.

5 In practice, for the years where data is available (namely 1980, 1986, 1992, 1995, 1999, 2005 and 2008) the corresponding import content have been used whereas for the remaining years it was considered a linear interpolation between two known years so as to smooth the evolution of the import content (see, for example, Bussière *et al.* (2011)).

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Appendix

Let us assume that there are n sectors in the economy and consider the equilibrium between total supply and total demand for each good

$$x_i + m_i = z_{i1} + z_{i2} + \ldots + z_{in} + y_{i1} + y_{i2} + \ldots + y_{ik} \tag{1}$$

where x_i is the domestic output of good i $(i=1,\ldots,n)$, m_i denotes imports of good i, z_{ij} is sector i´s product absorbed by sector j, that is, the intermediate consumption, and y_{il} is final demand l $(l=1,\ldots,k)$. In national accounts, final demand encompasses the different components of global demand such as private consumption, public consumption, investment and exports. Note that intermediate consumption includes both domestic output and imports ($z_{ij} = z_{ij}^d + z_{ij}^m$) and the same applies to each of the components of global demand ($y_{il} = y_{il}^d + y_{il}^m$).

Since

$$m_i = \sum_{j=1}^{n} z_{ij}^m + \sum_{l=1}^{k} y_{il}^m \tag{2}$$

substituting (2) into (1) we obtain

$$x_i = z_{i1}^d + z_{i2}^d + \ldots + z_{in}^d + y_{i1}^d + y_{i2}^d + \ldots + y_{ik}^d \tag{3}$$

For the n products we get a set of n equations

$$\begin{aligned} x_1 &= z_{11}^d + z_{12}^d + \ldots + z_{1n}^d + y_{11}^d + y_{12}^d + \ldots + y_{1k}^d \\ x_2 &= z_{21}^d + z_{22}^d + \ldots + z_{2n}^d + y_{21}^d + y_{22}^d + \ldots + y_{2k}^d \\ &\vdots \\ x_n &= z_{n1}^d + z_{n2}^d + \ldots + z_{nn}^d + y_{n1}^d + y_{n2}^d + \ldots + y_{nk}^d \end{aligned} \tag{4}$$

Define a_{ij}^d as

$$a_{ij}^d = \frac{z_{ij}^d}{x_j} \tag{5}$$

that is, the domestic output of product i used to produce a unit of product j. Substituting (5) into (4) we obtain

$$\begin{aligned} x_1 &= a_{11}^d x_1 + a_{12}^d x_2 + \ldots + a_{1n}^d x_n + y_{11}^d + y_{12}^d + \ldots + y_{1k}^d \\ x_2 &= a_{21}^d x_1 + a_{22}^d x_2 + \ldots + a_{2n}^d x_n + y_{21}^d + y_{22}^d + \ldots + y_{2k}^d \\ &\vdots \\ x_n &= a_{n1}^d x_1 + a_{n2}^d x_2 + \ldots + a_{nn}^d x_n + y_{n1}^d + y_{n2}^d + \ldots + y_{nk}^d \end{aligned} \tag{6}$$

which can be written, in matrix terms, as

$$X = A^d X + Y^d 1 \tag{7}$$

where

$$A^d = \begin{bmatrix} a_{11}^d & a_{12}^d & \cdots & a_{1n}^d \\ a_{21}^d & a_{22}^d & \cdots & a_{2n}^d \\ \vdots & \vdots & & \vdots \\ a_{n1}^d & a_{n2}^d & \cdots & a_{nn}^d \end{bmatrix} \quad X = \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix} \quad Y^d = \begin{bmatrix} y_{11}^d & y_{12}^d & \cdots & y_{1k}^d \\ y_{21}^d & y_{22}^d & \cdots & y_{2k}^d \\ \vdots & \vdots & & \vdots \\ y_{n1}^d & y_{n2}^d & \cdots & y_{nk}^d \end{bmatrix} \quad 1 = \begin{bmatrix} 1 \\ 1 \\ \vdots \\ 1 \end{bmatrix} \tag{8}$$

Let I be an identity matrix $n \times n$. Solving (7) for X, we get

$$X = (I - A^d)^{-1} Y^d 1 \tag{9}$$

where $(I\text{-}A^d)^{-1}$ is the well known Leontief matrix. The element (i,j) of the Leontief matrix allows to assess the increase in domestic output of product i if there is an unitary increase of final demand of the domestic output of product j.

Now define a_{ij}^m as the imports of product i used in the production of one unit of product j, that is

$$a_{ij}^m = \frac{z_{ij}^m}{x_j} \tag{10}$$

Therefore, resorting to equation (2), it is possible to write for each product i the following

$$m_i = \sum_{j=1}^{n} a_{ij}^m x_j + \sum_{l=1}^{k} y_{il}^m \tag{11}$$

By considering the n products, one obtains in matrix form

$$M = A^m X + Y^m 1 \tag{12}$$

where

$$A^m = \begin{bmatrix} a_{11}^m & a_{12}^m & \cdots & a_{1n}^m \\ a_{21}^m & a_{22}^m & \cdots & a_{2n}^m \\ \vdots & \vdots & & \vdots \\ a_{n1}^m & a_{n2}^m & \cdots & a_{nn}^m \end{bmatrix} \quad Y^m = \begin{bmatrix} y_{11}^m & y_{12}^m & \cdots & y_{1k}^m \\ y_{21}^m & y_{22}^m & \cdots & y_{2k}^m \\ \vdots & \vdots & & \vdots \\ y_{n1}^m & y_{n2}^m & \cdots & y_{nk}^m \end{bmatrix} \tag{13}$$

Define $c_{il}^{m} = \frac{y_{il}^{m}}{y_{il}}$ as the direct import content of final demand l of product i and $c_{il}^{d} = \frac{y_{il}^{d}}{y_{il}}$ as the final demand satisfied directly through domestic output, where the corresponding diagonal matrices are given by

$$C^{m} = \begin{bmatrix} c_{11}^{m} & 0 & \cdots & 0 \\ 0 & c_{22}^{m} & \cdots & 0 \\ \vdots & \vdots & & \vdots \\ 0 & 0 & \cdots & c_{nk}^{m} \end{bmatrix} \qquad C^{d} = \begin{bmatrix} c_{11}^{d} & 0 & \cdots & 0 \\ 0 & c_{22}^{d} & \cdots & 0 \\ \vdots & \vdots & & \vdots \\ 0 & 0 & \cdots & c_{nk}^{d} \end{bmatrix} \tag{14}$$

Substituting (9) into (12) and taking into account that $Y^{m} = C^{m}Y$ and $Y^{d} = C^{d}Y$ we obtain

$$M = \left[A^{m}(I - A^{d})^{-1}C^{d} + C^{m} \right] Y1 \tag{15}$$

where $A^{m}(I - A^{d})^{-1}C^{d}$ and C^{m} denote the indirect and the direct import content, respectively. Hence, for each component of the global demand (private consumption, public consumption, GFCF and exports) we obtain a vector of import contents which corresponds to the amount of imports required to fulfil one unit of final demand of each product j. The total import content of a given component of the global demand includes both the direct import content (final demand of imported goods) and the indirect component, that is, the imports of intermediate goods used to produce the domestic output. Additionally, the total import content of each component reflects the underlying composition in terms of products.