Banco de Portugal

EUROSYSTEM

Economic Bulletin | *Autumn 2010*

Volume 16, Number 3

Available at
www.bportugal.pt
Publications

BANCO DE PORTUGAL

Edition

Economics and Research Department
Av. Almirante Reis, 71-6th
1150-012 Lisboa

www.bportugal.pt

Distribution

Administrative Services Department
Documentation, Editing and Museum Division
Editing and Publishing Unit
Av. Almirante Reis, 71-2nd
1150-012 Lisboa

Printing

Security Print

Lisbon, 2010

Number of copies

150

ISSN 0872-9786
Legal Deposit no. 241773/06

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THE PORTUGUESE ECONOMY IN 2010

1. INTRODUCTION

2010 has been characterised by a broadly based recovery in world economic activity, following a particularly deep, synchronised and protracted global contraction. This improvement of the international environment of the Portuguese economy, albeit with some heterogeneity at a regional level, was particularly seen in the considerable acceleration of international trade flows, as well as in the relatively favourable developments in global equity and private debt markets. However, given the characteristics of the current recovery cycle – namely the fact that in the advanced economies there is in general a need to adjust financial systems and economic agents' balance sheets – the global economic buoyancy is expected to be mitigated compared with previous recession periods. Moreover, the sustainability of the recovery at the international level remains surrounded by high uncertainty. On the one hand, the stimulus given by the unprecedented support measures adopted by monetary and governmental authorities is likely to have already exerted its maximum impact and will tend to be mitigated in the near future. On the other hand, since the end of 2009 there has been a significant differentiation of sovereign risk in several euro area economies, including Portugal. This situation has affected in particular the countries that combined substantial and unexpected increases in the deficit and public debt with a set of fragilities of a structural nature, in particular as regards the degree of external indebtedness, the trend growth of the economy or the robustness of the banking system.

The increase in sovereign risk in Portugal in the course of 2010 – with several periods of particularly acute risk differentiation – brings about profound implications regarding economic developments. In fact, the deterioration of the assessment made by international investors as to the general government solvency conditions has led to much tighter access – in terms of prices and volumes – to international wholesale debt markets by the Portuguese banking system, as well as to a sharp increase in yields on Treasury bonds and on bonds issued by banks. Given the high degree of the external indebtedness of the Portuguese economy – in its near entirety intermediated by the banking system and the public sector – the above financial market segmentation would tend to imply the need for an abrupt adjustment between the level of domestic savings and investment, with serious consequences in terms of economic welfare. Such abrupt adjustment was not seen in 2010 largely due to the set of policy measures adopted at a supranational level. In particular, it should be noted that the ECB's non-standard monetary policy measures enabled the financing of the Portuguese banking system, with financing in international wholesale debt markets being replaced with the recourse to the operations conducted by the Eurosystem through fixed-rate tender procedures with full allotment. Hence, the banking system has continued to ensure the growth of credit flows to households and non-financial corporations throughout 2010. In addition, the financing of the public sector in 2010 was also supported by the resident banking system and, to a smaller extent, by the Eurosystem's Securities Markets Programme. Thus, the non-standard policy measures of the ECB have been decisive to ensure the financing of the Portuguese economy. Concomitantly, these measures have contributed to mitigating the incentives leading to a significant adjustment of economic agents' balance sheets, of both the private and the public sector. It is important to reiterate that these measures are of a temporary nature. In fact, the phasing out of the ECB's non-standard measures will occur as soon as the functioning of financial markets is consistent with an adequate transmission of the ECB's monetary policy in the euro area as a whole.

The fiscal policy, assessed from an intertemporal sustainability perspective, naturally assumes crucial importance in the context of the current sovereign debt crisis. In fact, the access of the Portuguese economy to external financing under favourable conditions hinges on the pursuance of a credible fiscal consolidation policy, targeted at meeting the objectives assumed in the context of the Stability and Growth Pact. Available data on the budgetary execution in 2010 indicate that it would not be possible to ensure the fulfilment of the current fiscal targets for 2010 as a whole in the absence of substantial additional measures. According to the latest available information, these measures will predominantly be of a temporary nature. Against this background, achieving the ambitious fiscal targets set for 2011 will require pursuing a restrictive fiscal policy of unprecedented nature in recent history. The measures announced at the end of September, in anticipation of the State Budget for 2011, fit within this perspective. These measures will have significant contractionary effects on activity in the short run, but are instrumental in ensuring a higher sustainable growth path over the medium and long term. On the other hand, in so far as they enable a significant reduction in constraints to external financing, they will additionally contribute to an economic adjustment process of the private sector that will be less abrupt than it would be if an immediate convergence between domestic savings and investment was inescapable.

In sum, the main features of the Portuguese economy in 2010 result from the combination of several inter-connected factors, namely the relatively favourable international environment, the lagged effects of the steep falls in the official interest rates, the set of supranational policy measures – which have *de facto* suppressed external financing constraints, despite the exacerbated perception of risk in international financial markets –, the mitigated start of the fiscal consolidation process and the private sector deleveraging, and the maintenance of the prevailing institutional framework, characterised by the persistence of a number of commonly identified structural fragilities. In this context, Banco de Portugal estimates point to GDP growth of 1.2 per cent in 2010, after a sharp drop in 2009 (Table 1). According to the available data, GDP growth will be lower than in the euro area and in the European Union (EU). Thus, the Portuguese economy will again diverge in real terms, in line with the evidence for the past decade. In turn, the current projection for the inflation rate in 2010 stands at 1.4

Table 1

MAIN ECONOMIC INDICATORS
Rate of change, per cent

				Memo: EB Summer 2010
	2008	2009	2010	2010
Gross domestic product	0.0	-2.6	1.2	0.9
Private consumption	1.8	-1.0	1.8	1.3
Public consumption	0.8	2.9	1.5	-0.9
Gross fixed capital formation	-1.8	-11.9	-4.2	-3.3
Domestic demand	1.2	-3.0	0.4	0.0
Exports	-0.3	-11.8	7.9	5.2
Imports	2.8	-10.9	4.2	1.7
Contribution to GDP growth (in p.p.)				
Domestic demand	1.2	-3.4	0.5	0.1
of which:				
changes in inventories	0.3	-0.7	-0.2	0.0
Net exports	-1.2	0.8	0.7	0.9
Current account + capital account (% of GDP)	-11.1	-9.5	-9.2	-9.0
Harmonised Index of Consumer Prices	2.7	-0.9	1.4	1.4

Sources: *INE* and Banco de Portugal.

per cent, after the fall recorded in 2009. This figure is close to the current projections for euro area inflation, contrasting with the significant negative differential seen since mid-2007.

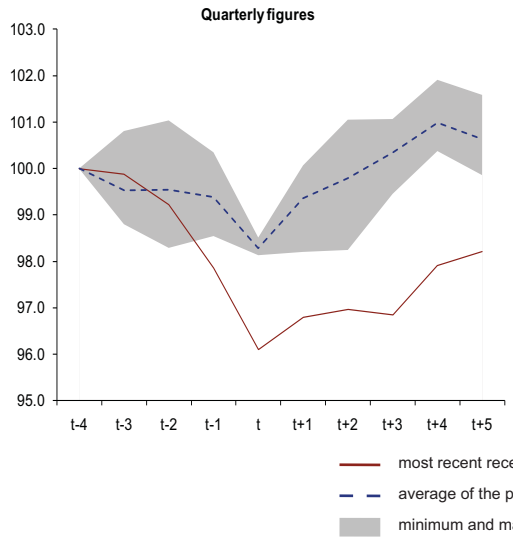
The dynamics of economic recovery in 2010 reflect different contributions from the several components of demand. Private consumption growth will again be higher than GDP growth, in line with the trend observed since the start of the euro area. In this respect, emphasis should be laid on the particularly sharp acceleration in the consumption of durable goods. In turn, strong growth is projected for exports – in particular extra-Community trade flows – which will be higher than the growth estimated for the external demand for Portuguese goods and services. Finally, corporate and private investment is projected to drop further in 2010, to new historical lows as a percentage of GDP. Against a background of high uncertainty regarding developments in household income and demand prospects for firms, a broad-based deceleration is projected for the components of overall demand in the second half of 2010, which will tend to intensify in 2011 (see "Projections for the Portuguese economy: 2010-2011", of this Bulletin).

Compared with previous recession periods, it is possible to conclude that after a particularly marked fall in activity in this recession, the subsequent recovery does not show a higher dynamism than in the past (Chart 1). In this regard, it is important to note that employment continues to record consecutive falls more than one year after the trough of the recession. These dynamics result from the combination of a gradual reduction in the rate of job creation, observed since mid-2007, with a sharp rise in the rate of job destruction, seen since mid-2009. In this context, the unemployment rate reached another historical peak in 2010, maintaining the trend observed in the last decade. Against the current background of decelerating economic activity and given the prospects for activity and employment, a reversal of this trend in the near future should not be expected.

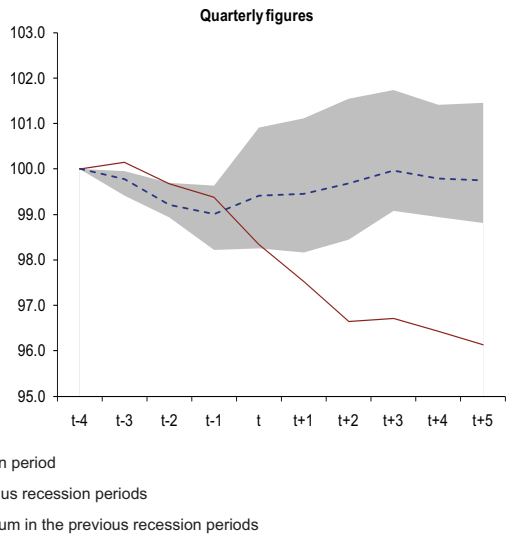
In 2010 net external borrowing requirements of the Portuguese economy as a percentage of GDP are projected to record only a slight reduction compared with the previous year. These developments contrast with previous recession periods, when a significant adjustment of the external deficit was

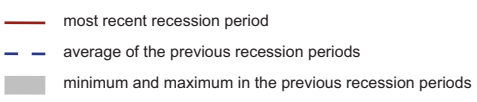
Chart 1

CUMULATIVE DEVELOPMENTS IN GDP IN RECESSION PERIODS*



CUMULATIVE DEVELOPMENTS IN EMPLOYMENT IN RECESSION PERIODS*





Sources: *INE* and Banco de Portugal.
Notes: (*) Period t represents the quarter with the trough in real GDP (2009 Q1, 2003 Q2, 1993 Q4, 1984 Q1). The series are rebased (with the base 100 level occurring four quarters before the trough in real GDP).

observed, as well as with evidence from other advanced economies in the context of the current crisis. The evolution in 2010 will result from declines in both the domestic savings rate and in the investment rate. However, the current situation is not sustainable, in particular given the persistence of constraints on the external financing of the economy. Thus, the process of fiscal consolidation, which cannot be postponed, must coexist with a deleveraging process in the private sector, desirably associated with a rise in domestic savings, which currently stand at historical lows.

The Introduction, Section 4 and the Conclusion of this article are based on data available up to end-September 2010. The remaining sections of this article are based on data available up to mid-September 2010.

2. THE INTERNATIONAL FRAMEWORK

The recovery from the most serious economic recession since World War II seems to have started in the second half of 2009 and to have continued into 2010. The pace of growth differed substantially across the different regions in the world, with emerging market economies revealing stronger dynamics. High uncertainty persists, however, regarding the sustainability of global recovery. This uncertainty is partly related to concerns surrounding the sustainability of public finances, particularly in some European economies, as shown by financial market turbulence in the first half of 2010. Moreover, some fragility persists in financial systems, especially of those in advanced economies. A number of temporary factors underlying stronger dynamics in the first half of 2010 are expected to unwind in the second half of the year. These factors include the end of the inventory building cycle and the gradual phasing-out of the economic stimulus measures, with stress on the implementation of budget consolidation measures in some advanced economies.

The economic recovery, heterogeneous among world regions, began in the second half of 2009, but a slowdown is expected in the second half of 2010

After the fall in Gross Domestic Product (GDP) in 2009, global economic activity started to recover in 2010, albeit at different paces across regions. In the first quarter of the year the annual growth rate of world GDP in real terms reached 4.8 per cent, decelerating to 4.6 per cent in the second quarter. World economic growth has thus been stronger than anticipated. According to the European Commission (EC), world GDP, excluding the European Union (EU), is expected to grow by 5 per cent in 2010 (Table 2.1). In spite of a return to financial market turbulence as of April 2010, in the wake of concerns about the sustainability of public finances in some European economies, economic recovery is expected to continue into the second half of 2010, albeit at a slower pace. However, uncertainty regarding the sustainability of global economic recovery continued to be high, as the temporary factors underlying recent growth are unwinding and there seem to be no signs of sustained recovery in several advanced economies. The changes in inventories cycle was one of the temporary factors stimulating growth in the first half of 2010 and is expected to moderate substantially in the second half of the year.

The strengthening of global activity has been chiefly due to strong growth in emerging market economies, whereas developments in advanced economies as a whole have been more modest. In effect,

Table 2.1

DEVELOPMENTS IN WORLD ECONOMY
Rates of change, per cent

	2009	2010
GDP		
World economy (excluding the European Union)[(a)]	-0.9	5.0
European Union (27 countries)	-4.2	1.8
Euro area	-4.1	1.7
Germany	-4.7	3.4
France	-2.6	1.6
Italy	-5.0	1.1
Spain	-3.7	-0.3
United Kingdom	-4.9	1.7
Consumer prices		
European Union (27 countries)	1.0	1.8
Euro area	0.3	1.4

Source: European Commission (Interim Forecast September 2010).
Note: (a) The figure for 2009 corresponds to that published in the European Commission's "European Economic Forecast Spring 2010".

against a background of strong monetary and fiscal policy stimuli, economic recovery in advanced economies is not yet sustained. In turn, several emerging market and developing economies have shown rather favourable momentum and, according to the EC, are projected to pursue robust economic growth, driven by world trade, developments in commodity markets and buoyant demand.

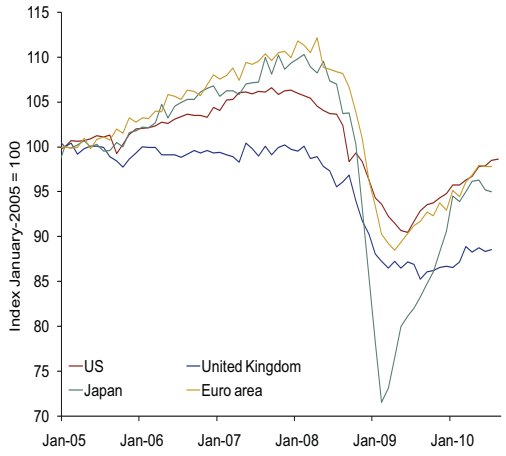
Industrial production and world trade stimulated by emerging market economies

The recovery of global economic activity has been apparent in developments in industrial production and international trade, which have recovered strongly since mid-2009 (Charts 2.1 and 2.2). After a substantial fall in international trade in 2008 and early 2009, the recovery in 2010 was also significant. In both points in time, however, developments were mixed across countries. Trade recovery was associated with the fading-out of factors that had led to the previous strong fall, namely the drop in global demand and credit constraints. Strong growth of domestic demand in Asian countries has contributed substantially to developments in industrial production and international trade. Nonetheless, industrial production and world trade levels in some countries continue to be lower than those observed before the crisis. Moreover, world trade growth is expected to decelerate in the second half of 2010, as the temporary factors underlying the recent momentum fade away, *i.e.*, as the favourable inventory cycle comes to an end and economic policy stimuli are discontinued. Consumer confidence indicators recovered somewhat in the second half of 2009 and in the first months of 2010, but remained at relatively low levels (Chart 2.3). PMI indicators for industry stood at a level consistent with recovery, but declined as of the second quarter of 2010, probably meaning that growth in world industrial production peaked in that quarter.

Recent developments in emerging market economies, particularly Asia, have largely contributed to global economic recovery. Strong external and domestic demand, thanks in part to expansionary monetary and fiscal policies, have contributed to these developments. However, worries about some overheating started to emerge in China and in other emerging market economies in second half of 2009 and early 2010, in view of the strong increase in credit and housing market prices. The year-on-year rate of change of loans by financial institutions to households and non-financial corporations peaked at 34 per cent in the second and third quarters of 2009. As a result, the authorities started to withdraw some stimulus measures. For instance, the Chinese authorities raised the minimum reserve requirements of credit institutions and announced in mid-June 2010 some flexibilization in the

Chart 2.1

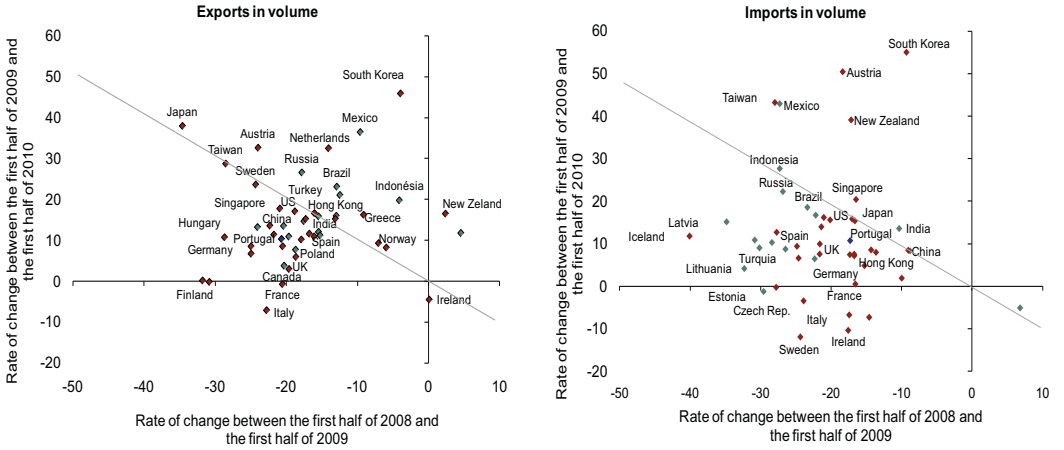
INDUSTRIAL PRODUCTION



Sources: Eurostat and Thomson Reuters.

Chart 2.2

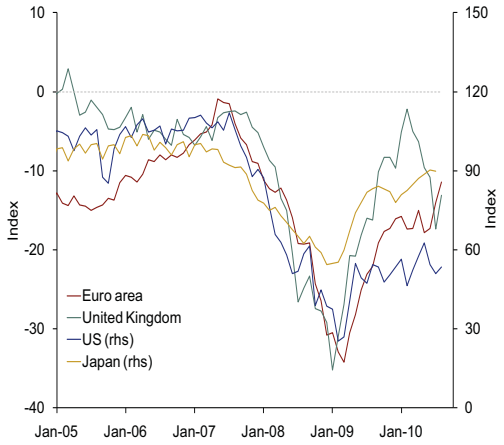
INTERNATIONAL TRADE OF GOODS BY COUNTRY



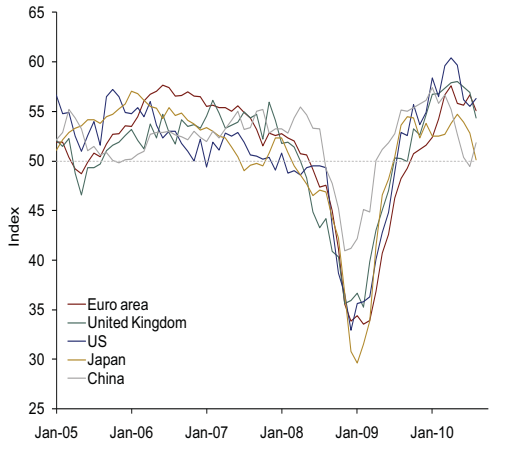
Source: CPB Monthly World Trade Monitor.
Note: Advanced economies are marked in red; emerging market economies are marked in green.

Chart 2.3

CONSUMER CONFIDENCE INDICATORS



PMI - MANUFACTURING



Sources: European Commission and Thomson Reuters.

renminbi exchange rate mechanism. Therefore, the nominal effective exchange rate of the renminbi appreciated by 3 per cent from early June to mid-September. In the first quarter of 2010, real GDP growth in China, in year-on-year terms, reached 11.9 per cent, decelerating to 10.3 per cent in the second quarter. Exports by Asian economies in the first half of the year rose sharply (Chart 2.2), stimulated by inventory rebuilding and the recovery of final demand in advanced economies. Domestic demand also grew strongly. In spite of some tightening in economic policies and financial market turbulence, the expansion of emerging market economies continued to show in general a robust dynamics. These economies are projected to maintain strong pace of growth, mainly sustained by domestic demand, although activity is forecast to decelerate in the second half of 2010.

Advanced economies economic recovery carried on in 2010

The recovery in advanced economies has been modest, with downside risks due to financial market turbulence as a result of higher sovereign risk, associated with the significant rise in fiscal deficits

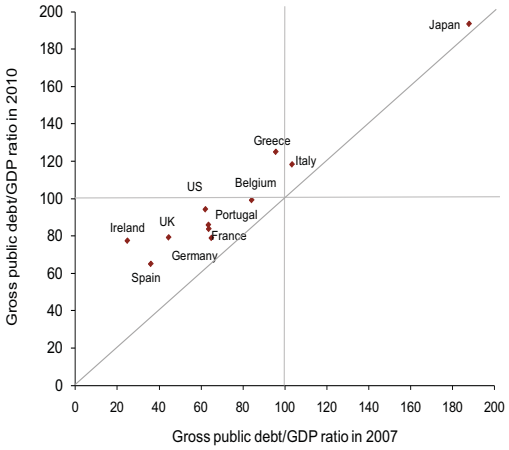
and public debt (Chart 2.4). Worries about the sustainability of public finances have focused on some economies combining a significant deterioration in fiscal position with the maintenance of some structural fragilities.

Private consumption in advanced economies has grown at a slower pace than in the years prior to the crisis, given that, on the one hand, households continue to readjust their balance sheets and, on the other hand, unemployment is expected to remain at high levels (Chart 2.5). Household indebtedness decreased and savings rates remained at high levels, although declining slightly since mid-2009 (Chart 2.6). The corporate sector, in turn, has shown some signs of normalisation, such as inventory building and improved financing conditions. These factors, in tandem with strong demand by emerging economies, have created the conditions for the recovery in investment, notwithstanding the risks associated with low capacity utilisation and pressure on banks to adjust their balance sheets. Economic recovery in advanced economies is expected to continue into the second half of 2010, in spite of some slowdown. Recovery is projected to rely more on private consumption and investment, in a context where the financial system remains fragile and vulnerable to shocks. Fiscal accounts in advanced economies are also a challenge and a risk. Fiscal consolidation plans already published anticipate an improvement in fiscal balances in 2010, but medium-term prospects continue to require additional consolidation measures, particularly in some euro area countries where financial market pressure has been more marked. Past experience suggests that fiscal consolidation measures have contracting effects on economic activity mainly in the short run. The present situation raises contracting risks and uncertainty about the policy effects, given that the interest rates are close to zero and credit market conditions remain tight. In the medium-term, however, credible fiscal consolidation plans have beneficial effects on the economy.

After the strong contraction in the first half of 2009, economic growth in the US has shown a profile of sharp recovery, although decelerating in 2010 (quarter-on-quarter rates of change of real GDP at 0.9 and 0.4 per cent in the first and second quarters respectively, compared to 1.2 per cent in the fourth quarter of 2009). Economic activity was underpinned by domestic demand, given that the contribution of net exports continued to be negative. In fact, in the first quarter of 2010, quarter-on-quarter growth of exports was similar to that of imports (2.7 per cent) and in the second quarter imports accelerated to 7.3 per cent, whereas exports decelerated to 2.2 per cent. Private consumption recovered slightly from mid-2009, but remained weak, in view of the unfavourable situation in the labour market and

Chart 2.4

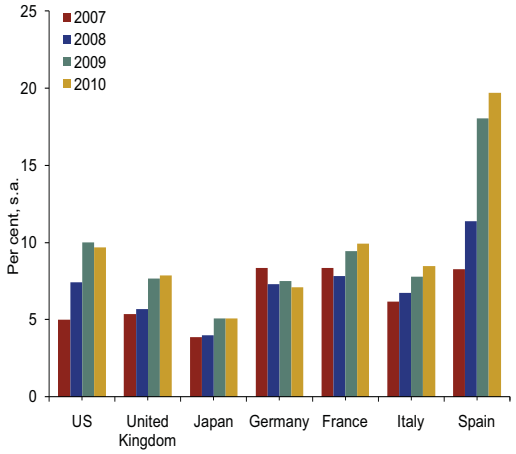
PUBLIC DEBT DEVELOPMENTS IN SOME ADVANCED ECONOMIES



Source: *AMECO*.

Chart 2.5

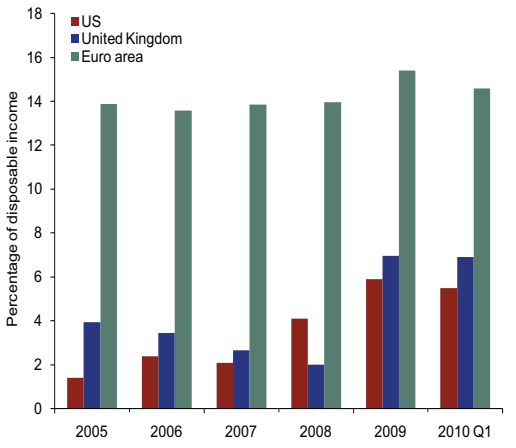
UNEMPLOYMENT RATE IN MAJOR ADVANCED ECONOMIES



Source: Thomson Reuters.
Note: The figures for 2010 correspond to the average of available months (January to August for the US and January to July for the other countries).

Chart 2.6

HOUSEHOLDS SAVINGS RATE IN MAJOR ADVANCED ECONOMIES



Sources: Eurostat and Thomson Reuters.

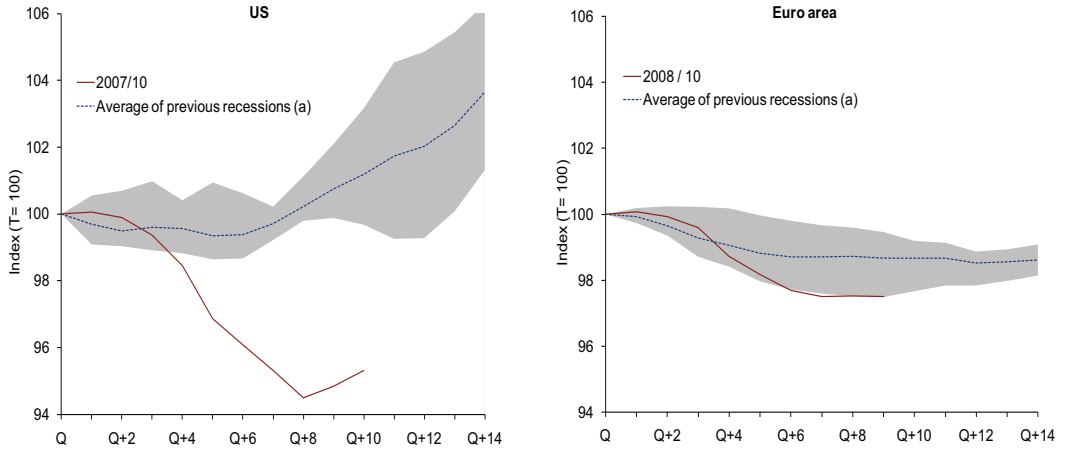
the financial situation of households. Unemployment remained high and job creation continued to be weak, after sharp falls in 2008 and 2009 (Chart 2.7). The positive contribution of inventory building to growth is coming to an end. The contribution of (non-residential) GFCF was small, but more buoyant in the second quarter of 2010. The situation in the housing market in the US remained fragile. Most recent indicators suggest unfavourable developments after some measures of stimulus to house purchase have ended. In view of the recent slowdown in some economic indicators, economic activity in the US is likely to decelerate in the second half of 2010, whereby recovery will continue to be slower than in previous recession episodes (Chart 2.8).

The economic recovery in the euro area started in the third quarter of 2009 has been moderate and GDP growth has largely reflected the dynamics of the external component. In the first quarter of 2010, real GDP grew by 0.3 per cent quarter-on-quarter and accelerated in the second quarter to 1.0 per cent. In the first quarter, net exports contributed negatively to quarter-on-quarter growth (2.4 and 4.0 per cent growth rates of exports and imports respectively), which was offset by the positive contribution of inventory building. In the second quarter, both exports and imports grew by 4.4 per cent, quarter-on-quarter, wherefore domestic demand was the main contributor to growth. Private consumption, in turn, remained weak, in an unfavourable labour market context and with savings rates reaching the highest levels over the last ten years (Chart 2.6). GFCF contracted significantly in the course of 2009 (11 per cent on annual average) and in the first quarter of 2010, but recovered slightly in the second quarter of 2010, which may point to the onset of a modest but sustained recovery of economic activity.

According to the EC, economic activity in the euro area is projected to decelerate in the second half of 2010, and GDP growth in the year as a whole will probably reach 1.7 per cent (0.5 and 0.3 per cent quarter-on-quarter growth in the third and fourth quarters respectively). EC projections suggest balanced risks for economic activity. On the one hand, the acceleration of activity in the first half of the year was partly due to temporary factors, such as the inventory cycle and the effect of policy stimulus, which may lead to lower growth as these factors fade. In addition, the deceleration in global activity may lead to a higher-than-expected slowdown in exports. Simultaneously, fiscal consolidation measures may contain domestic demand in some countries by more than anticipated. The financial system

Chart 2.7

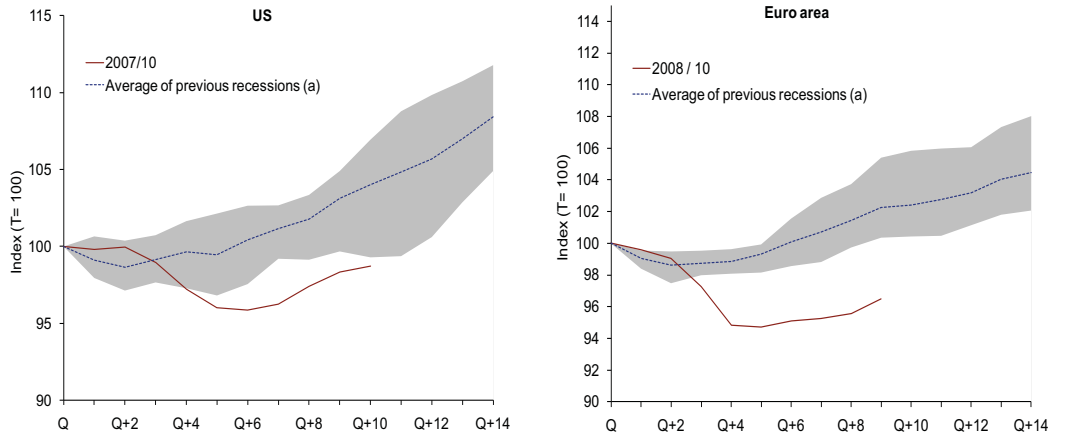
EMPLOYMENT - CYCLE COMPARISON SINCE 1970



Sources: CEPR, ECB, Eurostat, NBER and Thomson Reuters.
Notes: Q corresponds to the pre-recession peak quarter (the most recent recession: 2007 Q4 in the US and 2008 Q1 in the euro area). **(a)** Average recession level since 1970. The shaded area represents the range of between the maximum and minimum levels of previous recessions.

Chart 2.8

REAL GDP - CYCLE COMPARISON SINCE 1970

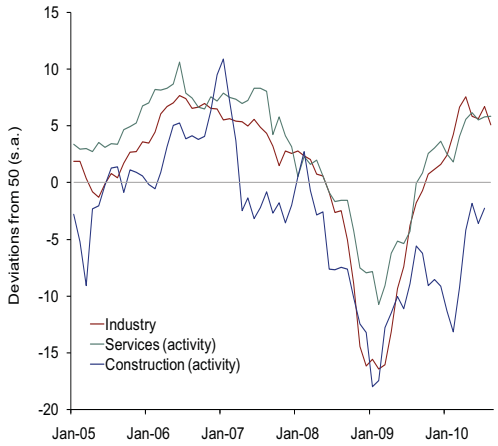


Sources: CEPR, ECB, Economic Cycle Research Institute, Eurostat, NBER, OECD and Thomson Reuters.
Notes: Q corresponds to the pre-recession peak quarter (the most recent recession: 2007 Q4 in the US and 2008 Q1 in the euro area). **(a)** Average recession level since 1970. The shaded area represents the range of between the maximum and minimum levels of previous recessions.

remains fragile and a new wave of turbulence may undermine the confidence of agents and constrain credit. On the other hand, the EC also stresses upside risks to economic activity. Investment recovery in the second quarter of 2010 and the improvement in economic agents' confidence may bring about surprisingly favourable effects. Indeed, excluding the construction sector, confidence indicators have improved and PMI indices stand above neutral level (Chart 2.9). Similarly to developments in the first half of 2010, exports and the labour market may again evolve more favourably than anticipated. In particular, exports may benefit from the lagged effects of the depreciation of the euro exchange rate. The stronger recovery of activity in Germany may also continue to have dragging beneficial effects on the other countries. It should also be mentioned that economic activity developments in the euro area were not homogeneous across countries and recovery will likely continue to be mixed (Table 2.1).

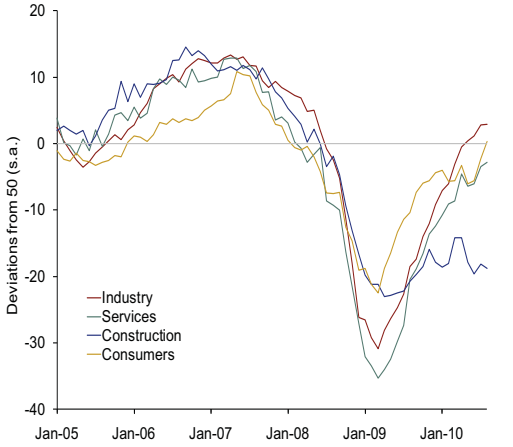
Chart 2.9

EURO AREA - PURCHASING MANAGERS INDEX



Source: Markit Economics.

EURO AREA - CONFIDENCE INDICATORS



Source: European Commission.

Significant recovery of external demand for Portuguese goods and services in 2010

Against this background, economic recovery in the main trading partners of Portugal has resulted in a significant increase in external demand for Portuguese goods and services, although not offsetting the very strong fall observed in 2009 (Table 2.2). The growth rates of economic activity in Spain, the main trading partner of Portuguese exports, were among the lowest in euro area countries as a whole in 2009 and 2010, reflecting a more pronounced impact of the financial crisis, in particular as a result of developments in the construction sector. In the first half of 2010, GDP grew moderately, thanks to the contribution of household consumption, which reflected movements in anticipation of the VAT increase in the second half of 2010. As a result, the savings rate of households, which was among the highest in the euro area in 2009, reaching an annual average of 18.4 per cent, declined in the first quarter of 2010 to 10.7 per cent. The situation in the labour market, however, continued to be rather unfavourable, and the unemployment rate peaked at 20.3 per cent in July. Net exports had a negative contribution to GDP growth in 2010. In the second quarter, imports grew by 2.8 per cent quarter-on-quarter, whereas exports increased by only 0.7 per cent. Similarly to the previous year, activity in Spain is projected to contract in 2010. In effect, EC projections point to a GDP contraction of -0.3 per cent in 2010. The EC estimates that domestic demand may contribute with -1.25 percentage points (p.p.) to the annual rate of change of GDP. Private consumption will likely contract in the second half of the year and investment will continue to be weak, as a result of the adjustment process under way in the housing sector and the decline in public investment.

Activity in Germany was more buoyant in 2010, after the adjustment period and moderate growth observed in the period prior to the crisis and the strong fall in 2009. In the second quarter of 2010, GDP accelerated to 2.2 per cent quarter-on-quarter (0.5 per cent in the first quarter). This strong rate of change was influenced by temporary factors, namely weather related, which warranted weaker buoyancy of economic activity in the first quarter of 2010, particularly in the construction sector. Recent growth was chiefly due to domestic demand, with strong investment growth. In effect, GFCF grew by 4.7 per cent quarter-on-quarter in the second quarter. Net exports, however, have also contributed positively to growth, with exports and imports growing by 8.2 and 7.0 per cent quarter-on-quarter respectively in the second quarter. Both industrial production and new orders indicators have shown signs of strong dynamics, chiefly as regards intermediate, capital and durable consumer goods. In this context, business confidence indicators, especially those measuring sentiment regarding the

Table 2.2

IMPORTS OF GOODS AND SERVICES BY SOME OF THE MAIN DESTINATION COUNTRIES OF PORTUGUESE EXPORTS

	Weights 2009	2007	2008	2009	2009 I	2009 II	2009 III	2009 IV	2010 I	2010 II
		Annual real rate of change			Real year-on-year rate of change					
Spain	26.9	8.0	-5.3	-17.8	-21.5	-22.2	-17.2	-9.2	2.0	8.1
Germany	13.1	5.2	2.9	-9.4	-8.3	-11.5	-10.1	-7.5	4.2	17.1
France	12.4	5.7	0.3	-10.6	-10.7	-12.6	-12.4	-6.4	1.1	8.9
United Kingdom[a]	5.7	4.0	-1.8	-12.8	-14.1	-15.0	-13.7	-4.9	4.7	8.4
Italy	3.8	3.3	-4.3	-14.6	-17.8	-17.4	-15.0	-7.8	4.3	8.2
US	3.0	2.7	-2.6	-13.8	-15.3	-18.3	-14.1	-7.2	6.2	17.2

Sources: Eurostat, Thomson Reuters and UK-ONS.
Note: (a) Excluing the effects of the VAT fraud, according to estimates of the United Kingdom's Statistical Institute.

present situation, have also improved. In turn, private consumption has remained weak. Contrary to most European countries, the labour market situation continued to be less unfavourable, given that corporations in Germany have decided to reduce the number of hours worked, as an alternative to reducing the number of workers, given the measures supporting job creation implemented by the German government. As a result, the unemployment rate in Germany peaked at 7.7 per cent in June 2009, declining to 6.9 per cent in mid-2010. The EC outlook for Germany points to GDP growth of 3.4 per cent in 2010, with some moderation in the second half of the year, reflecting the deceleration of external demand and the strengthening of domestic demand. The more favourable situation in the labour market, moderate inflation and some fiscal measures are likely to stimulate private consumption, whereas private investment should benefit from an increase in capacity utilisation, low interest rates and the strong financial position of the corporate sector.

Recovery in economic activity started earlier in France, more specifically in the second quarter of 2009. In the first quarter of 2010, activity decelerated (quarter-on-quarter rate of change of 0.2 per cent), which was reversed in the second quarter with GDP quarter-on-quarter rate of change of 0.6 per cent. Behind this recovery was the buoyancy of domestic demand, chiefly the contribution from changes in inventories, and also of private consumption and GFCF. In turn, the contribution of net exports was negative, and the year-on-year growth of exports and imports stood at 2.7 and 4.2 per cent respectively. According to the EC, GDP in France is projected to grow by 1.6 per cent in 2010, reflecting a deceleration in the second half of the year, as the favourable effects of temporary factors unwind. Private consumption is projected to remain limited, in view of weak disposable income and the withdrawal of measures of stimulus to consumption. Likewise, investment is projected to remain weak as a result of capacity utilisation levels. Finally, the lagged effects of the euro depreciation are likely to contribute to partly stimulate exports.

In the United Kingdom, the contraction in economic activity only came to an end in the fourth quarter of 2009. After a slight deceleration in the first quarter of 2010, activity rebounded strongly in the second quarter (quarter-on-quarter rates of change of 0.3 and 1.2 per cent in the first and second quarters respectively). This recovery was due to the buoyancy of domestic demand (including changes in inventories), since net exports have contributed negatively to economic growth. The quarter-on-quarter rate of change of exports was -1.7 and 1.1 per cent in the first and second quarters, whereas imports grew by 1.6 and 0.9 per cent in the same quarters. Consumption expanded in the first half of 2010, first as a result of public consumption and, in the second quarter, due to developments in private consumption, even though the main contribution to GDP change in the second quarter came

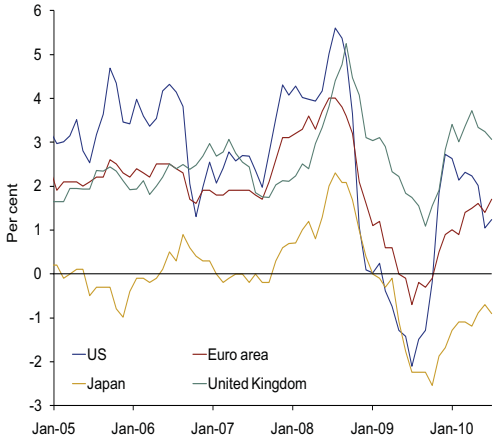
from inventories. GDP growth for 2010 in the United Kingdom is forecast by the EC to reach 1.7 per cent. In the fourth quarter of 2010, private consumption is expected to grow in anticipation of the VAT increase that will enter into force in January 2011. Investment is projected to remain weak, in view of tight credit conditions and expectations that demand will continue to be sluggish. Net exports will likely have a moderate contribution to growth. At the start of the period of the world economic and financial crisis, Italy was already facing weak growth and competitiveness difficulties. The quarter-on-quarter rate of change of GDP was 0.4 and 0.5 per cent in the first and second quarters of 2010 respectively. In the first quarter, the main contribution was made by domestic demand, particularly changes in inventories. In the second quarter, growth was due to the favourable developments of net exports. In effect, exports rose by 3.3 per cent quarter-on-quarter in this quarter, whereas imports grew by 0.8 per cent. Private consumption growth was virtually nil, while GFCF growth was sustained in the first half of the year, due to the recovery in the exporting sector and to tax incentives. GDP growth in Italy is forecast by the EC to stand at 1.1 per cent in 2010, chiefly stimulated by the developments expected for the industrial sector. Exports will likely continue to contribute positively to growth, but are projected to decelerate in the fourth quarter. Investment is expected to continue to recover gradually, although investment in construction will likely remain subdued. Private consumption is projected to be weak, bound by the unfavourable situation in labour markets. Some heterogeneity in inflation developments across regions worldwide

Inflation continued to be moderate in advanced economies, as a result of low capacity utilisation levels, high unemployment and continued expectations of anchored inflation (Chart 2.10). The year-on-year rate of change of the HICP for the euro area rose from 1.0 per cent in January to 1.7 per cent in July. In the US, the year-on-year rate of change of the CPI declined to levels close to 1 per cent in June and July, after levels above 2 per cent at the start of the year. In contrast, inflation rates in the United Kingdom were higher (above 3 per cent), partly reflecting temporary factors related to indirect tax increases, whereas in Japan the rate of change of prices remained at negative levels. The dynamics of inflation will likely continue to be mixed across advanced economies, depending on the leverage level of households, financial system vulnerabilities and the development of inflation expectations. According to the EC outlook, inflation will continue to be moderate in Europe in 2010 and is expected to stand at 1.4 per cent in the euro area. In emerging market economies, in

Chart 2.10

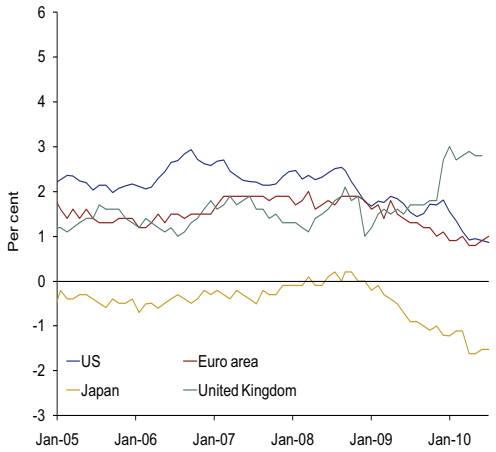
CONSUMER PRICES

Year-on-year rate of change



CONSUMER PRICES EXCLUDING ENERGY AND FOOD

Year-on-year rate of change

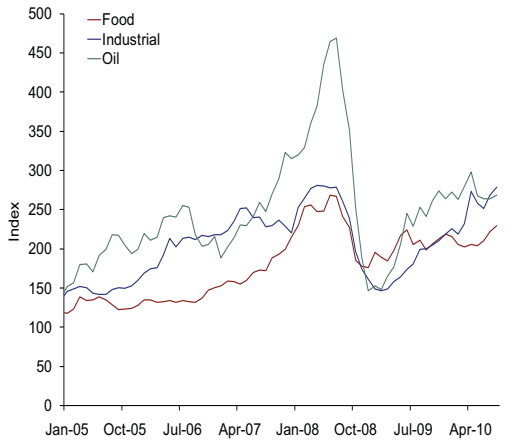


Sources: Eurostat and Thomson Reuters.

turn, inflation is projected to increase in 2010, due to strengthening economic activity, with risk of overheating in some economies, and to increased difficulties in anchoring expectations. Following the downward trend started in 2008, international commodity prices started to increase at the end of 2009 (Chart 2.11). The brent crude oil price showed an upward trend up to April 2010, reaching an average monthly value of 85 US dollars/barrel. Concerns about a slowdown in economic recovery and world demand have led to a decline in oil prices as of April. In the first half of September, the average price of oil was 77 US dollars/barrel. Available data on oil futures suggest a slight and gradual price increase to approximately 83 US dollars/barrel at the end of 2011. According to the International Energy Agency, global demand for oil is expected to grow by 2.2 per cent in 2010, due to demand by some emerging economies. In the course of 2010, stocks of oil and oil distillates have been high by historical standards, which may contribute to contain possible pressures on prices. Commodity prices excluding energy pursued the upward trend started in 2009, but decelerated as of May 2010. Food commodity prices, in particular cereal prices, rose considerably during the summer months, chiefly due to weather related factors and to the suspension of cereal exports by Russia. As a result, the HWWI index for non-energy commodities rose considerably in 2010, to stand against the USD at the historical peaks reached in the first half of 2008.

Chart 2.11

INTERNATIONAL COMMODITY PRICES IN USD



Source: HWWI-Hamburg Institute of International Economics.

Continued risks associated with global imbalances

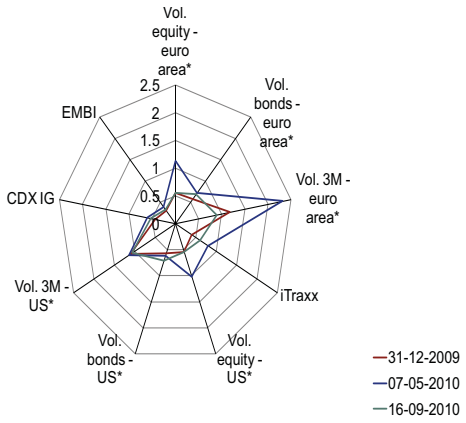
Capital flows to emerging market economies have intensified since 2009 and, after a fall in the first half of 2010 as a result of sovereign debt market turbulence in the euro area, have resumed their previous pace. These international capital flows, together with the appreciation of several currencies of these economies, may contribute to reduce global imbalances, which are reflected in high external deficits of some advanced economies, namely the US, and in balance of payments surpluses in Asian economies. In spite of the narrowing of global imbalances in recent years, no significant changes are expected in the near future. Notwithstanding the rise in household savings in the US, there is a risk that it resumes pre-crisis levels as the situation in housing and financial markets stabilises and consumer confidence recovers. In contrast, the savings rate in Asian economies will likely continue to be structurally high. Both economies, either in surplus or in deficit, will need to implement policies contributing to correcting global imbalances: in the US, policies leading to higher savings levels; in Asian economies, more flexible exchange rate policies, policies to stimulate domestic demand and easing of restrictions on international capital flows.

Concerns about the sustainability of public finances in some euro area countries have led to a new wave of turbulence in international financial markets …

In the first half of 2010, developments in financial markets were mainly determined by worries about sovereign credit risk. These fears started to materialise in late November with the possibility that Dubai World (investment corporation held by the government) would not meet the debt burden, and the publication of the much higher-than-expected Greek fiscal deficit. The situation intensified in the first months of 2010, in the wake of downward revisions of the credit rating of Greek public debt and contagion to other European countries with high fiscal deficits and structural fragilities, particularly Portugal, Ireland and Spain. Credit rating in Greece has undergone successive downgradings since October 2009, and stands now at a speculative level in the three main rating agencies. Portugal, Spain and Ireland have also undergone some downward credit rating revisions. In this context, international financial market volatility has risen significantly and investor confidence has deteriorated markedly, also on account of the uncertainty surrounding economic recovery (Chart 2.12). The spreads between government debt interest rates of euro area countries and Germany have widened, to reach a peak since the start of Stage Three of the Economic and Monetary Union (EMU). Up to early May 2010, these spreads widened significantly and the sovereign market debt posted high volatility, against the background of successive upward revisions of sovereign risk and uncertainty as to the authorities' responsiveness. In early May, ten-year interest rate spreads *vis-à-vis* Germany peaked at 952 basis points (b.p.) for Greece and exceeded 300 b.p. in Portugal and Ireland (Chart 2.13). In this framework, authorities have announced a range of measures, among which fiscal consolidation plans by the governments of the most affected countries and, on 2 May, the European Union and the IMF announced a joint plan to support Greece to the amount of 110 billion euro. International financial markets, however, continued to penalise the government debt of more vulnerable countries, considering that the measures announced were insufficient. In the Greek case, the market perceived the need for debt restructuring in the short term, which was reflected in the reversal of the yield curve and the Credit Default Swap (CDS) spread curve. As sovereign risk deteriorated, the risk of contagion to other countries, institutional sectors, in particular the banking sector, and different market segments was higher. The European Stabilisation Fund announced on 9 May, and to be acti-

Chart 2.12

FINANCIAL MARKETS RISKS

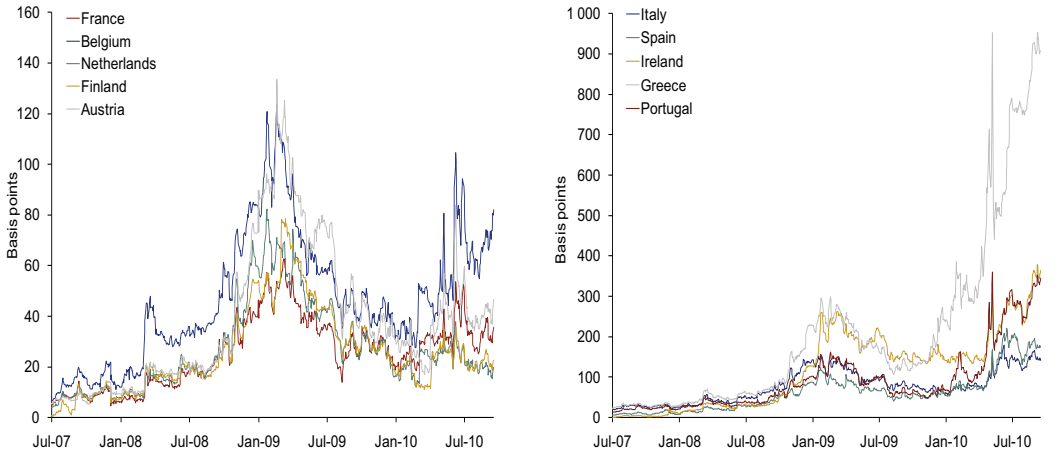


Sources: Bloomberg, Thomson Reuters and Banco de Portugal calculations.

Notes: The scale represents the ratio of the values of the respective the indicator between the indicated date and 31 December 2008. iTraxx is the CDS index on european corporations. CDX IG is the CDS index on US corporations. EMBI is an index measuring government interest rate spreads of emerging market economies *vis-à-vis* the US. * Implied volatilities in options on the nearest futures contract over the respective instrument.

Chart 2.13

10-YEAR GOVERNMENT BOND YIELDS SPREADS AGAINST GERMANY

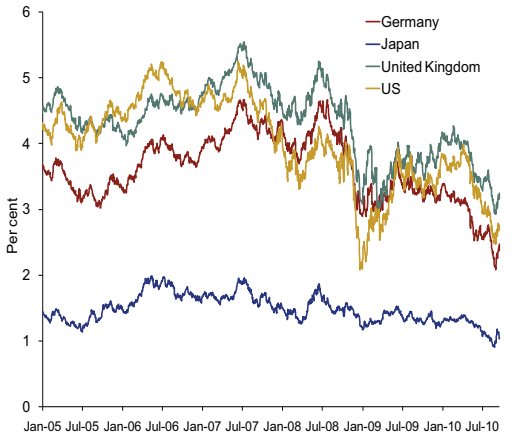


Sources: Thomson Reuters and Banco de Portugal calculations.

vated in case of need by EU countries facing external financing difficulties, has helped restore some market stability. The fund reaches 750 billion euro and is co-funded by the IMF. The EU has created the European Financial Stability Facility (EFSF), which is responsible for financing 440 billion euro of the fund through the issue of bonds. The activation of the fund requires compliance with a number of conditions and strong fiscal consolidation plans by the beneficiary, to be defined on a case-by-case basis. In turn, the ECB has announced several measures to restore liquidity and depth in dysfunctional market segments, in order to restore an appropriate monetary policy transmission mechanism. One of these measures was a programme for the purchase of euro area public and private debt securities (Securities Market Programme). The ECB has also expanded its longer-term refinancing operations, resumed the fixed-rate tender procedure with full allotment in all reverse refinancing operations, and reactivated the USD swap line with the US Federal Reserve. The ECB has also announced the maintenance of eligible securities issued or guaranteed by the Greek Government as collateral for refinancing operations, until further notice. In the last two months, tensions in euro area sovereign debt markets intensified and were reflected on government yield spreads between some countries and Germany. This situation was especially associated with the perception by market participants of increased risks surrounding the banking system situation in Ireland, negatively affecting, due to contagion effects, the cost of financing governments and banks in other euro area countries. In this context, Greece, Ireland and Portugal faced the most significant increase in ten-year government yield spreads *vis-à-vis* Germany to levels close to the peaks reported in May. In mid-September ten-year spreads in these countries stood at 908, 364 and 345 b.p. respectively. Whereas public debt yields have reached all-time highs in some countries, other countries have had a sustained downward trend, driven by greater demand for safe-haven assets by investors in a context of increased risk aversion and volatility. From 31 December 2009 to 16 September 2010, ten-year rates for Germany, US and the United Kingdom dropped by 91, 108 and 86 b.p. respectively, standing at historical lows and below 3 per cent in the two first countries (Chart 2.14). The interest-rate fall was justified by real interest rate developments, resulting from weak economic growth prospects, and very low inflation expectations, both of which are now at low levels by historical standards. Safe-haven flows have also been reflected on the price of gold.

Chart 2.14

TEN-YEAR GOVERNMENT BOND YIELDS



Source: Thomson Reuters.

… which has extended to foreign exchange markets …

Foreign exchange markets were the first to be hit by contagion effects from intensifying sovereign risk. The euro has depreciated substantially as of late 2009 (Table 2.3), in view of fears about the sustainability of fiscal accounts in different European countries and the resulting decline in demand for financial assets in euro. In nominal effective terms, the euro depreciated by 8.4 per cent from the end of 2009 to mid September 2010. *Vis-à-vis* the US dollar that depreciation was sharper (9.2 per cent). According to the IMF, these developments have brought the euro exchange rate closer to its fundamentals, even though this analysis is currently subject to above-normal uncertainty.

… and to other market segments, focusing on the banking sector

Turbulence in public debt markets has been reflected on other sectors, namely the banking sector. In effect, higher sovereign risk affects the banking system through different channels. First, banks are among main public debt investors, which means that lower price and increased volatility generate potential losses on banks' portfolios (Chart 2.15). Second, bank funding costs are partly co-related to the public sector funding cost. Third, the value of collateral and guarantees given by the State declines as sovereign risk increases. Finally, there is also an indirect effect of public action on the economy, which affects the situation of banks through the revision of credit and market risks. Therefore, credit risk in the European banking sector has risen in tandem with increased stress in the public sector (Chart 2.16). Tensions and financing difficulties in interbank markets have re-emerged, which was reflected in the rise in uncollateralised interest-rate spreads *vis-à-vis* overnight interest rate swaps (Chart 2.17). The results of the euro area-wide bank stress tests conducted by the Committee of European Banking Supervisors were published at the end of July, with a view to contributing to transparency in the banking sector. These results revealed a lower-than-expected need for recapitalisation measures and, overall, had a favourable impact on financial markets, even though largely temporary. Nonetheless, the need to raise the resilience of banking systems in some advanced economies still persists. Banks' balance sheets should be remedied, by raising liquidity and capital buffers in order to restore investor confidence. In September 2010, the Basle Committee on Banking Supervision announced the revision of capital requirements to higher levels, as well as the transition period. The banking system remains subject to risks, among which the possibility of undergoing additional losses, in view of the uncertainty surrounding economic recovery and risks associated with

Table 2.3

INTERNATIONAL FINANCIAL MARKETS
Daily data

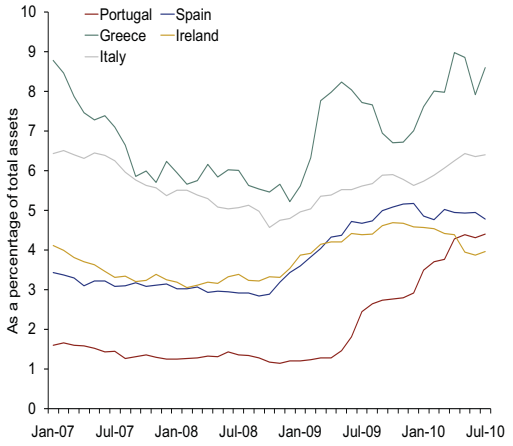
	Averages		End-of-period		End-of-period *vis-à-vis* the beginning of the financial crisis (percentage change or basis points)[b]		End-of-period *vis-à-vis* the moment preceding the bankruptcy of Lehman Brothers (percentage change or basis points)[c]	
	2009	2010[a]	2009	2010[a]	2009	2010[a]	2009	2010[a]
Stock price indices (percentage change)								
Dow Jones Euro Stoxx	-25	12	23	-3	-37	-39	-8	-11
Banks	-36	7	49	-13	-52	-59	-16	-27
S&P 500	-22	18	23	1	-28	-27	-7	-6
Banks	-46	27	-9	3	-67	-66	-29	-27
Nikkei 225	-23	8	19	-10	-41	-47	-14	-22
FTSE 100	-15	17	22	2	-18	-16	4	6
MSCI - emerging market economies[d]	-13	21	59	3	-11	-9	21	24
10-year interest rates - government debt (per cent)								
Euro area	4.0	3.8	4.0	3.6	-54	-98	-42	-86
United States	3.2	3.3	3.8	2.8	-111	-219	45	-63
Japan	1.4	1.2	1.3	1.1	-57	-81	-24	-49
United Kingdom	3.6	3.7	4.0	3.1	-130	-217	-45	-132
Spreads between corporate and government bond yields (basis points)								
Euro area								
AA	107	9	23	19	-17	-21	-125	-130
Non-financial corporations	67	-2	29	-6	4	-32	-38	-74
Financial corporations	117	13	21	27	-21	-15	-140	-134
BBB	380	158	187	152	114	79	-63	-98
Non-financial corporations	237	69	86	74	17	6	-128	-139
Financial corporations	1361	478	595	413	484	302	-26	-207
Banks	265	91	121	91	76	46	-91	-120
United States								
AA	270	143	143	136	67	60	-175	-183
Non-financial corporations	194	138	130	139	61	70	-78	-69
Financial corporations	302	140	141	132	64	55	-201	-210
BBB	519	296	309	293	177	160	-100	-117
Non-financial corporations	449	268	271	270	141	140	-109	-110
Financial corporations	1074	460	544	427	367	251	-172	-289
Banks	492	258	263	242	169	148	-213	-234
Emerging market debt spreads								
EMBI+	456	289	274	273	92	91	-106	-107
Nominal effective exchange rates (percentage change)								
Euro	1.0	-6.3	-1.0	-8.4	5.2	-3.6	3.5	-5.1
USD	6.6	-2.8	-5.4	0.2	-0.8	-0.6	0.9	1.0
Japanese yen	14.7	2.8	-5.4	8.5	30.7	41.8	14.8	24.6
Pound Sterling	-11.2	-0.3	7.2	0.7	-23.6	-23.1	-9.6	-9.0
Memo:								
EUR/USD exchange rate[e]	-5.2	-5.8	3.0	-8.8	3.7	-5.4	1.3	-7.6

Sources: Bank for International Settlements, Bloomberg, ECB, Federal Reserve Board and JPMorgan.
Notes: (a) Data until 16 September. (b) Changes *vis-à-vis* 23 July 2007. (c) Changes *vis-à-vis* 15 September 2008. (d) Morgan Stanley Capital International Index for emerging market economies: Argentina, Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Israel, Jordan, Korea, Malaysia, Mexico, Morocco, Pakistan, Peru. (e) A positive change corresponds to an appreciation of the euro.

the possible removal of policy stimuli. Mention should also be made of the risks associated with the refinancing of financial institutions' debt, given the high amounts involved, further concentration on the short-term in recent years, and increased investor risk aversion. Turbulence has also extended to equity markets, with broadly based falls in major indices (Table 2.3 and Chart 2.18). Therefore, the

Chart 2.15

GOVERNMENT BONDS HELD BY MONETARY FINANCIAL INSTITUTIONS

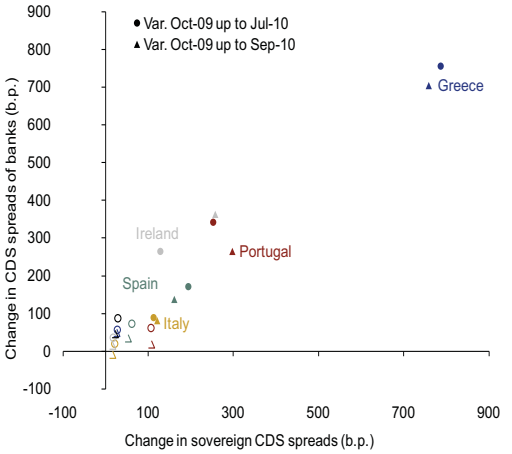


Source: ECB.

Chart 2.16

DEVELOPMENTS IN CREDIT RISK PREMIA ON GOVERNMENT DEBT AND BANKING SECTOR DEBT

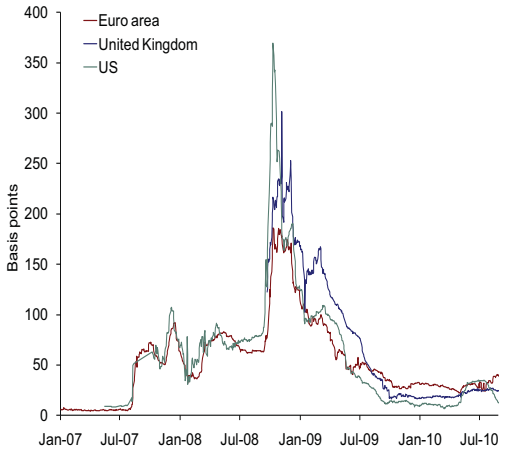
Euro area countries and United Kingdom



Sources: Thomson Reuters and Banco de Portugal calculations.

Chart 2.17

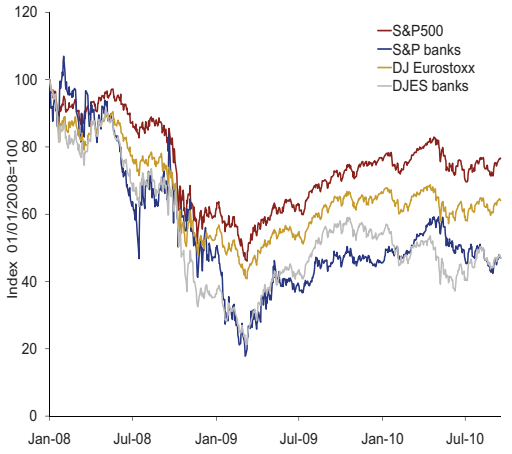
SPREAD BETWEEN DEPOSIT RATES AND THREE-MONTH OIS



Source: Thomson Reuters.

Chart 2.18

EQUITY INDICES



Source: Thomson Reuters.

upward trend observed since March 2009 was interrupted at the end of April. Price falls were sharper in euro area banking sector equity, with a fall by 27 per cent in Eurostoxx banks from 31 December 2009 to 7 May 2010, *i.e.*, the day before the European Stabilisation Fund was announced. Volatility in these markets, however, remained high. There has been a further recovery since July, facilitated by the release of better-than-expected performance of corporates and the results of stress tests to European banks. Nonetheless, heightened uncertainty as regards economic recovery in the wake of the release of less favourable indicators and higher risk aversion has again led to equity market falls. The release of Basel III measures has partly reduced uncertainty and has had a favourable impact.

In private debt markets, market conditions have improved in the course of 2009 and early 2010. In major advanced economies, yield spreads *vis-à-vis* public debt have declined from the peaks at-

tained in early 2009. In the euro area, the narrowing of the spreads was sharper and, in April 2010, they were close to the levels observed prior to the financial crisis. However, the contagion of sovereign risk to the private sector has reversed this trend and spreads are presently higher, even though yields remain at historical lows (Table 2.3 and Chart 2.19). Private debt securities issuance has also been affected by the turmoil in international financial markets and heightened investor risk aversion. In effect, total private debt, especially of financial corporations, declined in major advanced economies in the first half of 2010 (Chart 2.20). Financial markets in emerging economies were relatively immune to the turmoil that has affected markets in advanced economies (Chart 2.11). Public debt spreads in these economies *vis-à-vis* the US (EMBI spreads) over 2009 pursued a sustained downward trend, reaching in April 2010 levels close to those seen in early 2008, before the Bear Stearns crisis and the collapse of Lehman Brothers. In May these spreads widened somewhat, following the turmoil in sovereign debt markets in euro area countries and the uncertainty surrounding economic recovery. In early July, they narrowed again and in mid-September they were at relatively low levels by historical standards (approximately 290 b.p. below the average since 1991). The markets of some emerging market economies in eastern Europe were an exception to these favourable developments, and were more affected due to their strong link to the euro area. Recently, EMBI spreads in these economies have narrowed less markedly and stand presently close to the high levels seen in May. Equity markets of emerging market economies also reported a decline in May, but recovered in the subsequent months to levels in line with developments in late 2009.

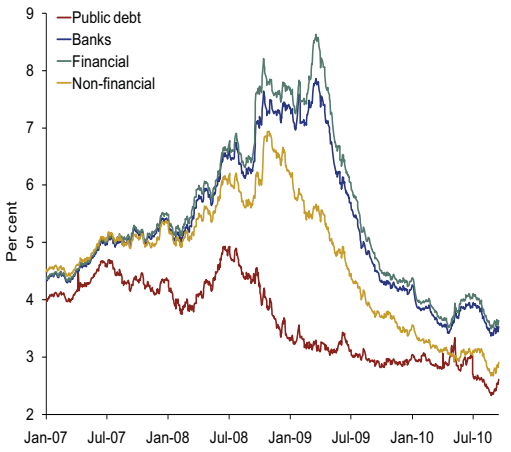
Heterogeneous response of the authorities due to mixed economic rebound

Authorities have phased-out policy stimuli in accordance with the different regional economic momentum. The timing, pace and sequence of withdrawal of accommodating policy measures has changed across countries, depending on the strength of private demand and financial conditions.

In emerging market economies, strong credit growth and asset price increases raised some concerns about overheating of the economies and led monetary authorities in some countries (for instance China, India and Brazil) to tighten their monetary conditions. This policy tightening included a combination of interest rate hikes, exchange rate appreciation and other measures such as the increase in the reserve requirement ratio of credit institutions and the imposition of credit limits.

Chart 2.19

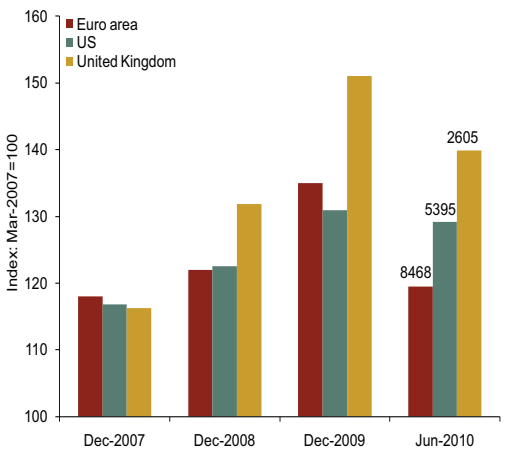
PUBLIC AND PRIVATE DEBT YIELDS IN THE EURO AREA



Source: Thomson Reuters (Merryll Lynch).

Chart 2.20

TOTAL DEBT OF FINANCIAL CORPORATIONS
End-of-period figures

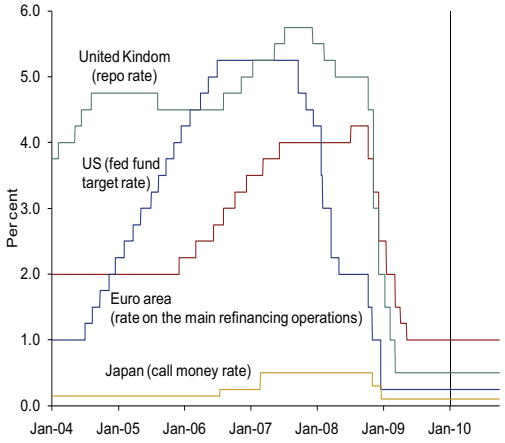


Source: Bank for International Settlements.
Note: Values in the chart bars in billion dollars.

In most advanced economies, monetary policy remained accommodative. Official interest rates in advanced economies stand at historically low levels and, in some cases, close to zero (Chart 2.21). In addition, central banks maintain a high level of financial intermediation. At the end of 2009 and during the first months of 2010, some central banks began the phasing-out of a number of unconventional measures. The Federal Reserve did not renew a range of facilities contributing to the funding of certain financial institutions and to the functioning of some market segments.[1] The Bank of England has decided to maintain the size of its asset purchase programme, which had already been affected.

Chart 2.21

OFFICIAL INTEREST RATES



Source: Bloomberg.

At the start of the year, the ECB reduced the number of longer-term refinancing operations and introduced the variable rate tender procedure in these operations. At the end of June, purchases under its Covered Bond Purchase Programme ended. However, in the wake of the sovereign risk crisis and the re-emergence of tensions in interbank markets, some measures were recovered and some new ones were introduced. The ECB implemented in May an euro area debt securities purchase programme with a view to restoring liquidity in these markets and to restore an appropriate monetary policy transmission mechanism. Purchases are sterilised, since the ECB withdraws liquidity from these final operations through one-week fine-tuning operations. To date, the amount involved is this portfolio has attained 60 billion euro. The ECB has also re-introduced some measures that had been discontinued: it widened the scope of longer-term refinancing operations and resumed the fixed-rate rate tender procedure with full allotment, and re-established a foreign-exchange swap line with the Federal Reserve, in order to provide funds in US dollars to euro area counterparties. Recourse to this latter facility, however, was rather limited. The financial crisis led to a significant deterioration of fiscal accounts in euro area countries in 2008 and 2009, due to the immediate impact from the deteriorating economic activity and stimulus measures to the economy and support measures to the financial system. In early 2010, it was deemed that not all policy stimuli should be withdrawn in that year, thereby contributing to the economic recovery. However, concerns about the sustainability of the public finance position and tension in international financial markets have led euro area countries, particularly those facing increased structural fragility and weak public finance sustainability to accelerate the implementation of fiscal policy tightening. The case of Greece should be highlighted, given that, following the election of a new government, the fiscal deficit and public debt were revised

(1) The facilities discontinued in this period were the Money Market Investor Funding Facility, Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility, Commercial Paper Funding Facility, Primary Dealer Credit Facility and Term Securities Lending Facility.

upwards on several occasions, revealing fiscal fragilities. In the wake of the approval of the joint European Union-IMF financial support to Greece, the Greek government defined additional measures to adjust public finances, aimed at correcting the excessive deficit by 2014. Among these measures, stress should be laid on cuts in government employee wages and retirement pensions, additional VAT increases, as well as structural reforms. The contagion to public debt markets in other euro area countries, in particular Ireland, Portugal and Spain, forced the two latter countries to adopt stronger fiscal tightening measures in May. In Portugal, the measures address both the revenue side (for instance, limits to fiscal incentives in the Personal Income Tax and the widening of the Social Security contribution base) and the expenditure side (for instance, wage freezes and postponement or cancellation of some investments).[2] In turn, the Spanish government has brought forward its objective of correcting the excessive deficit by 2013, and has also implemented additional measures, such as cutting government employee wages, reducing social benefits, and curtailing public investment and transfers to the autonomous regions and local authorities. At the end of 2009, Ireland was already in excessive deficit, but the European Commission agreed to widen the correction period up to 2014, given that the significant deterioration of public finances was the result of an exceptional situation deriving from the interaction between severe recession and the effect of automatic stabilisers. Also, Ireland had already shown significant efforts towards fiscal consolidation. Other countries, namely Germany, in a more favourable situation, have also implemented fiscal consolidation programmes aimed at reducing public expenditure. So that governments may regain financial market confidence, the programmes must be credible and must include structural reforms promoting potential output. In September 2010, the European Commission announced changes in the procedures to monitor public finances in EU countries. Among these changes is the creation of the European Semester which implies the anticipation of the report of national budgets to the Commission, even before their discussion at domestic level.

Fiscal policy measures should be followed by a reform of the financial system and macro-prudential and supervisory policies. These reforms are essential for making the financial system more resilient to shocks and restoring the balance sheets of financial institutions and investor confidence. In this context, the Basel III reform announced in early September calls for greater capital requirements of financial institutions. This reform includes the implementation of two capital buffers, a capital conservation buffer, to first absorb losses arising from adverse shocks, and a countercyclical buffer, defined at domestic level, to protect the banking sector from periods of excessive credit growth. In addition, a non-risk-based leverage ratio will be established, and systemically important financial institutions will also be subject to additional rules that are still under discussion. The Basle Committee has defined a gradual transition period up to 31 December 2018, when the new rules will be globally effective.

3. MONETARY POLICY OF THE ECB AND MONETARY AND FINANCIAL CONDITIONS OF THE PORTUGUESE ECONOMY

3.1. Monetary policy of the ECB

The Eurosystem did not introduce considerable changes in its monetary policy stance in 2010

The last change in the key ECB interest rates occurred in May 2009. Since then, the Governing Council of the ECB has kept these rates unchanged: the interest rate on the MROs stands at 1 per cent and the interest rates on the deposit facility and the marginal lending facility stand at 0.25 and 1.75 per cent respectively. Over the course of 2010, according to the Governing Council's assess-

(2) See "Box 3.1 *Medium-term fiscal outlook*", Banco de Portugal, *Annual Report* 2009.

ment the level of the official interest rates has remained adequate and in line with the objective of price stability. The annual rate of change in the HICP in the euro area increased from the negative levels recorded in mid-2009, but remained below 2 per cent (1.6 per cent in August). The inflation rate was slightly higher than expected, chiefly due to developments in energy and food prices. Nevertheless, the Governing Council continued to expect the maintenance of inflation at levels consistent with price stability, *i.e.* below, but close to, 2 per cent over the medium term. Expectations of moderate inflation over the medium term are related to economic activity prospects. According to the Governing Council, economic recovery in the euro area is expected to continue, albeit at a more subdued pace than in the first half of the year. Monetary policy decisions made in the course of 2010 were based on expectations of weak economic growth over the medium term. Renewed turbulence in financial markets and signs of some weakening in global activity introduced high uncertainty in economic prospects for the euro area, taken on board by the Governing Council in its decisions. In its meeting held in September 2010, the Governing Council identified mainly downside risks to economic activity. With regard to inflation, the Governing Council considered that the risks are mainly tilted to the upside, as a result of developments in energy and other commodity prices and rises in indirect taxation and administered prices, given the increased need for fiscal consolidation. The Governing Council also stressed the importance of keeping inflation expectations anchored in line with the objective of price stability, which has been achieved so far. In fact, inflation over the medium term foreseen by ECB staff or based on survey results will remain below, but close to, 2 per cent, as well as inflation expectations implicit in the price of inflation-indexed government bonds, which have even decreased in the course of 2010. However, information extracted from financial instruments needs to be interpreted with caution, as prices are affected by risk and liquidity considerations, particularly in times of turbulence.

With regard to the non-standard measures implemented, the provision of unlimited liquidity started in October 2008 produced the desired effect, contributing to the stability of money market rates and reducing pressure on bank funding. In view of improved financial market conditions and in order to avoid distortions in the economy, as a consequence of the maintenance of non-standard measures for too long, the Governing Council in its meeting held in December 2009 decided to gradually phase out these measures. The liquidity policy was the first to be changed. The MROs and the refinancing operations with a maturity equal to the maintenance period continued to be conducted as fixed-rate tenders with full allotment. The number and the frequency of the longer-term refinancing operations (LTROs) were reduced, but these operations continued to be conducted through fixed-rate tender procedures with full allotment; however, the rate could be different from the MRO rate prevailing at the time. In March 2010 the Governing Council announced a further step in the gradual phasing out of the non-standard measures. The Council decided to return to variable-rate tender procedures in the LTROs, starting with the operation to be allotted at the end of April. The Governing Council ensured that the allotment amounts in these operations would be sufficient to guarantee smooth conditions in money markets, avoiding any significant spreads between bid rates and the prevailing MRO rates.

The return of turbulence to financial markets led to additional non-standard measures

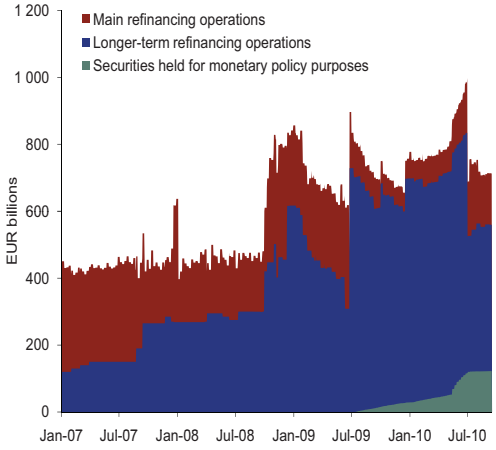
However, tensions continued to build up in sovereign debt markets spilling over to the euro area money market in April and May 2010. Some banks faced again difficulties in borrowing from international wholesale debt markets and spreads between unsecured and secured money market rates widened again. As a consequence of strong turbulence in financial markets, the Governing Council reversed some of the decisions previously made and took new measures to restore an appropriate monetary policy transmission mechanism. Thus, in May 2010 the Governing Council announced that it would conduct again LTROs as fixed-rate tenders with full allotment and a 6-month LTRO with the rate fixed

at the average minimum bid rate on the MROs during the maturity of the operation. The Governing Council also decided to reactivate the swap lines with the Federal Reserve that had expired in January 2010. Finally, the Governing Council announced a programme of purchases of euro area public and private debt securities (the Securities Market Programme – SMP) to restore the normal functioning of dysfunctional market segments and of the monetary policy transmission mechanism. In its September 2010 meeting, the Governing Council announced that it would continue to conduct its refinancing operations as fixed rate tender procedures with full allotment at least until the end of 2010.

As a consequence of the measures taken, the balance sheet of the Eurosystem expanded again from April 2010 onwards and the provision of primary liquidity reached a new historical maximum in June (Chart 3.1.1). Financial markets reacted favourably to the new non-standard measures and the Eurosystem achieved its aim of stabilising affected market segments. The Covered Bond Purchase Programme started in June 2009 continued to be carried out as initially defined and was completed in June 2010 with the targeted amount of EUR 60 billion having been purchased. Liquidity injected in the banking system as a result of purchases under the SMP was sterilised through liquidity-absorbing reverse transactions, conducted weekly with a one-week maturity. Hence, the Eurosystem ensured that the stance of monetary policy remained unchanged. It is important to recall that non-standard measures, including the additional measures implemented in 2010, are of a temporary nature and were conceived in such a way as not to jeopardise the primary objective of price stability.

Chart 3.1.1

OUTSTANDING AMOUNTS OF THE EUROSYSTEM MONETARY POLICY OPERATIONS



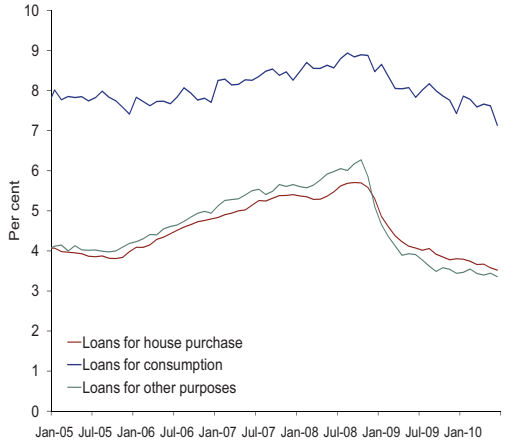
Source: ECB.

Credit markets continue to be subdued due to both demand and supply-side factors

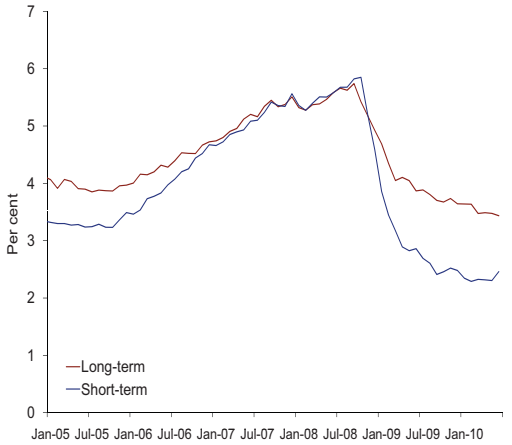
Overall, MFI interest rates on new business loans to the non-financial private sector of the euro area continued on a slightly declining trend (Chart 3.1.2). After the historical highs reached in the second half of 2008, interest rates on loans to households dropped by approximately 2 p.p. in cumulative terms until June 2010, while the drop reached 3 and 2 p.p. for new short and long-term loans to non-financial corporations respectively. The spreads between bank loans to households and reference market rates also narrowed after a sharp rise at the end of 2008, albeit still remaining at relatively elevated levels. The spreads regarding loans to non-financial corporations showed different developments depending on their maturity. As regards short-term loans, the spread *vis-à-vis* the reference market rate (3-month Euribor) has remained high and relatively stable since 2009. In turn, spreads regarding long-term loans narrowed considerably throughout 2009, and more markedly in 2010, reach-

Chart 3.1.2

INTEREST RATES ON LOANS TO HOUSEHOLDS (NEW BUSINESS)



INTEREST RATES ON LOANS TO NON-FINANCIAL CORPORATIONS (NEW BUSINESS)



Source: ECB.

ing negative figures. This was due to a reduction in the interest rate of long-term loans to enterprises and chiefly to an increase in long-term public debt rates, which are used as a benchmark for these loans. Given the low level of interest rates in the euro area and increased risk aversion, interest rate spreads of bank loans are expected to remain higher at least in comparison with the pre-crisis period.

After a decline in the tightening of credit standards on loans to non-financial corporations and households, reported in the Bank Lending Survey for the euro area during 2009, the results for 2010 suggest that banks tightened further their credit standards. However, there is some heterogeneity across euro area contries. Turning to the demand for loans, survey results suggest that it continues to decrease slightly but at an ever slower pace, except for an increase in the demand for housing loans.

According to statistics from Monetary and Financial Institutions (MFIs), after the sharp fall in the growth of loans to the private sector started in 2008, in early 2010 there was some pick up (Chart 3.1.3). In 2009 there was even a slight drop in loans, reversed in the meantime. However, given the credit supply conditions and the weak economic recovery, the pace of credit growth is expected to remain subdued in 2010.

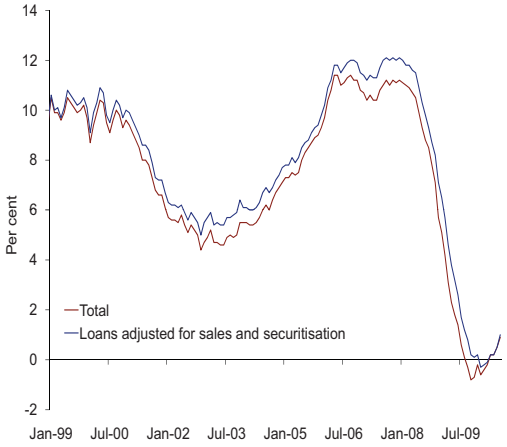
Loans to households started an earlier recovery, reversing the cycle in mid-2009. This dynamics was mostly due to a pick up in MFI loans for house purchase, on account of the low interest rates. In turn, consumer credit continued to show negative annual rates of change. Latest developments in loans to households suggest the stabilisation of the current growth rates, in line with persistently weak credit dynamics (Chart 3.1.4).

Despite the rise in the growth rates of loans to non-financial corporations, growth continues close to zero, after one year with negative rates (Chart 3.1.4). The decline in these loans was stronger in short-term loans, with an annual growth rate of -13 per cent in December 2009 and January 2010. The most recent dynamics of loans to non-financial corporations suggests some stabilisation, due to an increase in the tightening of credit standards, but also to a reduction in demand. By contrast, debt securities issuance by non-financial corporations remained strong, albeit decelerating since mid-May 2010. Issuance of quoted shares by these corporations also increased significantly in historical terms during 2009, with an annual growth close to 2 per cent, but decelerated in 2010 (0.9 per cent annual growth rate in July).

Chart 3.1.3

LOANS TO THE EURO AREA PRIVATE SECTOR

Annual growth rate

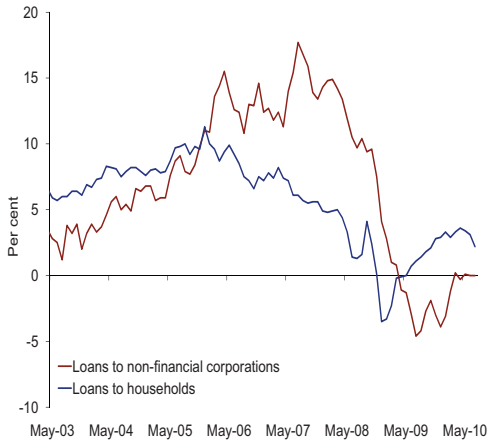


Source: ECB.

Chart 3.1.4

LOANS TO EURO AREA CORPORATE SECTOR AND HOUSEHOLDS

Annualised 3-month rate of growth



Source: ECB.
Note: Unadjusted for the sale of loans and securitisation.

3.2. Monetary and financial conditions of the Portuguese economy

Since the end of 2009, sovereign risk differentiation has increased markedly across the euro area, primarily penalising economies with larger fiscal and external imbalances and more significant structural problems, including Portugal. This has had a sizeable impact on the Portuguese banks' financing capacity, leading to very tight quantitative constraints in the access to international wholesale debt markets. This situation was reflected in very sharp increases in the yields on Treasury bonds with a residual maturity of 10 years, government-backed bonds and subordinated bonds issued by Portuguese banks (Chart 3.2.1).

In this context, the Council of the European Union, the EU Member States and the ECB took further steps towards an easing of international financial market tensions.[3] It was thus possible for the Portuguese banking system to further finance the non-monetary sector through a large-scale recourse to ECB liquidity-providing operations, which replaced international wholesale debt market funding. Accordingly, despite international debt market turmoil, bank interest rate increases were neither strong nor broad based up to the second quarter of 2010. However, at the end of the second quarter, interest rates on new consumer loans and time deposits rose, indicating, in the latter case, that banks started to offer more attractive conditions with a view to strengthening their deposit base against a background of wholesale financing market instability. Finally, developments in loans were in line with their usual determinants, namely the state of the business cycle, and there were none of the sharp falls traditionally observed during severe credit rationing episodes.

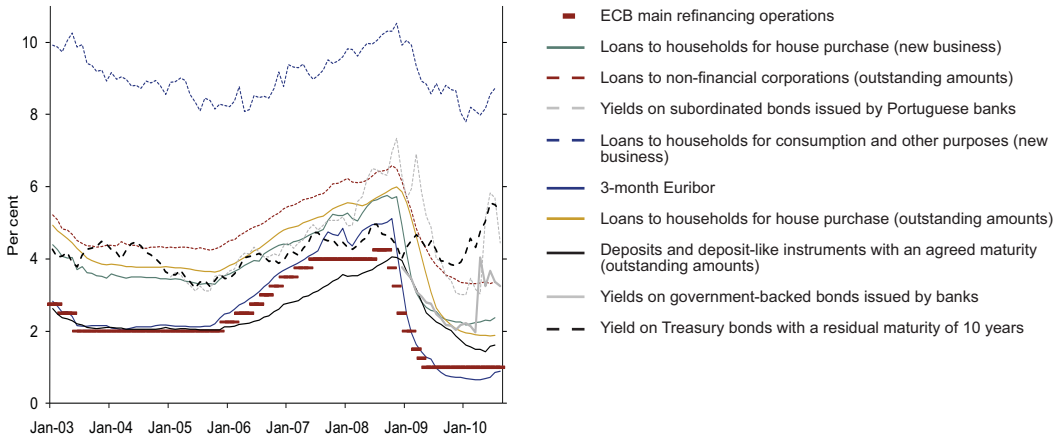
As mentioned above, the banking sector's capacity to further finance the non-monetary sector was mainly linked to the Eurosystem's non-standard monetary policy measures.[4] Given that such measures are only temporary, it is particularly important to ensure the sustainability of government and external accounts, so as to restore investor confidence and credibility. In fact, although, in principle, the necessary measures have negative consequences in the near term for economic growth and credit and market risk materialisation, if such measures were not taken, the inevitable adjustment process would be more abrupt and costlier.

(3) For more details, see "Subsection 3.1 *Monetary policy of the ECB*", of this Bulletin.

(4) For more details, see "Subsection 8.3 *Financial account and international investment position in the first half of 2010*", of this Bulletin.

Chart 3.2.1

INTEREST RATES



Sources: Bloomberg, ECB and Banco de Portugal.

Notes: The yields on Portuguese bank bonds refer to asset-weighted averages of subordinated bonds issued by *BCP* and *BES* and government-guaranteed bonds issued by *BCP*, *BES* and *CGD*.The lack of market depth strongly restricts the existence of bonds with comparable characteristics within each segment, and therefore the rates shown should be interpreted as purely indicative .Government guarantees on bonds issued by Portuguese banks are part of a series of financial stability support measures announced by the government on 12 October 2008.

Euro area government bond market turmoil led to considerable increases in the sovereign risk premium as of late 2009

The yield spread between Portuguese Treasury bonds and German government bonds, which had narrowed since March 2009 amid relative normalisation in international financial markets, has increased significantly as from November 2009, when it stood slightly below 40 basis points (Chart 3.2.2). This followed the emergence of major disruptions in euro area government debt markets. Although this situation had relatively stabilised in February and March, international financial market tensions have increased substantially since late April. Following the measures taken by the Council of the European Union, the EU Member States and the ECB, international financial market tensions eased, resulting in narrower yield spreads between Portuguese and German government bonds. Nevertheless, as from mid-May this spread widened again and in mid-September, against a background of increased uncertainty surrounding the Irish banking system, it returned to figures close to those seen earlier in May, which were all-time highs since the start of the euro area. Moreover, given the marked sovereign risk differentiation, the widening yield spread between Portuguese and German government bonds was influenced by both a rise in the yields demanded by investors to hold Portuguese bonds and a fall in the German government bond yield, due to greater demand for less risky and more liquid assets by investors.

According to Barbosa and Costa (2010), since September 2008 euro area sovereign spreads have more intensely reflected differences in credit quality and country-specific liquidity characteristics of government debt securities, as opposed to a decline in the importance of common factors across countries.[5] Moreover, idiosyncratic credit factors seem to have largely resulted in wider spreads from the last months of 2009 to the first months of 2010.

(5) See the article entitled "Determinants of sovereign bond yield spreads in the euro area in the context of the economic and financial crisis", of this Bulletin.

The growing sovereign risk differentiation was reflected in a decline in general government financing by non-residents, in contrast to the greater importance of the resident banking system

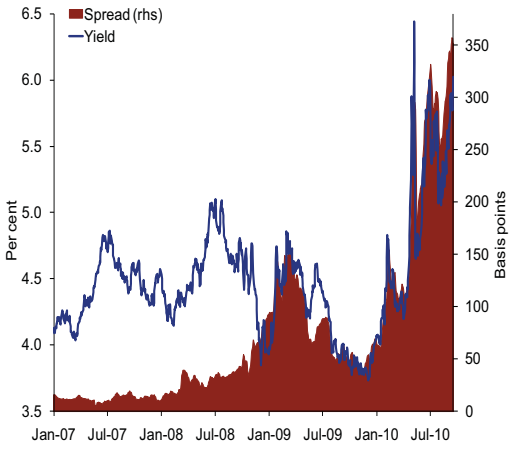
Over the past few years, the Portuguese general government obtained funds mainly by issuing debt securities to non-residents, accounting for around 75 per cent of total government debt at the end of 2009. However, following credit rating downgrades for Portugal in early 2010, access to international debt market funding by the general government was under tight constraints. In fact, net financing flows to general government through securities held by non-residents were negative during the first half of 2010, particularly in the second quarter (Chart 3.2.3). Hence, the public sector obtained funds mainly from the resident banking system, although it is worth noting, in the second quarter of 2010, the financing flows from medium-term and long-term securities placed with the resident non-monetary sector, as well as purchases within the scope of the Eurosystem's programme for purchasing euro area public and private debt securities.

Continued high growth of Portuguese banks' balance sheet positions, in contrast to the euro area

As shown in Charts 3.2.4 and 3.2.5, Portuguese banks' balance sheets continued to grow clearly above the euro area as a whole over the first half of the year. The importance of credit granted to central government for raising Portuguese banks' assets has increased since mid-2009 and, more markedly, as of the second quarter of 2010. The unfavourable financing conditions of the State in international financial markets should have contributed to this development. In turn, government debt securities are eligible as collateral for ECB liquidity-providing operations. Moreover, the contribution of credit granted to the resident non-monetary private sector to total growth of Portuguese banks' assets has fallen significantly, largely due to credit to non-financial corporations and, particularly, to loans granted to this sector. In fact, following very marked growth in 2008, loans to non-financial corporations have slowed down and are growing in line with the typical determinants.

Chart 3.2.2

PORTUGUESE PUBLIC DEBT YIELD AND SPREAD *VIS-Â-VIS* GERMAN PUBLIC DEBT (10-YEAR)

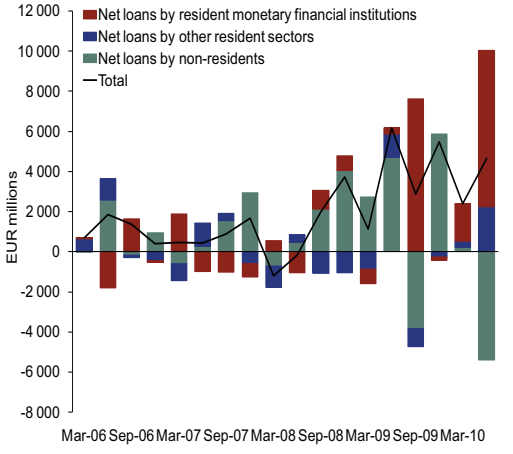


Sources: Thomson Reuters and Banco de Portugal.

Note: Yields obtained at close of business. The spread was calculated by interpolating the German yield curve, so as to ensure that the yield of the Portuguese 10-year benchmark bond is compared to a German yield of a similar maturity. The calculation of the spread was based on 5-day moving average.

Chart 3.2.3

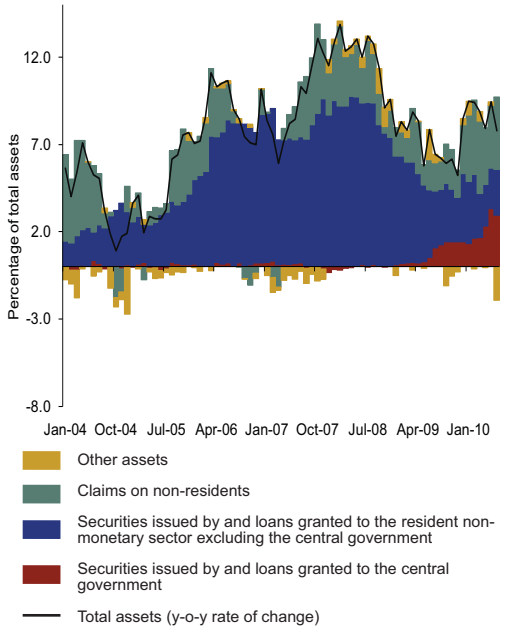
GENERAL GOVERNMENT FINANCING
Quarterly net flows



Source: Banco de Portugal.

Chart 3.2.4

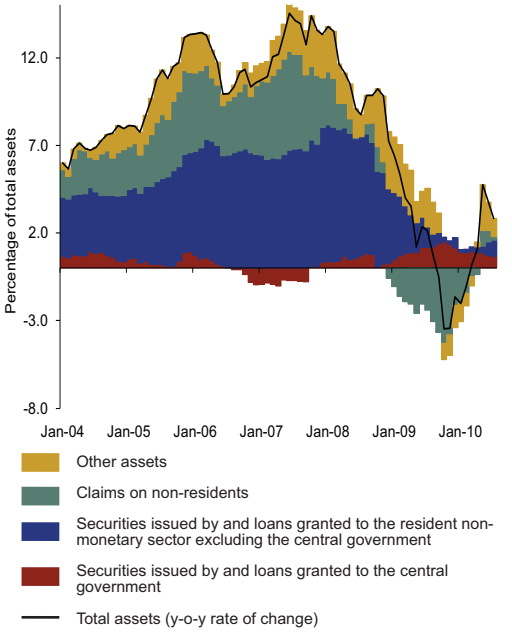
MAIN ASSETS OF THE PORTUGUESE BANKING SECTOR
Contribution to the year-on-year rate of change



Source: Banco de Portugal.

Chart 3.2.5

MAIN ASSETS OF THE EURO AREA BANKING SECTOR
Contribution to the year-on-year rate of change



Source: ECB.

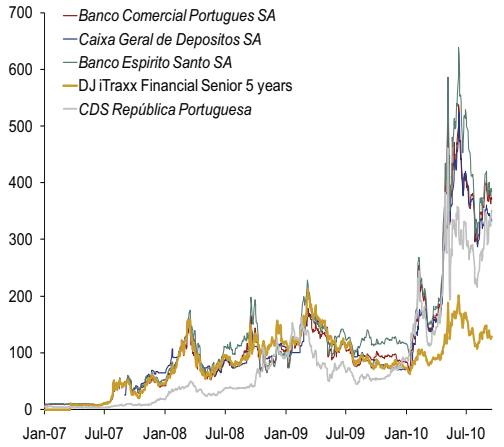
Sovereign debt market turmoil was reflected in a very sharp deterioration in access conditions of the banking sector to international wholesale debt market funding

Similarly to other European countries, the Portuguese banking sector was significantly affected by disruptions triggered by the growing sovereign credit risk differentiation. Indeed, credit default swaps (CDS) for a number of major Portuguese banking groups increased strongly, following the upward trend in CDS on the Portuguese sovereign debt, and clearly exceeded those on the European financial sector (Chart 3.2.6).

Increased sovereign debt market disruptions resulted in a deteriorating liquidity position for Portuguese banks in 2010, mostly as from late April. In turn, the adverse economic situation continued to result in increased default by the non-financial private sector, especially in what regards the non-financial corporate segment and that of loans to households for consumption and other purposes. Nonetheless, as of October 2009, flows of new overdue credit and other non-performing loans have followed a downward path. Moreover, although the overall capital adequacy ratio of the six major Portuguese banking groups decreased in the first half of 2010, the Tier I capital adequacy ratio was broadly stable, at around 8.5 per cent (Table 3.2.1). Profitability indicators for the six major banking groups deteriorated further, mainly due to developments in the financial margin against a background of low money market interest rates. In an environment of strong increase in sovereign risk, bank stock prices were considerably penalised as, between late 2009 and August 2010, the PSI Financial Services index fell by 21 per cent. This decline was significantly more sizeable than that in the PSI Geral index but was in line with the index for euro area banks, which decreased by around 18 per cent over the same period.

Chart 3.2.6

CREDIT DEFAULT SWAP SPREADS OF PORTUGUESE BANKS (5 YEARS SENIOR)



Sources: Bloomberg and Thomson Reuters.

Table 3.2.1

INDICATORS FOR THE SIX MAJOR PORTUGUESE BANKING GROUPS

	2009		2010
	Jun.	Dec.	Jun.
Capital adequacy			
Overall capital adequacy ratio	11.2	11.5	10.8
Tier I capital adequacy ratio	8.4	8.6	8.5
Profitability			
Return on equity	11.7	9.5	8.2
Return on assets	0.71	0.61	0.57
Default ratio in the credit portfolio	2.4	2.6	2.8

Source: Banco de Portugal.
Note: Consolidated basis.

Bank financing strongly dependent on ECB liquidity-providing operations

Against the background of increasing international wholesale debt market tensions, the ongoing expansion of the banking system activity largely depended on access to ECB liquidity-providing operations, particularly since May (Chart 3.2.7). Therefore, there was a shift in the banking financing structure, with a marked decline in financing by non-residents, through both securities and deposits, together with a considerable increase in borrowing from the Eurosystem.[6] In turn, the contribution of deposits by the resident non-monetary sector, albeit positive, was negligible, following the slowdown seen in 2009.

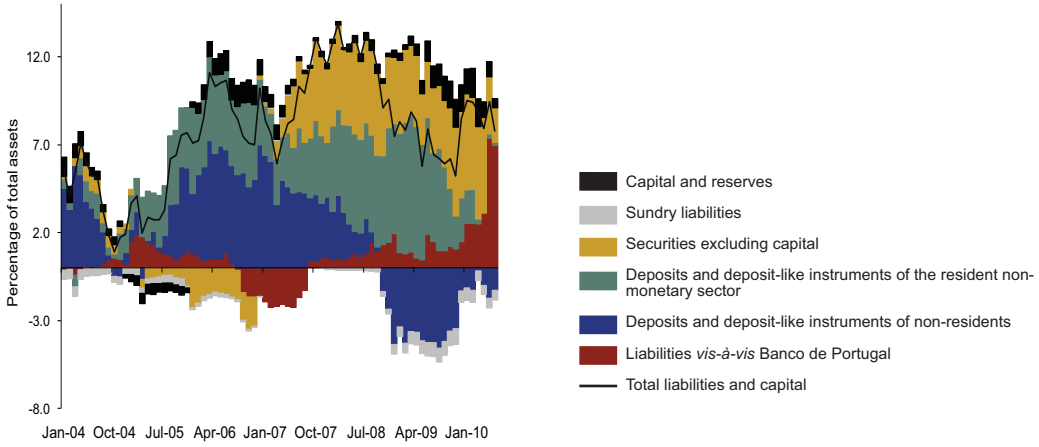
Following the slowdown observed in 2009, deposit growth rates remained modest in the first half of 2010

Developments in deposits should be analysed in the light of developments in banks' financing strategy and in household investment portfolios. In this respect, in the first half of 2009 banks obtained funds by placing significant amounts of debt securities with customers. In the second half, amid de-

(6) For more details, see "Subsection 8.3 *Financial account and international investment position in the first half of 2010*", of this Bulletin.

Chart 3.2.7

MAIN LIABILITIES OF THE PORTUGUESE BANKING SECTOR
Contribution to the year-on-year rate of change



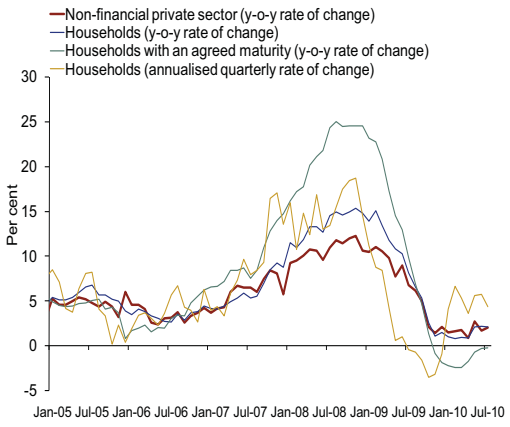
Source: Banco de Portugal.

creasing risk aversion, households again turned to net subscriptions of mutual fund units. However, these subscriptions had declined since the last quarter of 2009 and, as of the second quarter of 2010, net redemptions of mutual fund units have reached significant levels.

After a slowing trend since late 2008, the year-on-year rate of change in deposits by households fell to a trough of 0.8 per cent in February 2009, accelerating somewhat afterwards, and was relatively stable between May and June at slightly above 2 per cent (Chart 3.2.8). Moreover, the behaviour of the annualised quarterly rate of change in household deposits, based on seasonally adjusted figures, suggests an increase in its year-on-year rate of change over the next months. This should fall under the banks' financing strategy, against a background of growing international wholesale debt market funding costs and seeing that the Eurosystem's non-standard monetary policy measures are only temporary. Banks should therefore seek alternative financing sources. In turn, the acceleration in

Chart 3.2.8

BANK DEPOSITS
Rates of change



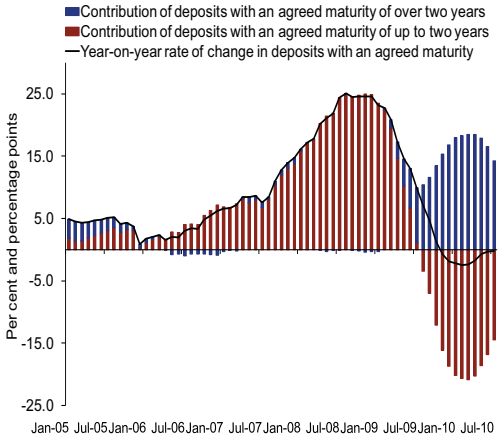
Source: Banco de Portugal.

deposits is also consistent with changes in the composition of households' financial asset portfolios amid a deterioration in the financial market situation, which makes investment in mutual fund shares/ units less attractive.

The annual rate of change in household deposits with an agreed maturity has stood in negative territory since November 2009. However, this segment of deposits accelerated, as its annual rate of change increased from -2.4 to -0.2 per cent between March and July 2010. As seen since mid-2009, developments in deposits with an agreed maturity of over and below two years were mixed, with high growth rates in longer maturities as opposed to negative growth rates for shorter maturities (Chart 3.2.9). This may have been linked to demand by banks for more stable financing sources.

Chart 3.2.9

BANK DEPOSITS
Year-on-year rates of change and contributions



Source: Banco de Portugal.

Developments in interest and foreign exchange rates with favourable effects on economic activity

The monetary conditions index only takes into account the effect of money market interest rates and the effective exchange rate index, which is a limitation in the current environment in which both quantitative constraints and the risk premium on different interest rates against money market rates, for different time horizons, have played a relevant role. Therefore, despite disruptions in international financial markets, this index shows that the downward path followed by interest rates since the end of 2008 resulted in a positive impact on economic activity in 2010, also contributing, albeit to a smaller extent, to a rise in inflation (Chart 3.2.10).[7] In turn, according to the same indicator, developments in the effective exchange rate index gave a marginally positive contribution to both economic growth and the inflation rate over the same period. As of October 2009, the effective exchange rate index showed a depreciation trend, standing in July 2010 2.3 per cent below the level seen at the end of 2009 (Table 3.2.2).

Limited and lagged pass-through to bank interest rates of difficulties in access to international debt markets

Since the last months of 2008, spreads associated with bank lending rates have widened significantly while those associated with deposit interest rates have narrowed (Chart 3.2.11). These movements

(7) For methodological data, see Esteves, P.S., "Monetary conditions index for Portugal", Banco de Portugal, *Economic Bulletin*-June 2003.

Table 3.2.2

MONETARY AND FINANCIAL CONDITIONS OF THE PORTUGUESE ECONOMY

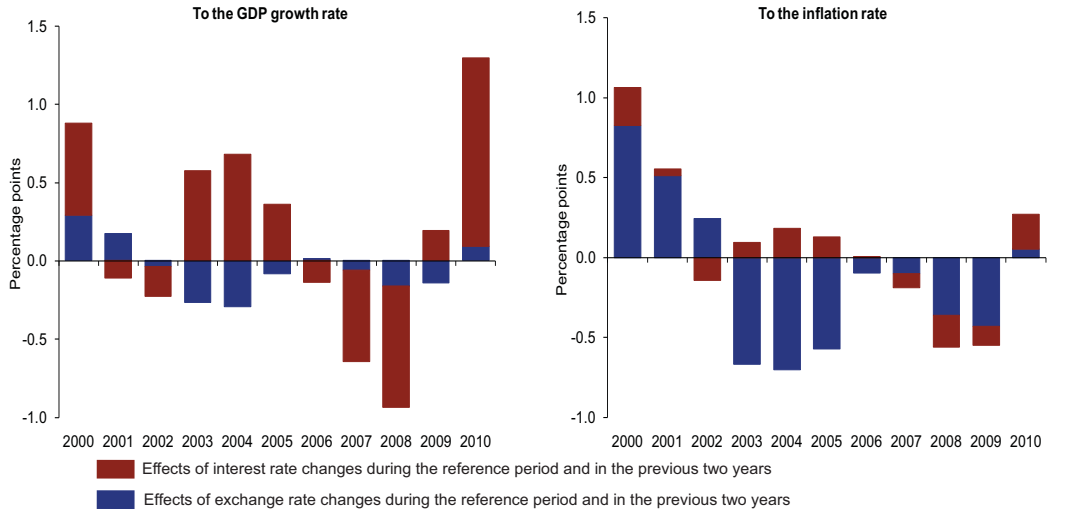
	Annual evolution		Quarterly developments				Monthly developments							
	2007	2008	2009Q1	2009Q2	2009Q3	2009Q4	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10
Nominal interest rates - period averages (per cent)														
3-month Euribor	4.3	4.6	2.0	1.3	0.9	0.7	0.7	0.7	0.6	0.6	0.7	0.7	0.8	0.9
12-month Euribor	4.4	4.8	2.2	1.7	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.3	1.4	1.4
10-year fixed-rate Treasury bond yields	4.4	4.5	4.5	4.4	4.0	3.9	4.2	4.6	4.3	4.8	5.0	5.5	5.5	5.3
Bank interest rates														
On outstanding amounts of loans														
Non-financial corporations	5.8	6.3	5.3	4.3	3.7	3.4	3.3	3.3	3.3	3.3	3.4	3.3	3.4	
Households for house purchase	5.1	5.7	5.1	3.6	2.5	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	
Households for consumption and other purposes	8.6	9.0	8.8	8.1	7.7	7.4	7.4	7.3	7.3	7.3	7.3	7.8	7.8	
On outstanding amounts of deposits with an agreed maturity														
Households	2.8	3.5	3.5	2.6	2.3	1.9	1.6	1.6	1.5	1.5	1.4	1.5	1.6	
On new business														
Loans to households for house purchase	4.8	5.4	3.5	2.7	2.4	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.4	
Loans to households for consumption (excluding overdrafts)	9.3	10.0	9.8	8.8	8.7	8.5	7.8	8.2	8.1	8.0	8.2	8.6	8.7	
Exchange rate - period averages														
Nominal effective exchange rate index[a][b]	101.8	103.0	103.3	103.5	103.5	103.9	103.4	102.8	102.8	102.5	101.7	101.1	101.4	
Nominal effective exchange rate index - percentage change from the previous corresponding period[a][b]	0.8	1.2	0.8	0.2	0.1	0.4	-0.4	-0.5	0.0	-0.3	-0.7	-0.6	0.3	
Stock market - percentage change from the previous corresponding period (end-of-period values)														
PSI Geral index	18.3	-49.7	0.4	19.1	16.9	0.1	-5.7	-4.6	6.3	-7.1	-2.7	0.6	4.0	0.1
Broad Dow Jones Euro Stock	4.9	-46.3	-14.0	16.4	20.7	2.1	-4.7	-1.9	7.9	-2.8	-7.2	-1.4	6.2	-4.0
Housing market prices - year-on-year rate of change														
Confidencial Imobiliário index[c]	1.3	3.9	1.1	0.8	-1.8	0.2	1.2	1.3	1.3	1.4	1.5	1.8	2.4	3.2
Bank assessment (*INE*)[d]	0.5	-4.3	-5.8	-1.5	-0.1	3.1	3.4	3.5	3.8	3.6	3.3	1.8	1.3	0.3
Loans granted to the non-financial prvate sector - end-of-period annual rate of change														
Loans granted by resident monetary financial institutions[e]														
Non-financial private sector	9.9	7.1	5.0	3.6	2.8	2.1	2.4	2.3	2.2	1.8	1.8	2.3	2.2	
Households - Total	9.0	4.6	3.1	2.2	2.1	2.3	2.8	2.8	2.9	2.9	3.0	3.0	3.0	
For house purchase	8.5	4.3	3.2	2.5	2.3	2.6	2.9	2.9	3.0	3.1	3.1	3.3	3.2	
For consumption and other purposes	11.3	6.2	2.9	1.3	1.0	0.9	2.2	2.3	2.3	2.3	2.4	1.9	1.8	
of which: For consumption	13.7	8.9	6.6	4.1	2.7	1.7	1.6	1.8	1.9	2.4	2.7	2.1	2.5	
Non-financial corporations	11.2	10.5	7.5	5.4	3.7	1.9	2.0	1.6	1.3	0.4	0.2	1.3	1.2	
Deposits in resident monetary financial institutions - end-of-period year-on-year rate of change														
Non-financial private sector	5.7	10.6	10.5	8.9	5.0	2.1	1.5	1.6	1.8	0.8	2.7	1.7	2.0	
Households with an agreed maturity	14.7	26.8	20.9	13.0	4.6	-1.9	-2.2	-2.4	-2.4	-1.7	-0.7	-0.3	-0.2	
Memo:														
HICP - End-of-period annual average rate of change														
Portugal	2.4	2.7	1.9	0.8	-0.3	-0.9	-0.9	-0.9	-0.8	-0.7	-0.5	-0.3	0.0	0.3
Euro area	2.1	3.3	2.7	1.8	0.8	0.3	0.3	0.3	0.3	0.4	0.5	0.7	0.9	1.0

Sources: Euronext Lisboa, Eurostat, *Imométrica*, *INE*, Thomson Reuters and Banco de Portugal.

Notes: **(a)** A positive change corresponds to an appreciation of the effective exchange rate index. **(b)** Calculations against a group of 22 trading partners. For a detailed description of the methodology, see Gouveia, A. C. and C. Coimbra, "New effective exchange rate index for Portugal", Banco de Portugal, *Economic Bulletin*-December 2004. **(c)** The Confidencial Imobiliário index tracks developments in the residential market in Portugal, in particular in the Lisbon and Oporto metropolitan areas. In October 2006 this index adopted a new methodology and broadened its background information. It uses data available at www.lardocelar.com, which in 2005 contained around 280,000 real estate registers. For further details on the methodology used, see the article "Índice Confidencial Imobiliário: procedimentos metodológicos", by Isabel Fonseca and Ricardo Guimarães, in the October 2006 issue of the Newsletter *Imobiliária Portuguesa - Confidencial Imobiliário*. **(d)** In January 2010 *INE* changed the method for the calculation of the bank assessment indicator for housing, which now incorporates information from all banks with a significant weight in housing loans and is compiled on a monthly basis. *INE* published backward-looking data as of September 2009, and the new series is considered starting from this date. **(e)** The annual rates of change are obtained from the relationship between the outstanding amounts of bank loans at the end of the month, adjusted for securitisation operations, and monthly transactions, which are calculated from outstanding amounts adjusted for reclassifications, write-offs and exchange rate and price revaluations.

Chart 3.2.10

CONTRIBUTION OF MONETARY CONDITIONS

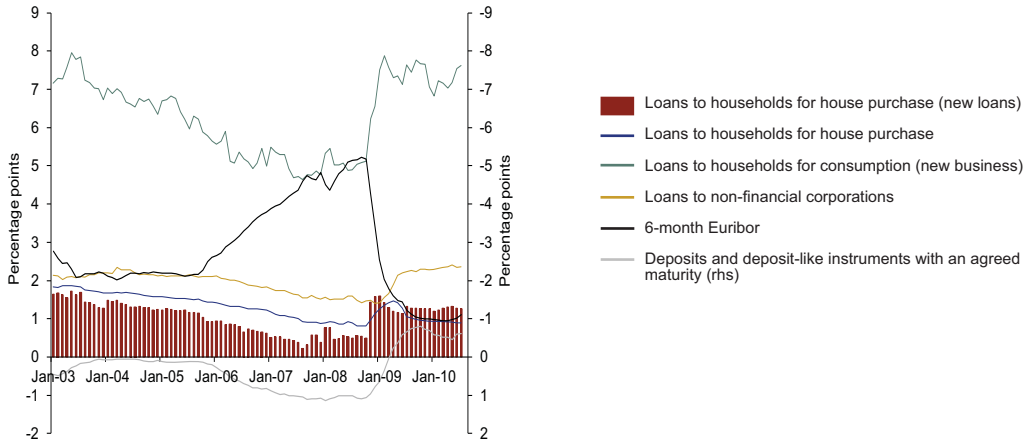


Source: Banco de Portugal.

Notes: For methodological information, see Esteves, P., "Monetary conditions index for Portugal", Banco de Portugal, Economic *Bulletin*-June 2003. The multipliers underlying the construction of this index (corresponding to impacts of changes in the exchange rate and the interest rate) were updated taking into account the main model currently used in economic projections for the Portuguese economy.

Chart 3.2.11

BANK INTEREST RATE MARGINS *VIS-À-VIS* MONEY MARKET INTEREST RATES



Sources: ECB and Banco de Portugal.

Note: The interest rate margin in outstanding amounts of loans is calculated as the difference between the interest rate on outstanding amounts and the six-month moving average of the six-month Euribor. In the case of new loans, the interest margin is the difference between the interest rate on new loans and the six-month Euribor. The margin of lending operations is defined by the spread between interest rates on loans and the Euribor rate, while for deposit operations it is defined by the spread between the Euribor rate and the interest rate on deposits.

were partly due to the usual lag in the pass-through of changes in these interest rates to banking rates on new business and to the fact that new business – where there is interest rate setting/renegotiation – only accounts for a fraction of gross credit and deposit flows. Nonetheless, developments since the third quarter of 2009, together with the behaviour of spreads calculated from new loans for house purchase and consumption, suggest that spreads on loans stabilised at figures clearly above those seen prior to the onset of the financial crisis, whereas the opposite was observed for deposits. However, given the magnitude of disruptions in international debt markets, the pass-through to bank

interest rates was relatively limited, but more marked in the case of rates on new consumer loans and time deposits, with their spreads against money market rates increasing somewhat (in absolute value) since the end of the first half of 2010.

This is consistent with data compiled within the scope of the Bank Lending Survey, according to which banks have tightened credit standards, namely by setting wider spreads. The widening of spreads on lending in the current economic environment is also consistent with the findings presented in Castro and Santos (2010), according to which higher credit default and increasing unemployment contributed significantly to developments in lending rates in 2009.[8] The update on these findings for the first half of 2010 indicates that the risk factors considered have generally maintained their contribution to the widening of spreads. In turn, the provision of more attractive conditions for customer deposits falls under the banks' financing strategy, taking into account the disruptions in wholesale financing markets also mentioned within the scope of the Bank Lending Survey, particularly as regards the second quarter of 2010. Indeed, in July banks anticipated that this situation would deteriorate further in the third quarter of the year.

Deceleration in credit to households and non-financial corporations overall in line with its cyclical developments, despite an increase in sovereign risk premium

Following the significant deceleration in bank loans to the non-financial private sector between the first half of 2008 and the end of 2009, their annual rate of change was relatively stable in the first half of 2010, hovering at around 2 per cent (Table 3.2.2). Nonetheless, the deceleration observed in Portugal was lower than for the euro area as a whole, where negative annual rates of change were recorded between September 2009 and February 2010, followed by a slight acceleration to levels below 1 per cent.

Growth of bank loans to households remained low, particularly in loans for consumption and other purposes

Loans to households for house purchase started to decelerate in mid-2006, when the corresponding growth rate stood above 11 per cent, and deteriorated further in 2008 and 2009 in an environment of economic and financial crisis, with 2.3 per cent growth in July 2009 (Chart 3.2.12). As of the third quarter of 2009, loans to households for house purchase have tended to accelerate slightly, in line with the usual cyclical developments, but remained at relatively low levels, close to those seen in the euro area (3.2 and 3.5 per cent respectively in July 2010).

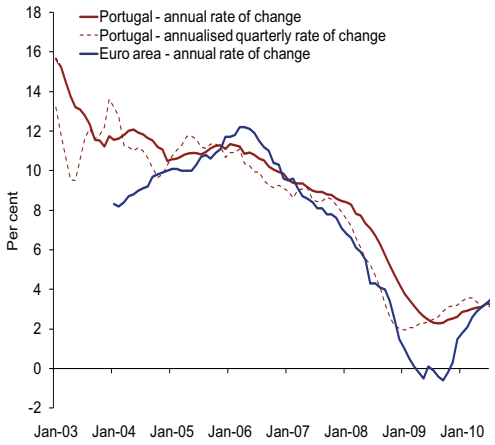
In turn, loans for consumption and other purposes slowed down between April 2008 and July 2009, with the annual rate of change in loans to this segment hovering at around 2 per cent since then. Since the beginning of 2010, the corresponding annualised quarterly rate of change, calculated on the basis of seasonally adjusted figures, points to a further decline in the annual rate of change. Nonetheless, the annual rate of change in loans in this segment in Portugal in 2010 was higher than in the euro area. Taking only into account consumer loans, the differential between annual rates of change for Portugal and the euro area is even more significant, particularly in the most recent period (Chart 3.2.13). In fact, as of April 2009 the rate for the euro area has stood in negative territory.

The results of the Bank Lending Survey to the five banking groups included in the sample for Portugal are in line with the deceleration path followed by loans to households and provide a better understanding of the factors underlying these developments. In fact, as shown by this survey, banks have gradually tightened credit standards applied to loans to households since the summer of 2007. Al-

(8) See the article entitled "Bank interest rates and loan determinants", Banco de Portugal, *Economic Bulletin*-Spring 2010.

Chart 3.2.12

LOANS TO HOUSEHOLDS FOR HOUSE PURCHASE GRANTED BY RESIDENT MONETARY INSTITUTIONS

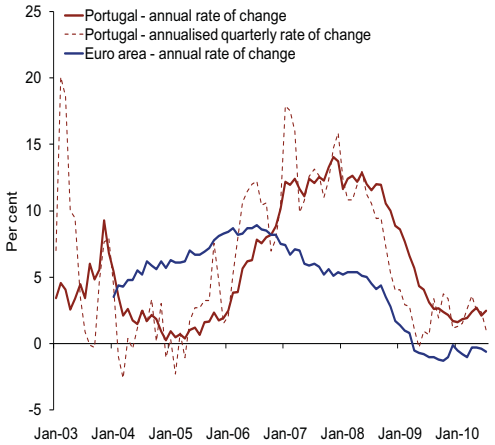


Source: Banco de Portugal.

Notes: The annual and quarterly rates of change are calculated on the basis of the relationship between the outstanding amounts of bank loans at the end of the month, adjusted for monthly transactions, which are calculated from outstanding amounts adjusted for reclassifications, write-offs and exchange rate and price revaluations. The quarterly rate of change is seasonally adjusted. Figures for Portugal are also adjusted for securitisation operations.

Chart 3.2.13

LOANS TO HOUSEHOLDS FOR CONSUMPTION GRANTED BY RESIDENT MONETARY INSTITUTIONS



Source: Banco de Portugal.

Notes: The annual and quarterly rates of change are calculated on the basis of the relationship between the outstanding amounts of bank loans at the end of the month, adjusted for monthly transactions, which are calculated from outstanding amounts adjusted for reclassifications, write-offs and exchange rate and price revaluations. The quarterly rate of change is seasonally adjusted. Figures for Portugal are also adjusted for securitisation operations.

though in 2009 this tightening in credit standards gradually subsided, conditions deteriorated more significantly in the second quarter of 2010, and the outlook for the third quarter of the year is more negative than that for the previous quarter. In line with growing sovereign risk differentiation in euro area debt markets, the surveyed institutions highlighted as the main factors behind this tightening in credit standards applied to loans to the sector under review the higher financing costs and tighter constraints in banks' balance sheet and risks associated with expectations regarding developments in general economic activity. In the case of loans to households, mention was also made to the impact of an increase in risks associated with housing market prospects, and as regards loans for consumption and other purposes, the deterioration in consumers' creditworthiness and increased risks associated with collateral requirements.

Turning to household demand for loans, although surveyed banks have reported an improvement between late 2009 and early 2010, more recently demand was reportedly lower, particularly as regards loans for house purchase. This seems to have been mainly due to deteriorating housing market prospects and consumer confidence, the latter of which was also indicated as a major determinant of the contraction in demand for loans for consumption and other purposes, together with greater recourse to savings by households.

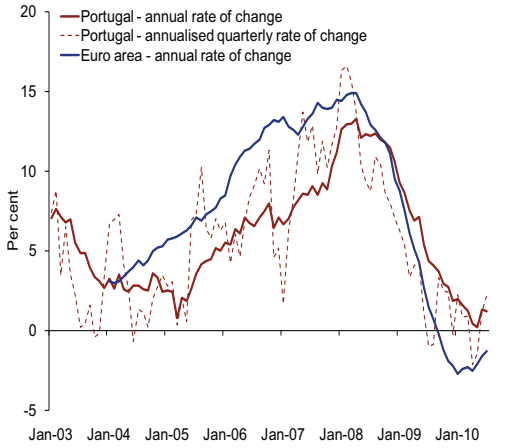
Growth of bank loans to non-financial corporations at low, but positive, levels

Bank loans to non-financial corporations, after very high growth rates of approximately 13 per cent in the first months of 2008, started a deceleration path in May 2008, reaching an annual rate of change of 1.2 per cent in July 2010 (Chart 3.2.14). The slowdown in loans to non-financial corporations lagged behind loans to households, which is consistent with the usual cyclical developments in these aggregates.[9] Deceleration in loans to this segment was also more marked in the euro area as a whole, with negative annual rates of change since September 2009.

(9) See "Box 2.2 *Cyclical evolution of loans to non-financial corporations and households*", in the *Annual Report* 2009.

Chart 3.2.14

LOANS TO NON-FINANCIAL CORPORATIONS GRANTED BY RESIDENT MONETARY INSTITUTIONS



Source: Banco de Portugal.

Notes: The annual and quarterly rates of change are calculated on the basis of the relationship between the outstanding amounts of bank loans at the end of the month, adjusted for monthly transactions, which are calculated from outstanding amounts adjusted for reclassifications, write-offs and exchange rate and price revaluations. The quarterly rate of change is seasonally adjusted. Figures for Portugal are also adjusted for securitisation operation.

Developments in bank loans to non-financial corporations should be analysed in view of the current economic situation, particularly the significant fall in corporate investment. In fact, in the context of the Bank Lending Survey, lower investment financing needs together with M&A and corporate restructuring, were reported to be the main factors contributing to a decline in corporate credit demand. Moving in the opposite direction, *i.e*. contributing to an increase in demand, was the increase in corporate borrowing requirements associated with debt restructuring. Therefore, in general, banks did not report significant changes in corporate demand for loans in the first half of 2010, having only indicated a decrease in demand by large corporations and for long-term loans.

On the supply side, banks reported a gradual tightening of credit standards over the same period, particularly as regards long-term loans. This seems to have been driven by disruptions in financial markets, which were reflected in deteriorating access to market financing and worsening liquidity position, as well as an increase in capital costs. Moreover, participating banks have also highlighted increased risks associated with expectations about the general economic activity and the outlook for specific industries or corporations, as well as increased risks associated with collateral requirements.

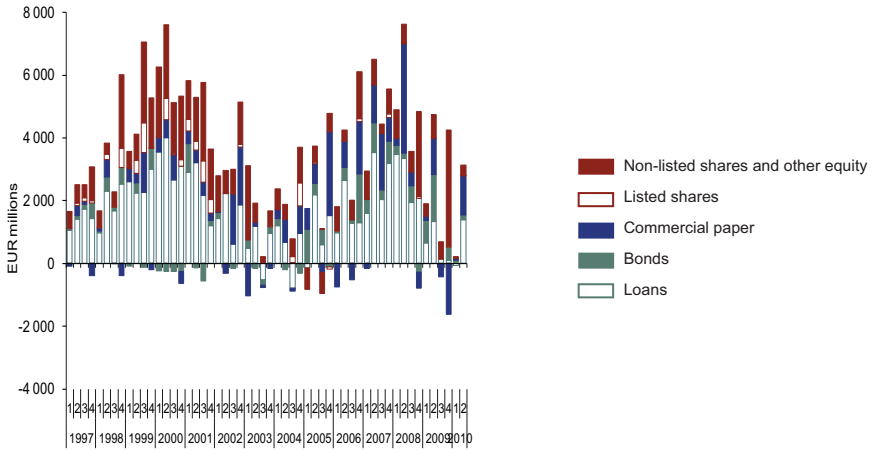
In July, banks anticipated a further tightening of credit standards applied to loans granted to this sector for the third quarter of the year. On the demand side no major changes were broadly expected, albeit demand by small and medium-sized enterprises was expected to increase somewhat, as opposed to a decline in demand by large enterprises. In terms of maturities, banks anticipated increased demand for short-term loans in contrast to lower demand for long-term loans.

International debt market turmoil did not have a marked impact on non-financial corporate financing in the first half of 2010

Despite renewed disruptions in euro area financial markets during the first half of 2010, Portuguese non-financial corporations issued substantial amounts of commercial paper and thus restored part of the net redemptions seen in the second half of 2009 (Chart 3.2.15). However, net issuance of longer-

Chart 3.2.15

FINANCING OF PORTUGUESE NON-FINANCIAL CORPORATIONS
Net issues



Source: Banco de Portugal.

term debt securities continued to be low, as opposed to a substantial contribution of bank loans. Finally, following a very marked increase in non-listed shares and other equity over the fourth quarter of 2009, this source of financing made only a small contribution in the first half of 2010.

Stock prices declined in the first half of 2010, thus interrupting the trend recovery observed in 2009

After a significant valuation (of 40 per cent) in 2009, between the end of that year and late May 2010, the PSI Geral index declined by 13.5 per cent (Table 3.2.2). This is in line with developments in the Dow Jones Euro Stoxx index, which fell by 9.1 per cent over the same period. However, as of the end of June both stock indices started to rebound and, by 16 September, the PSI Geral index was 9.1 per cent below the level seen at the end of 2009, while the euro area index declined by 3.3 per cent over the same period. In this context, in the first half of 2010 issuance of listed shares was not significant by either financial corporations or non-financial corporations. Nonetheless, between June and August 2010, the PSI Geral index recorded positive developments.

Non-financial corporate bond yields remained below the government debt yield with a comparable maturity

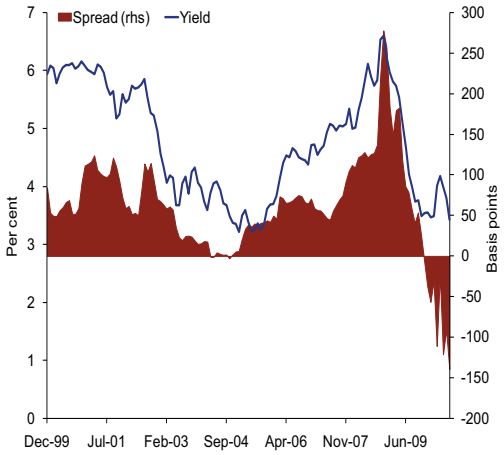
Against significant increases in the Portuguese government debt yield since the end of 2009, the spread between the yield on non-financial corporate bonds and sovereign debt securities with a comparable maturity, which had declined as of late 2008, stood in negative territory between December 2009 and August 2010, when it reached a trough of around -140 b.p. (Chart 3.2.16). Therefore, market financing conditions for non-financial corporations do not seem to have been markedly affected as yet by more negative assessments of government debt risk. At the end of July 2010 the yield on Portuguese corporate bonds stood at 3.8 per cent, similarly to the trough recorded during the 2003 recession. However, the number of Portuguese non-financial corporations with access to the issuing of bonds is very limited.

The cost of non-financial corporate financing in Portugal in 2010, assessed in real terms through a synthetic indicator incorporating information referring to costs associated with shares and other

equity, bank loans and securitised debt, was close to the level observed in 2009 (Chart 3.2.17).[10] Nonetheless, developments in this indicator's components were mixed, and estimated costs of the recourse to the equity market and the bond market increased somewhat, while costs associated with bank loans and with the short-term debt instruments considered were virtually stable in the first half of 2010. Moreover, in July 2010 the real cost associated with non-financial corporate financing through bank loans and short-term debt securities stood at levels above those seen in the context of the 2003 recession, largely reflecting the current lower level of inflation.

Chart 3.2.16

PORTUGUESE NON-FINANCIAL CORPORATE BOND YIELD AND SPREAD *VIS-À-VIS* GOVERNMENT DEBT SECURITIES OF A COMPARABLE MATURITY

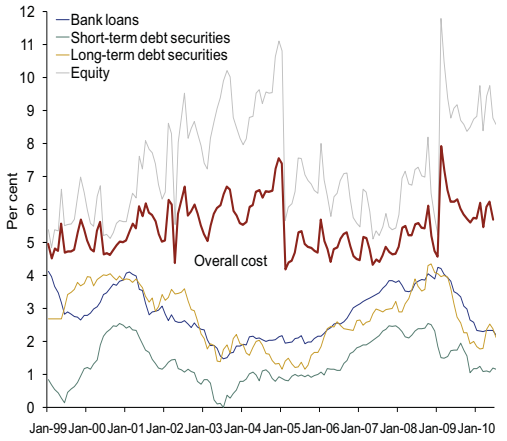


Sources: Barclays Capital and Banco de Portugal.

Chart 3.2.17

DEVELOPMENTS IN FINANCING COSTS OF NON-FINANCIAL CORPORATIONS IN PORTUGAL

In real terms



Sources: Barclays Capital, Consensus Economics, ECB, Thomson Reuters and Banco de Portugal calculations.

Note: The break in the series in January 2003 was due to the introduction of harmonised Eurosystem statistics for MFI interest rates.

Subdued growth of housing market prices

Given that real estate assets are used as collateral in loans, real estate valuation is liable to affect credit market developments and the respective financing conditions. Moreover, real estate accounts for a significant share of household wealth, so that changes in its valuation may have a sizeable impact on household spending decisions. According to the *Confidencial Imobiliário* index, the year-on-year rate of change in Portuguese housing market prices stood at 3.2 per cent in August 2010, after 0.2 per cent at the end of 2009 (Chart 3.2.18 and Table 3.2.2).[11] In turn, the bank assessment index published by *Instituto Português de Estatística – INE* (Statistics Portugal) recorded a year-on-year rate of change of 0.3 per cent in August 2010, compared with 3.1 per cent at the end of 2009.[12]

(10) The synthetic indicator for the financing costs of non-financial corporations is calculated as a weighted average of the costs of the different types of financing. The component with the highest weight in this indicator is the cost of equity financing, which is calculated through the following formula $r = \frac{D}{P}[(1+gn)+8(ga-gn)]+gn$, where r is the capital cost, D/P the dividend yield, gn corresponds to the growth rate of dividends in the long term and ga to the respective growth rate for the next four years. The cost associated with the remaining instrument categories is calculated on the basis of interest rates considered as representative. For methodological information, see Gameiro, I. and Ribeiro, N., "Financing costs of Portuguese companies", Banco de Portugal, *Economic Bulletin*-Autumn 2007.

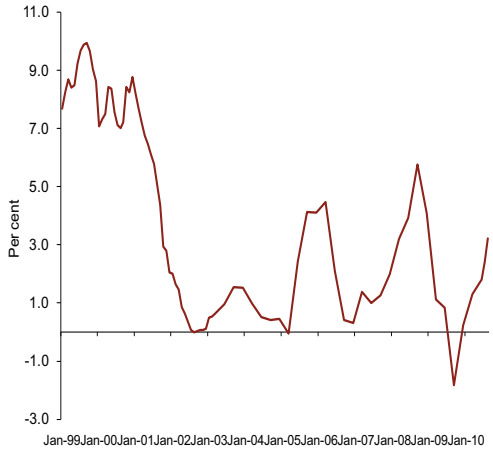
(11) This index is calculated on the basis of supply-side prices, weighted by region and state of use of the dwelling. The quality adjustment used for the calculation, however, means that it is not possible to exercise complete control over the parameters and this fact could well underlie the relatively high growth recorded towards the end of 2008. For information on methodology, see "Índice Confidencial Imobiliário: procedimentos metodológicos", Isabel Fonseca and Ricardo Guimarães", Newsletter *Imobiliária Portuguesa – Confidencial Imobiliário*, October 2006.

(12) This indicator, up to January 2010, was calculated on the basis of data for seven banks accounting for 60 per cent of credit granted. However, in January 2010, *INE* changed the method for the calculation of the bank assessment indicator for housing, which now includes all banks with a significant weight in housing loans and is now compiled on a monthly basis. *INE* published backward-looking information as of September 2009, and the new series is considered starting from this date. This indicator is not quality adjusted.

Developments in this indicator are influenced by changes in credit standards applied by banks, while the *Confidencial Imobiliário* index is calculated on the basis of housing supply prices.

Chart 3.2.18

CONFIDENCIAL IMOBILIÁRIO INDEX
Year-on-year rates of change



Source: *Imométrica*.

4. FISCAL POLICY

The September 2010 Excessive Deficit Procedure notification kept unchanged the fiscal targets set for 2010, which will be achieved with recourse to significant temporary measures.

The September 2010 Excessive Deficit Procedure notification kept unchanged the official target for the general government deficit in 2010 at 7.3 per cent of GDP (9.3 per cent in 2009).[13] Available data on the budget outturn was indicating that the fulfilment of this outcome would demand significant additional measures. Indeed, in the context of the decisions announced on 29 September, it was included the transfer of a Portuguese telecommunications company (*Portugal Telecom*) pension funds to Social Security, with the aim of ensuring the programmed reduction of the deficit. This measure, of a temporary nature, only affects revenue of the current year, not changing neither the structural balance,[14] nor the assessment of the sustainability of public finances. The projection for the debt ratio at the end of 2010, included in the September notification, stands at 83.3 per cent of GDP.

In a context of increasing sovereign risk in 2010, additional consolidation measures were adopted and more ambitious fiscal targets were set.

2010 has been marked by strong instability and differentiation in euro area government debt markets. In Portugal, like in some other countries, sovereign risk increased due to the significant and not fully anticipated deterioration of the general government deficit and debt, in conjunction with the persistence of a number of weaknesses of a structural nature. The escalation of this situation as of the end of April, which strongly conditioned Portuguese banks' funding in international wholesale debt markets, led to the adoption by mid-May of additional fiscal consolidation measures, beyond those

(13) It is important to recall that the notification includes statistics until the end of the previous year compiled by the National Statistical Institute and an estimate for the current year prepared by the Ministry of Finance.

(14) In the framework of the Stability and Growth Pact, the structural balance is adjusted for the effects of the economic cycle and excludes the impact of temporary measures.

announced in January in the State Budget for 2010 and in March in the update of the Stability and Growth Programme (SGP). Following the announcement of these measures, the official targets for the deficit in 2010 and 2011 were revised downwards to 7.3 and 4.6 per cent of GDP, respectively. The new objectives for the deficit in 2012 and 2013, as well as a revised path for the public debt ratio for the whole period from 2010 to 2013, were made public in early July in the Steering Report on the Budgetary Policy (*Relatório de Orientação da Política Orçamental – ROPO*) (see Table 4.1). This document did not present additional measures but included projections for the general government accounts as a percentage of GDP for 2010-2013. According to the estimate for 2010, the decrease in the deficit would be achieved mainly through an increase in the ratio of total revenue to GDP (by 1.8 p.p. of GDP), as primary expenditure as a percentage of GDP was projected to decline less markedly (0.5 p.p. of GDP) and interest expenditure is expected to rise by 0.4 p.p. of GDP. It is important to note, however, that the projections included in the *ROPO* are not directly comparable with those presented in the Budget for 2010 and in the SGP, as they were already using the new National Accounts base (see "Box 1 *The impact of the new National Accounts base on the general government sector*").

Table 4.1

FISCAL TARGETS
Percentage of GDP

	2009	2010	2011	2012	2013
			Fiscal balance		
State Budget for 2010 (*January 2010*)	-9.3	-8.3	-	-	-
SGP (*March 2010*)	-9.3	-8.3	-6.6	-4.6	-2.8
ROPO (*July 2010*)[a]	-9.3	-7.3	-4.6	-3.0	-2.0
			Public debt		
State Budget for 2010 (*January 2010*)	76.6	85.4	-	-	-
SGP (*March 2010*)	77.2	86.0	89.4	90.7	89.8
ROPO (*July 2010*)	76.3	83.5	85.9	85.9	84.8

Source: Ministry of Finance.
Note: (a) In May, following the additional consolidation measures, the targets for the 2010 and 2011 deficits were revised to 7.3 and 4.6 per cent of GDP, respectively.

Tax revenue growth has been higher than budgeted, but developments in the remaining months of the year are still surrounded by high uncertainty

The State budget outturn until August showed a 3.3 per cent year-on-year increase in tax revenue. This partly resulted from macroeconomic developments, with particular emphasis on private consumption, which had a positive effect on the receipts of some of the main indirect taxes. However, some risks still persist as to the magnitude of the deceleration of private consumption towards the end of the year, and, as a consequence, on the evolution of tax revenue. The results of the collection of some of the main taxes are also strongly affected by factors that distort their intra-annual pattern, hampering the making of estimates for the year as a whole. It should also be noted that the impact of the consolidation measures on tax revenue was quite limited until the end of August. In any case, the estimate released in the *ROPO* for the change in the ratio of tax revenue to GDP represents a substantial upward revision from the budgeted figure, taking into account the favourable budget outturn of the early months of the year, beyond the tax measures announced after the Budget for 2010.

As regards net revenue from the main taxes collected until August, mention should be made to the reductions in the personal and corporate income taxes by 7.7 and 4.9 per cent, respectively, and to the 13.9 per cent rise in VAT. As far as the personal income tax is concerned, the decline recorded in the first eight months of the year is chiefly explained by the fact that, unlike in 2009, transfers to local authorities in 2010 are being processed on a monthly basis, but also, although to a lesser extent,

by higher tax refunds. As to the corporate income tax, there was a strong deceleration in tax collection in the past two months, compared with the growth of the tax assessment referring to the 2009 income. Gross VAT revenue until August benefited from developments in private consumption, with particular emphasis on the sharp increase in car sales. The high growth rate of the receipts of this tax, in net terms, reflects the acceleration of refunds in 2009, whose effects are likely to fade away in the last months of the year. The impact of the increase in VAT rates should affect the collection of this tax from September onwards. On the revenue side, it is also important to note the 2.4 per cent increase in contributions to the Social Security subsystem, whose growth is higher than that recorded by declared wages.

Public expenditure will have to decelerate somewhat in the last months of the year

As regards expenditure, available data on the budgetary outturn indicates that the fulfilment of the target for the deficit will still require some deceleration until the end of the year, even taking into account the impact of the transfer of *Portugal Telecom* pension funds. This will be partly achieved through the implementation of the consolidation measures announced in broad terms. In the State subsector, primary current expenditure increased by 4.8 per cent until August. It should be highlighted the growth of wages and salaries (1.7 per cent) and current transfers to other general government subsectors (5.9 per cent). As regards the former, note that wage growth is influenced by adjustments in some specific public administration careers and occurred despite the freezing of the wage scale and the announcement of stricter control of the evolution of the number of public employees. Due to its relevance, it is also important to mention the rise in Social Security expenditure, which increased by 6.9 per cent until August compared with the same period of 2009. This outcome is partly justified by developments concerning expenditure with unemployment benefits and employment support and the social support programmes for the elderly (*Complemento Solidário para Idosos*) and poor households (*Rendimento Social de Inserção*), which as a whole increased by 16.6 per cent, although already showing a slight deceleration. Regarding expenditure with pensions, there were increases by 4.1 per cent in the Social Security subsystem and by 4.4 per cent in the public employees (*Caixa Geral de Aposentações – CGA*) subsystem. In both cases, the average increase in the number of pensioners accounts for about half of the change recorded. As regards the budget outturn of the National Health Service, whose data are available for the first half of the current year, it is worth noting that total expenditure,[15] on a comparable basis, recorded a 3.0 per cent year-on-year change, *i.e.* higher than the budgeted figure for the State transfer (0.6 per cent). Finally, it should be noted the uncertainty regarding the evolution of public investment. Indeed, in the first half of 2010, there was a 9.5 per cent fall in local government investment, on a public accounts basis, which contrasts with the slightly positive value compiled by the quarterly National Accounts for general government as a whole (1.7 per cent).

The ongoing fiscal adjustment programme is very demanding, but it is not evident that the package of measures recently announced and well specified is enough to ensure its materialisation

The ongoing fiscal adjustment programme is very demanding and assumes the correction of the excessive deficit in 2012, one year earlier than the deadline set by the Ecofin Council. Its materialisation is crucial to reduce sovereign debt risk premia and to restore more favourable conditions for the financing of the Portuguese economy in international markets. The European Commission welcomed the ambitious nature of the targets and measures announced, but recommended the specification in

(15) It is important to note that total expenditure of the National Health Service includes expenditure made by entities classified within the general government sector, including payments to corporate hospitals for services supplied (but not the expenditure of those ones, as they belong to the non-financial corporate sector).

the State Budget for 2011 of measures with an impact corresponding to 1.5 per cent of GDP. On 29 September, the government approved a package of additional measures to be included in the Draft Budget for 2011. However, the measures with a permanent nature already well specified do not seem enough to fulfil the target for 2011.

5. SUPPLY

European countries started a recovery phase in the second half of 2009, after having experienced the sharpest contraction since World War II. These developments are consistent with the dynamics of the Portuguese economy (Chart 5.1).

According to data published by *Instituto Nacional de Estatística – INE* (Statistics Portugal), the gross value added (GVA) of the Portuguese economy increased by 1.5 per cent in year-on-year terms in the first half of 2010, compared with a decrease of 3.4 per cent in the first half of 2009 and a decrease of 1.3 per cent in the second half of 2009.

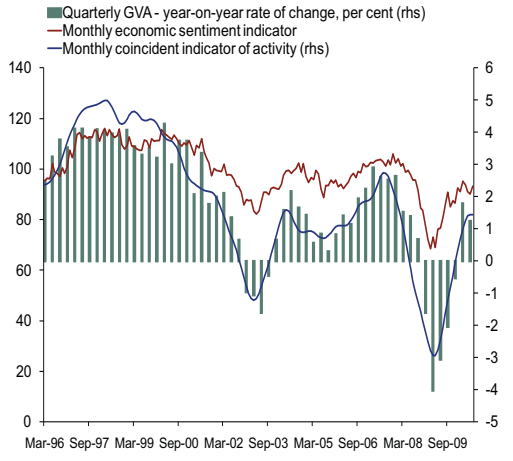
In intra-annual terms, the upward trend of the European Commission's monthly economic sentiment indicator, initiated in the second quarter of 2009, was interrupted in the second quarter of 2010. The monthly coincident indicator of activity calculated by Banco de Portugal is consistent with this trend.

Developments in GVA, although heterogeneous in sectoral terms, were broadly positive compared with the first half of 2009. Over the same period, construction and agriculture, forestry and fishing decreased by 4.4 and 2.1 per cent in year-on-year terms respectively, while the industrial sector increased by 3.7 per cent in the first half of 2010 (Chart 5.2).

The mixed recovery of the Portuguese economy in sectoral terms in the first half of 2010 was evident in other indicators, such as in the manufacturing, services and retail trade confidence indicators, as well as in indicators of production expectations and order books (Chart 5.3). The confidence indica-

Chart 5.1

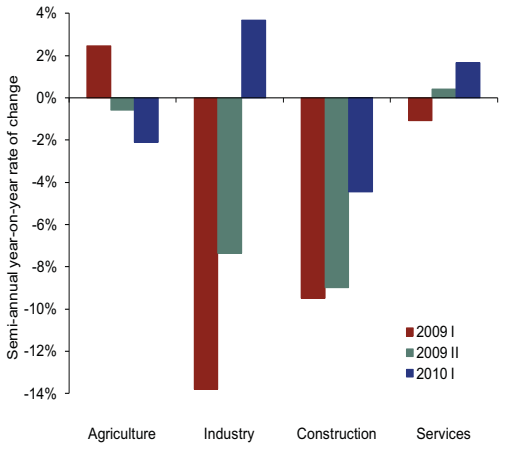
GVA, COINCIDENT INDICATOR OF ACTIVITY AND ECONOMIC SENTIMENT INDICATOR



Sources: European Commission, *INE* (Quarterly National Accounts) and Banco de Portugal.

Chart 5.2

SECTORAL GVA



Source: *INE* (Quarterly National Accounts).

Note: Agriculture comprises the GVA of Agriculture, Animal production, Hunting, Forestry and Fishing; Industry comprises the GVA of Mining and quarrying and Manufacturing; Construction comprises the GVA of Construction; and Services comprise the GVA of Wholesale and retail trade; Repair of motor vehicles and motorcycles and Accommodation and food service activities; Transportation and storage and Information and communication activities; Financial and insurance activities and Real estate activities and Business services, Public Administration, Education and Health and Other services.

tor in services displayed a positive trend, but fell significantly short of its pre-crisis level (first half of 2008), while the manufacturing industry indicator stood close to its previous level and the retail trade indicator exceeded it. In contrast, the confidence indicator in construction continued to deteriorate, remaining close to its historical minimum reached in 2002.

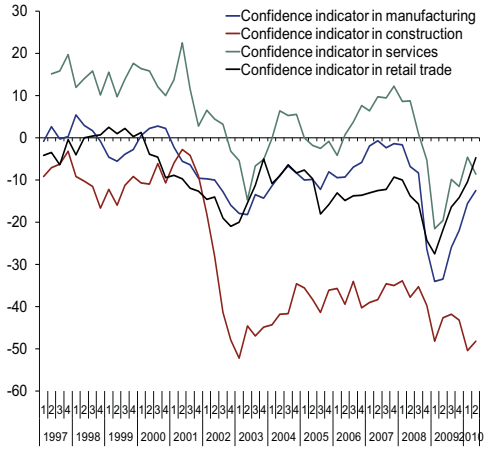
For 2010 as a whole, GDP is projected to increase by 1.2 per cent (see "Section 6 *Demand*"), mainly due to the substantial rise in the contribution of total factor productivity, from -1.2 p.p. in 2009 to 2 p.p. in 2010. In turn, labour input continues to make a negative contribution (-1.6 p.p. in 2009 and -0.9 p.p. in 2010), associated with a strong fall in employment, while capital input made a positive contribution of 0.1 p.p.[16]

Apparent labour productivity in the private sector is expected to increase by 3.0 per cent in 2010, compared with falls of 0.5 per cent in 2008 and 0.1 per cent in 2009 (Chart 5.4). Developments in labour productivity are the result of (typically pro-cyclical) developments in the capacity utilisation rate, which, in the first quarter of 2010, reversed the sharp downward trend that started in the first half of 2008 (Chart 5.5). It should be noted that developments in labour productivity are significantly conditioned by the fall in private sector employment observed in 2009 and in the first half of 2010 (Chart 5.6).[17] In sectoral terms, reference should be made to an increase in productivity in the manufacturing sector.

Compared with the downturn of 2002-2003, employment decreased more markedly during the recent economic contraction (Chart 5.8). The year-on-year rate of change stood at -2.8 per cent in 2009 and -1.7 per cent in the first half of 2010.

Chart 5.3

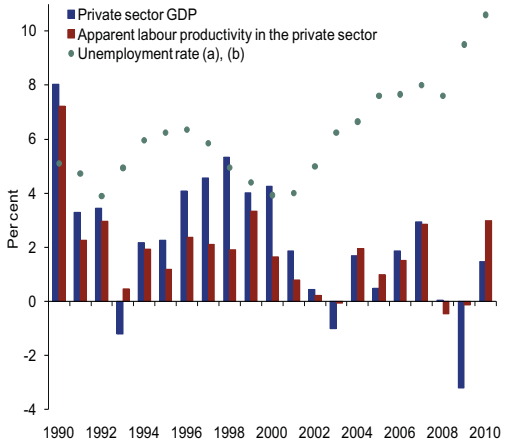
QUARTERLY CONFIDENCE INDICATOR BY BRANCH OF ACTIVITY



Sources: European Commission, *INE* (Quarterly National Accounts) and Banco de Portugal.

Chart 5.4

CHANGE IN APPARENT LABOUR PRODUCTIVITY AND PRIVATE SECTOR GDP



Sources: *INE* and Banco de Portugal.

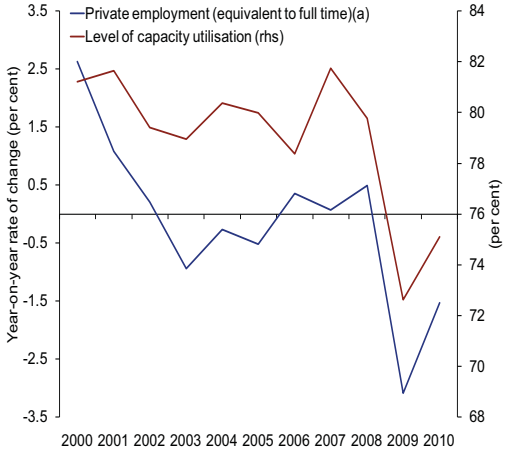
Notes: (a) The unemployment rate series was constructed according to the methodology described in Castro, G. L. and Esteves, P. S. (2004), "Quarterly series for the Portuguese economy: 1977-2003", Banco de Portugal, *Economic Bulletin*-June. (b) The unemployment rate for 2010 is an average of figures for the first two quarters of the year.

(16) The breakdown of output growth is described in detail, including interpretation caveats, in Almeida V. and R. Félix, 2006, "Computing potential output and the output gap for the Portuguese economy", Banco de Portugal, *Economic Bulletin*-Autumn.

(17) It should be noted that employment data used in the calculation of productivity are final only up to 2007. From 2008 to 2010, the private employment series is based on the assumption that the average number of hours worked per worker remained unchanged. Private sector employment is defined as total employment excluding Banco de Portugal estimates for public sector employment and does not include public hospitals converted into public corporate entities.

Chart 5.5

PRIVATE EMPLOYMENT IN THE ECONOMY (EQUIVALENT TO FULL TIME) AND CAPACITY UTILISATION

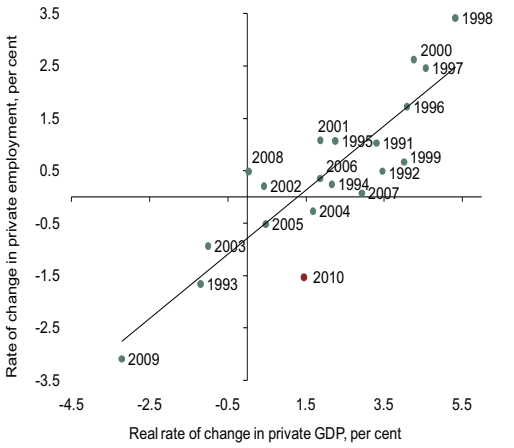


Sources: *INE* and European Comission.

Notes: (a) The employment level used corresponds to total employment in the economy adjusted for the number of hours worked. Each number of hours worked equivalent to full time corresponds to one job. From 2008 to 2010, the series for total employment is based on the assumption that the average number of hours worked per worker remained unchanged. The level of capacity utilisation for 2010 corresponds to the figures for the first quarter.

Chart 5.6

PRIVATE GDP AND PRIVATE EMPLOYMENT GROWTH (EQUIVALENT TO FULL TIME)(a)

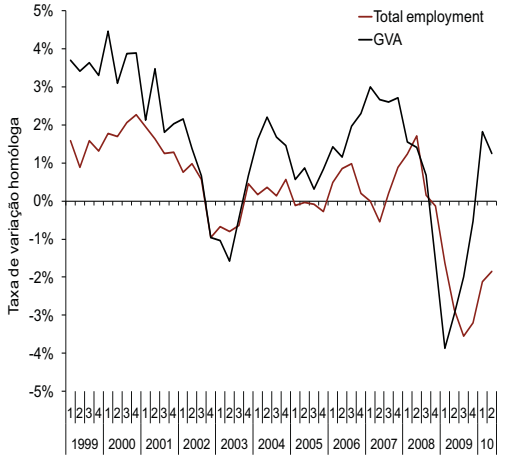


Sources: *INE* and Banco de Portugal.

Note: (a) Private sector employment is defined as total employment excluding Banco de Portugal estimates for public sector employment. Private GDP is calculated as total GDP less compensation of public employees and general government fixed capital consumption. Private GDP and private employment series do not include public hospitals converted into public corporate entities. From 2008 to 2010, the private employment series is based on the assumption that the average number of hours worked per worker remained unchanged.

Chart 5.7

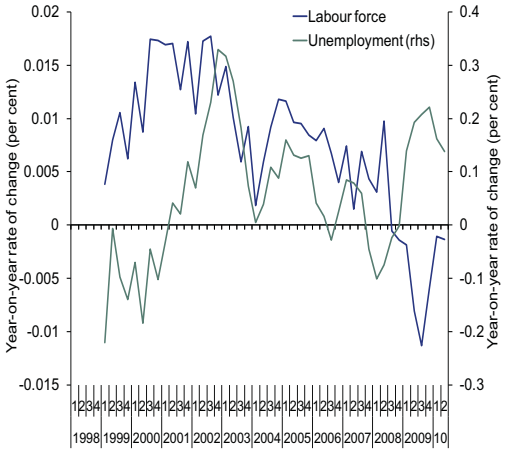
LABOUR FORCE AND UNEMPLOYMENT



Source: *INE* (Labour Force Survey).

Chart 5.8

TOTAL EMPLOYMENT AND GVA



Source: *INE* (Labour Force Survey).

Over the business cycle, corporations adjust employment with some time lag to changes in output. When these time lags are long, job creation may not be sufficient to bring unemployment down at the early stages of economic recovery.[18]

Current developments in employment and in the GVA of the Portuguese economy point to a greater time lag between the response of job creation and the recovery in the GVA compared with the previ-

(18) There are a number of explanations in the literature for recoveries without employment growth (see, for instance, Arpaia and Curci (2010, pp.32-33) "EU labour market behaviour during the Great Recession", European Comission).

ous recession (Chart 5.7). At the early stage of the recession, job destruction was more mitigated. At the same time, the job creation rate fell sharply, and therefore a net increase in employment has not yet been observed in the current stage of the recovery (Table 5.1 and Chart 5.8).

Table 5.1

POPULATION, EMPLOYMENT AND UNEMPLOYMENT

Year-on-year rate of change, per cent (unless otherwise indicated)

	Annual figures		2008		2009		2010
	2008	2009	H1	H2	H1	H2	H1
Population	0.2	0.1	0.2	0.2	0.1	0.2	0.0
Labour force	0.1	-0.7	0.5	-0.3	-0.7	-0.8	0.0
Participation rate, aged 15-64 (% of population)	74.2	73.7	74.2	74.1	73.9	73.5	74.0
Total employment	0.5	-2.8	1.3	-0.2	-2.3	-3.2	-1.7
Dependent employment	1.2	-2.4	1.6	0.8	-1.8	-2.9	-0.6
Permanent contract	0.6	-1.3	0.0	1.2	0.0	-2.7	-2.5
Fixed-term contract	6.2	-4.5	10.3	2.4	-5.7	-3.4	8.4
Self-employment	0.9	-3.7	2.2	-0.3	-3.0	-4.4	-5.8
Total unemployment	-4.8	23.8	-8.1	-1.4	19.9	27.5	17.8
Total unemployment rate (% of labour force)	7.6	9.5	7.5	7.8	9.0	10.0	10.6
Long-term unemployment (% of total unemployment)[a]	49.8	46.4	51.1	48.6	44.8	47.9	53.4

Sources: *INE* (Labour Force Survey) and Banco de Portugal.
Notes: (a) A long-term unemployed is an individual seeking work for 12 months or more.

In order to better understand the effect of the economic crisis on employment, an approach similar to that of the "Labour market and wage developments in 2009" report was considered, whereby actual employment developments are compared with hypothetical developments, with the aim of inferring the level of employment if the crisis had not occurred. This approach follows Engemann and Wall (2010),[19] who analyse the gap between actual employment and hypothetical employment, *i.e.*, between the loss of employment due to the crisis and the employment which would have been observed if the past trend had continued.

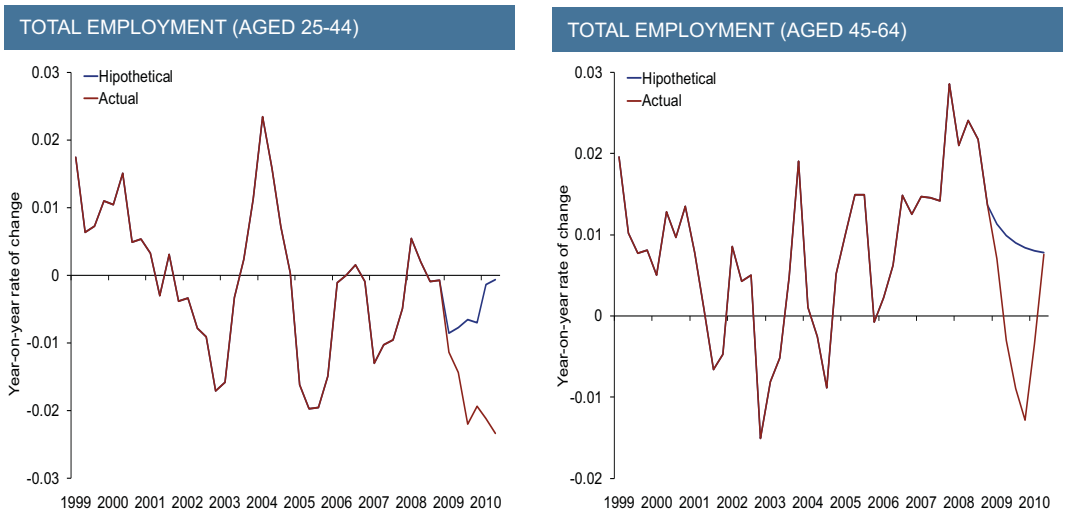
In order to analyse hypothetical developments, available data is considered up to the fourth quarter of 2008 for total employment weighed by the labour force of two groups of workers, one with workers aged between 25-44 and the other with workers aged between 45-64, and the year-on-year rate of change is projected for these age groups up to the second quarter of 2010 (Chart 5.9).

The hypothetical year-on-year rate of change in employment for individuals aged 25-44 is of 0.7 per cent in 2009 and 0.1 per cent in the first half of 2010, while for individuals aged 45-64 it stands at 1 per cent in 2009 and 0.8 per cent in the first half of 2010. Actual developments in employment reveal a year-on-year rate of change of 1.7 per cent in 2009 and 2.2 per cent in the first half of 2010 for individuals aged 25-44, and 0.4 per cent in 2009 and 0.2 per cent in the first half of 2010 for individuals aged 45-64.

Based on these figures, effective loss of employment, resulting from the difference between actual and hypothetical figures for individuals aged 25-44 would be 1.0 per cent in 2009 and 2.1 per cent in the first half of 2010. For individuals aged 45-64, this loss would correspond to -1.4 per cent in 2009 and 0.6 per cent in the first half of 2010. These results suggest that the cumulative impact of the current economic crisis has been more marked among the younger age groups.

(19) Engemann, K. and H. J. Wall (2010), "The effects of recessions across demographic groups", Federal Reserve Bank of St. Louis Review, Jan./Feb. 92(1), 1-26.

Chart 5.9



Sources: *INE* (Labour Force Survey) and Banco de Portugal calculations.

Employment dynamics in the first half of 2010 resulted from a fall in both dependent employment (-0.6 per cent) and self-employment (-5.8 per cent), which continued the downward trend that started in the second half of 2008 (Table 5.1).

With regard to employment developments by type of employment contract, the share of permanent contracts in total dependant employment decreased (from 77.6 per cent in the second half of 2009 to 76.9 per cent in the first half of 2010), returning to the level observed in 2008. The drop in the share of permanent contracts in the first half of 2010 mainly results from a significant decrease in the number of employees with this type of contract, as well as from a marked increase (8.4 per cent) in the number of employees with fixed-term contracts (Table 5.1 and Chart 5.10).

In sectoral terms, according to *INE's* Employment Survey, the reduction in employment slowed down in the first half of 2010 in the construction and manufacturing sectors. However, loss of employment continues to be more concentrated in these two sectors (decreases of 7 and 3.7 per cent respectively), similarly to the first and second halves of 2009.

Economic activity slowed down markedly in the EU, resulting in significant job losses. According to the "Labour market and wage developments in 2009" report,[20] 6 million jobs were lost in the EU between the second quarter of 2008 and the fourth quarter of 2009, of which 4 million in 2009. Yet, considerable heterogeneity can be observed in the EU labour market and in the euro area countries. Take, for example, Spain and Germany, two of the largest economies in the euro area. Spain, where the construction sector has a strong weight, experienced significant job losses, while Germany, which adopted an employment maintenance policy, recorded only small losses.[21]

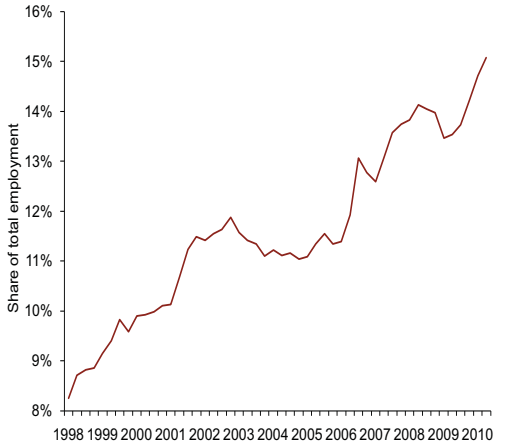
Labour force developments in Portugal were negative in the second half of 2008 and in 2009, with a year-on-year rate of change of -0.7 per cent in 2009 and zero in the first half of 2010 (Chart 5.8). According to *INE's* Employment Survey, the participation rate (for individuals aged 15-64) stood at 74 per cent in the first half of 2010, increasing slightly when compared with the same period in 2009 (73.9 per cent) (Table 5.1). The increase in the participation rate resulted mainly from developments in the female participation rate, which stood at 69.9 per cent, the highest level recorded in the past

(20) Labour market and wage developments in 2009, European Economy 5, 2010.

(21) In mid-2010, the unemployment rate stood at 6.9 per cent in Germany and 20.3 per cent in Spain.

Chart 5.10

SHARE OF FIXED-TERM CONTRACTS



Sources: *INE* (Labour Force Survey) and Banco de Portugal.

three years (2007 to 2009). The male participation rate was 78.2 per cent, showing an increase when compared to the second half of 2009, but standing below the rate of the same period in the previous year (78.9 per cent).

To guide Member States' action regarding employment, the European Council has supported the objectives proposed by the European Commission, which consist of an employment rate target of 75% for all individuals aged 20-64 (Europe 2020 Strategy),[22] including a higher participation of younger and older workers, as well as of those with lower education levels, and a better integration of legal migrants in the work force. In view of the above, the participation rate, as a whole, in Portugal is very close to the proposed objective.

Although there is evidence of an improvement of the economic situation, the unemployment rate continued to grow in many EU countries in the first months of 2010, and Portugal was no exception. In the euro area, Portugal falls within the group of five countries that, in the second quarter of 2010, had an unemployment rate above 10 per cent (in diminishing order, Spain, Slovakia, Ireland, Greece and Portugal). In the first half of 2010 the number of unemployed increased by 17.8 per cent in year-on-year terms and the unemployment rate reached 10.6 per cent, an increase of 1.6 p.p. compared with the first half of 2009.

The male unemployment rate increased by 1.4 p.p. to 9.8 per cent, while the female unemployment rate rose by 1.9 p.p. to 11.5 per cent. The unemployment rate has been following a clear upward trend since 2001, partly associated with structural problems in the Portuguese economy. As observed during the downturn of 2002-2003, the (year-on-year) increase in unemployment in the first half of 2010 was more marked in the unmarried men group (the unemployment rate rose from 14.9 per cent in 2009 to 16 per cent in 2010) (Chart 5.11). These developments are consistent with a sharp segmentation of the labour market, where, as previously mentioned, employment dynamics is associated with developments in fixed-term contracts which particularly affect younger age groups.

In terms of the breakdown of unemployment into duration levels, the year-on-year rate of change of long-term unemployment (12 months or more) increased considerably as a percentage of total unemployment, which rose from 47.9 per cent in the second half of 2009 to 53.4 per cent in the first half of 2010, reaching a 12-year high (Chart 5.11).

(22) The employment rate target was set at 70% in the Lisbon strategy.

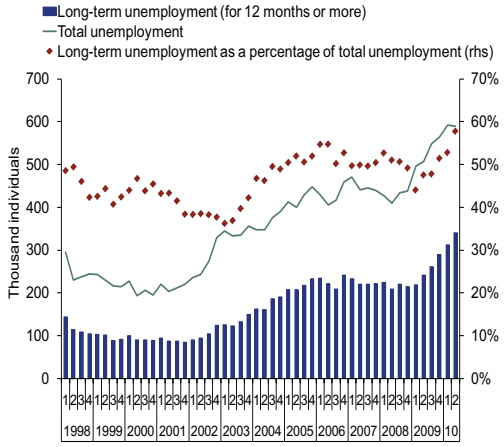
This increase results partly from a slight decrease in short-term unemployment, and mainly from marked growth in long-term unemployment in absolute terms, in particular unemployment with a duration of 12 to 24 months. The average duration of unemployment increased in the first half of 2010 (24.3 months) compared with the second half of 2009 (23 months).

The comparison of the recent evolution of the natural rate of unemployment with the actual unemployment rate is consistent with the protracted decline in the job creation rate (Chart 5.12).[23]

Labour market dynamics can also be analysed in terms of flows between the different labour market status – inactivity, employment and unemployment. Chart 5.13 shows the quarterly averages of these flows over the past four quarters. On average, 44.9 thousand individuals moved from employment into inactivity and 40.7 thousand individuals moved in the opposite direction. 60.6 thousand individuals moved from unemployment into employment (an increase of 14.5 per cent compared with the corresponding period in 2009) and 54.1 thousand in the opposite direction (a decrease of 9.3 per cent compared with the corresponding period in 2009). Finally, 55.2 thousand individuals moved from inactivity into unemployment and 56.9 thousand in the opposite direction. Total flows between the different labour market status account for 7.2 per cent of the labour force, compared with 7.0 per cent in the same period of 2009.

Chart 5.11

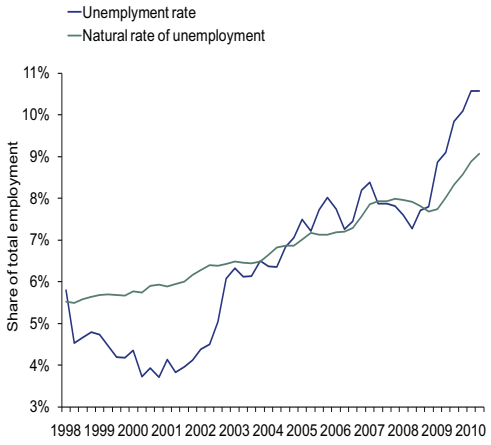
UNEMPLOYMENT DURATION



Source: *INE* (Labour Force Survey).

Chart 5.12

UNEMPLOYMENT RATE AND NATURAL RATE OF UNEMPLOYMENT



Sources: *INE* (Labour Force Survey) and Banco de Portugal.

(23) For a detailed description of the natural rate of unemployment and its estimation for Portugal, see M. Centeno, J.R. Maria and A. A. Novo (2009) *Unemployment: Supply, demand, and institutions, in The Portuguese Economy in the Context of Economic, Financial and Monetary Integration*, Economics and Research Department, Banco de Portugal, pp.219-262.

Chart 5.13

QUARTERLY AVERAGE FLOWS IN THE LABOUR MARKET[(a)]

Volume in thousands and, in brackets, percentage of labour force[(b)]

Sources: *INE* and Banco de Portugal.
Notes: **(a)** Considering the common sample component of quarter t and quarter t-1, and using the population weights of quarter t. **(b)** Average figures for the last two quarters of 2009 and the first two quarters of 2010.

6. DEMAND

Banco de Portugal projections point to economic activity growing by 1.2 per cent in 2010, following a strong fall seen in 2009 (Table 6.1 and "*Projections for the Portuguese economy: 2010-2011*"). The strengthening of economic activity in Portugal reflects distinct dynamics between domestic and external demand. On the one hand, strong buoyant exports are projected, against the background of an increase in global trade flows. On the other, notwithstanding a rebound in private consumption, which will likely grow again above GDP and the euro area average, domestic demand will grow modestly. In this context, reference should be made to weak performing investment – an expenditure component whose buoyancy is instrumental to ensure sustained growth of the Portuguese economy –, which will likely fall further in 2010, albeit more moderately than in the previous year. Amid high uncertainty around developments in household income and the outlook for corporate demand, the current projection has an implied deceleration profile for most global demand components in the second half of the year. This has reflected the impact of fiscal consolidation measures, the maintenance of an adverse labour market situation, the tightening of credit standards and an expected slowdown in the growth pace of world trade, with the unwinding of some of the temporary factors contributing to its dynamics. Comparing the current projection with the average value of the projection range for GDP growth in the euro area released in the September 2010 issue of the Monthly Bulletin of the European Central Bank (ECB), there may be a further negative differential between GDP growth rates in Portugal and the euro area, as seen throughout the last decade and only interrupted in 2009 (Chart 6.1).

The effects of the global economic recession seem to have been heterogeneous across the various countries due to different vulnerability factors. In the Portuguese case, after a decade characterised by very modest economic activity growth, which translated into the maintenance of low potential output growth, the GDP fall in 2009 was less marked than in most advanced economies (Chart 6.2). Among the factors likely to have contributed to a further smoothing of GDP in this period, stress should be laid on the resilience of the Portuguese financial system to disturbances resulting from the global crisis and the fact that the Portuguese economy did not show an overvaluation of real estate

market prices. In addition, divergences among the immediate effects of the recession seem to have also reflected differences at the level of the production and expenditure structure of each economy. In particular, and in comparison with most advanced economies, the Portuguese economy shows a higher weight of private consumption, an expenditure component that typically shows a smoother trend. During the recession, private consumption in Portugal showed a more stable profile than that recorded in most advanced economies, standing in early 2010 at higher levels than those seen before the outbreak of the economic crisis. With regard to the remaining expenditure components, developments in Portugal were overall similar to those observed in the major economies. However, and contrary to other advanced economies, in this period there was no considerable adjustment of the current account deficit (see "Section 8 *Balance of payments*").

Recovery of economic activity conditioned by the need to correct structural imbalances

In 2009 the Portuguese economy experienced the greatest contraction in activity of the past few decades in the context of an unprecedented global shock characterised by an abrupt correction of expectations and a very sharp rise in uncertainty. This notwithstanding, current projections point to a rebound in the growth pace in 2010, although the GDP level remains lower than in early 2008, as in most advanced economies. However, in the framework of an increase in sovereign risk differentiation among euro area economies, the correction of the Portuguese economy's structural macroeconomic imbalances, which have been reflected in low potential output growth, assumes a particularly urgent role. Hence, developments in the Portuguese economy in the next few years will be strongly conditioned by fiscal consolidation and the reduction in private sector indebtedness, especially for companies. In spite of the contractionary impact associated with these processes in the short term, this effort is inevitable in the current economic and financial environment and is considered of the essence to ensure sustained growth in the medium term.

Table 6.1

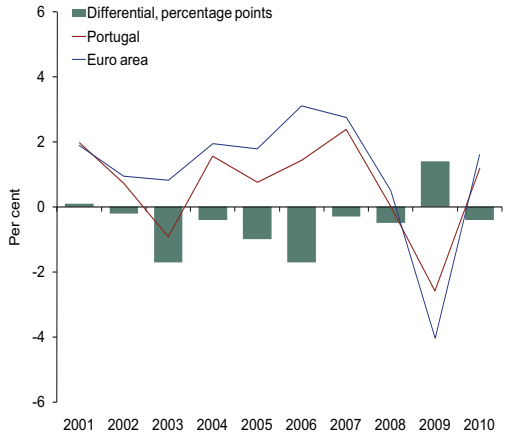
GDP AND MAIN EXPENDITURE COMPONENTS[a]
Real rate of change, per cent

	2003	2004	2005	2006	2007	2008	2009	2010[p]
GDP	-0.9	1.6	0.8	1.4	2.4	0.0	-2.6	1.2
Private consumption	-0.2	2.7	1.7	1.8	2.5	1.8	-1.0	1.8
Consumption of durable goods	-9.4	3.8	3.7	0.7	4.3	-0.4	-14.1	8.7
Current consumption	1.0	2.5	1.4	1.9	2.3	2.0	0.5	1.1
Public consumption	0.4	2.4	3.3	-0.6	0.5	0.8	2.9	1.5
Investment	-7.9	3.7	-0.9	-0.6	2.0	-0.4	-14.2	-5.3
GFCF	-7.1	0.0	-0.5	-1.3	2.6	-1.8	-11.9	-4.2
Machinery and metal products	-2.2	6.7	3.2	5.3	7.9	7.0	-11.3	-6.2
Transport equipment	-10.4	-2.1	2.3	4.5	8.0	-4.2	-23.3	7.5
Construction	-8.8	-2.3	-1.9	-4.7	-0.4	-5.8	-11.8	-5.1
Other	-1.0	2.8	-3.0	1.5	5.9	7.3	-0.6	-3.0
Change in inventories[b]	-0.2	0.9	-0.1	0.2	-0.1	0.3	-0.7	-0.2
Domestic demand	-1.9	2.9	1.4	0.8	2.0	1.2	-3.0	0.4
Exports	3.7	4.1	0.2	11.6	7.6	-0.3	-11.8	7.9
Imports	-0.4	7.6	2.3	7.2	5.5	2.8	-10.9	4.2
Contribution of domestic demand to GDP[b]	-2.1	3.1	1.5	0.9	2.2	1.2	-3.4	0.5
Contribution of net external demand to GDP[b]	1.2	-1.5	-0.8	0.5	0.2	-1.2	0.8	0.7

Sources: *INE* and Banco de Portugal.
Notes: (a) Banco de Portugal estimates from *INE*'s National Accounts for the 2007-2009 period (ESA 95). (b) Contribution to the real rate of change in GDP in percentage points.

Chart 6.1

GROWTH DIFFERENTIAL *VIS-À-VIS* THE EURO AREA
Real rate of change



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

This adjustment will be noticeable in the second half of 2010. In fact, underlying the current projection for economic activity growth is a deceleration profile in the second half of the year, following 1.8 and 1.5 per cent year-on-year growth in the first and second quarters of the year respectively. In particular, the difference between the dynamics of domestic demand and external demand is expected to become more marked. A considerable correction of domestic demand is also expected, following the vigour seen in the first half-year, stress being laid on a strong deceleration in private consumption, namely in the component regarding durable consumer goods, and on the maintenance of the fall in GFCF. In turn, exports, although decelerating from the first half-year, in line with the slowdown in external demand, will remain the most dynamic component of global demand. This seems to be backed by the latest data. The industrial turnover index has been showing a clear contrast between robust growth in external market turnover and considerably lower growth in national market turnover. In turn, disaggregated data for the services turnover index show a strong dynamics in more export-oriented services, in contrast to services that are more conditioned by developments in domestic demand.

Acceleration in private consumption in the first half of 2010 particularly marked by the purchase of cars

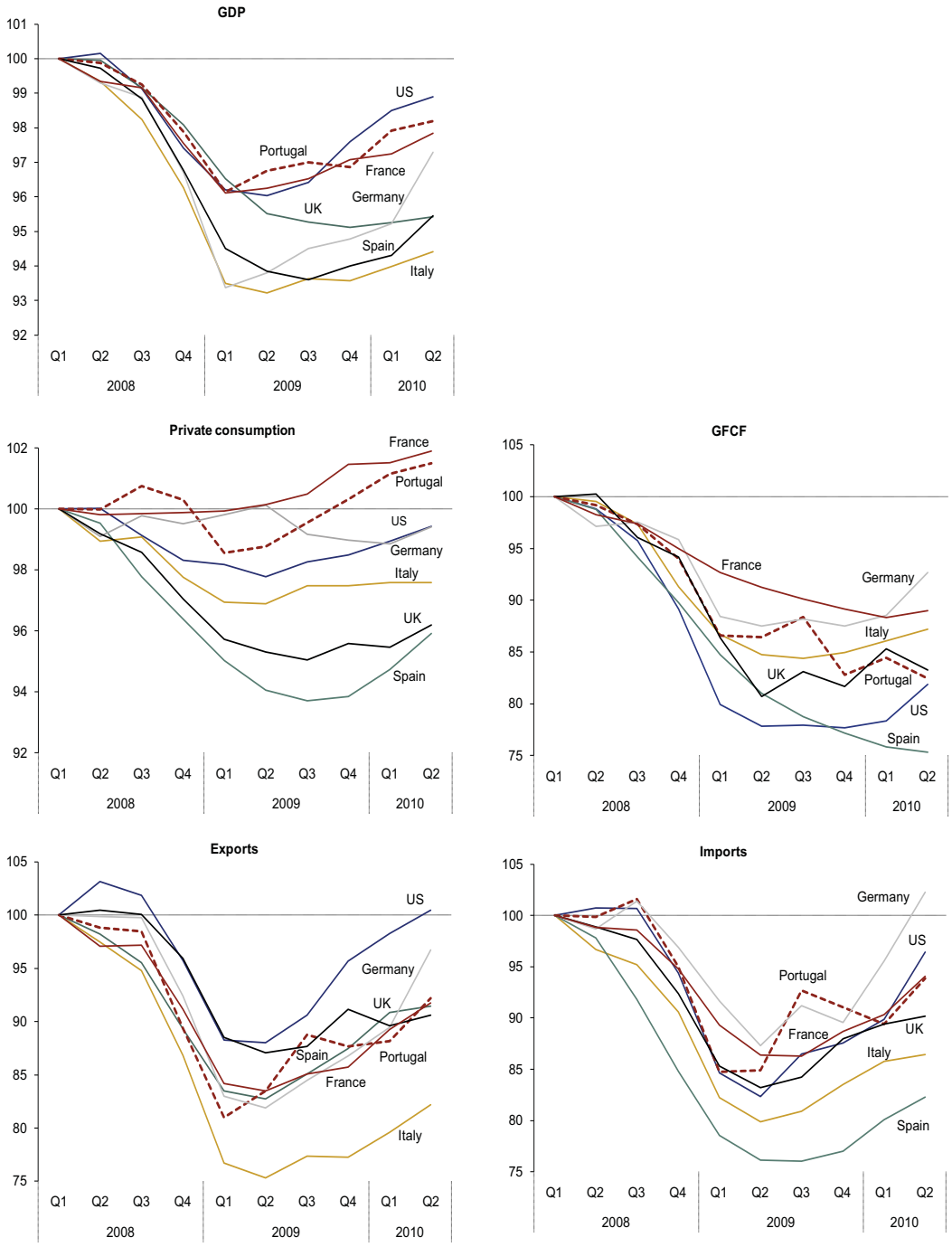
Current projections for 2010 as a whole incorporate private consumption growth by 1.8 per cent, after the 1.0 per cent fall seen in 2009, in the context of a slight increase in real disposable income. In nominal terms, private consumption is projected to grow more than disposable income.

The pace gathered by private consumption in 2010 as a whole will be supported by growth in some disposable income components with a high marginal propensity for consumption, namely labour compensation and public sector transfers, as well as by the maintenance of interest rates at low levels. Hence, there has not been a considerable pass-through to household financing conditions, despite the marked deterioration of the conditions of banks' accessing international financial market financing (see "Subsection 3.1 *Monetary policy of the ECB*").

Despite the deceleration projected for compensation per employee in 2010, total labour compensation is likely to grow more than in 2009, in a context where the level of employment will fall again considerably, although less than in the previous year. According to information from the Institute for Informatics and Statistics of the Ministry of Labour and Social Solidarity, average compensation per

Chart 6.2

QUARTERLY PROFILE OF GDP AND MAIN COMPONENTS
(2008Q1=100)



Sources: Eurostat and Banco de Portugal.

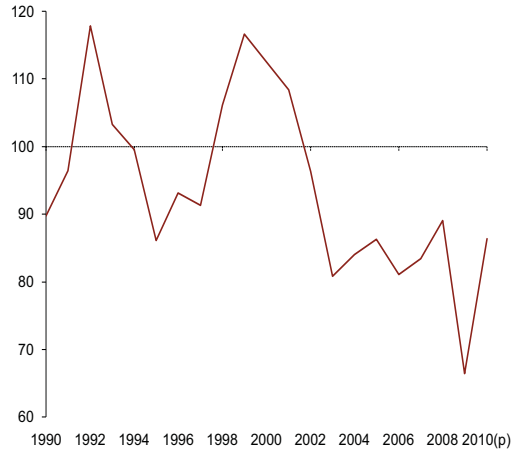
employee for the private sector increased by 3.1 per cent in the first seven months compared with the same period in 2009. Taking into account the projection for the inflation rate in 2010 (1.4 per cent) presented in this issue of the Economic Bulletin ("Section 7 *Prices*"), such increase accounts for growth in real wages, which will, however, be lower than in 2009 and than estimated for average labour productivity (2.5 per cent rise). In addition, the impact on household consumption expenditure arising from the adverse labour market situation may be partly dampened by a significant increase in the unemployed on unemployment benefits.

The strength gained by private consumption in 2010 reflects a rise in the consumption of both current goods and durable consumer goods. The consumption of current consumer goods and services, usually characterised by a smoother intertemporal profile, is estimated to grow by 1.1 per cent in 2010, following a 0.5 per cent increase in 2009. In turn, expenditure on durable goods is likely to rise by 8.7 per cent, following a 14.1 per cent fall in 2009, in line with the strong sensitiveness of this private consumption component to the business cycle. The significant growth in expenditure on durable goods stems from the strong buoyancy of car sales, particularly in the first half-year, following the considerable drops seen in the previous year, associated with the economic recession (Chart 6.3). In addition, the rise in VAT rates on 1 July brought about an anticipation of car purchases in the first half of the year. Furthermore, the incentive programme for the retirement of end-of-life vehicles was kept, with the entry into force of the State Budget for 2010 at end-April, despite the relatively limited contribution to total car sales (Chart 6.4).[24] In the past 10 years car sales have been following a downward trend, which translated into a gradual increase in the average age of the Portuguese car fleet, from 7.2 years in 2000 to 10 years in 2009.

In line with the trend of some qualitative and quantitative indicators for the third quarter of the year, private consumption is likely to decelerate until the end of the year, after having grown strongly in the first half of 2010, with year-on-year rates of change in the first and second quarters of 2.6 and 2.8 per cent respectively. In this context, reference should be made to the trend of the coincident indica-

Chart 6.3

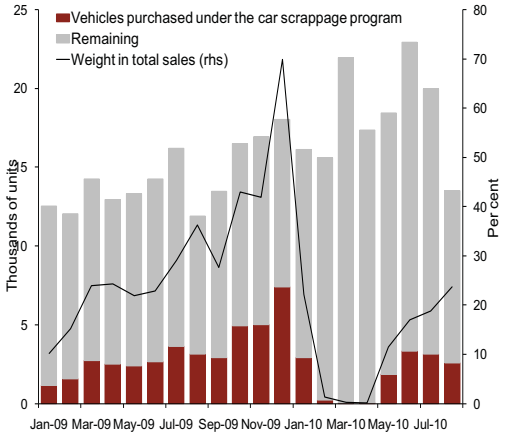
SALES OF LIGHT PASSENGER VEHICLES
(1990-1999)=100



Source: *ACAP*.
Note: Excludes off-the-road vehicle sales. Value for 2010 calculated based on the cumulative change up to August (44.6 per cent).

Chart 6.4

CAR SCRAPPAGE PROGRAM
Total sales and weight in sales of light passenger vehicles



Source: *ACAP*.

(24) There are currently two incentive programmes in force for the retirement of end-of-life vehicles, one for the purchase of combustion-engine driven vehicles (Tax Incentive Programme for the Retirement of End-of-Life Vehicles), and the other for the purchase of exclusively electric vehicles (Electric Mobility Programme). For more information, go to *http://www.valorcar.pt/detentores_programa_incentivo_fiscal.asp*.

tor for the trend evolution of private consumption, calculated by Banco de Portugal, which has been showing a deceleration profile since April (Chart 6.5). In addition, sales of light passenger vehicles, after having risen quite significantly in the first six months of 2010, will likely slow down until the end of the year. This intra-annual profile reflects the limitations resulting from household solvency conditions due to budget restrictions. The latter are a reflection not only of a tightening of credit standards but also of a worsening of taxation and the prospect of the maintenance of adverse labour market conditions, amid high uncertainty as to future income.

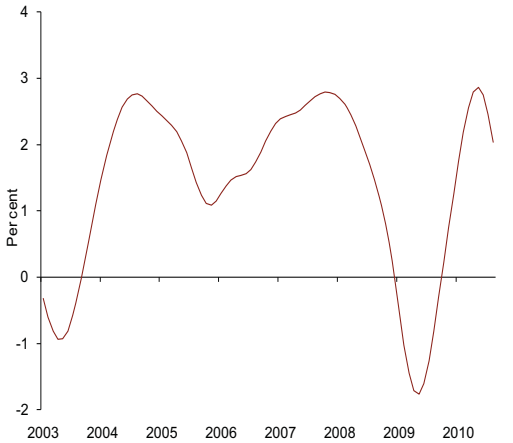
Within the framework of the fiscal measures approved in 2010, public consumption is expected to grow by 0.8 per cent in real terms (2.9 per cent in 2009). This projection includes a considerable impact from the purchase of military equipment by the general government in the second quarter of the year (see "Section 4 *Fiscal policy*").

Broadly based fall in investment across the various institutional sectors

Current projections for 2010 point to a further drop in gross fixed capital formation (GFCF) by 4.2 per cent, albeit more moderate than in 2009 (11.9 per cent). This contraction is shared by the public and private components. With regard to the private component, it reflects, inter alia, a deterioration of expectations about developments in domestic demand, high uncertainty and risk associated with investment decisions, and a tightening of credit standards. GFCF performance in 2010 closes a decade of rather unfavourable developments in an expenditure component regarded as instrumental to ensure sustained growth in the Portuguese economy. From 2000 to 2007 GFCF in Portugal fell by 8.7 per cent in cumulative terms (when only considering the corporate component, GFCF grew by 8.9 per cent in the same period). This was particularly noticeable in the case of household housing investment, which in the same period fell by 34 per cent in cumulative terms, following the strong vigour seen in the second half of the 1990s. Despite the unequivocal impact of the international crisis in the recent trend of investment in Portugal, GFCF performance in the last decade is associated with structural factors, rather than cyclical.

Chart 6.5

COINCIDENT INDICATOR FOR PRIVATE CONSUMPTION
Quarterly values, year-on-year rate of change



Source: Banco de Portugal.

As previously mentioned, the acceleration in economic activity in 2010 was characterised by a greater dynamics of exports, which, however, was not accompanied by a rebound in investment. In addition to the specificities that seem to be putting a strain on public investment and housing investment, corporate investment also showed a further negative change in 2010. In the year as a whole, corporate investment is likely to decline by 3.0 per cent, after having fallen by around 17 per cent in 2009. Despite remaining at lower levels than those recorded prior to the outbreak of the financial crisis, manufacturing confidence has improved considerably since the beginning of the year, particularly as regards the appraisal of order books, and there was an increase in the indicator of turnover in manufacturing, namely in the external market. These indications, jointly with an increase in the level of capacity utilisation, may be regarded as a recovery scenario for investment in external market-oriented sectors in Portugal.

However, the deterioration of demand growth expectations with regard to the situation prevailing before the financial crisis, jointly with high indebtedness levels, may bring about a need for corporate balance sheet adjustments. These adjustments may not allow for such a buoyant recovery of investment as that typically observed in post-recession periods. Growth in bank loans to non-financial corporations has been following a downward trend since the mid-2008, declining from year-on-year changes of approximately 12 per cent to 1.2 per cent in July. This deceleration will simultaneously reflect a decline in credit demand, as well tighter criteria on the supply side, as shown in the bank lending survey released in July. In any case, loans to non-financial corporations kept positive rates of change, contrary to the euro area (see "Subsection 3.1 *Monetary policy of the ECB*").

In turn, data from the Investment Survey released in July confirm the importance of the deterioration of demand expectations for the trend of corporate investment. From among companies of different sectors claiming to have their investment limited in 2010 (50.2 per cent of total companies in the sample), a much higher percentage continues to point to the deterioration of sales expectations as the main limiting factor. Although playing a significantly less important role, there was an increase in the share of companies that pointed out the difficulties in obtaining credit as the main limiting factor (Chart 6.6).

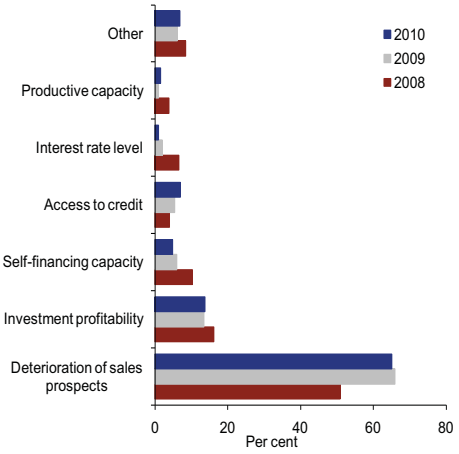
The fall in GFCF in 2010 was broadly based across its components, with the exception of GFCF in "Transport equipment", which will likely increase considerably (7.5 per cent). The trend of this component reflects very considerable growth in the purchase of cars by rent-a-car companies in the first half of the year, as well as a significant increase in sales of light commercial vehicles. In the first eight months, these sales increased by 22.0 per cent, after having dropped by 29.8 per cent in 2009 as a whole. This only partly reflects the impact of the rise in VAT rates on 1 July, which led to an anticipation of car purchases in the first half of 2010. In turn, GFCF in "Machinery and equipment" is likely to show a 6.2 per cent contraction, after a fall of 11.3 per cent in 2009. Finally, GFCF in "Construction" is likely to fall further in 2010 (5.1 per cent), which is consistent with the evolution of this sector's confidence indicators and of cement sales of national companies to the domestic market (Charts 6.7 and 6.8). The behaviour of GFCF in "Construction" in 2010 continued to be influenced by the trend of the component relating to house purchase by households, which fell for the tenth consecutive year. Within this scope, and in spite of a slight acceleration in the first few months of 2010, the growth rate of bank loans to households for house purchase remained at historically low values, as a reflection of supply side and demand side factors.

Exports rose sharply, in the context of a rebound in international trade flows

Within a framework characterised by a rebound in international trade flows and an increase in the outlook for growth in the major trading partners of Portugal, exports of goods and services are likely

Chart 6.6

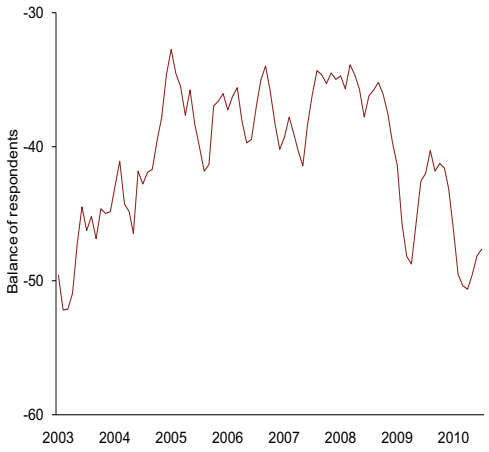
MAIN FACTOR LIMITING INVESTMENT
As a percentage of the total number of companies with investment restrictions



Source: *INE* (Investment Survey).
Note: The results shown for each year are based on the second Investment Survey published in the current year.

Chart 6.7

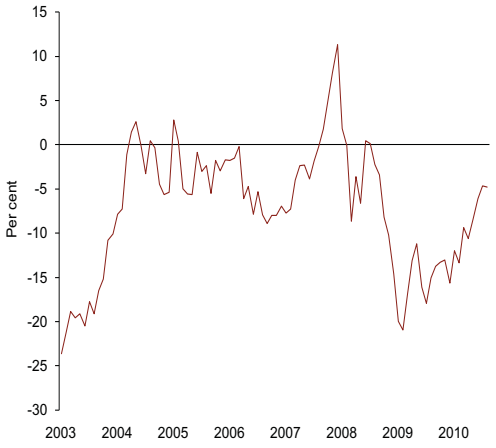
CONSTRUCTION CONFIDENCE INDICATOR
3-month average



Source: European Commission.

Chart 6.8

CEMENT SALES OF NATIONAL COMPANIES TO THE DOMESTIC MARKET
Quarterly year-on-year rate of change



Sources: *Secil* and *Cimpor*.

to accelerate sharply in 2010. The current projection points to 7.9 per cent growth in the volume of exports of goods and services in 2010, after a fall of 11.8 per cent in the previous year.[25] For the year as a whole, projections assume a gain in market share similar to that seen in 2009 (Chart 6.9). Underlying the current projection for 2010 is a decline in rates of change in exports in the second half of the year, reflecting a certain slowdown in world trade. This will occur as some of the temporary factors that have contributed to its dynamics unwind, namely the restoring of inventory levels and the gradual withdrawal of stimulus policies.

(25) The average value of the projection range for euro area export growth in 2010, released in the September 2010 issue of the ECB's Monthly Bulletin, is 8.7 per cent, after a 13.2 per cent fall in 2009.

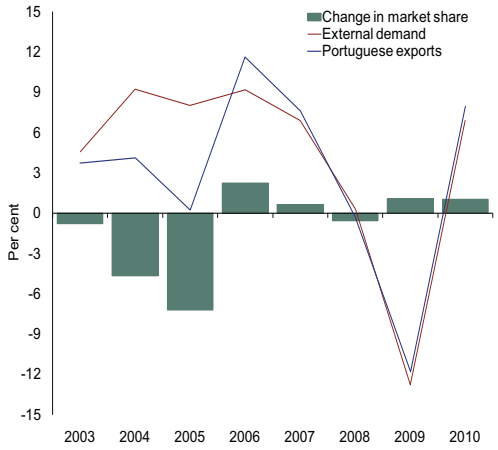
The rise in exports in 2010 was particularly significant in the case of goods exports, for which real growth is projected to be 8.9 per cent, after a 14.4 per cent fall in 2009, while currently projected growth for services exports amounts to 5.8 per cent (-5.9 per cent in 2009). The more favourable developments in exports were common to most world economies, with performance differences being partly related to the fact that countries specialise in distinctly growing geographic and sectoral markets (see "Box 2 *The importance of sectoral specialisation for recent developments in the export market shares of euro area countries*").

Nominal goods exports grew by 14.7 per cent year on year in the first seven months of 2010. The rise in nominal exports was broadly based across sectors, being generally more significant in those that fell the most in 2009 (Chart 6.10). Fuel exports, namely to the United States, increased rather markedly as of the beginning of the year, after a strong fall in 2009 (Table 6.2). Fuel exports in nominal terms have been gaining in importance in the structure of national exports, corresponding to 6.6 per cent of the total in the first seven months of 2010, compared with an average value of 3.0 per cent in the 2000-2007 period. Excluding fuels, nominal growth of goods exports in the first seven months of the year stood at 11.6 per cent. The rising momentum in exports also extended to other sectors. Considering exports classified by technological intensity, the rise in exports was significant in the case of medium-high and medium-low tech products. With regard to the former, stress should be laid on exports of cars and other transport equipment, especially to the German market, which accelerated considerably in the first seven months of 2010. With regard to medium-low tech products, in addition to a great strengthening of fuel exports, sales abroad of rubber and plastic products (33.5 per cent), paper and cellulose pulp (32.4 per cent) and basic metals (17.8 per cent) played a particularly important role in the greater contribution of exports to the Spanish market to total exports.

The analysis of nominal exports of goods by geographical area also shows a substantial increase in exports to European Union countries and extra-EU markets (Table 6.3). In terms of contributions, stress is laid on exports to Spain, which accounted for 28.3 per cent of total exports in 2009 and grew by 15.9 per cent year on year in the first seven months of 2010. It is also important to note the strong momentum of exports to the United Kingdom, which have grown considerably after three consecu-

Chart 6.9

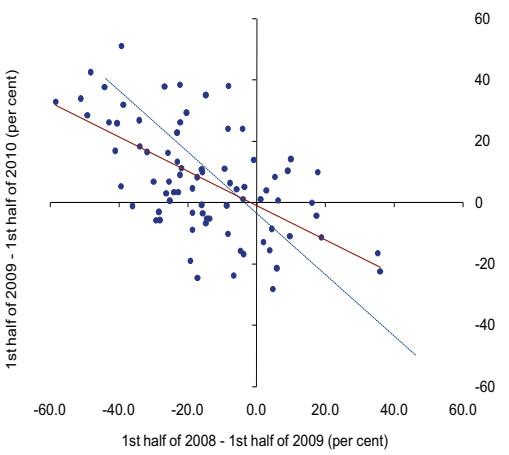
MARKET SHARE OF PORTUGUESE EXPORTS OF GOODS AND SERVICES
Real rate of change



Sources: ECB, UK Office for National Statistics and Banco de Portugal.
Note: External demand adjusted for the effects of the tax fraud in the United Kingdom.

Chart 6.10

EXPORT GROWTH RATE
Combined Nomenclature two-digit sectors; Year-on-year rate of change



Source: *INE*.

Table 6.2

PORTUGUESE EXPORTS OF GOODS BY GROUPS OF PRODUCTS, MAIN ECONOMIC CATEGORIES AND TECHNOLOGICAL INTENSITY

Year-on-year rate of change and respective contribution; nominal values

	Weights 2009	Year-on-year rate of change (per cent)								Contribution to the year-on-year rate of change (p.p.)							
		2009	2010 (up to July)	2009				2010		2009	2010 (up to July)	2009				2010	
				Q1	Q2	Q3	Q4	Q1	Q2			Q1	Q2	Q3	Q4	Q1	Q2
Total	100.0	-18.7	14.7	-26.4	-24.4	-17.7	-4.3	14.8	17.2	-18.7	14.7	-26.4	-24.4	-17.7	-4.3	14.8	17.2
Classification by groups of products																	
Agriculture	5.4	-11.6	9.2	-17.2	-11.2	-6.1	-4.2	13.4	16.9	-0.6	0.5	-0.4	-0.9	-0.6	-0.3	0.2	0.7
Food	6.0	-2.0	-0.1	0.7	0.5	-6.4	-5.6	3.6	2.6	-0.1	0.0	0.1	-0.1	0.0	-0.4	-0.2	0.3
Mineral fuels	5.0	-30.1	95.1	-49.1	-36.1	15.8	87.0	129.9	52.8	-1.7	4.0	-3.1	-3.0	-1.1	0.7	5.8	2.9
Chemicals	4.8	-19.1	20.4	-21.5	-27.8	-10.2	17.3	24.3	21.0	-0.9	1.0	-1.1	-1.2	-1.3	0.1	0.9	1.2
Rubber and plastic products	6.3	-12.7	33.5	-22.3	-12.3	1.6	28.5	38.9	34.2	-0.7	2.0	-1.6	-1.2	-0.7	0.7	1.8	2.6
Leather, leather products	0.3	-23.1	17.3	-23.2	-29.4	-22.8	-1.6	19.1	33.1	-0.1	0.1	-0.1	-0.1	-0.1	0.0	0.0	0.1
Wood, cork	3.7	-23.4	5.2	-28.7	-22.9	-13.6	-0.2	11.8	3.8	-0.9	0.2	-1.3	-1.2	-0.7	-0.3	0.3	0.3
Cellulose pulp, paper	4.9	-10.0	32.4	-18.4	-9.0	0.5	11.5	44.5	34.5	-0.4	1.5	-0.9	-0.6	-0.4	0.1	1.3	2.0
Textile products	4.3	-15.0	8.4	-14.0	-18.1	-11.1	6.5	8.5	9.0	-0.6	0.4	-0.9	-0.7	-0.6	-0.2	0.3	0.4
Clothing	6.8	-13.2	-2.3	-15.6	-12.2	-10.9	-8.8	4.8	-0.1	-0.8	-0.2	-1.0	-1.0	-0.7	-0.7	-0.5	0.2
Footwear	4.0	-8.5	-1.6	-6.1	-6.2	-11.9	-10.7	7.3	-0.2	-0.3	-0.1	-0.4	-0.2	-0.3	-0.3	-0.2	0.1
Minerals, ores	5.7	-15.3	8.8	-23.0	-10.2	-10.1	10.6	12.4	7.9	-0.8	0.5	-1.4	-1.2	-0.8	0.3	0.3	1.0
Basic metals	7.8	-27.1	17.8	-32.2	-34.0	-12.5	4.8	25.2	18.6	-2.3	1.4	-2.8	-3.2	-2.5	-0.6	1.0	2.0
Machinery, equipment	16.2	-31.7	5.0	-35.3	-30.5	-26.7	-7.8	12.0	2.8	-6.1	0.8	-7.0	-6.7	-6.1	-4.4	1.0	1.1
Motor vehicles, other transport equipment	11.8	-21.0	15.8	-29.7	-21.0	-12.9	16.6	18.9	14.5	-2.6	1.9	-4.4	-2.8	-2.4	-0.3	2.0	1.8
Optical and precision instruments	1.1	0.7	12.6	-1.9	2.9	4.8	16.9	8.9	8.6	0.0	0.1	0.0	-0.1	0.0	0.1	0.2	0.1
Other products	6.0	8.3	9.3	0.2	9.9	18.6	17.7	7.6	9.1	0.4	0.6	0.0	-0.1	0.5	1.2	0.6	0.5
Classification by main economic categories																	
Intermediate goods	32.8	-22.6	19.9	-31.4	-30.0	-23.4	-0.6	17.0	25.1	-7.8	6.5	-10.9	-11.0	-8.0	-0.2	5.5	8.5
Capital goods	24.8	-27.3	8.4	-33.3	-31.9	-26.9	-14.8	9.0	11.1	-7.6	2.1	-9.5	-8.8	-7.4	-4.1	2.3	2.8
Consumer goods[a]	36.1	-9.3	3.7	-13.2	-10.3	-8.7	-5.0	2.0	5.6	-3.0	1.4	-4.2	-3.1	-2.8	-1.8	0.8	2.0
Fuels	4.7	-29.7	90.4	-56.7	-46.8	-14.7	12.8	172.9	62.7	-1.6	3.6	-2.9	-2.9	-0.9	0.6	5.3	2.7
Other	1.6	2232.5	67.1	1811.2	2309.4	3166.5	1913.7	62.9	70.7	1.2	1.1	1.1	1.3	1.4	1.2	1.0	1.3
Classification by technological intensity[b]																	
High-tech	10.2	-18.3	-3.8	-28.6	-23.8	-8.8	-8.5	-0.2	-2.5	-1.9	-0.4	-3.1	-2.5	-0.8	-0.9	0.0	-0.3
Medium-high-tech	27.2	-26.2	16.6	-32.8	-29.4	-30.0	-10.5	16.4	16.6	-7.9	4.5	-9.9	-8.7	-9.0	-3.2	4.5	4.6
Medium-low-tech	25.2	-21.2	33.7	-34.4	-30.9	-18.2	5.6	40.2	35.1	-5.5	8.2	-8.8	-8.6	-4.9	1.3	9.1	8.9
Low-tech	37.4	-10.4	6.4	-13.7	-14.3	-8.7	-4.4	3.0	10.9	-3.5	2.4	-4.6	-4.6	-2.9	-1.6	1.2	4.0
Memo item: Total excluding fuels	95.3	-18.1	11.6	-24.7	-22.9	-17.9	-5.1	9.8	15.2	-17.1	11.1	-23.4	-21.5	-16.8	-4.9	9.5	14.5

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

Notes: (a) Including passenger vehicles. (b) Breakdown of exports by technological intensity of the following correspondence with the two-digit Combined Nomenclature: High-tech (30; 84; 88; 90 and 91); Medium-high-tech (28; 29; 31-38; 85-87; 89 and 92-95); Medium-low-tech (25-27; 39-40; 68-83); Low-tech (1-24; 41-67; and 96-99).

tive years of decline. In turn, exports to Germany and France, the two main markets of destination after Spain, grew more moderately. With regard to extra-EU markets, whose weight in total exports of goods has been growing since early 2010, resuming the pre-2009 trend, exports to Angola have declined (-6.6 per cent), following strong increases up to 2008 and a slight reduction in 2009. Despite strong growth in exports to the United States in the first seven months of 2010 (42.9 per cent), as well as to other growingly important markets such as Brazil (80.8 per cent) or Mexico (100.0 per cent), Angola remains the main extra-EU market for Portuguese exports. In the first seven months of 2010, exports to extra-EU European countries as a whole grew rather significantly.

In contrast to the past few years, nominal exports of services were far less buoyant than goods exports, with 5.6 per cent year-on-year cumulative growth in the first seven months of 2010, largely reflecting the behaviour of the two components with the greatest weight, *i.e.* tourism and transport services (Table 6.4). In an environment of rebound in international demand, nominal tourism revenue grew by 8.4 per cent in the first seven months of 2010, after having fallen by 7.0 per cent in 2009 (Chart 6.11).[26] Taking into account the 10 main national services markets, stress should be laid on a sharp increase in services exports to Brazil, associated in particular with the trend of tourism revenue from this market, which in the first seven months of 2010 saw 66.6 per cent year-on-year growth (Tables 6.5 and 6.6). This is in line with data on overnight stays by Brazilian tourists in Portuguese hotels. In fact, by contrast with overall developments in overnight stays by foreign tourists in Portugal, which fell by 3.7 per cent in the first half of 2010, the number of overnight stays by Brazilian tourists increased markedly, against a backdrop of growth in accommodation service prices (see "Section 7 *Prices*"). In turn, exports to Spain and the United Kingdom – the two main external markets of national services – showed a more modest growth pace in the first seven months of the year. In this period, the contribution from extra-EU tourism revenue to total revenue growth was clearly higher than the contribution from intra-EU revenue.

Increase in imports in line with developments in weighted global demand

In 2010 the volume of imports of goods and services will likely increase by 4.2 per cent, continuing to reflect developments in weighted global demand, particularly in some demand components with high import content, such as the consumption of durable goods and exports (Chart 6.12). Similarly to exports, import developments were relatively broad-based at international level, as a reflection of the strengthening of world economic activity and a rebound in international trade flows, after the collapse at end-2008 and in 2009. Given the strong sensitivity of imports to the business cycle, the rate of import penetration in demand in 2010 will likely increase, after the decline seen in 2009, in line with the usual developments in periods of acceleration in economic activity (Chart 6.13).

Nominal imports of goods grew by 10.8 per cent year on year in the first seven months of 2010. The increase in goods imports was observed in most products, although, however, there was a fall in imports of machinery and appliances, in line with developments in GFCF of this component (Table 6.7). However, there are a few differences in the dynamics of imports among the various products. Associated in particular with strong growth in the consumption of durable goods, there was a sharp increase in imports of "Vehicles and other transport equipment" in year-on-year terms (37.7 per cent). In turn, fuel imports grew substantially in the first seven months of 2010 (33.6 per cent). Excluding fuels, nominal import growth stood at 7.7 per cent. The further momentum of imports extended to a number of sectors, which fell rather significantly in 2009, although having a modest weight in the structure of national imports, such as the case of hides, leather and leather products, rubber and plastic products and wood and cork. The analysis of the behaviour of imports by geographical area

(26) It is important to note that part of the revenue from trips by foreign tourists is not recorded as tourism revenue. This is the case, for example, of amounts paid on air tickets which are recorded as transport service revenue.

Table 6.3

PORTUGUESE EXPORTS OF GOODS BY GEOGRAPHICAL AREAS
Year-on-year rate of change and respective contribution; nominal values

	Weights 2009	Year-on-year rate of change (per cent)								Contribution to the year-on-year rate of change (p.p.)							
		2009	2010 (up to July)	2009				2010		2009	2010 (up to July)	2009				2010	
				Q1	Q2	Q3	Q4	Q1	Q2			Q1	Q2	Q3	Q4	Q1	Q2
TOTAL	100.0	-18.7	14.7	-26.4	-24.4	-17.7	-4.3	14.8	17.2	-18.7	14.7	-26.4	-24.4	-17.7	-4.3	14.8	17.2
Intra-EU	76.7	-17.8	13.9	-27.5	-23.5	-16.3	-0.2	13.9	15.6	-13.3	10.5	-21.4	-17.8	-11.8	-0.2	10.6	11.9
of which:																	
Spain	28.3	-21.6	15.9	-31.6	-30.1	-22.0	3.2	16.1	17.2	-6.0	4.2	-9.1	-8.8	-6.0	0.8	4.3	4.6
Germany	13.0	-16.3	7.0	-23.3	-16.0	-18.0	-6.6	6.0	8.7	-2.1	1.0	-3.1	-2.0	-2.3	-0.8	0.8	1.2
France	12.6	-14.6	7.7	-23.7	-20.5	-10.1	-0.2	9.0	8.7	-1.7	1.0	-3.0	-2.5	-1.1	0.0	1.2	1.1
United Kingdom	6.0	-15.6	14.7	-28.1	-23.6	-10.3	2.6	21.9	12.1	-0.9	0.8	-1.5	-1.3	-0.6	0.1	1.1	0.7
Italy	4.1	-19.5	2.5	-25.0	-22.4	-17.2	-11.6	10.4	-4.4	-0.7	0.1	-1.0	-0.9	-0.6	-0.5	0.4	-0.2
Extra-EU	23.3	-21.4	17.3	-22.3	-27.0	-21.4	-14.9	17.7	22.3	-5.5	4.2	-5.0	-6.6	-5.9	-4.2	4.2	5.3
of which:																	
PALOP	5.5	-1.1	-16.0	21.0	5.6	-6.8	-15.8	-16.9	-13.0	-0.1	-1.3	1.1	0.3	-0.5	-1.5	-1.5	-1.1
United States	4.8	-24.5	42.9	-37.2	-38.0	-23.1	10.2	60.0	27.9	-0.8	1.3	-1.3	-1.4	-0.8	0.3	1.8	0.8
Brazil	0.9	-7.7	80.8	-19.2	-33.8	-3.4	18.0	72.6	97.9	-0.1	0.6	-0.1	-0.3	0.0	0.2	0.5	0.7
Memo item:																	
Africa (excl. PALOP)	1.9	-6.4	42.4	-4.2	-19.1	-3.3	2.6	34.6	63.5	-0.1	0.8	-0.1	-0.3	-0.1	0.1	0.6	1.2
America (excl. United States and Brazil)	1.7	-13.5	58.5	-13.9	-29.0	-3.2	-7.9	63.2	82.7	-0.2	1.0	-0.2	-0.5	-0.1	-0.1	0.9	1.3
Europe (extra-EU countries)	1.4	-16.7	78.2	-54.8	-38.0	12.1	37.3	142.9	100.3	-0.2	1.0	-0.8	-0.6	0.2	0.4	1.3	1.2

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

Table 6.4

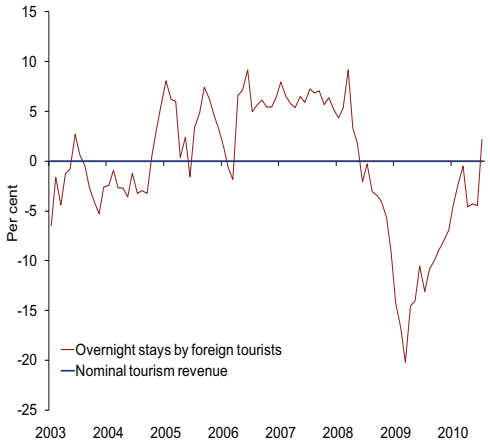
PORTUGUESE EXPORTS OF SERVICES
Year-on-year rate of change and respective contribution; nominal values

	Weights 2009	Year-on-year rate of change (per cent)			Contribution to the year-on-year rate of change (p.p.)		
		2008	2009	2010 (up to July)	2008	2009	2010 (up to July)
Total	100.0	5.3	-8.8	5.6	5.3	-8.8	5.6
Tourism	42.5	0.5	-7.0	8.4	0.2	-2.9	3.3
Transportation	25.4	10.4	-12.6	8.7	2.6	-3.3	2.3
Other business services	19.8	10.2	-6.6	6.1	1.9	-1.3	1.2
Communications	3.1	8.3	-21.9	-11.4	0.3	-0.8	-0.4
Construction	3.0	4.7	-15.6	-8.9	0.2	-0.5	-0.3
Financial services	1.6	15.3	-2.5	-2.3	0.2	0.0	0.0
Personal, cultural and recreational services	1.4	7.1	10.7	24.8	0.1	0.1	0.3
Government operations	1.0	0.5	-2.4	12.4	0.0	0.0	0.1
IT and information services	0.9	-4.7	-32.6	-2.3	-0.1	-0.4	0.0
Insurance	0.7	5.1	3.3	-21.6	0.0	0.0	-0.2
Royalties and license fees	0.7	-29.8	150.5	-79.5	-0.1	0.4	-0.8

Source: Banco de Portugal (Balance of Payments).

Chart 6.11

DEVELOPMENTS IN TOURISM REVENUE AND OVERNIGHT STAYS BY FOREIGN TOURISTS IN PORTUGAL
Year-on-year rate of change; 3-month moving average



Source: European Commission.

points to strong growth of imports from some reference intra-EU markets in the first seven months of 2010, like Germany (9.1 per cent), Italy (11.1 per cent) and the United Kingdom (32.1 per cent), jointly with more modest increases in sales from other markets, such as Spain (5.0 per cent) and France (0.5 per cent). Compared with 2009, reference should be made to a higher weight of extra-EU imports, particularly those originating in the Chinese market. As a result of a strong dynamics in the first seven months of 2010 (44.2 per cent growth), this became the main extra-EU market for Portuguese imports of goods.

With regard to services, nominal imports grew by 2.2 per cent year on year in the first seven months of 2010, after having dropped by 8.5 per cent in 2009. This had a key contribution from imports of transport services and tourism services, which grew by 5.8 and 7.3 per cent respectively until July.

Table 6.5

PORTUGUESE EXPORTS OF SERVICES BY GEOGRAPHICAL AREAS
Year-on-year rate of change and respective contribution; nominal values

	Weights 2009	Year-on-year rate of change (per cent)			Contribution to the year-on-year rate of change (in p.p.)		
		2008	2009	2010 (up to July)	2008	2009	2010 (up to July)
TOTAL	100.0	5.3	-8.8	5.6	5.3	-8.8	5.6
Intra-EU	73.6	3.0	-10.0	2.8	2.3	-7.4	2.0
of which:							
Spain	15.0	6.2	-12.0	-1.2	0.9	-1.9	-0.2
United Kingdom	14.8	-3.3	-18.8	1.0	-0.6	-3.1	0.2
France	13.9	8.0	-4.5	3.8	1.0	-0.6	0.5
Germany	10.1	2.1	-9.3	3.1	0.2	-0.9	0.3
Netherlands	4.1	9.0	4.0	5.9	0.3	0.1	0.2
Italy	3.7	-8.7	-11.4	7.8	-0.4	-0.4	0.3
Extra-EU	26.4	12.9	-5.3	13.5	3.1	-1.4	3.6
of which:							
United states	4.9	7.1	-12.8	8.5	0.4	-0.7	0.4
Switzerland	4.8	7.1	-12.8	8.5	0.4	-0.7	0.4
Brazil	3.6	7.8	-3.9	49.5	0.3	-0.1	1.7

Source: Banco de Portugal (Balance of Payments).

Table 6.6

PORTUGUESE EXPORTS OF TOURISM BY GEOGRAPHICAL AREAS
Year-on-year rate of change and respective contribution; nominal values

	Weights 2009	Year-on-year rate of change (per cent)			Contribution to the year-on-year rate of change (in p.p.)		
		2008	2009	2010 (up to July)	2008	2009	2010 (up to July)
TOTAL	100.0	0.5	-7.0	8.4	0.5	-7.0	8.4
Intra-EU	81.2	-0.4	-8.0	4.1	-0.3	-6.6	3.4
of which:							
Spain	18.9	-8.4	-20.1	3.8	-2.0	-4.4	0.7
United Kingdom	17.6	6.3	1.2	6.0	1.0	0.2	0.9
France	15.3	-1.8	-2.2	4.5	-0.3	-0.3	0.7
Germany	10.9	2.9	-6.8	1.1	0.3	-0.7	0.1
Netherlands	4.1	7.6	-2.8	9.4	0.3	-0.1	0.4
Italy	2.3	-7.7	-8.0	13.1	-0.2	-0.2	0.3
Extra-EU	18.8	4.9	-2.4	26.5	0.8	-0.4	5.0
of which:							
United states	3.5	-20.2	1.7	30.3	-0.8	0.1	1.0
Switzerland	2.8	31.8	-15.9	66.6	0.8	-0.5	2.0
Brazil	2.7	-20.2	1.7	30.3	-0.8	0.1	1.0

Source: Banco de Portugal (Balance of Payments).

Table 6.7

PORTUGUESE IMPORTS OF GOODS BY GROUPS OF PRODUCTS, MAIN ECONOMIC CATEGORIES AND TECHNOLOGICAL INTENSITY
Year-on-year rate of change and respective contribution; nominal values

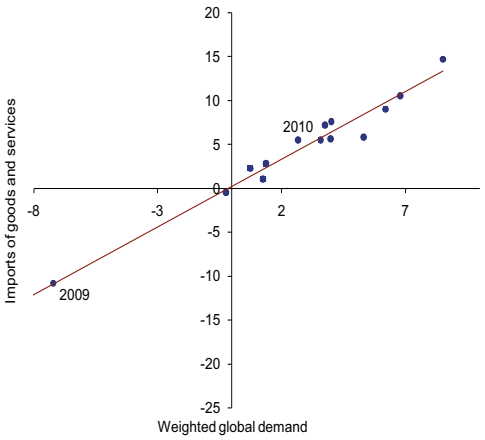
	Weights 2009	Year-on-year rate of change (per cent)								Contribution to the year-on-year rate of change (p.p.)							
		2009	2010 (up to July)	2009				2010		2009	2010 (up to July)	2009				2010	
				Q1	Q2	Q3	Q4	Q1	Q2			Q1	Q2	Q3	Q4	Q1	Q2
Total	100.0	-20.2	10.8	-23.7	-26.5	-20.0	-9.9	8.0	18.8	-20.2	10.8	-23.7	-26.5	-20.0	-9.9	8.0	18.8
Classification by groups of products																	
Agriculture	9.9	-13.5	2.6	-15.9	-10.1	-9.6	-5.3	3.8	3.8	-1.2	0.3	-1.4	-1.5	-1.2	-0.9	0.2	0.6
Food	4.5	-1.9	-1.3	-1.5	3.1	0.9	-2.9	2.6	-7.2	-0.1	-0.1	-0.1	-0.1	0.0	-0.1	0.2	-0.1
Mineral fuels	12.7	-36.7	34.9	-44.2	-42.9	-15.6	18.3	43.2	33.5	-5.9	4.2	-6.7	-7.0	-7.5	-2.0	4.0	5.7
Chemicals	10.3	-3.3	7.3	-2.7	0.3	-4.8	3.3	12.7	7.6	-0.3	0.8	-0.6	-0.3	-0.2	-0.1	0.6	1.3
Rubber and plastic products	4.9	-16.2	13.7	-21.8	-15.9	-11.3	10.0	17.9	13.8	-0.8	0.7	-1.1	-1.0	-0.8	-0.1	0.7	0.9
Leather, leather products	0.9	-19.8	18.4	-23.3	-19.2	-14.6	0.2	25.5	20.1	-0.2	0.2	-0.3	-0.2	-0.2	-0.1	0.1	0.2
Wood, cork	1.1	-27.8	15.0	-36.4	-26.5	-20.0	-6.5	28.9	18.4	-0.3	0.2	-0.4	-0.4	-0.3	-0.2	0.1	0.4
Cellulose pulp, paper	2.5	-8.4	-0.1	-10.5	-4.3	-8.2	-7.0	5.3	-0.1	-0.2	0.0	-0.2	-0.2	-0.2	-0.1	0.0	0.1
Textile products	2.7	-16.6	10.6	-18.9	-12.8	-10.4	-1.1	11.9	16.2	-0.4	0.3	-0.7	-0.6	-0.2	-0.2	0.1	0.5
Clothing	3.1	-4.1	4.8	-5.9	3.9	-7.4	-2.4	12.8	11.2	-0.1	0.1	-0.3	0.0	-0.1	-0.1	-0.1	0.5
Footwear	0.9	-12.0	-2.2	-11.9	-6.2	-16.5	-16.4	7.0	4.3	-0.1	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	0.1
Minerals, ores	1.6	-14.9	-10.9	-13.9	-14.5	-27.0	-17.6	-6.4	-1.8	-0.2	-0.2	0.0	-0.3	-0.3	-0.3	-0.4	0.0
Basic metals	7.7	-34.2	14.8	-42.6	-39.6	-20.6	1.2	23.3	10.3	-3.2	1.1	-3.4	-4.4	-3.4	-1.3	1.1	1.8
Machinery, equipment	19.1	-23.1	-9.7	-23.3	-18.4	-26.1	-17.7	-4.9	-10.9	-4.6	-1.9	-4.3	-4.5	-3.8	-5.8	-1.5	-1.3
Motor vehicles, other transport equipment	12.2	-20.4	37.7	-37.3	-29.6	4.3	20.6	31.8	61.8	-2.5	4.4	-3.9	-5.6	-1.7	1.7	2.1	7.8
Optical and precision instruments	2.3	-4.9	6.8	-2.6	-7.1	-0.4	3.4	9.2	4.3	-0.1	0.2	-0.2	-0.1	-0.1	0.0	0.2	0.1
Other products	3.4	-1.9	16.6	-9.5	-2.0	3.8	12.9	25.4	3.8	-0.1	0.5	-0.1	-0.2	0.1	0.0	0.9	0.4
Classification by main economic categories																	
Intermediate goods	28.6	-22.9	11.1	-26.5	-28.8	-23.3	-11.6	7.7	17.9	-6.8	3.2	-8.0	-8.8	-6.8	-3.3	2.2	5.3
Capital goods	26.0	-21.7	-3.4	-26.7	-27.0	-16.7	-16.0	1.8	-3.4	-5.8	-0.9	-7.1	-7.1	-4.2	-4.4	0.5	-0.9
Consumer goods[a]	32.2	-8.7	9.6	-11.2	-15.1	-7.6	-0.6	4.9	18.0	-2.4	3.0	-3.1	-4.1	-2.1	-0.2	1.6	5.6
Fuels	12.4	-37.1	33.6	-43.5	-42.1	-41.8	-16.4	34.2	40.9	-5.8	4.0	-6.6	-6.8	-7.4	-2.2	3.8	5.2
Other	0.8	586.5	137.1	3500.6	624.6	501.4	133.7	-6.6	726.5	0.6	1.4	1.2	0.3	0.5	0.3	-0.1	3.7
Classification by technological intensity[b]																	
High-tech	17.8	-11.9	-9.7	-20.5	-16.3	-2.7	-6.8	-1.7	-9.2	-1.9	-1.8	-3.4	-2.6	-0.4	-1.2	-0.3	-1.7
Medium-high-tech	28.6	-19.8	18.2	-20.0	-28.5	-19.5	-10.6	5.3	35.7	-5.6	5.2	-5.7	-8.1	-5.3	-3.1	1.6	9.9
Medium-low-tech	27.3	-31.7	22.2	-35.9	-38.6	-35.6	-13.3	20.3	30.6	-10.1	6.0	-11.2	-12.7	-12.1	-3.9	5.3	8.4
Low-tech	26.3	-10.9	5.3	-14.2	-13.3	-9.0	-7.1	5.4	8.3	-2.6	1.4	-3.4	-3.0	-2.1	-1.7	1.4	2.2
Memo item: Total excluding fuels	87.6	-17.1	7.7	-20.1	-23.5	-15.3	-8.8	4.7	15.6	-14.4	6.8	-17.1	-19.7	-12.6	-7.6	4.2	13.6

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

Notes: (a) Including passenger vehicles. (b) Breakdown of exports by technological intensity of the following correspondence with the two-digit Combined Nomenclature: High-tech (30; 84; 88; 90 and 91); Medium-high-tech (28; 29; 31-38; 85-87; 89 and 92-95); Medium-low-tech (25-27; 39-40; 68-83); Low-tech (1-24; 41-67; and 96-99).

Chart 6.12

IMPORTS OF GOODS AND SERVICES AND WEIGHTED GLOBAL DEMAND
Real rate of change, per cent



Sources: *INE* and Banco de Portugal.
Note: The ratio of imports of goods and services to weighted global demand was estimated excluding the observation for 2009.

Chart 6.13

RATE OF IMPORT PENETRATION IN GLOBAL DEMAND

Sources: *INE* and Banco de Portugal.
Note: The penetration of imports assesses goods and services import growth *vis-à-vis* global demand growth. An increase denotes a gain in market share by foreign producers.

7. PRICES

In 2010 the inflation rate in Portugal, as measured by the average change in the Harmonised Index of Consumer Prices (HICP), is likely to stand at 1.4 per cent, after having fallen by 0.9 per cent in 2009 (Chart 7.1). Comparing the current projection for Portugal with the average value of the projection range for the average inflation rate in the euro area released in the September 2010 issue of the ECB's Monthly Bulletin, the inflation differential *vis-à-vis* the euro area will likely be slightly negative (-0.2 p.p.), after a historical trough of -1.3 p.p. in 2009.

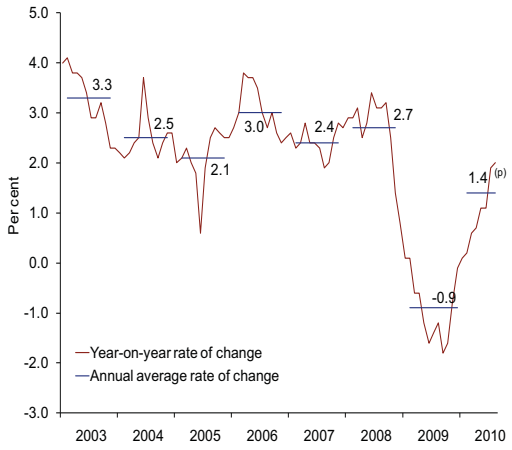
Rise in consumer prices in 2010, after a fall in 2009

Following a period of strong deceleration of prices in Portugal started at end-2008 and extending into the following year, which translated into a negative annual average inflation rate in 2009 – a unique case in the past three decades – the inflation rate will resume positive values in 2010.[27] The reversal of the downward trend of prices since early 2010 reflects, on the one hand, an improvement in the Portuguese economy's external environment, with an increase in the outlook for growth in the major world economies and a gradual recovery of international trade flows, following a strong contraction in 2009. This has translated into a rise in the international prices of both energy and non-energy commodities (Table 7.1). In particular, after a considerable fall in 2009, oil prices recorded a sharp correction, especially in the last few months of 2009 and in early 2010, with year-on-year increases of approximately 60 per cent. The rise in international commodity prices was reflected in the behaviour of goods import prices, as well as in some services prices. In turn, the rebound in the consumption of current goods, although modest, seems to have also contributed to a rise in prices, particularly by easing the pass-through of the rise in international commodity prices to domestic prices. By contrast, prices for most services show relatively low growth rates, in the context of a slight fall in unit labour costs. Finally, the projection for inflation in 2010 reflects, inter alia, the 1 p.p. increase in all VAT rates

(27) The year-on-year change in the HICP reached a trough in September 2009 (-1.8 per cent), showing positive values as of January 2010.

Chart 7.1

HARMONISED INDEX OF CONSUMER PRICES
Year-on-year and average rates of change



Sources: Eurostat and Banco de Portugal.
Note: (p) - Projection.

Table 7.1

PORTUGAL – MAIN INTERNATIONAL PRICE INDICATORS
Rate of change, per cent

	2005	2006	2007	2008	2009	2010	
						Q1	Q2
Goods import prices[a]							
Total	2.9	4.0	1.0	4.7	-9.8	1.5	5.7
Total excluding fuels	-0.6	1.6	1.0	0.8	-6.3	-1.7	0.1
Consumer goods	4.6	3.3	-2.8	-0.3	-3.0	-5.7	-3.5
Food consumer goods	3.3	2.3	0.0	5.8	-2.0	-4.8	-2.0
Non-food consumer goods	5.2	3.8	-4.0	-3.1	-3.5	-6.0	-4.2
International commodity prices							
Oil prices (Brent Blend), EUR	45.0	19.0	0.4	26.6	-33.2	60.0	44.2
Non-energy commodity prices, EUR	9.4	24.8	9.2	4.4	-17.1	27.3	42.8
Nominal effective exchange rate index for Portugal[b]	-0.2	0.2	0.8	1.2	0.5	-0.3	-1.6

Sources: Eurostat, HWWI, *INE*, Thomson Reuters and Banco de Portugal.
Notes: (a) Banco de Portugal calculations based on information provided by *INE*. The classification by broad economic categories shown in this table differs from that used by *INE*, given that light passenger vehicles are included in consumer goods rather than in capital goods. (b) A positive change corresponds to an appreciation of the index. For a detailed description of the methodology, see Gouveia, A. C. and Coimbra, C., (2004), "New effective exchange rate index for the Portuguese economy", Banco de Portugal, *Economic Bulletin*-December.

from 1 July 2010 onwards. Assuming that this increase will be fully reflected in final consumer prices, the estimated impact on the inflation rate in 2010 will be 0.4 p.p.

Strong deceleration in unit labour costs, amid considerable growth in productivity per employee

According to Banco de Portugal estimates, unit labour costs in Portugal are likely to fall slightly in 2010. This reflects a lower increase in compensation per employee compared with 2009, as well as considerable growth in labour productivity, against the backdrop of a rebound in economic activity and a further fall in total employment. Growth in compensation per employee in 2010, which will likely stand at 2.2 per cent (3.2 per cent in 2009), namely reflects the freezing of the general government sector wage grid, a 5.6 per cent increase in the national minimum wage, as well as a composition ef-

fect stemming from a change in the employment structure. Composition effects are associated with a decline in the weight of low-paid workers, possibly associated with lower skills, which typically occurs in a cyclical downturn, inducing a positive bias in aggregate compensation. Despite the deterioration in labour market conditions, with the unemployment rate reaching historically high levels, compensation growth in the private sector as a whole is estimated not to decelerate significantly (2.7 per cent, after 3.1 per cent in 2009).

In 2010 there should also be a fall in unit labour costs in the euro area, more significant than forecast for Portugal, according to European Commission projections.[28] Hence, and in contrast to the past two years, there should be a positive differential between unit labour cost growth in Portugal and in the euro area (Chart 7.2). Underlying the projection for unit cost growth in the euro area is a deceleration in compensation compared with 2009, which will likely grow less than productivity per employee. After a fall in 2009, productivity per employee in the euro area is likely to show a further positive change in 2010, in the context of a rebound in economic activity and a further decline in total employment.

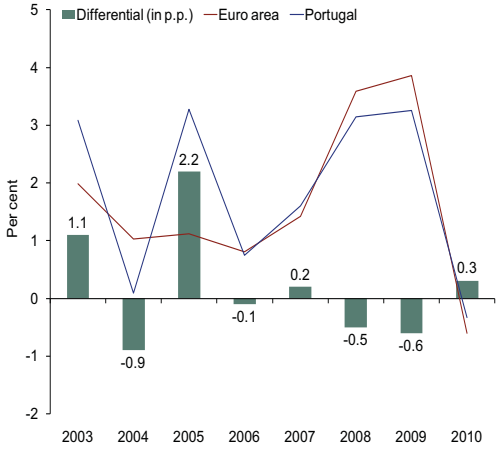
In an environment of weak demand, in response to a rise in import prices, a worsening of both direct and indirect taxes and a rise in credit costs, companies may initially face some compression in their profit margins. In addition, they may chose to cut other costs – including wage costs – to mitigate the impact on profit margins. According to the available information, in 2010 corporate profit margins are expected to recover after the compression observed in 2009.

Acceleration profile of consumer prices over the year, namely reflecting a rise in VAT rates in July

After the trough experienced in September 2009 (-1.8 per cent), the HICP recorded an upward intra-annual profile, with the year-on-year rate of change reaching 2.0 per cent in August. Price developments up to August largely reflect the behaviour of energy prices, although the acceleration in prices seen as of the end of 2009 is broadly based across the different HICP components. This excludes services prices, which in the first eight months of 2010 recorded slightly lower year-on-year rates of change than those observed in the same period in 2009 (Charts 7.3 and 7.4). Underlying the current estimate for inflation in 2010 is the maintenance of the acceleration in prices up to the end of the year,

Chart 7.2

UNIT LABOUR COSTS IN PORTUGAL AND THE EURO AREA
Rates of change and differential

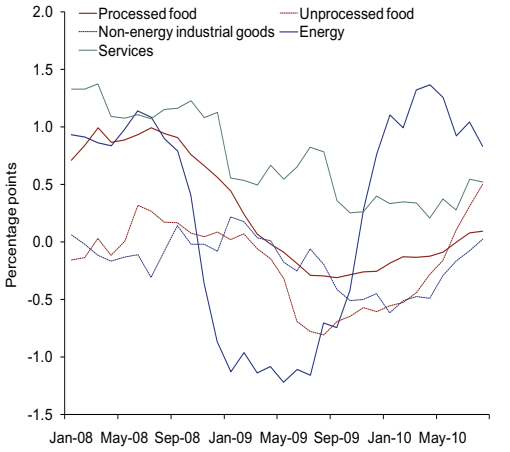


Sources: European Commission, *INE* and Banco de Portugal.

(28) European Commission, 2010. "*European Economic Forecast – Spring 2010*", May.

Chart 7.3

DEVELOPMENTS IN THE CONTRIBUTIONS TO THE YEAR-ON-YEAR RATE OF CHANGE IN OVERALL HICP

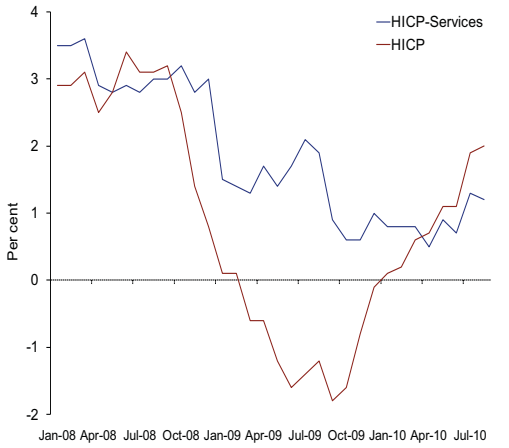


Source: Eurostat.

Chart 7.4

SERVICES PRICES

Year-on-year rate of change



Source: Eurostat.

with the year-on-year rate of change in HICP recording values above 2 per cent. The rise in the inflation rate in the second half of the year chiefly reflects the expected acceleration in the prices of HICP non-energy components. Price developments until the end of the year will also reflect the rise in VAT rates from 1 July onwards, which will have an upward effect on every HICP component.

The considerable acceleration in energy prices (9.8 per cent cumulative change in the first eight months of 2010, after an 8.0 per cent fall in 2009 as a whole) was associated with oil price developments (Chart 7.5 and Table 7.2). However, current estimates point to year-on-year rises in the prices of this component in the second half of 2010 of a lower magnitude than early in the year, as a reflection of the unwinding of the base effect associated with a substantial decline in oil prices until October 2009. As far as energy goods are concerned, the upward trend observed in this period essentially reflected a rise in the prices of products that are more directly influenced by oil price developments, such as liquid fuels, lubricants and gas. In turn, the prices of other products, such as electricity or solid fuels, grew more moderately. It should be noted, however, that the prices of some of these products, such as electricity or gas, are subject to specific regulations, and hence the magnitude and speed of the pass-through to final consumer prices may be different than observed in non-administered product prices.

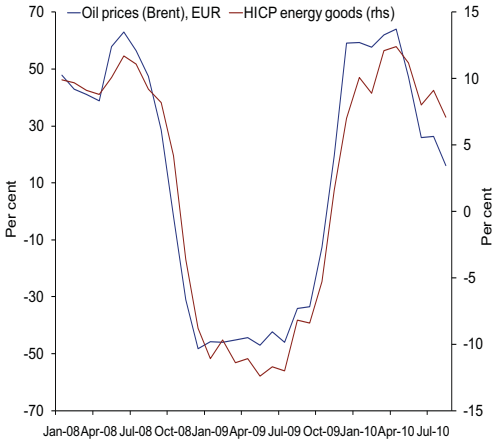
The behaviour of food prices is usually analysed taking into account the prices of processed and unprocessed food separately. Following the downward trend seen in the course of 2009, which extended into May 2010, unprocessed food prices have been accelerating strongly, a trend which will likely be extended into late 2010 (Chart 7.6).[29] Developments in processed food prices in 2009 and the first few months of 2010 were similar to those in unprocessed food, with the downward trend being reversed also from June onwards, although with less significant year-on-year changes, in line with a typically smoother evolution of the prices of these goods.[30]

(29) This largely reflects strong growth in fruit and vegetable prices in the most recent months. Among the explanatory factors were the declines in production in various crops that were particularly affected by adverse weather conditions, as well as the increase in transport costs, in the wake of the upward trend of fuel prices. By contrast, in the first seven months of 2010, the prices of meat and fish, the products with the greatest weight in this component, continued to show negative or close to zero year-on-year changes.

(30) The rise in the prices of this component reflects the behaviour of the prices of products that are more affected by indirect taxes, such as tobacco, wine, beer and spirits, given that the prices of products with the greatest weight, such as bread, eggs and dairy products, continued to show negative year-on-year changes.

Chart 7.5

ENERGY PRICES
Year-on-year rate of change



Sources: Eurostat and Thomson Reuters.

Table 7.2

HICP – MAIN CATEGORIES AND AGGREGATES
Cumulative and year-on-year rates of change, per cent

	Weights 2009	Annual average rate of change					Year-on-year rate of change			
		2006	2007	2008	2009	2010	2009	2010		
		Dec	Dec	Dec	Dec	Aug	Dec	Mar	Jun	Aug
Total	100.0	3.0	2.4	2.7	-0.9	0.3	-0.1	0.6	1.1	2.0
Total excluding energy	89.1	2.5	2.3	2.2	-0.2	-0.5	-1.0	-0.8	0.3	1.3
Total excluding unprocessed food and energy	79.2	2.4	2.2	2.5	0.3	-0.2	-0.4	-0.3	0.1	0.8
Goods	58.5	3.2	2.2	2.4	-2.4	-0.1	-0.9	0.5	1.5	2.5
Food	21.4	3.6	2.8	4.2	-2.5	-2.0	-4.0	-2.7	0.5	2.9
Unprocessed	9.9	3.2	3.0	0.6	-4.3	-3.0	-6.1	-4.4	1.1	5.4
Processed	11.6	4.1	2.6	8.1	-0.9	-1.2	-2.2	-1.2	0.0	0.9
Industrial	37.0	3.0	1.9	1.4	-2.3	1.0	0.9	2.3	2.0	2.3
Non-energy	26.1	1.5	1.4	-0.2	-0.8	-1.4	-1.7	-1.8	-0.6	0.1
Energy	10.9	8.1	3.5	6.6	-8.0	5.9	7.0	12.1	8.0	7.1
Services	41.5	2.7	2.8	3.1	1.3	0.8	1.0	0.8	0.7	1.2
Memo:										
CPI	-	3.1	2.5	2.6	-0.8	0.3	-0.1	0.5	1.2	1.9
HICP - euro area	-	2.2	2.1	3.3	0.3	1.0	0.9	1.4	1.4	1.6

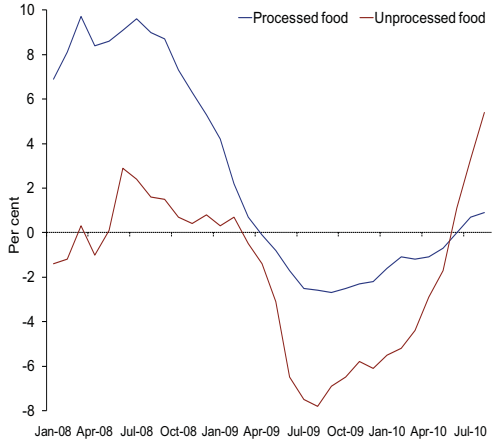
Sources: Eurostat and *INE*.

Among the main HICP components, only the aggregate relating to services showed a deceleration profile in the first half of 2010 (0.9 per cent cumulative change in the first eight months, after a 1.3 per cent increase in 2009 as a whole).[31] However, underlying the current projection for 2010 is an acceleration in services prices in the course of the second half-year. The prices of some services will tend to directly or indirectly reflect the rises in other goods prices through transmission mechanisms whose magnitude and speed vary depending on market structure, such as supply and demand elasticity, regulation levels and competition. In particular, the acceleration in fuel and lubricant prices will

(31) In April 2010 services prices recorded a 0.5 per cent year-on-year change – the lowest value since the start of the HICP series (1996).

Chart 7.6

FOOD PRICES
Year-on-year rate of change



Source: Eurostat.

gradually tend to be transmitted to transport services prices, despite the strong administered component in this type of services. In turn, the rise in food prices seems to be influencing – albeit with a lag – the behaviour of restaurant and café prices (Charts 7.7 and 7.8). In addition to these price transmission mechanisms, developments in the price of some tourism sector-related services will tend to also reflect a rebound in external demand. Stress should be laid, in particular, on an increase in accommodation services prices, after a fall in 2009 and the reversal of the downward trend in package holiday prices.

Acceleration in prices perceived correctly by consumers

In line with the behaviour of inflation, in the course of 2010 there was a gradual increase in the weight of HICP components with positive year-on-year changes. Following the trough recorded in June 2009 (50 per cent), the weight of these components has been growing progressively, reaching around 70 per cent in August. Despite the upward trend of the year-on-year rate of change in HICP over 2010, the mode of rates of change in prices in August 2010, although remaining positive, declined to close to zero (Chart 7.9). In turn, having assumed negative values throughout 2009, the degree of skewness in the distribution of rates of change in prices has also evolved to a similar situation to that of previous years, going on to record positive values since early 2010 (Chart 7.10)[32].

The acceleration in prices in the course of 2010 seems to be duly perceived by consumers, with economic agents' inflation expectations for a 12-month horizon presenting an equally upward trend (Chart 7.11). In the euro area there was also an increase in inflation expectations for the 12-month horizon, which have remained above the values observed for Portugal (Chart 7.12).

Widening of the inflation differential vis-à-vis the euro area with positive values from July onwards

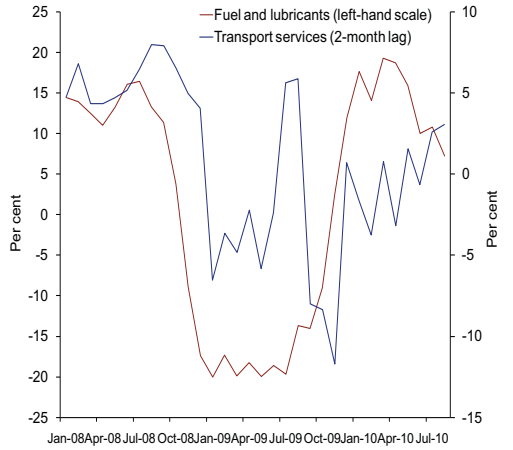
The inflation differential between Portugal and the euro area, measured on the basis of the year-on-year change in the HICP, followed a downward trend as of the mid-2007, being negative from September onwards. This movement became more marked in the course of 2009, with the inflation

(32) A positive (negative) degree of skewness is associated with a higher frequency of major positive (negative) price changes in relation to major negative (positive) changes.

Chart 7.7

DEVELOPMENTS IN THE PRICES OF FUEL AND LUBRICANTS AND TRANSPORT SERVICES

Year-on-year rate of change

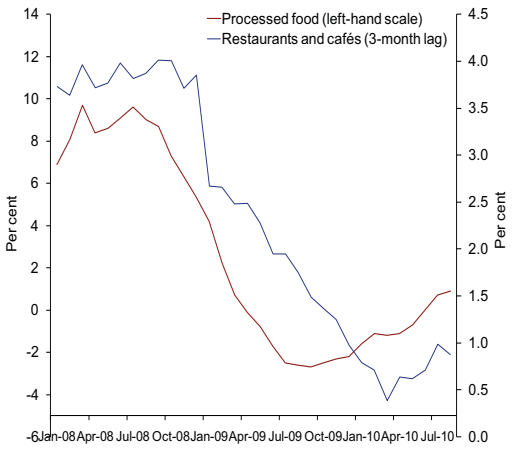


Source: Eurostat.

Chart 7.8

DEVELOPMENTS IN THE PRICES OF PROCESSED FOOD AND RESTAURANTS AND *CAFÉS*

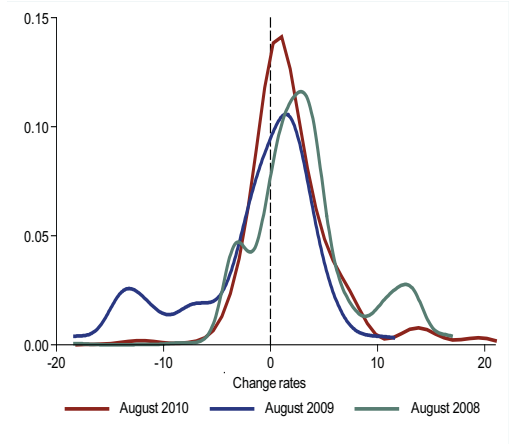
Year-on-year rate of change



Source: Eurostat.

Chart 7.9

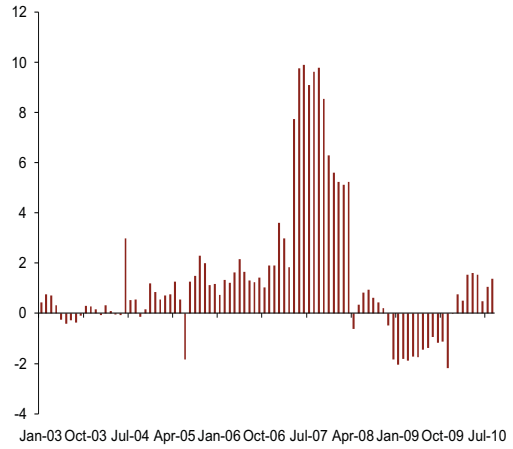
EMPIRICAL DISTRIBUTION OF YEAR-ON-YEAR RATES OF CHANGE IN OVERALL HICP COMPONENTS



Sources: Eurostat and Banco de Portugal calculations.
Note: Empirical distribution obtained by the use of non-parametric methods, notably a Gaussian kernel weighting the various.

Chart 7.10

SKEWNESS OF THE DISTRIBUTION OF YEAR-ON-YEAR RATES OF CHANGE IN HICP COMPONENTS



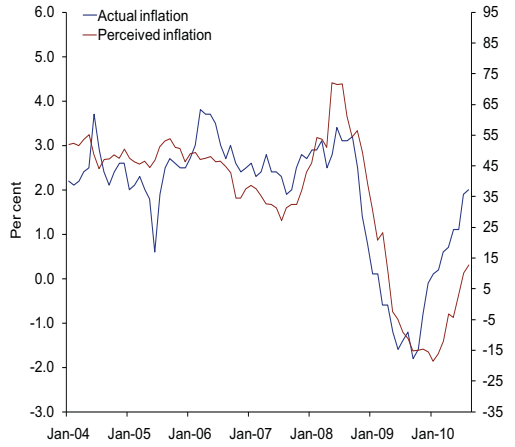
Sources: Eurostat and Banco de Portugal calculations.
Note: The skewness measure used is calculated as $m_3/m_2^{3/2}$, where m_k is the centred moment of order k. The sign of this measure indicates the sign of skewness.

differential reaching historical troughs in September and October (-1.5 p.p.). As of the mid-2010 there has been a progressive widening of the inflation differential, which became positive from July onwards (Chart 7.13). With the exception of energy prices, whose positive differential has been declining since early 2010, the widening of the inflation differential between Portugal and the euro area was seen across all major HICP components. With regard to administered goods prices, the respective growth differential *vis-à-vis* the euro area, although remaining positive, has narrowed somewhat, after an average differential of 0.7 p.p. in 2009.[33]

(33) These results are based on the new series of administered prices, published by Eurostat since February 2010 (see *http://epp.eurostat.ec.europa.eu/portal/page/portal/hicp/methodology/administered_prices*).

Chart 7.11

CONSUMERS' PERCEPTION OF PRICE DEVELOPMENTS



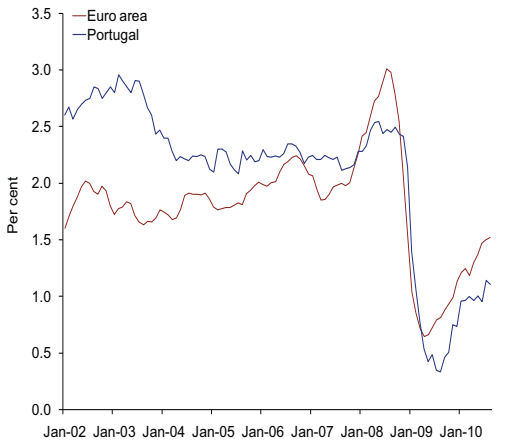
Sources: Eurostat and European Commission.

Note: The balance of respondents taken from the question on the assessment by consumers of price developments in the past 12 months within the scope of theconsumer survey published by the European Commission was used as a measure of perceived inflation (for further details, see Dias, Duarte and Rua (2009) "Inflation Perceptions and Expectations in the Euro Area and Portugal", Banco de Portugal, *Economic Bulletin*-Spring).

Chart 7.12

INFLATION EXPECTATIONS: PORTUGAL AND EURO AREA

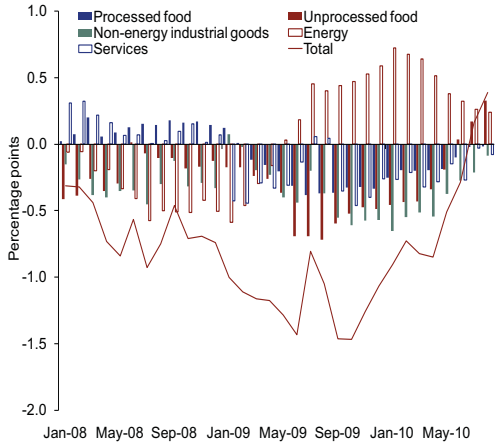
Expectations for a 12-month horizon



Sources: Consensus Forecasts and Banco de Portugal calculations.

Chart 7.13

BREAKDOWN OF THE DIFFERENTIAL BETWEEN THE YEAR-ON-YEAR RATE OF CHANGE IN OVERALL HICP FOR PORTUGAL AND THE EURO AREA



Source: Eurostat.

8. BALANCE OF PAYMENTS

8.1. Borrowing requirements in 2010

In 2010, net external borrowing of the Portuguese economy as a percentage of GDP is estimated to remain high, decreasing only slightly from the previous year. (Table 8.1.1 and Chart 8.1.1). A further decline in investment is projected to contribute to this small improvement in the external deficit, given that the domestic savings rate is also expected to decrease slightly. Both the savings and the investment rate are at historical lows. In turn, net capital transfers (mostly European Union transfers) are projected to decrease further, continuing the downward path observed since 1995, when the current series of National Accounts began. The slight reduction in the net external borrowing of the economy (as a percentage of GDP) results from a lower general government deficit, while the private sector borrowing requirements increased. Contrary to the previous recession period, no significant adjustments were made to the external deficit in the recent period of economic and financial crisis, which, in contrast to other economies, has remained at high levels in the past few years. In effect, the external deficit is estimated to stand slightly above that of 2007 at the end of 2010 (Charts 8.1.1 and 8.1.2).

The absence of bubbles in the real estate market, the relatively favourable situation of the banking system within the European context (enabling the economy to be further financed in a context of economic and financial crisis) and the high degree of accommodation of the monetary and fiscal policies are likely behind these developments. The high external deficit continued to be financed throughout 2010 due to measures taken within the Eurosystem, against the background of a marked increase in the Portuguese sovereign risk premium with highly adverse consequences for banks in their access to international financial markets. These measures aim to avoid a sharp adjustment of the Portuguese economy, but they must not lead to a postponement of the steps necessary to correct unsustainable imbalances.

Net external borrowing expected to decrease slightly in 2010, remaining at a high level

Despite the widening of the external deficit in the first half of the year, net external borrowing of the economy are expected to decrease slightly in 2010 as a result of the sharp slowdown in domestic

Table 8.1.1

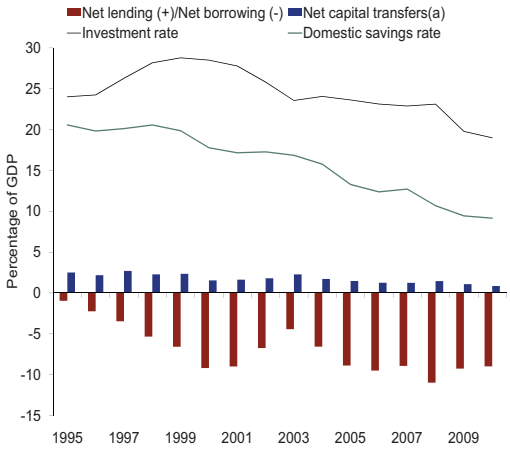
CURRENT AND CAPITAL ACCOUNTS
Balances as a percentage of GDP

				1st half of the year[a]		
	2008	2009	2010[b]	2008	2009	2010
Current and capital account	-11.1	-9.5	-9.2	-10.9	-10.3	-10.8
Current account	-12.6	-10.3	-	-12.7	-11.3	-11.4
Goods and services account	-9.5	-6.9	-6.5	-9.8	-7.3	-7.7
Goods	-13.4	-10.4	-	-12.9	-10.0	-10.7
Services	3.8	3.6	-	3.2	2.7	2.9
of which:						
Travel and tourism	2.6	2.5	-	2.0	1.7	1.8
Income account	-4.5	-4.7	-	-4.3	-5.0	-4.6
Current transfers	1.4	1.3	-	1.4	1.0	1.0
of which:						
Emigrants/immigrants remittances	1.1	1.0	-	1.0	0.9	1.0
Capital account	1.5	0.8	-	1.8	1.0	0.6

Sources: *INE* and Banco de Portugal.
Notes: (a) For the calculation of ratios of the various Balance of Payments components to GDP over the first half of each year, six-month Banco de Portugal estimates of nominal GDP were used. (b) Banco de Portugal projections.

Chart 8.1.1

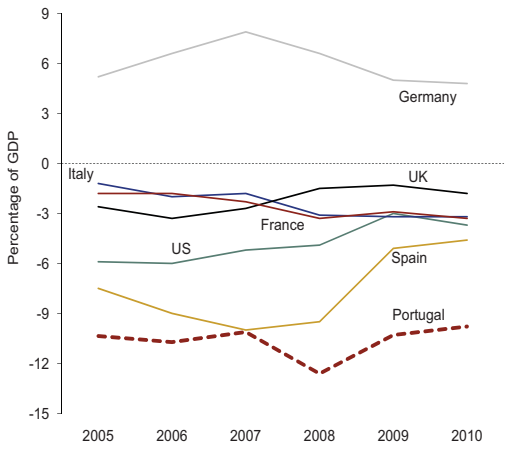
ECONOMY FINANCING



Sources: *INE* and Banco de Portugal.
Note: (a) Includes acquisitions less disposals of non-financial non-produced assets.

Chart 8.1.2

CURRENT ACCOUNT BALANCE



Sources: European Commission and Banco de Portugal.

demand projected for the second half of the year, which is likely to be more marked than in exports. The net external borrowing of the Portuguese economy in 2010, that generally correspond to the combined current and capital account deficit, are thus expected to remain substantial, decreasing only slightly, as a percentage of GDP, compared with the previous year (9.2 per cent of GDP, compared with 9.5 per cent in 2009).

The slight decline in the balance of payments deficit in 2010 reflects an improvement in the goods and services deficit of 0.4 p.p. of GDP (Table 8.1.1), while changes in the income, current transfers and capital accounts are estimated to be negligible. The lower goods and services deficit is expected to mainly result from a positive volume effect associated with the recovery in Portuguese exports and reflect a more favourable growth differential between exports and imports than in 2009 (see "Chapter 6 Demand"). In turn, the energy component is expected to contribute negatively to developments in the goods and services account, which is related to a marked increase in fuel prices estimated for 2010 after the decrease in 2009.

8.2. The balance of payments in the first half of 2010

External deficit increases in the first half of 2010, with relative stabilisation of the current account deficit at a high level and continuing downward trend in the capital account surplus

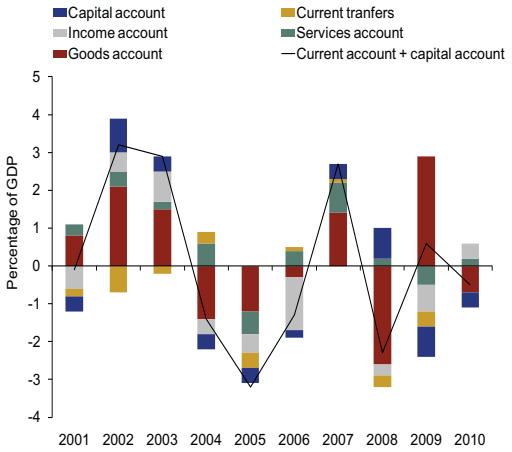
In the first half of 2010, the combined current and capital account deficit worsened from the same period in 2009, standing at 10.8 per cent of GDP (Table 8.1.1). In the first half of 2010, the current account balance remained at levels similar to the same period in 2009, as a percentage of GDP, while the capital account surplus decreased over this period. The negative change in the capital account is part of the downward trend observed since the late 1990s and mainly reflected the behaviour of the public transfers component (mostly European Union transfers). As for the current account balance, the negative change in the goods and services account was offset by a positive change in the income account (Chart 8.2.1). Nevertheless, these changes in the balance of payments account in the first half of 2010 were negligible compared with the previous year.

Worsening of the goods and services deficit, reflecting, in particular, higher growth in imports than exports of non-energy goods and, to a lesser extent, an increase in the price of fuel on international markets

After having improved in 2009, the goods and services account worsened in the first half of 2010 compared with the same period in the previous year, with the deficit standing at 7.7 per cent of GDP. The goods component (both energy and non-energy) contributed to this increase in the goods and services deficit (Chart 8.2.2). Contrary to the previous year, the largest deficit in the energy account reflected the negative price effect observed in the first half of the year. The worsening in the balance of goods excluding fuel results from a negative volume effect, together with higher growth in imports than exports (in spite of a significant rebound in both flows compared with the same period in 2009). The negative volume effect in non-energy goods was partially offset by positive terms-of-trade effects (Chart 8.2.3).

Chart 8.2.1

BREAKDOWN OF CHANGES IN THE CURRENT AND CAPITAL ACCOUNT
FIRST HALF OF THE YEAR

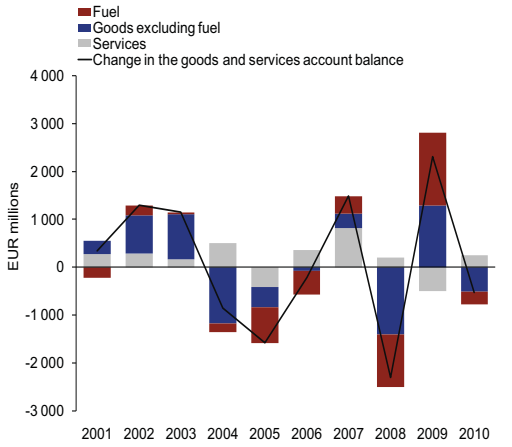


Sources: *INE* and Banco de Portugal.

Note: The calculation of ratios of the various Balance of Payments components to GDP over the first half of each year used six-month Banco de Portugal estimates of nominal GDP.

Chart 8.2.2

CHANGE IN THE GOODS AND SERVICES ACCOUNT BALANCE – 1ST HALF OF THE YEAR
Breakdown into services, fuel and goods excluding fuel



Sources: *INE* and Banco de Portugal.

The increase in the cost of financing for both the general government and the banks in international financial markets has not yet spilled over into the income account

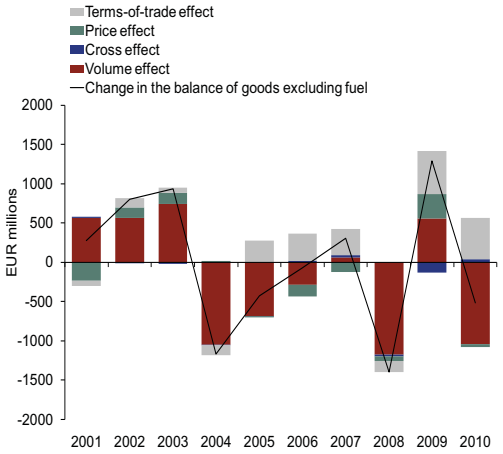
In the first half of the year, the income account deficit was below that of the same period in 2009, countering the worsening trend seen in the past few years. The marked decline in interest rates throughout 2009 and in the first months of 2010 and the replacement by banks of market financing for Eurosystem financing[34] are likely to have contributed to the improvement in this account in the first half of the year, compared with the same period of the previous year. In effect, the improvement in the income account in the first half of the year was observed in the components associated with interest-bearing financial instruments (portfolio and other investment income). In turn, income from foreign direct investment stabilised at the high level seen in the same period of the previous year (Chart 8.2.4). Thus, the substantial worsening in the Portuguese sovereign risk premium observed since the last months of the first half of 2010 and its consequences for the market financing cost of both the general government and the banks do not seem as yet to have spilled over into the income account.

(34) Regarding the financial account, the increase in the Eurosystem financing of banks resulted in an increase in other investment liabilities of monetary authorities related to their Target position. This position is remunerated at the rate applied to the Eurosystem's main financing operations (see "Subsection 8.3 *Financial account and international investment position in the first half of 2010*").

Chart 8.2.3

CHANGE IN THE BALANCE OF GOODS EXCLUDING FUEL - 1ST HALF OF THE YEAR

Breakdown into volume, price and terms-of-trade effects



Sources: *INE* and Banco de Portugal.

Note: A positive (negative) change means an increase (decrease) in the balance of goods excluding fuel. The change in the balance of goods excluding fuel may be broken down into four effects:

– volume effect – effect of the change in imported and exported volumes;
$[X_{t-1}.vx_t] - [M_{t-1}.vm_t]$

– price effect – effect of average growth of external trade prices;
$(X_{t-1}.p_t)-(M_{t-1}.p_t)$

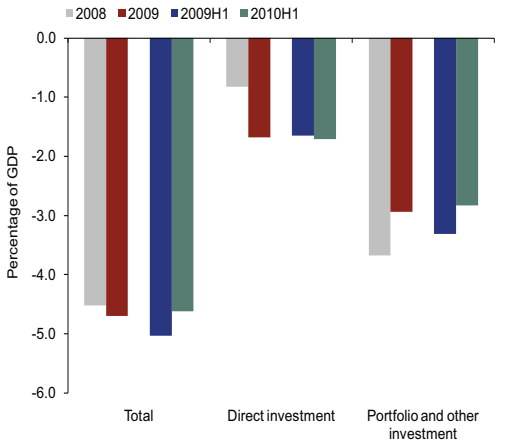
– terms-of-trade effect – effect of the relative change in export and import prices;
$[X_{t-1}.(px_t - p_t)] - [M_{t-1}.(pm_t - p_t)]$

– cross effect – effect of the interaction between changes in volume and prices of exports and imports;
$[X_{t-1}.vx_t.px_t] - [M_{t-1}.vm_t.pm_t]$

where: X_{t-1} and M_{t-1} denote the exports and imports in year $t-1$ at current prices; vx_t and vmt denote the rates of change in export and import volume in t; px_t and pm_t denote the rates of change of export and import prices in t; p_t is the average rate of change of external trade prices in year t $((px_t + pm_t)/2)$.

Chart 8.2.4

INCOME ACCOUNT



Sources: *INE* and Banco de Portugal.

8.3. Financial account and international investment position in the first half of 2010

Significant change in the external financing structure of the Portuguese economy

In the first half of 2010, the external financing profile of the Portuguese economy differed substantially from that observed since the start of the euro area. Underlying these developments is the turmoil in the sovereign debt markets of Portugal and other euro area countries at the end of 2009, further exacerbated from mid-April 2010. This was reflected, in particular, in very tight financing conditions for banks in international wholesale debt markets. In fact, with the exception of shorter maturities, Portuguese banks have been facing quantitative restrictions in their access to these markets since May.[35]

In view of the turmoil in sovereign debt markets, new measures were approved within the Eurosystem, namely the Securities Markets Programme in May 2010, as well as the maintenance of liquidity-providing operations at a fixed rate with full allotment.[36] Against this background of increased

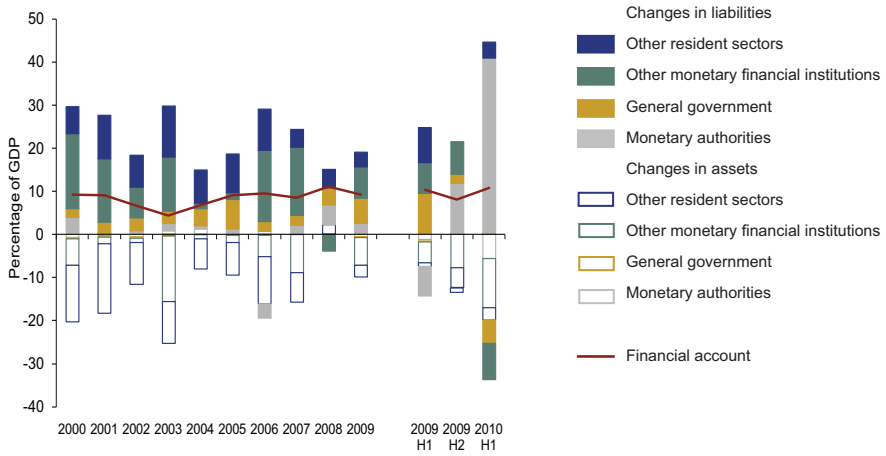
(35) For further details, see "Section 2 *The International framework*" and "Section 3 Monetary policy of the ECB and monetary and financial conditions of the Portuguese economy", of this Bulletin.

(36) For further details on the new measures taken, see "Section 3 *Monetary policy of the ECB and monetary and financial conditions of the Portuguese economy*", of this Bulletin.

difficulties by the State and the banks in issuing debt in international markets, the financing of the Portuguese economy has been ensured, to a large extent, by recourse to the ECB's monetary policy operations by Portuguese banks. Regarding the financial account and the international investment position, recourse by banks to Eurosystem financing resulted in a significant increase in other investment liabilities of monetary authorities related to their Target position.[37] Therefore, in the first half of 2010, this component increased very significantly, combined with a decrease in liabilities held by the general government and banks *vis-à-vis* non-residents (Chart 8.3.1).

Chart 8.3.1

FINANCIAL ACCOUNT
Balance and changes in assets and liabilities by institutional sector



Sources: *INE* and Banco de Portugal.

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

The considerable increase in the Portuguese sovereign risk premium from late 2009 resulted in increased difficulties in access to external financing for this sector

In the first half of 2010, the significant increase in the risk premium required by international investors to hold Portuguese government securities, in line with the growing differentiation of sovereign risk in euro area debt markets, strongly affected the issuance of Portuguese government securities abroad. In effect, the portfolio investment of the general government experienced a sharp reversal in its liability flows, *i.e.* posting outflows of 6.0 per cent of GDP, contrasting with inflows of 9.5 per cent of GDP in the first half of 2009 (Table 8.3.1). The sizeable redemption of 10-year Portuguese Treasury bonds in May 2010 contributed significantly to net outflows from portfolio investment.[38] According to available data, the general government has been financed by resident economic agents in the course of 2010, in particular the banking system, as well as by secondary market purchases under the Eurosystem's Securities Markets Programme.[39]

(37) Trans-European Automated Real-time Gross settlement Express Transfer system, *i.e.* a system for payments and receipts by Banco de Portugal to/from countries belonging to the ESCB.

(38) The redemption of 10-year Treasury bonds amounted to €5 626.8 million, *i.e.* 6.6 per cent of GDP for the first half of 2010 and 3.3 per cent of GDP estimated for 2010 as a whole.

(39) For further details, see "Section 2 *The international framework*" and "*Subsection 3.2 Monetary and financial conditions of the Portuguese economy*", of this Bulletin.

Table 8.3.1

FINANCIAL ACCOUNT
Percentage of GDP

	Jan-Jun 2009			Jan-Jun 2010		
	Changes			Changes		
	Liabilities	Assets	Net	Liabilities	Assets	Net
Current plus capital accounts			**-10.3**			**-10.8**
Financial account	**7.6 (7.1)**	**2.7 (3.2)**	**10.3**	**12.2**	**-1.4**	**10.8**
Direct investment	1.9	-0.9	1.0	1.9	-0.7	1.2
excluding Madeira and St. Maria (Azores) offshores	*0.9*	*-0.3*	*0.5*	*1.8*	*-0.3*	*1.5*
Portfolio investment	25.0	-11.0	14.0	-8.7	-11.8	-20.4
Financial derivatives	-10.7	10.9	0.1	-18.3	18.6	0.4
Other investment	-8.5	3.6	-4.9	37.2	-6.8	30.5
Reserve assets		0.1	0.1		-0.8	-0.8
By institutional sector of resident investor:						
Monetary Authorities[a]	**-6.4 (-6.9)**	**-1.2**	**-7.6 (-8.1)**	**40.5**	**-5.7**	**34.8**
Portfolio investment	0.0	-1.7	-1.7	0.0	-5.7	-5.7
Financial derivatives	0.0	0.0	0.0	-0.1	0.0	0.0
Other investment	-6.3 (-6.9)	0.3	-6.0 (-6.5)	40.5	0.8	41.4
Reserve assets		0.1	0.1		-0.8	-0.8
General Government	**7.1**	**1.9**	**9.0**	**-14.1**	**9.0**	**-5.1**
Direct investment	0.0	0.0	0.0	0.0	0.0	0.0
excluding Madeira and St. Maria (Azores) offshores	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Portfolio investment	9.5	-0.9	8.6	-6.0	0.2	-5.8
Financial derivatives	-2.4	2.5	0.1	-8.7	9.3	0.7
Other investment	0.0	0.3	0.3	0.5	-0.5	0.0
Other Monetary Financial Institutions[a]	**-0.1**	**1.8 (2.3)**	**1.7 (2.2)**	**-16.2**	**-3.6**	**-19.8**
Direct investment	0.0	-0.2	-0.2	0.0	-0.3	-0.3
excluding Madeira and St. Maria (Azores) offshores	*0.0*	*-0.2*	*-0.2*	*0.0*	*-0.3*	*-0.3*
Portfolio investment	8.9	-6.8	2.1	-2.5	-4.3	-6.8
Financial derivatives	-7.3	7.4	0.1	-7.8	7.6	-0.2
Other investment	-1.8	1.5 (2.0)	-0.3 (0.2)	-5.9	-6.5	-12.5
Non-Monetary Financial Institutions	**4.1**	**-1.0**	**3.1**	**-3.5**	**-0.6**	**-4.1**
Direct investment	1.4	-0.1	1.3	-0.2	0.0	-0.2
excluding Madeira and St. Maria (Azores) offshores	*1.1*	*-0.1*	*1.0*	*-0.2*	*0.0*	*-0.2*
Portfolio investment	2.9	-1.6	1.3	-2.8	-0.5	-3.3
Financial derivatives	-0.3	0.2	-0.1	-0.5	0.4	-0.1
Other investment	0.1	0.5	0.6	0.0	-0.5	-0.5
Non-Financial Corporations	**3.4**	**0.8**	**4.2**	**5.9**	**-0.3**	**5.6**
Direct investment	0.5	-0.6	-0.1	2.1	-0.4	1.7
excluding Madeira and St. Maria (Azores) offshores	*-0.2*	*0.0*	*-0.3*	*2.0*	*0.0*	*2.0*
Portfolio investment	3.6	0.1	3.8	2.6	-0.7	2.0
Financial derivatives	-0.3	0.4	0.0	-0.9	1.0	0.1
Other investment	-0.4	0.9	0.5	2.1	-0.3	1.8
Households	**-0.4**	**0.4**	**0.0**	**-0.3**	**-0.2**	**-0.5**
Direct investment	0.0	0.0	0.0	0.0	0.0	0.0
excluding Madeira and St. Maria (Azores) offshores	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Portfolio investment	0.0	-0.1	-0.1	0.0	-0.7	-0.7
Financial derivatives	-0.4	0.4	0.0	-0.3	0.3	0.0
Other investment	0.0	0.1	0.1	0.0	0.2	0.2
Errors and omissions			**0.0**			**0.0**

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 a decrease in foreign liabilities or an increase in foreign assets, *i.e.* a financial outflow. (a) Figures in brackets under "Other investment" of monetary authorities and other monetary financial institutions are adjusted for temporary end-year operations between these two sectors, which were reversed in the first days of the following year.

Marked net outflows through banks in 2010

As regards banks (other monetary financial institutions), financing flows with non-residents reversed markedly, *i.e*. with net outflows of 19.8 per cent of GDP, contrasting with net inflows of 2.2 per cent of GDP in the first half of 2009. These developments reflected a decrease in portfolio investment liabilities and, in particular, other investment liabilities in the second quarter of 2010, which resulted from the difficulties faced by Portuguese banks in access to financing in international debt and interbank markets. In addition, portfolio investment assets increased, namely through the purchase of Treasury bonds from other euro area countries. These purchases were concentrated in the first quarter of the year, *i.e*. before the tensions in the euro area sovereign debt markets were exacerbated, while the second quarter saw disinvestment by banks in this type of securities. Banks' other investment assets *vis-à-vis* non-residents also increased, although this reflects mixed developments in bank operations with entities belonging to the same group and other non-resident banks. In effect, the increase in banks' other investment assets is related to intra-banking group operations. By contrast, this type of financing of other non-resident banks decreased sharply in the second quarter.

Net outflows through non-monetary financial institutions

The first half of 2010 saw net outflows of non-monetary financial institutions. A decrease in this sector's portfolio investment liabilities was mainly behind these developments, which resulted, to a large extent, from the early redemption of securitisation units by other financial intermediaries and financial auxiliaries in the second quarter of 2010.

Significant net inflows to non-financial corporations

Similarly to the previous year, relevant net inflows to non-financial corporations in the first half of 2010 signalled that the turmoil in euro area sovereign debt markets during this period had no pronounced effects on the financing of non-financial corporations.[40]

In the first half of 2010, the importance of direct investment financing continued to be low. In this period, direct investment operations amounted to net inflows close to the level observed in the first half of the previous year (1.2 per cent of GDP).

Decrease in the international liability position of the Portuguese economy in the first half of 2010 as a result of sharp changes in the prices of financial instruments in international financial markets, despite the high combined current and capital account deficit

The debtor position of the Portuguese economy *vis-à-vis* the rest of the world decreased, standing at 106.7 per cent of GDP at the end of the first half of 2010 (Table 8.3.2).[41] This drop resulted from sharp positive changes in the value of portfolio investment and reserve assets (the latter associated with the gold valuation in international markets), given the persistence in the first half of 2010 of a substantial combined current and capital account deficit.[42] As for portfolio investment, since national assets held by non-residents exceed foreign assets held by residents, the decrease in debt market prices, in particular the debt of Portuguese issuers, and the devaluation observed in stock markets in the first half of 2010 had a positive impact on the international investment position of the Portuguese economy.

(40) For further details on developments in the financing of non-financial corporations, see "Section 3.2 *Monetary and financial conditions of the Portuguese economy*", of this Bulletin.

(41) Using the GDP for the year ending in the first half of 2010.

(42) The international investment position is valued at market prices.

Table 8.3.2

INTERNATIONAL INVESTMENT POSITION

	EUR millions							Percentage of GDP		
	2008	2009	June 2010[a]					2008	2009	June 2010[d]
	End-of-period positions		Transactions	Price changes	Exchange rate changes	Other adjustments	End-of-period positions	End-of-period positions		
International investment position	-165 195	-182 767	-9 273	9 778	2 660	-1 567	-181 169	-96.1	-109.0	-106.7
Direct investment[b]	-26 560	-30 561	-1 057	544	1 835	81	-29 160	-15.4	-18.2	-17.2
Portfolio investment	-53 432	-68 032	17 475	6 319	1 218	-1 255	-44 274	-31.1	-40.6	-26.1
Financial derivatives	163	-441	-331	-96	0	0	-868	0.1	-0.3	-0.5
Other investment[c]	-93 950	-94 829	-26 056	0	-515	-393	-121 793	-54.6	-56.6	-71.7
Reserve assets	8 585	11 096	696	3 011	122	0	14 926	5.0	6.6	8.8
By institutional sector of resident investor:										
Monetary authorities	4 787	3 822	-29 772	3 054	127	97	-22 673	2.8	2.3	-13.4
Portfolio investment	13 645	13 589	4 896	62	1	0	18 548	7.9	8.1	10.9
Financial derivatives	0	3	14	-20	0	0	-2	0.0	0.0	0.0
Other investment[c]	-17 442	-20 867	-35 378	0	4	97	-56 144	-10.1	-12.4	-33.1
Reserve assets	8 585	11 096	696	3 011	122	0	14 926	5.0	6.6	8.8
General government	-82 330	-91 855	4 402	7 100	268	49	-80 036	-47.9	-54.8	-47.1
Direct investment[b]	55	-45	0	0	0	0	-45	0.0	0.0	0.0
Portfolio investment	-83 673	-92 721	4 982	6 215	-25	50	-81 498	-48.7	-55.3	-48.0
Financial derivatives	-69	-47	-576	885	0	0	262	0.0	0.0	0.2
Other investment[c]	1 358	958	-5	0	293	-1	1 244	0.8	0.6	0.7
Monetary financial institutions	-75 332	-75 330	16 926	177	-570	613	-58 183	-43.8	-44.9	-34.3
Direct investment[b]	4 796	5 796	265	368	55	-42	6 442	2.8	3.5	3.8
Portfolio investment	5 136	-2 635	5 836	588	563	803	5 156	3.0	-1.6	3.0
Financial derivatives	204	-380	171	-779	0	0	-987	0.1	-0.2	-0.6
Other investment[c]	-85 469	-78 112	10 654	0	-1 188	-147	-68 793	-49.7	-46.6	-40.5
Non-monetary financial institutions	4 262	7 274	3 541	-1 827	598	-1 373	8 212	2.5	4.3	4.8
Direct investment[b]	-10 317	-12 240	162	-72	12	-520	-12 657	-6.0	-7.3	-7.5
Portfolio investment	14 797	20 298	2 849	-1 454	395	-1 013	21 076	8.6	12.1	12.4
Financial derivatives	0	-1	127	-302	0	0	-176	0.0	0.0	0.0
Other investment[c]	-218	-783	403	0	191	159	-30	-0.1	-0.5	0.0
Non-financial corporations	-34 344	-45 547	-4 767	1 463	1 976	-866	-47 741	-20.0	-27.2	-28.1
Direct investment[b]	-21 370	-24 331	-1 494	248	1 767	646	-23 164	-12.4	-14.5	-13.6
Portfolio investment	-13 651	-18 312	-1 676	1 145	103	-1 012	-19 752	-7.9	-10.9	-11.6
Financial derivatives	1	3	-69	70	0	0	4	0.0	0.0	0.0
Other investment[c]	677	-2 907	-1 529	0	106	-500	-4 830	0.4	-1.7	-2.8
Households	17 762	18 870	397	-189	262	-87	19 253	10.3	11.3	11.3
Direct investment[b]	276	259	9	0	0	-4	265	0.2	0.2	0.2
Portfolio investment	10 314	11 749	588	-238	182	-83	12 197	6.0	7.0	7.2
Financial derivatives	27	-21	1	50	0	0	31	0.0	0.0	0.0
Other investment[c]	7 145	6 883	-202	0	80	0	6 760	4.2	4.1	4.0

Sources: *INE* and Banco de Portugal.

Notes: (a) Preliminary estimates for price changes, exchange rate changes and other adjustments. (b) Includes quarterly estimates by Banco de Portugal based on the accumulation of monthly flows and the latest annual data obtained from Direct Investment Surveys. (c) Includes, in some components, quarterly estimates by Banco de Portugal, based on the accumulation of monthly flows. (d) For 2010,the GDP for the year ending in the first half of 2010 was used.

9. CONCLUSION

The Portuguese economy is facing a particularly demanding set of challenges, which will condition the decisions of the different national economic agents in the near future. In fact, the persisting constraints to the external financing of the economy are likely to accelerate and intensify the necessary balance sheet adjustment of both public and private agents, taking into account the maintenance of high levels of net external borrowing in the recent past. Within a monetary union and under normal financial market conditions, a deleveraging process of the economy could take place gradually, with the possibility of smoothing the adjustment between the public and private sectors. In contrast, in the current context of sovereign market segmentation and differentiation within the euro area, the pressure of the adjustment falls on all sectors of the economy simultaneously, causing a severe and inescapable contraction dynamics. This adjustment will entail a narrowing of the current gap between domestic savings and investment.

With regard to the deleveraging process of the private sector, it should be noted that the large external deficit of the Portuguese economy emerges in a context of particularly low investment and savings rates. As regards households, their net lending increased significantly only from 2009 onwards, reflecting a higher savings rate – after the troughs in previous years – and a continued downward trend of the investment rate, which currently stands at an historical low. In turn, in the context of the current crisis, the non-financial corporations sector initially experienced a rise in net borrowing as a percentage of GDP, only reversing this trend more recently, although to levels which are still high in the European context. These recent developments were the result of an increase in the sector's savings rate and a further decline in GFCF as a percentage of GDP, to historical lows. This balance sheet adjustment process is expected to intensify in the near future, involving a set of closely interlinked decisions between households and corporations. Given the importance of investment in creating the conditions for higher economic growth in the future, the adjustment should result from a global reinforcement of savings. This process will imply a moderation in private consumption and an increased recourse to self-financing by non-financial corporations.

The fiscal consolidation process is of paramount importance in the current context. In fact, the concerns of international investors regarding the sustainability of national public finances – against the background of continued structural fragilities of the Portuguese economy and of a severe turmoil in euro area financial markets – led to the differentiation of the risk assessment of the Portuguese economy in international financing markets and increased the urgency of the current fiscal adjustment process. The effort required to achieve the current fiscal commitments for 2011 is very substantial. Indeed, the information available suggests that the fiscal outcome for 2010 would imply, in the absence of significant temporary measures, a deficit well above the initial target. Therefore, the set of measures required to resume the ambitious consolidation path initially announced appears particularly challenging. Against this background, an extensive set of measures was announced at the end of September, in anticipation of the State Budget for 2011. These measures, as well as others that may be deemed necessary, are part of a fiscal consolidation process that, although favourable – and even indispensable – to economic growth in the medium and long term, will have a contractionary impact in the short term.

This impact will be exacerbated by the fact that several euro area countries are simultaneously undergoing fiscal consolidation processes, by the low levels of official interest rates and by the increasingly tightened credit standards applied to households and corporations. The counterfactual of no fiscal adjustment, however, does not emerge as a better alternative, given that it would entail immeasurably higher economic adjustments costs. In effect, a scenario of continued financing constraints in international markets – coupled with the gradual phasing-out of the ECB's non-conventional policies, which have sustained almost entirely the external financing needs of the Portuguese economy –

would entail an abrupt adjustment of external imbalances. In a monetary union context, the impossibility of rapidly adjusting relative prices with the rest of the world would require an unprecedented contraction in domestic demand and a substantial increase in unemployment. This scenario would thus imply extreme costs in terms of economic and social welfare. It is therefore indispensable that the budgetary targets currently announced be strictly met. The pursuit of these targets must naturally be combined with the strengthening of incentives for economic growth in the medium and long term, particularly as regards the degree of predictability and permanence of policies, the mobility and ability to reallocate resources, the quality in the qualification of human resources and the creation of an institutional framework – in particular with respect to the celerity of the judicial system – favourable to economic growth.

Box 1. The impact of the new National Accounts base on the general government sector

The new National Accounts base was made public by the National Statistical Institute in June 2010

The National Statistical Institute (Instituto Nacional de Estatística – INE) made public in June the new National Accounts base, taking 2006 as the reference year – overlap year with the last final annual National Accounts compiled according to the 2000 base. The new series released cover the period from 1995 to 2007, except for the accounts of the general government institutional sector which were extended until 2009. The new base reflects some changes at the methodological level and in terms of statistical sources. Among those changes the use of a new information system for companies (Informação Empresarial Simplificada) is particularly noteworthy. As a consequence, the level of the general government deficit was revised upwards, as well as nominal GDP, which for 2006 is 3.1 per cent higher than the figure obtained according to the 2000 base.

The main methodological changes in the compilation of general government accounts resulted from changes in the sector perimeter and from the different accounting treatment given to Caixa Geral de Aposentações and to the funds from the European Union

With respect to general government accounts, three major methodological aspects are worth noting. Firstly, adjustments in the sector's perimeter, resulting mainly from the inclusion of entities formerly classified as public non-financial corporations, as RTP (the State television corporation). Secondly, the reclassification of Caixa Geral de Aposentações – CGA (public employees' pension system) from the social security funds subsector to the central government subsector and the reassessment of general government staff costs as an employer, both stemming from the closure of CGA to new contributers from 2006 onwards. Finally, the non-intermediation by general government of EU transfers related to the European Social Fund and to structural funds, when the final beneficiaries are entities belonging to other institutional sectors. As regards statistical sources, data obtained according to the new official system of accounts for local government (POCAL) is used for the compilation of the final local government accounts.[1]

In the compilation of general government compensation of employees a rate of 28.43 per cent was fixed for the calculation of its contributions as an employer

The calculation of general government staff costs as an employer requires a more detailed explanation, given its impact on economic activity as measured by GDP and on public revenue and expenditure. In the former National Accounts bases actual general government contributions (one of the general government compensation of employees components) included not only the amounts resulting from the application of the rates set in the legislation to gross wages but also the transfer of the State required for the financial balance of the system. Hence, considering that the growth of expenditure with public employees' pensions has been far higher than the growth of wages over the years, this accounting method has artificially added to the increase in social contributions and compensation of employees. Additionally, by influencing the value of public consumption, it also impacted on the evolution of GDP. The closure of CGA to new contributers intensified these problems, as it leads to a gradual decline in the number of members and respective contributions. In turn, the number of retirees and expenditure with pensions will continue to increase, leading to considerable growth of CGA financing by the general government, fully included in social contributions and compensation of employees (and, consequently, also in public consumption). The solution consisted in fixing a rate of 28.43 per cent on gross wages of CGA contributors for the calculation of the contributions of general government entities as employers.[2] *This rate corresponds to the ratio between contributions and base wages in 2005, i.e. the year before CGA was closed to new contributors. From 2006 onwards a growing gap between the contributions calculated according to the 28.43 per cent rate and expenditure with CGA pensions arises, largely due to a reduction in the ratio of contributors to retirees. This dif-*

(1) *At present the 2009 local government account is still of a provisional nature. Thus, the balance of this subsector is set in line with financing as calculated by Banco de Portugal.*

(2) *Furthermore, contributions calculated according to this method will be recorded as general government imputed contributions rather than actual contributions.*

ference ceases to be treated as part of compensation of employees, consolidating within the central government subsector, given that it is a transfer from the State to CGA. Expenditure with social benefits remains unchanged. Finally, it is important to note that this procedure was not applied to the compensation of employees' series in the period prior to 2006.

The general government deficit, obtained according to the 2006 base procedures, is higher largely due to the inclusion of some entities in this sector and the use of new statistical sources

Tables 1a and 1b present a summary of the accounts of the general government institutional sector for the period 2006-2009 according to the 2006 base, comparing them with the 2000 base.[3] Firstly, it should be noted that the deficit is higher in the 2006 base than in the 2000 base, largely due to the inclusion of some entities in the general government sector and the use of POCAL as the source of the local government accounts. An item-by-item analysis shows that nearly all of them present more or less significant differences between the two bases. Due to their magnitude and analytical relevance, special reference should be made to the downward revisions in social contributions and compensation of employees, mainly explained by the adoption of a new methodology as regards the treatment of the State transfer to CGA from 2006 onwards. As mentioned above, this methodology eliminates an artificial component that unduly enlarged the evolution of those items and, hence, of total revenue and expenditure and public consumption. To a higher or smaller degree, nearly all items are affected upwards due to the enlargement of the general government perimeter. This influence is evident in taxes on income and wealth, on the revenue side, and in intermediate consumption, other current expenditure and gross fixed capital formation, on the expenditure side. Additionally, it is also relevant in compensation of employees, where it is offset by the impact of the change in the treatment of the State subsidy to CGA. In turn, the non-intermediation by the general government of EU transfers relating to the European Social Fund and structural funds, when the final beneficiaries are entities belonging to other institutional sectors, in contrast with the former procedure, has a negative effect on other current revenue, capital revenue, subsidies and other capital expenditure. As a percentage of GDP, although the deficit is not significantly affected, total revenue and expenditure of general government decrease considerably.

The public debt ratio was substantially revised downwards due to a denominator effect

Although the concept of public debt used within the scope of the Excessive Deficit Procedure follows specific rules, that deviate from those set down in ESA95 regarding the valuation criteria and the range of liabilities taken into consideration, the adoption of the 2006 base had implications on its level, due to the widening of the general government perimeter – the inclusion of RTP being particularly noteworthy – and the recourse to some new information sources. However, given the substantial upward revision of nominal GDP, the ratio of public debt to GDP declined significantly.

(3) *Latest versions made available by the INE. The comparison between accounts compiled according to the two bases relating to 2008 and, in particular 2009, is also affected by the fact that the 2006 base accounts use more complete and final information.*

Table 1a

IMPACT OF THE NEW BASE ON GENERAL GOVERNMENT ACCOUNTS
Millions of euros

	Current (2006 base)				Previous (2000 base)				Differences: 2006 base - 2000 base			
	2006	2007	2008	2009	2006	2007	2008	2009	2006	2007	2008	2009
Total revenue	64.836	69.092	69.967	65.298	65.817	70.372	71.978	68.106	-981	-1.280	-2.012	-2.807
Current revenue	63.613	67.956	68.486	64.136	64.048	68.910	70.420	66.624	-435	-954	-1.933	-2.488
Taxes on income and wealth	13.852	16.084	16.698	15.210	13.719	15.905	16.517	14.998	132	179	182	212
Taxes on production and imports	23.902	24.527	24.285	21.359	23.947	24.535	24.291	21.366	-45	-8	-6	-7
Social contributions	18.985	19.621	20.041	20.053	19.360	20.717	21.552	22.446	-375	-1.096	-1.511	-2.393
Sales	3.673	3.852	3.929	3.832	3.773	4.138	4.194	4.004	-99	-286	-265	-172
Other current revenue	3.200	3.872	3.533	3.683	3.248	3.615	3.867	3.811	-48	257	-334	-128
Capital revenue	1.224	1.135	1.480	1.162	1.769	1.462	1.559	1.481	-546	-326	-78	-319
Total expenditure	71.328	73.763	75.004	80.999	71.909	74.590	76.683	83.531	-581	-827	-1.679	-2.532
Current expenditure	66.331	68.617	70.734	74.972	66.611	68.900	71.964	77.050	-280	-283	-1.230	-2.078
Social payments	29.284	31.284	32.824	36.183	29.181	31.334	33.190	36.436	103	-50	-366	-254
Compensation of employees	20.812	20.271	20.300	20.707	21.174	21.059	21.436	22.424	-363	-788	-1.136	-1.717
Interest	4.246	4.704	5.046	4.777	4.267	4.592	4.835	4.649	-21	113	212	128
Intermediate consumption	6.641	7.048	7.393	7.806	6.392	6.755	7.241	7.632	249	293	152	174
Subsidies	1.507	1.421	1.259	1.408	2.231	1.901	1.970	2.337	-723	-480	-710	-929
Other current expenditure	3.841	3.890	3.912	4.091	3.366	3.260	3.293	3.572	474	630	619	519
Capital expenditure	4.997	5.146	4.270	6.027	5.298	5.690	4.719	6.481	-301	-544	-449	-454
Gross fixed capital formation	3.916	4.113	3.976	4.055	3.700	3.767	3.779	3.987	216	346	197	69
Other capital expenditure	1.081	1.032	294	1.972	1.598	1.923	940	2.495	-517	-890	-646	-523
Overall balance	-6.491	-4.671	-5.038	-15.701	-6.092	-4.218	-4.705	-15.426	-399	-453	-333	-275
Memo item:												
GDP	160.273	168.737	172.103	168.076	155.446	163.051	166.462	163.891	4.827	5.686	5.641	4.185
Public debt	102.440	105.857	112.353	127.908	100.522	103.702	110.377	125.910	1.918	2.155	1.976	1.998

Source: National Statistical Institute.

Table 1b

IMPACT OF THE NEW BASE ON GENERAL GOVERNMENT ACCOUNTS
As a percentage of GDP

	Current (2006 base)				Previous (2000 base)				Differences: 2006 base - 2000 base			
	2006	2007	2008	2009	2006	2007	2008	2009	2006	2007	2008	2009
Total revenue	40.5	40.9	40.7	38.9	42.3	43.2	43.2	41.6	-1.9	-2.2	-2.6	-2.7
Current revenue	39.7	40.3	39.8	38.2	41.2	42.3	42.3	40.7	-1.5	-2.0	-2.5	-2.5
Taxes on income and wealth	8.6	9.5	9.7	9.0	8.8	9.8	9.9	9.2	-0.2	-0.2	-0.2	-0.1
Taxes on production and imports	14.9	14.5	14.1	12.7	15.4	15.0	14.6	13.0	-0.5	-0.5	-0.5	-0.3
Social contributions	11.8	11.6	11.6	11.9	12.5	12.7	12.9	13.7	-0.6	-1.1	-1.3	-1.8
Sales	2.3	2.3	2.3	2.3	2.4	2.5	2.5	2.4	-0.1	-0.3	-0.2	-0.2
Other current revenue	2.0	2.3	2.1	2.2	2.1	2.2	2.3	2.3	-0.1	0.1	-0.3	-0.1
Capital revenue	0.8	0.7	0.9	0.7	1.1	0.9	0.9	0.9	-0.4	-0.2	-0.1	-0.2
Total expenditure	44.5	43.7	43.6	48.2	46.3	45.7	46.1	51.0	-1.8	-2.0	-2.5	-2.8
Current expenditure	41.4	40.7	41.1	44.6	42.9	42.3	43.2	47.0	-1.5	-1.6	-2.1	-2.4
Social payments	18.3	18.5	19.1	21.5	18.8	19.2	19.9	22.2	-0.5	-0.7	-0.9	-0.7
Compensation of employees	13.0	12.0	11.8	12.3	13.6	12.9	12.9	13.7	-0.6	-0.9	-1.1	-1.4
Interest	2.6	2.8	2.9	2.8	2.7	2.8	2.9	2.8	-0.1	0.0	0.0	0.0
Intermediate consumption	4.1	4.2	4.3	4.6	4.1	4.1	4.3	4.7	0.0	0.0	-0.1	0.0
Subsidies	0.9	0.8	0.7	0.8	1.4	1.2	1.2	1.4	-0.5	-0.3	-0.5	-0.6
Other current expenditure	2.4	2.3	2.3	2.4	2.2	2.0	2.0	2.2	0.2	0.3	0.3	0.3
Capital expenditure	3.1	3.0	2.5	3.6	3.4	3.5	2.8	4.0	-0.3	-0.4	-0.4	-0.4
Gross fixed capital formation	2.4	2.4	2.3	2.4	2.4	2.3	2.3	2.4	0.1	0.1	0.0	0.0
Other capital expenditure	0.7	0.6	0.2	1.2	1.0	1.2	0.6	1.5	-0.4	-0.6	-0.4	-0.3
Overall balance	-4.1	-2.8	-2.9	-9.3	-3.9	-2.6	-2.8	-9.4	-0.1	-0.2	-0.1	0.1
Memo item:												
Public debt	63.9	62.7	65.3	76.1	64.7	63.6	66.3	76.8	-0.8	-0.9	-1.0	-0.7

Source: National Statistical Institute.

Box 2. The importance of sectoral specialisation for recent developments in the export market shares of euro area countries

International trade recorded a sharp broad based fall in 2009. According to data from the International Monetary Fund (IMF), 2009 was the first year since World War II that saw a decline in the world trade of goods and services.

Chart 1 shows a decline in nominal exports of goods and services for all euro area countries in 2009. Despite some contribution from prices, such decline is chiefly related to a substantial fall in trade volumes. The aggregation of exports of the 16 euro area countries, covering both intra and extra-EU trade, fell by 15.9 per cent, accounted for by a decline of 3.0 per cent in prices and 13.3 per cent in volume.

Although this decline was broadly based, there are important differences among the various countries. For example, whereas Portugal evolved rather close to the average, Irish exports declined only slightly (-2.3 per cent) and the Finnish fell by almost 30 per cent.

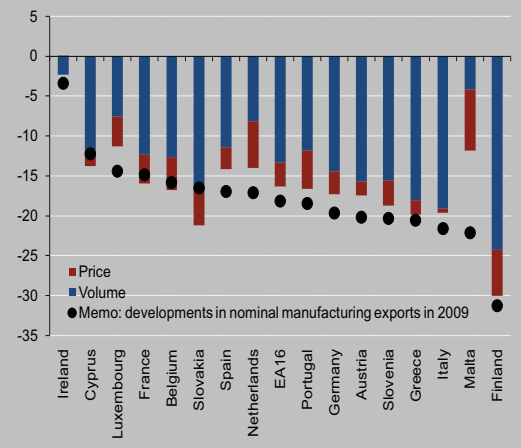
This Box aims at ascertaining whether the different sectoral specialisations of the various countries can contribute to explain these differentiated developments. A more detailed analysis is shown for Portuguese exports.

Calculation of structure effects by product

The calculation of the effects associated with the various countries' different sectoral specialisation is based on the constant market share methodology.[1] This analysis uses information from the World Trade Atlas (WTA) database for developments in external trade in nominal terms. As usual, only manufacturing is taken into account, given that the high volatility of commodity prices may distort the interpretation of market shares assessed in nominal terms. This option should not, however, limit a certain mainstreaming of results obtained for developments in total exports. In fact, as shown in Chart 1, manufacturing export growth in 2009 is relatively in line with developments in total exports for most countries considered.

Chart 1

EXPORTS OF EURO AREA COUNTRIES IN 2009
Goods and services, annual rates of change(*)



Sources: Eurostat, World Trade Atlas and Banco de Portugal.
Note: (*) The breakdown between volume and price is based on an additive approximation between growth rates, which may diverge slightly from the values observed and shown in the chart.

(1) *The analysis is in line with the methodology initially presented by Nyssens and Poullet (1990), "Parts de marché des producteurs de l'UEBL sur les marchés extérieurs e intérieur", Cahier 7, Banque Nationale de Belgique. For a recent application of this type of methodology to Portugal, see Amador, J. and S. Cabral (2008), "The Portuguese export performance in perspective: a constant market share analysis", Banco de Portugal, Economic Bulletin – Autumn.*

The products chosen were based on the 4-digit level of disaggregation of the Harmonised Commodity Description and Coding System (HS) considered by the WTA, by using the United Nations conversion rule between this system and the Standard International Trade Classification (SITC) so as to exclude all non-manufactured products. Such procedure made it possible to consider 931 products individually. In addition to euro area countries, imports from China, the US, Japan, the United Kingdom and Russia are also considered for the construction of a world trade indicator.[2] As usual, the results presented should be interpreted with caution given the limitations of this type of analysis.[3]

Developments in the market share – i.e. the difference between growth in world exports $(\hat{x})$ *and imports* $(\hat{m})$ *– may be expressed as an aggregation of developments in exports and imports of the various sectors considered (*$\hat{x}$ *and* $\hat{m}_i$*)weighted by the importance of each sector in total world exports (*x_i / x*) and imports (*m_i / m*). These developments can be easily broken down into two effects: (i) a revealed competitiveness effect that results from actual gains/losses in share in each of the markets considered, weighted by the importance of each of those sectors in total exports; (ii) a product structure effect that is related to the relative specialisation of each country, which positively (negatively) influences the aggregate market share if that country is more specialised in products with higher (lower) growth in the world economy.*

$$\hat{x} - \hat{m} = \sum_{i=1}^{n} \hat{x}_i \frac{x_i}{x} - \sum_{i=1}^{n} \hat{m}_i \frac{m_i}{m}$$

$$= \underbrace{\sum_{i=1}^{n} \left(\hat{x}_i - \hat{m}_i\right) \frac{x_i}{x}}_{(revealed\ competitiveness\ effect)} + \underbrace{\sum_{i=1}^{n} \left(\hat{m}_i - \hat{m}\right)\left(\frac{x_i}{x} - \frac{m_i}{m}\right)}_{(product\ strcture\ effect)}$$

Mixed effects among euro area countries

The product structure effect on export market shares of euro area countries appears to have been the most negative since 2000, and its dispersion across the various economies reached the highest value since the creation of the euro area (Chart 2).

This shows that the different sectoral specialisations may have contributed to the various countries' export growth differentials.

Table 1 shows the results of this product structure effect for each of the countries, both for the last decade and for 2009. This table also shows developments in the respective market shares in all the countries used as proxy for the world market. The trend of this share is biased, in the sense that it records a more favourable evolution than actually observed at world trade level. The sample excludes markets that have recorded, on average, more dynamic growth than all the 21 countries considered. By contrast, it is not possible to anticipate the sign of the bias when estimating the product structure effects.

Contrary to the past 10 years, when only three countries – Luxembourg, Portugal and the Netherlands – did not benefit from the sectoral structure of their exports, most euro area countries recorded a negative structure effect in 2009, due to having a relative specialisation in products whose world trade recorded lower growth. The four exceptions were France, Malta, Cyprus and especially Ireland.

Irish export market shares were quite influenced by its specialisation in pharmaceutical products and some organic chemicals. At world level, the market for this type of products, which account for more than half of the Irish manufacturing exports, has continued to grow more than the remaining sectors. The structure effect estimated for 2009 (15.2 p.p.) can be fully accounted for by these two sectors. A similar but significantly smaller effect took place in Belgium, an economy that is also specialised in this type of product (around 1/4 of manufacturing exports).

(2) *According to information from the CEPII-CHELEM database, these countries accounted for 58 per cent of total world manufacturing imports in 2008.*

(3) *In particular, although a high level of disaggregation was adopted, market shares assessed in nominal terms may be influenced by the simple evolution of relative prices, especially when account is taken of countries with different currencies.*

Chart 2

PRODUCT STRUCTURE EFFECT ON EXPORT SHARES OF THE 16 EURO AREA COUNTRIES

Sources: World Trade Atlas and Banco de Portugal.

Table 1

EXPORT MARKET SHARES AND RESPECTIVE CONTRIBUTIONS OF THE PRODUCT STRUCTURE EFFECT

	1999-2009 (*)		2009	
	Share	Product structure effect	Share	Product structure effect
Ireland	-0.2	0.9	15.3	15.2
Cyprus	9.0	1.8	6.5	9.8
Luxembourg	4.7	-1.1	4.3	-4.9
France	-0.8	0.9	3.8	2.7
Belgium	1.9	0.8	2.8	-0.7
Slovakia	13.6	0.2	2.2	-4.5
Spain	1.8	0.2	1.7	-3.4
Netherlands	2.5	-0.2	1.6	-1.9
Portugal	-1.3	-1.1	0.2	-1.9
Germany	1.9	0.5	-0.9	-1.9
Austria	1.9	0.3	-1.4	-3.4
Slovenia	6.0	0.8	-1.6	-2.3
Greece	1.6	0.9	-1.9	-1.3
Italy	-0.2	0.1	-2.9	-2.3
Malta	-3.5	3.6	-3.5	6.8
Finland	-1.5	1.1	-12.5	-3.0

Sources: World Trade Atlas and Banco de Portugal.
Note: (*) Annual average value

As for France, the positive structure effect on developments in manufacturing exports can be fully accounted for by the aircraft industry (included in HS code 88). This sector represents around 11 per cent of French manufacturing exports, against only 2.5 per cent in all countries taken into account to measure world trade. Also, there were no considerable falls in most of the remaining products (virtually nil growth rate in 2009).

With regard to negative contributions, reference should be made to car sector exports, which play a considerably important role in several euro area countries, such as Spain (24 per cent of total manufacturing exports in 2009), Slovakia (22 per cent), Slovenia (19 per cent), Germany (16 per cent) and Portugal (15 per cent). Given the significant contraction of this sector in 2009, this specialisation pattern made a negative contribution to developments in the export market share of these countries.

Finally, the considerable decline in Finnish exports cannot be accounted for, especially due to a specialisation effect in sectors that are more affected by the economic slowdown for Finland. Despite a possible need for analysis with a greater degree of disaggregation due to the fact that Finnish exports may be quite concentrated on certain specific markets, the more detailed information available seems to confirm the results obtained.[4]

Structure effects on developments in Portuguese market shares remain negative

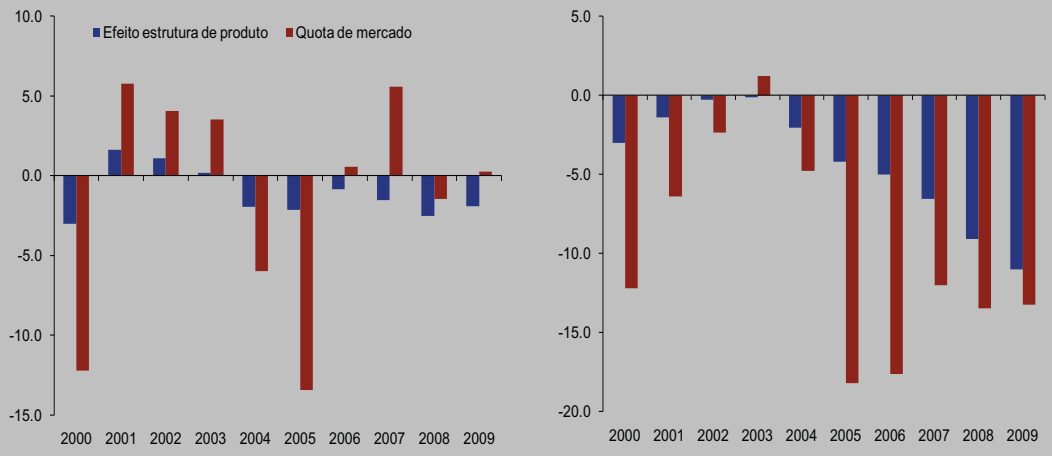
Chart 3 shows more detailed information for the Portuguese case. According to these results the sectoral structure effect in 2009 appears not to have been very different from that observed in previous years. This effect has been systematically negative since 2003, and in annual average terms it has made a negative contribution (-1.1 p.p.) to the market share of Portuguese exports over the past 10 years (-1.9 p.p. in 2009). Despite the methodo-

(4) *In 2008 the component "Electrical apparatus for line telephony, telephone sets" (HS code 8517) accounted for around 16 per cent of Finnish manufacturing exports and declined by 53.1 per cent in 2009. This fall was broadly based across the various geographical destination markets. However, the proxy considered for the world trade of this sector has declined by only 8.3 per cent, showing that the fall in this sector's exports may correspond to an actual deterioration in competitiveness. This was also the case for the paper sector, whose exports account for almost 20 per cent of total Finnish manufacturing exports (against a weight of only 2 per cent in world trade), having declined by 18 per cent in 2010, while the respective world imports fell less significantly (about 13 per cent).*

Chart 3

MARKET SHARES OF PORTUGUESE MANUFACTURING EXPORTS AND RESPECTIVE PRODUCT STRUCTURE EFFECT

Percentage points



Sources: World Trade Atlas and Banco de Portugal.

logical differences, in particular the effects related to the level of disaggregation used, this result is in line with those obtained in previous studies.[5]

As already mentioned, the results on the market share should be interpreted with caution given that they tend to overstate developments in the export market share in world trade, for excluding countries that as a whole grew more than the selected economies.[6]

Table 2 summarises the results obtained for the various sectors,[7] *while Table 3 shows more detailed information, presenting the main positive and negative contributions of HS classes with a 4-digit level of disaggregation.*

In 2009, similarly to the last decade, total developments in the market share of Portuguese exports were negatively influenced by the fact that Portugal did not have specialisation in sectors with higher growth, such as pharmaceutical products, the so-called other transport equipment (excluding vehicles) and optical, photographic, and surgical instruments. The type of chemicals and electrical machinery produced in Portugal seems to have also not contributed to a better performance of the export share in 2009. Similarly to other countries, relative specialisation in motor vehicles appears to have also made a negative contribution to developments in Portuguese export shares in 2009. The other sector that made a negative contribution to growth was non-electrical machinery. With regard to machinery sectors (HS 84 and HS 85), the more detailed data shown in Table 3 point out the negative contribution of electrical apparatus related to communication (HS 8517) and computers (HS 8471). Portugal does not show specialisation in these two sectors, whose declines in 2009 seem to have been less pronounced than those observed for total international trade. By contrast, no product from these sectors appears to have made an important positive contribution to developments in the market share of Portuguese exports in 2009.

(5) *The already mentioned study by Amador and Cabral (2008) also points to a negative geographical effect in the Portuguese export share. Such effect, not envisaged in the current analysis, stems from the fact that the European market – where Portugal shows higher specialisation – grew less than other world markets. However, reference should be made to the growing importance of those markets outside the European Union (EU) for Portuguese exports: considering the current 27 member countries, the weight of extra-EU trade of goods rose from 15.8 per cent in 1999 to 26.9 per cent in 2009.*

(6) *Underlying the data used is an increase in external demand by approximately 90 per cent in the 1999-2008 period. The CEPII-CHELEM database makes it possible to assess developments in total world trade, although data are made available with more delay and do not incorporate such a high degree of sectoral breakdown. In the same period, according to this database, world manufacturing trade seems to have grown by around 10 p.p. in cumulative terms.*

(7) *The results shown result from an aggregation of the calculations made at a 4-digit level of disaggregation.*

Table 2

PRODUCT STRUCTURE EFFECTS ON DEVELOPMENTS IN NOMINAL MANUFACTURING EXPORT SHARES

HS code	Name	World growth(*) %		Weight in world trade (*)		Weight in Portuguese exports		Contribution to the product structure effect p.p.	
		1999-2009(**)	2009	1999-2009	2009	1999-2009	2009	1999-2009	2009
30	Pharmaceutical products	26.3	7.9	0.04	0.06	0.01	0.02	-0.2	-0.9
85	Electrical machinery	2.4	-15.8	0.15	0.15	0.14	0.11	-0.6	-0.6
28-29,31-32,38	Chemicals & allied industries	5.0	-17.9	0.07	0.08	0.03	0.03	0.0	-0.5
86,88-89	Other transport equipment	5.5	5.2	0.03	0.02	0.01	0.00	0.0	-0.4
90	Optical, photographic, and surgical instruments & accessories	3.7	-9.1	0.04	0.04	0.01	0.01	0.0	-0.3
87	Vehicles	-0.3	-28.8	0.14	0.11	0.16	0.15	-0.1	-0.3
84	Non-electrical machinery	0.6	-21.9	0.18	0.16	0.09	0.10	0.2	-0.1
94	Furniture	3.4	-16.3	0.02	0.02	0.03	0.04	0.0	0.0
44,48	Wood and paper	0.4	-15.5	0.03	0.02	0.04	0.05	0.0	0.0
45	Cork	-0.1	-14.0	0.00	0.00	0.03	0.03	-0.1	0.0
39-40	Plastics	4.1	-19.5	0.05	0.05	0.06	0.08	0.0	0.1
64	Footwear	2.7	-5.5	0.01	0.01	0.06	0.05	0.0	0.3
72-80	Metals	3.8	-41.7	0.07	0.07	0.07	0.08	0.0	0.3
50-63	Textiles and clothing	1.2	-8.4	0.07	0.07	0.17	0.13	-0.1	0.7
	Other			0.11	0.13	0.08	0.11	0.2	-0.2
Total		2.6	-18.7	1.00	1.00	1.00	1.00	-1.1	-1.9

Sources: World Trade Atlas and Banco de Portugal.

Notes: (*) overall developments are measured by the imports of the 16 euro area countries, China, US, Japan, United Kingdom and Russia. (**) annual average growth.

Although metals in aggregate terms have had a nil structure effect, several products of this class have made important contributions (both positive and negative) to developments in the export market share (Table 3). This occurred due to a relative specialisation which was quite different depending on the various types of metals, in a context where these generally fell much more than total international trade. In contrast to the previous decade, specialisation in the most traditional sectors – such as textiles, clothing and footwear – made a positive contribution to export share growth in 2009. Despite the decrease of its weight in total Portuguese exports, Portugal continues to show a relative specialisation in those sectors, which in 2009 fell less markedly than world manufacturing trade. From the 10 products that have made the most positive contribution to developments in the export market share, four belong to these sectors. In turn, by contrast, no product from these sectors stands out for having made a significant negative contribution (Table 3).

The analysis in this Box shows the mechanical effects associated with the fact that economies have different sectoral specialisations. This, however, should not be interpreted as something completely exogenous to the corporate decision-making process. Investing in sectors with higher growth prospects or the ability to self-promote the development of some market segments – namely through the creation and introduction of innovation and differentiation factors – are important aspects of an economy's revealed competitiveness.

Table 3

PRODUCT STRUCTURE EFFECTS ON DEVELOPMENTS IN NOMINAL MANUFACTURING EXPORT SHARES IN 2009

HS code	Name	World growth(*) %	Weight in world trade (*)	Weight in Portuguese exports	Contribution to the product structure effect (p.p.)
10 main positive contributions					
6109	T-shirts, singlets, tank tops etc, knitted or crocheted.	-5.1	0.005	0.024	0.24
6403	Footwear, outer sole of rubber, plastic or leather & uppers of leather	-11.1	0.007	0.043	0.24
7202	Ferroalloys	-63.9	0.002	0.000	0.23
7208	Flat-roll iron & non-alloy steel not under 600mm wide, hot-rolled, not clad.	-56.2	0.003	0.000	0.20
6302	Bed linen, table linen, toilet linen & kitchen linen.	-6.6	0.002	0.015	0.16
7102	Diamonds, worked or not, not mounted or set.	-32.1	0.007	0.000	0.11
7110	Platinum, unwrought, semi-manufactured forms or in powder form.	-45.7	0.003	0.000	0.10
7219	Flat-roll stainless steel products, not under 600mm wide.	-51.4	0.002	0.000	0.10
7403	Refined copper & alloys (no mast alloy), unwrought.	-42.4	0.003	0.000	0.10
6104	Women's or girls' suits, ensembles, jackets, dresses, skirts, divided skirts, trousers, breeches, knitted or crocheted	8.4	0.002	0.007	0.10
10 main negative contributions					
8708	Parts & accessories for motor vehicles.	-26.6	0.027	0.061	-0.19
8471	Automatic data processing machines, digital processing units; magnetic readers, etc. computer hardware.	-11.4	0.034	0.006	-0.21
8704	Motor vehicles for transport of goods.	-45.6	0.007	0.013	-0.23
2933	Heterocyclic compounds, nit hetero-atom, nucleic acids.	15.4	0.010	0.000	-0.25
8517	Electrical apparatus for line telephony, telephone sets, pts.	-8.3	0.033	0.004	-0.27
8802	Aircraft, powered, spacecraft & launch vehicles.	18.3	0.015	0.000	-0.27
3002	Human blood; animal blood; antisera and other blood fractions, vaccines, toxins, microbial culture, similar products.	22.4	0.010	0.000	-0.27
7108	Gold (incl put plated), unwrought, semi-manufactured or powder.	39.7	0.013	0.004	-0.38
7214	Bars and rods of iron or non-alloy steel, forged, hot-rolled, hot-drawn, hot-extruded.	-57.5	0.001	0.008	-0.42
3004	Medicaments nesoi, mixed or not, in dosage etc fm.	6.5	0.046	0.017	-0.56

Sources: World Trade Atlas and Banco de Portugal.

Note: (*) overall developments are measured by the imports of the 16 euro area countries, China, US, Japan, United Kingdom and Russia.

PROJECTIONS FOR THE PORTUGUESE ECONOMY: 2010-2011

According to the current projection, the Portuguese economy is expected to stagnate in 2011, after a 1.2 per cent growth in 2010 (Table 1).[1] This will result from the combined effect of a contraction in domestic demand from the second half of 2010 onwards and a slowdown in exports, in line with the growth of external demand for Portuguese goods and services. Consumer prices are projected to increase 1.8 per cent in 2011, after a 1.4 per cent rise in 2010, in a context of moderate growth of wage costs and higher prices in international markets, particularly in the case of commodities.

Portuguese economic developments in 2011 will be strongly conditioned by the fiscal consolidation process and by some deleveraging of the private sector. In the current context of marked and persistent differentiation of sovereign risk in the euro area and given the temporary nature of the Eurosystem nonconventional policy measures – which have covered the external financing needs of the Portuguese economy –, the unavoidable process of economic adjustment will tend to intensify from the second half of 2010 onwards. However, there is high uncertainty about its degree of materialisation in the projection horizon.

Risks surrounding the projection for economic activity are markedly on the downside. Such risks are exacerbated by the fact that the projections only include the set of fiscal policy measures that meet the criteria agreed within the Eurosystem projection exercises, *i.e.* the fiscal policy measures already

Table 1

PROJECTIONS OF BANCO DE PORTUGAL: 2010-2011
Rate of change, in percentage

	Weights 2009	EB Autumn 2010			EB Summer 2010		
		2009	2010(p)	2011(p)	2009	2010(p)	2011(p)
Gross Domestic Product	100.0	-2.6	1.2	0.0	-2.7	0.9	0.2
Private consumption	66.8	-1.0	1.8	-0.8	-0.8	1.3	-0.9
Public consumption	21.1	2.9	1.5	-1.0	3.5	-0.9	-1.4
Gross Fixed Capital Formation	19.5	-11.9	-4.2	-3.2	-11.1	-3.3	-1.6
Domestic demand	107.7	-3.0	0.4	-1.2	-2.5	0.0	-1.1
Exports	28.0	-11.8	7.9	4.5	-11.6	5.2	3.7
Imports	35.6	-10.9	4.2	0.4	-9.2	1.7	-0.7
Contribution to GDP growth (in p.p.)							
Net exports		0.8	0.7	1.2	0.1	0.9	1.3
Domestic demand		-3.4	0.5	-1.2	-2.8	0.1	-1.2
of which:							
Changes in inventories		-0.7	-0.2	0.1	-0.6	0.0	0.0
Current and capital account (% of GDP)		-9.5	-9.2	-8.2	-9.4	-9.0	-8.2
Goods and services account (% of GDP)		-6.9	-6.5	-5.1	-6.8	-6.2	-4.8
Harmonised Index of Consumer Prices		-0.9	1.4	1.8	-0.9	1.4	2.0

Source: Banco de Portugal.

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

(1) Projections for developments in the Portuguese economy incorporate information available up to mid-September 2010. In particular, the fiscal measures announced on 29 September are not included, given that they do not fully comply yet with the criteria agreed within the scope of the Eurosystem projection exercises. The detailed analysis of developments in the Portuguese economy in 2010 is presented in this Bulletin.

approved by the national parliament or that have been specified in sufficient detail and are likely to pass the legislative process.

Increase in external demand, amid a depreciation of the euro and tight financing conditions

The current projections are based on a set of assumptions regarding the developments in the international environment of the Portuguese economy (Table 2).

As regards world trade developments, assumptions are made on the basis of information published in the September 2010 issue of the European Central Bank (ECB) Monthly Bulletin. This information incorporates a deceleration in external demand for Portuguese goods and services in 2011, which, however, will continue to make a significant contribution to economic activity growth.

Financing conditions underlying the current assumptions reflect data available up to mid-September 2010, indicating that short-term interbank money market rates will remain low in 2011, although higher than in 2010 and exhibiting an upward path. Current assumptions about long-term interest rates on Portuguese sovereign debt point to a continued increase over the projection horizon. The situation in the sovereign debt market will continue to condition the access to international wholesale debt markets by the Portuguese banking system. Therefore, following a period where the pass-through of such constraints to corporate and household financing conditions was lagged and limited, this transmission is now expected to intensify, due to both the widening of spreads and the adoption of tighter credit standards applied to new loans.

Technical assumptions about exchange rate developments imply a depreciation of the euro in 2011, both in effective terms and against the US dollar, although lower than expected for 2010. Data available in futures markets point to an increase in euro and US dollar-denominated oil prices, albeit lower than the rise expected for 2010.

Turning to developments in the public finance aggregates in Portugal, and according to the rules followed in the Eurosystem projection exercises, fiscal policy measures are only included when they have already been approved by the national parliament or have been specified in sufficient detail and are likely to pass the legislative process. Therefore, current projections incorporate, in particular, the fiscal consolidation measures announced in mid-May 2010 (for a detailed description of the main

Table 2

ASSUMPTIONS UNDERLYING THE PROJECTION EXERCISE

		EB Autumn 2010			EB Summer 2010		
		2009	2010	2011	2009	2010	2011
External demand	yoy	-12.8	6.9	4.6	-12.6	4.9	3.5
Interest rate							
Short-term	%	1.2	0.8	1.1	1.2	0.7	1.1
Long-term	%	4.2	5.2	5.9	4.2	5.0	5.5
EUR exchange rate							
EUR effective	yoy	1.0	-7.1	-2.4	1.0	-7.5	-2.5
EUR-USD	aav	1.39	1.30	1.28	1.39	1.27	1.21
Oil price							
in USD	aav	61.9	77.4	80.8	61.9	76.7	80.1
in EUR	aav	44.1	59.5	63.3	44.1	60.5	66.0

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

Notes: yoy - year-on-year rate of change, % - per cent, aav - annual average value. An increase in the exchange rate represents an appreciation.

measures, see the summer 2010 issue of the Economic Bulletin), but not the measures announced on 29 September, given that they do not fully comply yet with the criteria agreed within the scope of the Eurosystem projection exercises.

Recovery in economic activity in 2010, although markedly slowing down in the second half of the year

Projections for 2010 point to a 1.2 per cent economic growth, following the sharp contraction in 2009 (Table 1). However, this incorporates a marked intra-annual deceleration of GDP over the year, reflecting a slowdown in consumption expenditure and exports and the maintenance of a negative GFCF growth. Such developments imply important dynamic effects, with significant impact on economic activity projections for 2011.

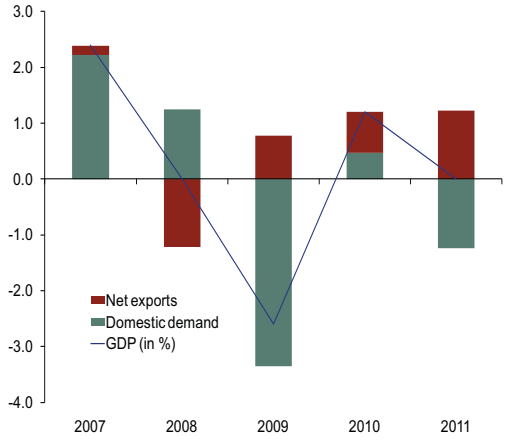
Economic activity stagnation in 2011

Current projections point to economic activity stagnation in 2011 (Chart 1), as a result of a contraction in domestic demand and an increase in exports of goods and services. Developments in domestic demand reflect a fall in consumption expenditure of both households and the general government and a further decline in GFCF (Chart 2).

After a 1.8 per cent growth in 2010, private consumption is projected to fall by 0.8 per cent in 2011, mirroring a decelerating path that is expected to start in the second half of 2010 and continue throughout 2011. This reflects a sharp fall in consumption of durable goods and a marked slowdown in consumption of non-durable goods. The projected behaviour of private consumption largely reflects the inter-temporal constraints resulting from household indebtedness, which will tend to increase with the higher pass-through of banks' particularly tight financing conditions in international financial markets. Moreover, the fall in private consumption seems to be associated with developments in real disposable income, resulting from a further decline in employment, a sharp deceleration in real wages and higher direct taxes.

Chart 1

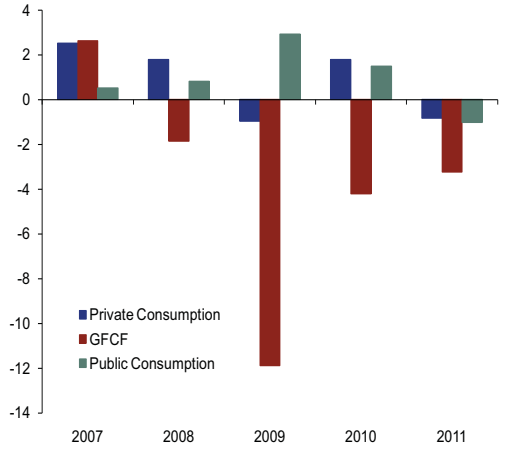
BREAKDOWN OF GDP GROWTH
Contribution to the annual rate of change



Sources: *INE* and Banco de Portugal.

Chart 2

DEVELOPMENTS IN DOMESTIC DEMAND
Annual rate of change



Sources: *INE* and Banco de Portugal.

The projected 3.2 per cent GFCF decrease in 2011 (-4.2 per cent in 2010) reflects a contraction in both public and private (residential and corporate) investment. Similarly to private consumption, these projections are also affected by financing constraints in international financial markets felt by banks, resulting in tighter credit standards applied to new loans. In addition, households uncertainty about their permanent income, namely due to labour market conditions, together with the impact of the outlook for demand developments on corporate decisions, will also condition private investment developments. Finally, mention should be made of the fall in public investment, according to the assumptions for developments in public finance variables.

Projections for exports point to 4.5 per cent growth in 2011 (7.9 per cent in 2010), in line with expected developments in the indicator of external demand for Portuguese goods and services, against a background where the competitiveness level of the Portuguese economy is not expected to change significantly. This reflects growth in exports of both goods and services, particularly of tourism services.

Imports are expected to grow 0.4 per cent in 2011 (4.2 per cent in 2010), in line with a virtual stabilisation of overall demand weighted by import content and of the competitiveness of domestic production. This should imply a slight increase in the degree of import penetration, following the increase expected for 2010.

The financing needs of the economy, measured by the combined current and capital account balance as a percentage of GDP, are projected to drop to 8.2 per cent of GDP in 2011 (9.2 per cent in 2010) (Chart 3). This fall is mainly due to a reduction in the goods and services deficit, which will benefit from increased external demand, from an adjustment in domestic demand and from favourable developments in terms of trade. In turn, the income deficit is expected to widen, reflecting both a deterioration in the international investment position and an increase in financing costs.

At the sectoral level, manufacturing activity and export-oriented services are projected to grow, in line with positive developments in external demand. The construction sector as well as services more directly related to domestic demand are expected to contract, reflecting the projected fall in both investment and consumption expenditure of households and of the general government.

Turning to the labour market, the stagnation of economic activity will likely lead to a 0.7 per cent fall in employment in 2011. This reflects a contraction in private sector employment, as a well a decline in the number of public sector employees, according to the public finance assumptions underlying the current projections.

Compared with the summer 2010 issue of the Economic Bulletin, GDP growth was revised upwards in 2010, reflecting higher-than-expected growth both of domestic demand and exports. In 2011, economic activity is revised slightly downwards, reflecting lower GFCF growth, against a background of a slight upward revision of exports.[2]

Subdued growth of consumer prices over the projection horizon

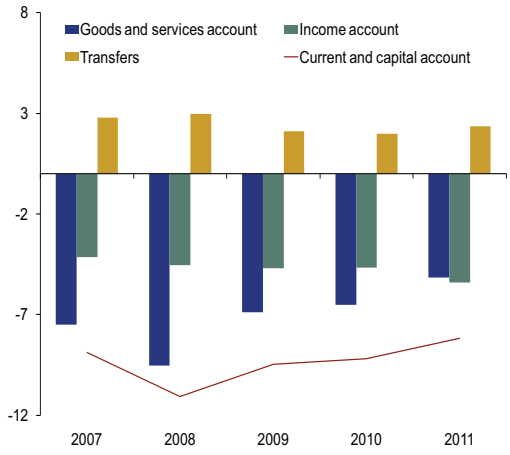
The Harmonised Index of Consumer Prices (HICP) is projected to increase 1.8 per cent in 2011, after a 1.4 per cent growth in 2010. This will mainly reflect an acceleration in prices of the non-energy component of the HICP, against a background of slightly decelerating energy prices.

Projected developments in non-energy goods and services will likely mirror, on the one hand, an ac-

(2) Revisions are affected by the fact that the current projections are not fully comparable with those published in the summer issue of the Economic Bulletin, given that they are based on different national accounts methodologies.

Chart 3

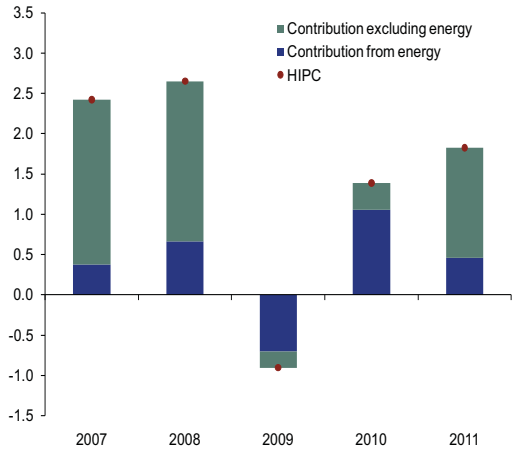
DEVELOPMENTS IN FINANCING NEEDS
Contribution to the annual rate of change



Sources: *INE* and Banco de Portugal.

Chart 4

INFLATION
Contribution to the annual rate of change of the HICP



Sources: *INE* and Banco de Portugal.

celeration in the non-energy goods import deflator, amid a global economic recovery with an impact on prices charged by major suppliers, particularly as regards non-energy commodities. On the other hand, such developments will reflect a moderate rise in unit labour costs, in line with the expected increases of nominal wages. In turn, higher energy prices mainly result from oil price increases.

Moreover, projections for inflation assume a full pass-through of the impact of the 1 percentage point increase in all VAT rates on 1 July 2010, which is likely to affect the annual average HICP growth rate in both 2010 and 2011.

Compared with the summer 2010 issue of the Economic Bulletin, current projections imply that inflation projected for 2010 will remain unchanged and will be revised slightly downwards in 2011, due to a lower-than-expected increase in both oil prices and import prices.

Downside risks to economic activity and balanced risks to inflation

The current projection incorporates significant downside risks to economic activity. At the domestic level, the main risk factor is related to the intensification of the necessary fiscal consolidation effort and its impact on Portuguese economy risk assessment by financial market participants. This calls for additional policy measures aimed at meeting the current demanding budget targets. It is, however, unclear whether the set of recently announced measures will be sufficient to ensure that these targets are achieved. Such measures will certainly have a contractionary impact in the short run, by negatively affecting real household disposable income and demand prospects, resulting in lower private consumption and investment. It should be noted that the impact on economic activity, together with the operation of automatic stabilisers, mitigates the total magnitude of fiscal consolidation. An additional domestic risk factor concerns the possibility of a significant deleveraging of the Portuguese banking system, which would imply a tightening of household and corporate financing conditions and, thus, have a further negative impact on both demand conditions and economic activity.

At external level, the main risk factor stems from high uncertainty about the sustainability and buoyancy of the current rebound in world demand and economic activity. In particular, it is unclear whether the necessary conditions exist to replace monetary and fiscal stimuli with sustained private demand

buoyancy, amid persistent international financial market tensions and the need to correct fiscal imbalances in several euro area countries. A potential slowdown in world economy stemming from such fragilities would lead to a fall in external demand for Portuguese goods and services, with an impact on exports and economic activity.

Turning to inflation, risks are balanced. Against a background of a potential deterioration of labour market developments and the announcement of public sector wage cuts, wage growth may be lower than projected, exerting downward pressure on prices. Moreover, the materialisation of the already mentioned risks to the external environment of the Portuguese economy would also affect international prices. In the opposite direction, the stepping-up of fiscal consolidation efforts brings about upside risks to inflation, given that indirect taxes may still be increased and co-payments of some goods and services by the general government may be reduced, having an impact on consumer prices.

ARTICLES

DETERMINANTS OF THE EONIA SPREAD AND THE FINANCIAL TURMOIL OF 2007-2009*

*Carla Soares***

*Paulo M. M. Rodrigues***

1. INTRODUCTION

Nowadays, monetary policy is implemented in most advanced economies by setting a reference level for a short-term interest rate. The ECB Governing Council is responsible for setting the official interest rates in the euro area, which serve as a benchmark for interbank market interest rates. This is the first step in the monetary policy transmission mechanism. The expectations theory, one of the explaining theories of the yield curve argues that an investment with a longer maturity should generate the same return as an investment with a shorter term plus a forward investment for the remaining maturity. This implies that the long-term interest rate should reflect the current level of the shorter-term interest rate and its expectations over the maturity of the long-term investment. Thus, ultimately, it is the shortest maturity interest rate, *i.e.*, the overnight interest rate, and expectations on this rate that determine the remaining interest rates. It is therefore important to understand how the Eurosystem influences the market interest rate, *i.e.*, the benchmark overnight interest rate for the euro area, the Euro Overnight Index Average rate (EONIA).

The financial turmoil that began in 2007 had a significant impact over the functioning of the money market. Interest rates in this market increased substantially and volatility soared. Longer-term money market interest rates began to incorporate a larger liquidity and credit risk premia. The overnight segment turned more volatile and contingent to conditions of interbank market functioning. This situation might have altered Eurosystem's ability to intervene in interbank market and steer interest rates in line with monetary policy stance.

Our aim is to analyse the EONIA spread against the main ECB reference rate. Under "normal" market functioning conditions, the EONIA should fluctuate around the main ECB reference rate. Given that most empirical studies focus on the period prior to the new operational framework, it is relevant to reassess the EONIA spread determinants under "normal" conditions and the eventual changes under market stress situations, both in the money market and in financial markets in general. The article is organized as follows: in Section 2 we recall the main features of the euro area money market and the monetary policy implementation framework of the Eurosystem. In Section 3, we describe the recent evolution of the EONIA, focusing mainly on the financial turmoil that began in 2007 and in the most

* The authors thank João Sousa and Isabel Gameiro for useful comments. The opinions expressed in the 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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relevant events to explain the behaviour in the money market. In Section 4, we explain the methodology and the data used and Section 5 presents the main estimation results. Section 6 concludes.

2. THE EURO AREA MONEY MARKET AND THE IMPLEMENTATION OF MONETARY POLICY

According to the ECB (2004), "*monetary policy exerts significant influence over short-term nominal market interest rates. By setting interest rates, monetary policy influences the economy, and ultimately the price level, in a number of ways*." The monetary policy transmission mechanism begins then with the setting of official interest rates. The European Central Bank (ECB) provides funding or receives deposits from market participants at these rates, which then serve as benchmark to interbank market interest rates. Longer maturity money market rates, such as the 3- and 6-month Euribor, which are widely used as an index for interest rates on bank loans in several euro area countries, are influenced by expectations over shorter term interest rates, and by liquidity and credit risk premium. Therefore, changes in official interest rates impact banks funding costs and interest rates on bank loans. Central bank reference rates are transmitted along the yield curve and other asset prices. Consequently, the central bank is able to influence investment and consumption decisions and, ultimately, consumer prices.

The Eurosystem influences short-term interest rates since it sets the price of the monetary base, of which the Eurosystem is the sole supplier.[1] The Eurosystem has at its disposal several means of intervention in the market for reserves. The main refinancing operation (MRO) is the most important open market instrument. In these operations, which are conducted every week, the Eurosystem provides liquidity with one-week maturity, according to its forecast for the aggregate liquidity needs of the euro area banking system. Between 2000 and 2008, banks interested in obtaining funding through MRO would have to submit bids in the pair bid amount-interest rate. The bids are satisfied by decreasing order of bid rates, which cannot be below the minimum bid rate defined by the ECB. Since October 2008, following money market stress, the Eurosystem adopted a fixed rate full allotment tender procedure. This meant that counterparties began bidding only the amount of primary liquidity they would need, obtaining the full amount and paying the interest rate defined by the ECB equal for all participants.[2]

The Eurosystem also provides reserves at a longer term via its longer-term refinancing operations (LTRO). These operations are conducted monthly and have a 3-month maturity. With these operations the Eurosystem has no aim of steering longer maturities interest rates but only to provide liquidity for a longer period of time in order to smooth the banking system funding needs. Therefore, LTRO are conducted as pure variable rate tender, *i.e*, there is no limit on the interest rates that banks can propose. During the financial turmoil, some changes were introduced in this instrument: the Eurosystem conducted operations with 6- and 12-month maturity, increased the frequency of 3-month

(1) Reasons for banks demanding monetary base are for example, the public demand for currency, the need to clear interbank balances and the obligation to meet minimum reserve requirements with the central bank.

(2) At the beginning of phase III of the Economic and Monetary Union (EMU), MRO were also conducted as a fixed rate tender, but the ECB defined the allotment amount. In June 2000, the procedure was changed to a variable rate tender.

operations and, similarly to the MRO, since October 2008 adopted the fixed rate full allotment tender procedure.

Another available type of open market operation is the fine-tuning operation. Contrary to MRO and LTRO, these are not regular and pre-scheduled operations. They aim at managing the liquidity situation and steering interest rates in the money market, in particular to smooth the effects on interest rates from unexpected liquidity fluctuations. The majority of the fine-tuning operations conducted so far had overnight maturity and same day value. Since March 2004, when several changes were introduced in the operational framework[3] (ECB (2003)), the frequency of fine-tuning operations increased, but it did not imply that these operations turned into a regular feature. Since the new operational framework, the last MRO is allotted one week before the end of the maintenance period, which meant that during the last week liquidity imbalances (liquidity forecast errors) accumulated.[4] If imbalances reach a significant value, then the pressure on short-term market interest rates will show up. Hence, given the aim of fine-tuning operations, their frequency increased naturally.[5]

Besides these open market operations, the Eurosystem has at the disposal of counterparties two standing facilities, the deposit and the marginal lending facilities. The rates of the facilities are set at a "penalty" level, in order to induce institutions to use this instrument in case of late, large and unexpected individual liquidity shocks. The facilities have overnight maturity and therefore aim at limiting the volatility of overnight rates. Counterparties have no incentive to trade above the marginal lending facility rate or below the deposit facility rate, as there is no limit on the use they can make of the facilities.[6] Therefore, standing facilities rates form a fluctuation corridor for the market overnight rate; as can be observed from Chart 1.[7]

Eurosystem counterparties must fulfill reserve requirements, *i.e.*, hold non-negative current accounts with the respective national central bank during the reserve maintenance period (around one month), in such a way that the daily average current account is at least the amount of the reserve requirements. Reserves are remunerated in order to avoid an implicit taxation on banks.

The Eurosystem does not have an explicit interest rate target, contrary to some central banks, such as the Federal Reserve Bank or the Bank of England.[8]

The Eurosystem aims at steering market interest rates at very short maturities. Nonetheless, the design of the monetary policy operational framework implies that the overnight market rate usually fluctuates around the middle of the corridor given by the standing facilities rates. The EONIA rate is

(3) The period since these changes were introduced is called new operational framework (NOF).

(4) One of the changes introduced with the NOF was to coincide the beginning of the maintenance period with the MRO allotment day immediatelly following the ECB Governing Council meeting for which the monetary policy stance discussion is scheduled.

(5) The operational framework still foresees the existence of structural operations, with the aim of shifting the structural liquidity position of the Eurosystem. These operations are not relevant for the money market behaviour at the very short-term and were never used so far.

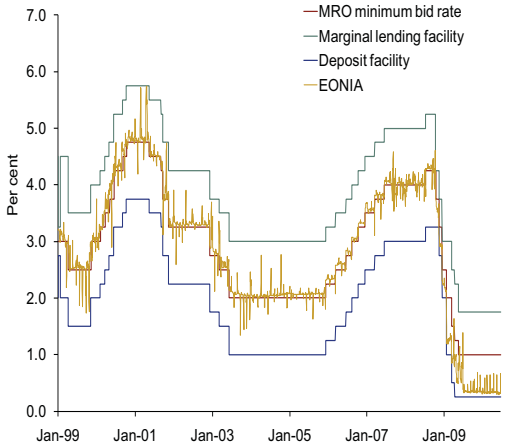
(6) With the exception of the collateral that counterparties have to post as a guarantee when they use the marginal lending facility.

(7) See ECB (2008) for more details on the monetary policy operational framework.

(8) See Federal Reserve System (2005) and Bank of England (2008).

Chart 1

EONIA AND ECB REFERENCE INTEREST RATES



Source: Thomson Reuters.

the benchmark overnight rate for the euro money market.[9]

Acording to Perez-Quirós and Mendizábal (2006), the main features of the operational framework that explain EONIA's behaviour are the averaging provision of reserve requirements and the existence of an interest rates corridor. These features, together with balanced liquidity supply, lead the EONIA to typically fluctuate around the middle of the corridor. However, reserve fulfilments in the different days of the maintenance period are not perfect substitutes. As the end of period approaches, the overnight market rate tends to rise, deviating from the martingale, as one would expect. Perez-Quirós and Mendizábal's (2006) model replicates this behaviour using features of the Eurosystem's operational framework without the need to introduce market frictions or non-competitive behaviour.

Empirical studies on the behaviour of the EONIA confirm the importance of the monetary policy operational framework. The most important factors driving the spread can be related to liquidity conditions, policy rate expectations and calender and end-of-period effects (Wurtz (2003), Bindseil *et al.* (2003), Moschitz (2004), Nautz and Offermanns (2006), Linzert and Schmidt (2008), Välimäki (2008)). Firstly, monetary policy influences the EONIA by setting the interest rate level for primary liquidity. For the period before 2004, Nautz and Offermanns (2006) found a strong link between the EONIA and the policy rate, except at the end of the maintenance period. Liquidity conditions are closely related to the liquidity provision by the central bank, which weighs on the level and the volatility of the EONIA (Wurtz (2003), Moschitz (2004)). Linzert and Schmidt (2008) found that tighter liquidity conditions and uncertainty regarding liquidity conditions (related with the allotment uncertainty at refinancing operations) pressure the EONIA spread upwards relative to the main ECB reference rate. The authors conclude that the ECB is only able to reduce the value of the spread when its liquidity policy induces excess liquidity conditions at the end of the maintenance period. From a more struc-

(9) The EONIA (Euro Overnight Index Average) is the average of the rates at which major euro area banks traded during the day weighted by the transactions amount; see http://www.euribor-ebf.eu/euribor-eonia-org/about-eonia.html for more information.

tural point of view, there seems to exist evidence for a positive relation between the structural liquidity deficit, which is partly defined by the ECB, and the value of the EONIA spread (Linzert and Schmidt (2008), Välimäki (2008)).[10]

The standing facilities interest rate range and the degree of asymmetry relative to the main reference rate also influence the market interest rate. A reduction in the amplitude of the corridor allows the EONIA to be more stable and closer to the policy rate (Perez-Quirós and Mendizábal (2006)). In a recent paper, Perez-Quirós and Mendizábal (2010) argue that, if banks have a strong preference for liquidity due to expectations of tight liquidity conditions in the future, the corridor amplitude only has an impact on the demand for reserves if the corridor is asymmetric relative to the main reference rate.

Another important feature of the Eurosistem's monetary policy operational framework is the obligation of counterparties to deliver financial assets as collateral in the refinancing operations. According to Neyer and Wiemers (2004), the market interest rate turns higher than the policy rate when there are opportunity costs of holding collateral which can differ across banks (besides other factors, such as, total liquidity needs of the banking sector and transaction costs in the interbank market). Thus, banks with lower opportunity costs of holding colateral will obtain more funding from the central bank and act as intermediaries for the remaining banks.

The behaviour of the EONIA also depends on some features of the money market functioning unrelated to monetary policy. At the end of the month, quarter and year, banks usually increase their demand for reserves due to expected increases in payment activities occurring in the last day of the month and due to end of the month balance sheet management activities (Bindseil *et al.* (2003)). Most studies confirm the relevance of these calender effects for the behaviour of the EONIA (Wurtz (2003), Moschitz (2004), among others). In the same token, in the last day of the reserve maintenance period, counterparties have to fully comply with reserve requirements, which pressure market transactions. The impact on the EONIA usually depends on the aggregate liquidity conditions and on the distribution among market participants.

3. RECENT EVOLUTION OF THE EONIA

The behaviour of the EONIA has changed significantly since the onset of the financial crisis in August 2007 (Chart 1). Chart 2 shows in a clearer way the evolution of the EONIA spread relative to the MRO minimum bid rate since the implementation of the new operational framework and Table 1 presents the descriptive statistics (in basis points (b.p.)). As previously mentioned, the new operational framework implied significant changes in the operational framework, and consequently, the way the overnight market works. Thus, our analysis will only consider the period from March 2004 onwards.[11]

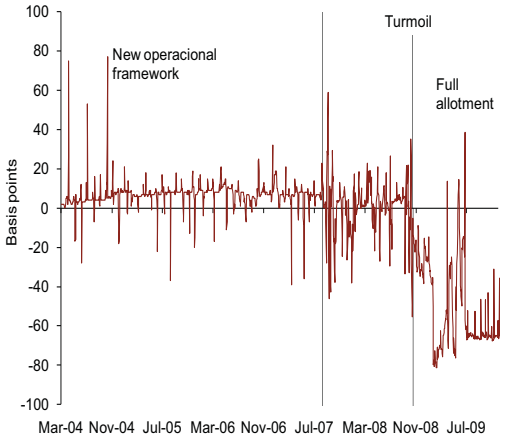
The EONIA spread was relatively stable from 2004 until the onset of the financial markets turmoil in

(10) The liquidity deficit is given by the total amount of reserve requirements plus the autonomous factors, not related to monetary policy, such as banknotes in circulation and government deposits. In the Eurosystem, the liquidity deficit is relatively stable, since a large part of it is given by reserve requirements and demand for banknotes.

(11) Throughout this article, the results relative to the NOF correspond to the period from March 2004 to August 2007. The period of the financial crisis goes from August 2007 until the end of December 2009. The full allotment period begins in October 2008 and goes until 2009.

Chart 2

EVOLUTION OF THE EONIA SPREAD SINCE THE START OF THE NEW OPERATIONAL FRAMEWORK



Source: ECB.

2007. The average spread was around 7 b.p. with the occurence of ocasional spikes, which were mostly linked to the reserves maintenance period calender. Since August 2007, the situation changed substantially and the spread turned much more volatile. The behaviour of the EONIA spread with-in the maintenance period also changed considerably.

The descriptive statistics in Table 1 show the different behaviour of the EONIA spread in the periods before and during the financial turmoil. From the amplitude of the spread interval (maximum - minimum) one can confirm the expected increase in the dispersion of the spread during the turmoil. The value for the skewness suggests a larger asymmetry in the period before the turmoil than during it. The value for the period before the turmoil is positive (1.42), implying a positive asymmetry, *i.e*, a distribution with a longer right tail. The value for the skewness for the financial crisis period is close to zero (-0.23), suggesting a symmetric distribution. The kurtosis of the distribution allows us to conclude in favour of a platykurtic distribution (a distribution flatter than the normal distribution) for the financial crisis period, suggesting a larger frequency of deviations in the EONIA spread. In the period before the turmoil, the distribution is leptokurtic (taller and more concentrated than the normal), which hints at the higher stability in the spread during this period.

Chart 3 shows the average and the one standard deviation interval of the EONIA spread for the same day of the maintenance period. Prior to the crisis, one observed a stable and positive spread up to the last few days of the maintenance period, during which the spread could vary substantially.[12] During the turmoil, the spread has been on average negative and very volatile all through the maintenance period. We will present next, in more detail, the major events occurring during the financial crisis that may contribute to explain the evolution of the EONIA spread.

(12) Notice that this pattern is already at odds with Perez-Quirós and Mendizábal's (2006) predictions of a slightly increase in the overnight interest rate over the maintenance period, regardless of the liquidity conditions.

Table 1

DESCRIPTIVE STATISTICS OF THE EONIA SPREAD

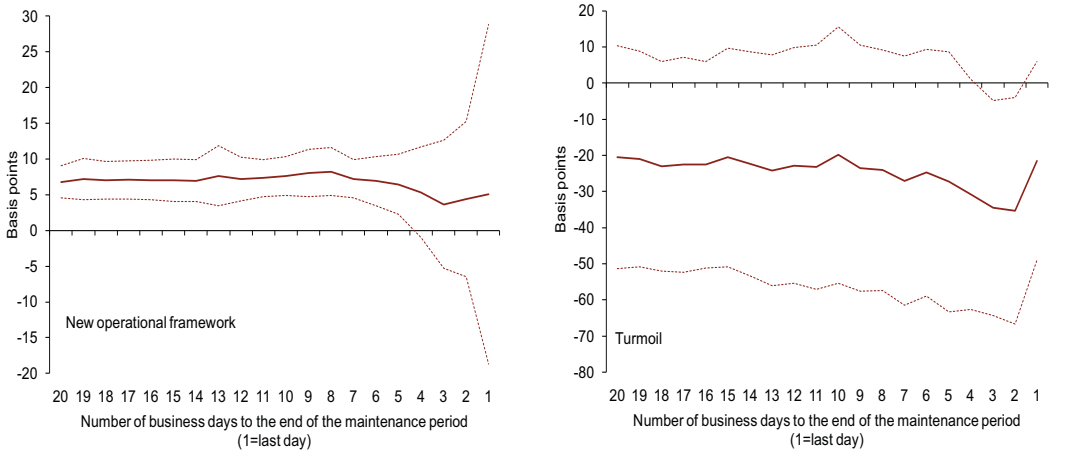
	Full sample	March 2004-August 2007	August 2007-December 2009
Mean	-6.53	6.79	-25.43
Median	5	7	-18.3
Maximum	77	77	58.8
Minimum	-81.4	-39	-81.4
Std. Dev.	26.26	6.72	31.55
Skewness[a]	-1.46	1.42	-0.23
Kurtosis[b]	4.09	38.29	1.66

Source: Authors' calculations.
Notes: (a) The normal distribution typically used as a reference, is symmetric and the value of this statistics is null. (b) The kurtosis of the normal distribution has a value equal to 3.

Brunnermeier (2009) presents an analysis of the factors which led to the financial crisis. In the summer of 2007, investors began a process of strong reassessment of risk related to revaluations in the market for securitization exposed to the US subprime market. In August, these fears spread to euro area banks and to money markets. The uncertainty about the true value and the exposure of banks to, especially, asset-backed securities lead in a first phase to a liquidity crisis. While market participants were uncertaint about their own liquidity needs, given the context of higher volatility, they were also revising upwards their counterparties credit risk in a context of asymmetric information and uncertainty about banks' balance sheets. This translated into an increased demand for liquidity. Banks increased demand for central bank liquidity and showed a preference for reserve frontloading, *i.e*, to hold more deposits with the central bank than necessary at the beginning of the maintenance period as a precautionary measure (Chart 4). The bidding behaviour in the Eurosystem's refinancing operations also changed and there was an increase in tender bid rates and in its dispersion (Eisenschmidt

Chart 3

AVERAGE EONIA SPREAD OVER THE RESERVE MAINTENANCE PERIOD

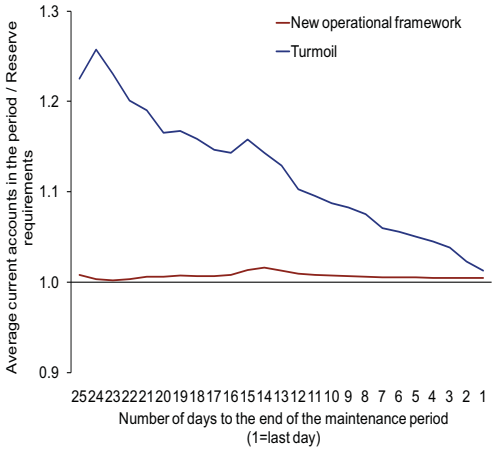


Average EONIA spread for the same day of the maintenance period over all maintenance periods for each sample period.
+ - 1 standard deviation.

Sources: ECB and authors calculations.

Chart 4

AVERAGE RESERVE FULLFILMENT PATH OF EUROSYSTEM RESERVE REQUIREMENTS



Source: ECB.

et al. (2009)). The increase in the demand for liquidity was also visible in the rise of the amounts that were reported to be traded among EONIA panel banks in the second half of 2007. There was also a reduction in the availability to trade in the money market at the remaining maturities. Consequently, interest rates of the unsecured money market segment jumped, as well as volatility (ECB (2009b)). Anedoctal and survey evidence (ECB (2009a)) confirms the strong decrease registered in the unsecured money market activity, especially at longer maturities.[13]

The immediate response of the Eurosystem was to increase the liquidity provision with the aim of containing excessive deviations of short-term market interest rates from policy rates (ECB (2009b)). As a consequence, the value of the EONIA spread remained relatively limited and around zero.

In September 2008, there was a sharp deterioration of the financial markets following the Lehman Brothers investment bank fallout, reaching the second phase of the financial crisis, the systemic risk phase. Money markets worldwide froze and unsecured market interest rates skyrocked. Demand for primary liquidity increased substantially and the use of Eurosystem standing facilities rose to unprecedented levels. In a situation where credit risk rose substantially, market participants almost ceased to trade between each other and the central bank took the role of intermediator. The response by central banks was quite significant. The most relevant measure taken by the Eurosystem was to switch all liquidity providing tenders to a procedure of fixed rate tender with full allotment of the amount bid by banks. In this way, banks were able to secure all their funding needs via the ECB. The ECB also broadened the list of eligible collateral so that the collateral requirements did not became binding. The number and frequency of refinancing operations also increased.[14] Aiming at reducing volatility in

(13) Despite the shift in preference from longer to shorter maturities, there seems to be no relevant impact on interest rates. Zagaglia (2008) reports that before the turmoil, there was evidence of spillovers of volatility from longer maturities of the money market to overnight rates, but this no longer occurs during the turmoil.

(14) Given that the strains were also felt in dollar and swiss franc funding markets, the ECB also provided liquidity to Eurosystem counterparties in these currencies; see, for instance, ECB (2009b) for more details.

shorter-term market interest rates, in October 2008 the ECB narrowed the standing facilities interest rate corridor from 200 to 100 b.p., keeping it symmetric around the MRO rate.

As a consequence of the measures taken, money market liquidity conditions became relatively ample. Aggregate liquidity was now determined by the demand side and banks were able to get increased funding at regular operations and depositing it later in the day at the deposit facility. Thus, money market activity, including the overnight segment, reduced. The EONIA moved below the MRO rate and kept systematically closer to the deposit facility rate. Broadly speaking, the measures were effective in limiting the turmoil in funding markets. Therefore, in December 2008 the ECB decided to re-widen the interest rate corridor back to 200 b.p. This was expected to reduce ECB intermediation by increasing banks opportunity costs of trading in the market. Nonetheless, given that the fixed rate full allotment procedure of refinancing operations was kept, the excess liquidity and the high recourse to the deposit facility remained. The lower level for the deposit facility rate may have contributed to a further decrease in the EONIA spread, by keeping EONIA closer to the deposit facility rate. Perez-Quirós and Mendizábal (2010) argue that the symmetry in the corridor, regardless of the amplitude, does not impact the demand for reserves when banks have a preference for liquidity for precautionary reasons, and therefore, central banks should intervene in the liquidity provision and the asymmetry degree of the corridor.

One can argue that the central bank has the ability to influence interes rates when liquidity risk premium prevails, as seems to have occurred in the first phase of the crisis (Nobili (2009), Frank and Hesse (2009)). However, the ability of central banks to influence interest rates when credit risk premium prevails is most likely low. According to Nobili (2009), following the Lehman Brothers fallout, the liquidity risk premium responded favourably to Eurosistem policy measures and the credit risk component became then the main responsible for the evolution of money market rates. Frank and Hesse (2009) and Christensen *et al.* (2009) also conclude in favour of the success of central banks measures on easing stress in unsecured money markets.

In May 2009, money market conditions were more stable. Some additional measures, not directly related to the situation in the overnight segment, were taken. The Eurosystem expanded further its non-conventional measures aiming at easing funding conditions in the banking system and promoting credit to the rest of the economy ("enhanced credit support" phase). The standing facilities corridor was narrowed again to 150 b.p. in order to avoid the deposit rate being at the zero lower bound while keeping the corridor symmetric around the MRO rate. The Eurosystem also decided to purchase covered bonds and to provide further longer-term liquidity to counterparties via 1-year refinancing operations. The first 1-year operation, conducted at the end of June 2009, met a great demand, implying that about half of the liquidity provided by regular operations was through the 1-year operation. This operation provided a substantial liquidity buffer and seems to have allowed for a greater stabilization of the money market conditions.

4. DATA AND METHODOLOGY

In this study the determinants of the EONIA spread are analysed, in particular, the effects of the financial crisis. Only few empirical papers have looked at the behaviour of the EONIA since the new operational framework. The period analysed in this paper starts in March 2004 and ends in December 2009.

The liquidity effect indicates the capacity of the central bank to influence the level of the interest rates through changes in the supply of reserves. From the viewpoint of monetary policy, it is important to understand this effect and how it may have changed with the turbulence of the financial markets. Given that one of the relevant components for the evolution of the money market interest rates and, in particular, the EONIA, was the liquidity premium, one may expect that the ability of the Eurosystem to influence the interest rates has changed. The Eurosystem does not completely determine the supply of reserves since it began with the full allotment procedure at the refinancing operations; this might have implied a lower liquidity effect.

Market turbulence was also affected by the credit risk component. The effect over the overnight segment is not clear. On the one hand, this segment is not subject to credit risk considerations. On the other, the larger preference for short-term maturities in detriment of long-term ones due to credit risk, may imply an indirect effect in the overnight segment. If this is the case, it may indicate that monetary policy loses ability to influence the interest rates.

Besides these two effects, it is also important to analyse other characteristics of the overnight segment of the money market, such as calendar and maintenance period effects (Wurtz (2003), Perez-Quirós and Mendizábal (2006), Moschitz (2004), among others).

The methodology used follows previous studies, in particular the seminal work of Hamilton (1996) for the fed funds rate. The EONIA spread with regards to the MRO rate, which we define as s_t, is modelled considering that the conditional variance follows two regimes. This feature of the conditional variance is modeled using an EGARCH (Exponential General Autoregressive Conditional Heteroskedastic) model as proposed by Nelson (1991), but with the particularity of the two regimes introduced by Hamilton (1996). In order to accommodate this characteristic, the innovations are considered to follow a distribution which consists of the combination of two normal distributions which differ in the variance.

The EONIA spread, s_t, is described as:

$$s_t = \mu_t + h_t v_t$$

where μ_t is the conditional mean, h_t the conditional standard deviation and v_t are random shocks which follow a normal distribution with zero mean and variance $p + (1-p)\sigma^2$. In other words, the distribution of the shocks is given as,

$$g(v_t) = p\frac{exp\left(-\frac{v_t^2}{2}\right)}{\sqrt{2\pi}} + (1-p)\frac{exp\left(-\frac{v_t^2}{2\sigma^2}\right)}{\sqrt{2\pi}\sigma}$$

where with probability p, the inovations follow a distribution with low volatility, in which the variance is normalised to one, and with probability $(1\text{-}p)$, a distribution with high volatility, whose variance is σ^2. Hamilton (1996) was one of the first to use this distribution in this context in order to capture the tails and the infrequent spikes which are found in the fed funds rate. The equation for the conditional mean of the spread is given as,

$$\mu_t = c + \rho s_{t-1} + \beta' x_t + \varphi' D_t$$

The conditional mean is explained by a constant c, the first lag of the spread, s_{t-1}, a set of explanatory varaibles x_t and a set of dummy variables D_t. The conditional variance of the EONIA spread is given by h_t^2 according to the expression,

$$\log\left(h_t^2\right) - \gamma z_t = \delta\left[\log\left(h_{t-1}^2\right) - \gamma z_{t-1}\right] + \alpha\left(\left|v_{t-1}\right| - E\left|v_{t-1}\right| + \aleph v_{t-1}\right)$$

where z_t corresponds to a set of explanatory and dummy variables. Considering the logarithm of the conditional variance ensures that it always assumes positive values, independently of the sign of the coefficients, avoiding in this way the need to impose restrictions on the model parameters in order to guarantee that the unconditional variance is positive. The parameter $\aleph$ allows for the existence of asymmetric effects, *i.e.*, positive surprises may have different impacts than negative surprises. If $\aleph = 0$, negative surprises have the same impact on volatility as positive surprises. If $\aleph < 0\left(\aleph > 0\right)$, negative (positive) surprises have a larger impact on volatility. If $\aleph < -1\left(\aleph > 1\right)$, positive (negative) surprises reduce volatility while negative (positive) ones increase volatility (Hamilton (1994)).

In the mean as well as in the variance equation, explanatory variables look to capture liquidity effects, credit risk effects, interest rate expectation effects (both within the maintenance period as well as in between) and the conditions of primary liquidity provision. The dummy variables look to capture calendar effects, end and start of the maintenance period effects, fine-tuning operations and changes of official interest rates.

5. RESULTS[15]

The period before the financial markets turmoil

Tables 2 and 3 present the results of the model parameters for the mean and conditional variance, respectively, for the period from March 10, 2004 to August 8, 2007. The explanatory variables included in the model are (i) the expected spread in the maintenance period, measured by the spread between the one week EONIA swap and the current MRO rate[16] and (ii) the liquidity imbalance in relative terms, given by the ratio between the sum of daily excess reserves accumulated over the maintenance period and the use of the deposit facility net of the use of the marginal lending facility, and the amount of reserve requirements. One may expect that the impact of liquidity imbalances is

Table 2

PARAMETER ESTIMATES FOR THE MEAN EQUATION FOR THE PERIOD BEFORE THE TURMOIL (from 10 March 2004 to 08 August 2007)

Variable	Coefficient	St. Error	*z*-stat
	Mean equation		
C	0.3521	0.0865	4.0698
s_{t-1}	0.7695	0.0287	26.8025
D_1: end of month	1.9022	0.1108	17.1733
D_2: end of year	1.0253	1.102	0.9304
D_5: change in policy rate	-6.425	0.4466	-14.3864
D_6: liq. absorbing FTO	4.5716	1.003	4.5579
D_7: liq. providing FTO	0.4424	1.5967	0.2771
Expected spread within MP	0.1976	0.0238	8.2865
Rel. ex. liq. last week MP	-55.3724	17.0214	-3.2531
Rel. ex. liq. remaining MP	-18.5803	6.9588	-2.6701

Source: Authors' calculations.
Note: *z*-stat is equivalent to the *t*-test.

Table 3

PARAMETER ESTIMATES FOR THE VARIANCE EQUATION FOR THE PERIOD BEFORE THE TURMOIL (from 10 March 2004 to 08 August 2007)

Variable	Coefficient	St. Error	*z-stat*
	Variance equation		
D_1: end of month	-1.0797	0.2643	-4.0852
D_3: last day of MP	2.108	0.1888	11.1682
D_4: penultimate day do PM	4.0673	0.3441	11.8212
D_5: change in policy rate	-1.6375	0.7038	-2.3267
Expected spread within MP	-0.0233	0.0196	-1.1908
δ	0.0753	0.046	1.6364
α	0.4883	0.0324	15.0685
$\aleph$	0.0887	0.0546	1.6249
p	0.7712	0.1047	17.5348
σ	10.1139	0.9001	11.2359
Maximum likelihood (log)	-1736.9495		

Source: Authors' calculations.
Note: *z*-stat is equivalent to the *t*-test.

(15) Estimations were done in Gauss 10.0.3 based on an adaptation of the code of Hamilton (1996), available on his website http://dss.ucsd.edu/~jhamilto/software.htm#fed.

(16) The source used for the overnight swaps were the Reuters quotes to June 20, 2005 and the EONIA swap index of the European Federation of Banks from that date onwards.

different in the last week of the period, when banks are more sensitive to liquidity variations, in comparison to the rest of the maintenace period. The dummy variables included are: D_1=1 for the last week day of the month; D_2=1 for the last week day of the year; D_3=1 for the last day of the reserve maintenance period; D_4=1 for the penultimate day of the maintenance period; D_5=1 for the days in which the ECB Governing Council changes the official interest rates; D_6=1 for the days in which the ECB conducts a liquidity absorbing fine-tuning of and D_7=1 for the days in which the ECB conducts an liquidity providing fine-tuning operation.

As expected, the mean of the EONIA spread is influenced by the calendar effects and tends to increase 2 b.p. in the last business day of the month, and additionally 1 b.p. in the last business day of the year. This result is consistent with previous studies and relates mainly to the increase in payments and activities of balance sheet management (Bindseil *et al.* (2003), Wurtz (2003), Moschitz (2004), Benito *et al.* (2006) and Linzert and Schmidt (2008)). The effect of the maintenance period is not significant for the mean behaviour, but volatility increases at the end of the maintenance period. This effect is not consensual in the literature. Regarding the euro market and for a sample previous to the one considered here, Perez-Quirós and Mendizábal (2006), Bindseil *et al.* (2003) and Wurtz (2003) do not find a significant effect, while Moschitz (2004) concludes that the EONIA volatility increases at the end of the period. Hamilton (1996) and Bartolini *et al.* (2000) verify that, for the fed funds rate, the effect of the maintenance period is relevant for both the mean and variance.

To a certain extend, the effect of fine-tuning operations on the EONIA spread corresponds to what would be expected. The spread tends to increase when there is a liquidity absorbing fine-tuning operation, but liquidity providing fine-tuning operations do not have a significant effect over the spread.

Interest rate expectations for the maintenance period are not significant in the new operational framework (which is in line with the results of Linzert and Schmidt (2008)). However, in the days in which the ECB Governing Council decides to change the official interest rates a significant fall in both the mean and variance of the spread is observed. This is a robust result, but to a certain extend unexpected. With this regard, the results in the literature are not consistent. While Wurtz (2003) does not find a significant effect on volatility after changes in the official interest rates, Moschitz (2004) concludes that the EONIA volatility increases in the days in which the ECB Governing Council meets, for similar samples in both studies. A possible explanation for our results may be related with a process of adjustment over those days, after an increase of the volatility of the spread prior to expected changes in the official interest rates.[17]

Expectations on interest rates within the maintenance period are important for the behaviour of the EONIA spread. According to Linzert and Schmidt (2008), the one week ahead expected spread is positively correlated with the current spread. The effect of expectations on volatility is not statistically relevant.[18]

(17) Effectively, changes in official interest rates are generally correctly antecipated by market participants.

(18) Although this variable is statistically significant, this does not completely rule out the possibility that market participants may be antecipating changes in the official interest rates, given that this variable captures this effect in the last week of the maintenance period.

It is possible to find a significative liquidity effect in the period under analysis. The results suggest that a liquidity imbalance of half of the amount of the minimum reserves would imply a variation in the spread of less than 30 b.p. Recall that the average of minimum reserves over this period rose to 155 billion euro. Over the rest of the maintenance period a three times bigger imbalance of aggregated liquidity would be necessary to observe the same effect. This result is in accordance with the literature (Friedman and Kuttner (2010)), although the estimated coefficients are smaller than the results in other papers. Wurtz (2003) only finds a significant effect of the liquidity conditions in the EONIA in the last two week days of the period. The results of Ejerskov *et al.* (2008) imply that an imbalance of one billion euros implies a variation in the spread of 25 b.p. in the last week of the period and only 2 b.p. in the remaining part of the period. Moschitz (2004) also finds an end-of-period effect, where an imbalance of the same magnitude generates a variation of 7.7 b.p. of the EONIA.

Relatively to the results for the EGARCH parameters, the coefficient that captures possible asymmetry effects (λ) is not significant. The probability of observing spikes in the innovations is relatively low when compared to previous studies for the euro area (Moschitz (2004), Perez-Quirós and Mendizábal (2006), Gaspar *et al.* (2004)). However, the period analysed in these studies preceeds the introduction of the new operational framework, a period in which the behavior of the EONIA was more volatile throughout the maintenance period. Our estimates suggest that less than one in every five observations is drawn from a distribution with a larger variance. The variance of this distribution is about 10 times larger than that of the distribution with the normalized variance. This indicates that spikes in the innovations are relatively infrequent but may reach very high levels, which is consistent with the evolution of the EONIA in this period.

The financial markets turmoil period

Tables 4 and 5 present estimation results for the conditional mean and variance equations, respectively, for the period from August 9, 2007 to December 31, 2009. The explanatory variables included in this period and which were not included in the previous sample are (i) the CDS spread, given by the CDS index itraxx senior financials published by Markit, whose constituting entities closely represent the EONIA panel banks, and is used as a proxy for credit risk and (ii) the bid-to-cover ratio, given by the ratio between the total bid amount and the allotted amount at the MRO[19]. Since the implementation by the ECB of the full allotment tender procedure, it is no longer necessary to use this variable. The additional dummies used are: D_8=1 in the two last and first business days of the maintenance period; D_9=1 in the last day of the quarter; D_{10}=1 since the allotment of the first LTRO with one year maturity, and D_{11}=1 for June 24, 2009, when a very high value of the spread was registered as a consequence of a one day lag between the maturity of the MRO and the placement of a very large amount of the one year operation.

Relatively to the value of the constant in the mean equation, two conclusions are possible: either the variables modeled do not capture completely the evolution in negative levels of the mean spread, or a structural change has occurred under balanced liquidity conditions affecting the mean spread. The

(19) Since the model uses daily data, the bid-to-cover ratio is kept constant over the week (at the same level of the last operation).

coefficient of the lag of the spread is close to one, which suggests a high degree of persistence as well as a change in persistence when compared to the period previously analyzed.[20]

Calendar effects are still significant in explaining the mean behaviour of the spread, but market participants seem now to be more sensitive to these effects. In fact, during the crisis, the EONIA spread rose on average 6 b.p. in the last business day of the month, which compares to less than 2 b.p. in

Table 4

PARAMETER ESTIMATES FOR THE MEAN EQUATION FOR THE PERIOD DURING THE TURMOIL (from 09 August 2007 to 31 December 2009)

Variable	Coefficient	St. Error	*z-stat*
	Mean equation		
C	-1.2006	0.4476	-2.6823
s_{t-1}	0.9881	0.0046	214.0279
D_1: end of month	6.0344	1.2358	4.8829
D_9: end of quarter	2.6306	1.7265	1.5237
D_3: last day of MP	13.8033	2.7594	5.0023
D_5: change in policy rate	-0.8943	0.2221	-4.0273
D_6: liq. absorbing FTO	5.1641	1.5486	3.3346
D_7: liq. providing FTO	-4.4297	1.2389	-3.5754
D_{11}: 24/06/2009	46.1302	3.5294	13.0704
Rel. ex. liq. last week MP before full allot.	-22.7857	14.3875	-1.5837
Rel. ex. liq. last week MP during full allot.	-0.6708	0.1665	-4.029
Rel. ex. liq. remaining MP	-0.3048	0.2659	-1.1466
CDS spread	0.0061	0.002	3.0432
Bid-to-cover ratio before full allot.	0.5199	0.2635	1.9733

Source: Authors' calculations.
Note: *z*-stat is equivalent to the *t*-test.

Table 5

PARAMETER ESTIMATES FOR THE VARIANCE EQUATION FOR THE PERIOD DURING THE TURMOIL (from 09 August 2007 to 31 December 2009)

Variable	Coefficient	St. Error	*z-stat*
	Variance equation		
D_1: end of month	2.0831	0.341	6.1085
D_8: first and two last days of the MP	2.577	0.289	8.9157
D_6+D_7: fine-tuning operation	0.5627	0.6549	0.8592
D_{10}: 1-year LTRO	-0.893	0.4272	-2.0903
Rel. ex. liq. last week MP before full allot.	-6.8412	12.2038	-0.5606
Rel. ex. liq. last week MP during full allot.	-1.5254	0.4606	-3.3122
Rel. ex. liq. remaining MP	1.7944	0.3745	4.7917
Bid-to-cover ratio before full allot.	0.4849	0.1847	2.625
δ	0.7809	0.0565	13.8216
α	0.2051	0.0653	3.1407
$\aleph$	0.1377	0.1664	0.8277
p	0.6519	0.1278	10.7086
σ	6.6221	0.4919	13.4625
Maximum likelihood (log)		-1797.8009	

Source: Authors' calculations.
Note: *z*-stat is equivalent to the *t*-test.

(20) Hassler and Nautz (2008) showed that the persistence of the EONIA spread increased with the new operational framework, which suggests a reduction in the ability of the ECB to control the EONIA. However, the results refer to the period before the financial crisis.

the previous period. This larger sensitivity is still more pronounced at the end of the maintenance period, with an increase of 14 b.p. in the last day of the period, independently of the liquidity conditions. These effects also have a significative impact and are more pronounced than before on the volatility of the EONIA spread; the logarithm of the variance increases about 2 b.p. in the last weekday of the month and in the days around the reserve maintenance period shift.

A reduction effect of the spread, although of a milder magnitude, is still observed on the days the Governing Council decides to alter the official interest rates.[21] On the other hand, the impact of fine-tuning operations is more pronounced during the financial crisis. Fine-tuning operations seem to have a symmetric impact, given that liquidity absorbing operations increase the spread by 5 b.p. whereas liquidity providing operations tend to reduce it by 4.4 b.p. Furthermore, the conduction of fine-tuning operations does not seem to have a relevant impact over the behavior of volatility.

The liquidity effect was substantially reduced in the financial crisis and particularly since the ECB initiated the full alotment procedure.[22] The effect continues to be more pronounced in the last week of the maintenance period, as was also the case in the previous period, which is also in line with previous studies (Wurtz (2003), Ejerskov *et al.* (2008), Moschitz (2004), among others). Taking into consideration that the average value of reserve requirements during the crisis and before the full alotment policy was 204 billion euros, the results suggest that a liquidity imbalance of about 9 billion euros would be necessary to generate a 1 b.p. change in the EONIA spread in the last week of the maintenance period.[23] Since the ECB began with the full allotment procedure at refinancing operations, the variable representing the liquidity conditions looses economic meaning. In contrast, Akram and Christophersen (2010) conclude that, for the Norwegian overnight market, total liquidity is more important during the crisis in order to pressure downwards interest rates. The effect of liquidity imbalances in the variance has also changed with the financial crisis. The imbalances of the last week of the maintenance period are not statistically significant before the implementation of the full allotment procedure, but the large excess liquidity created since then contributed to reduce the logarithm of the variance by 1.5 b.p.

The results for the liquidity effect suggest two conclusions. On the one hand, the liquidity effect is very likely nonlinear. When the deviations with respect to the balanced supply of reserves increase, the impact on the EONIA is lower, particularly in the case of the Eurosystem where there is a limit on rates given by the standing facilities rates. Given the high excess of liquidity (Chart 5), it is expectable that increasing liquidity provision will have a small marginal effect. On the other hand, during the financial crisis, EONIA spread may simply have become less sensitive to changes in aggregate liquidity conditions. Given the preference for liquidity in a context of a high counterparty risk and where, as a consequence, a market segmentation situation emerges, the "depth" of the market shrinks, making

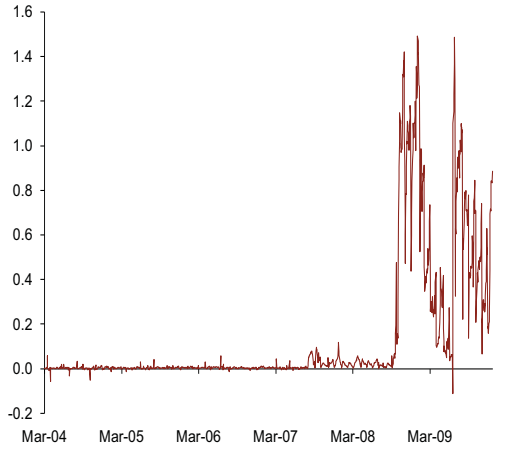
(21) The impact is smaller, although still significant, if one considers a dummy for the days on which a decision over the official interest rates is scheduled at the Governing Council meeting.

(22) The EONIA spread fell when this procedure started. However, the dummy variable for this period is not significant as long as the regression includes a variable that captures aggregate liquidity conditions.

(23) When the model is estimated using only daily accumulated excess reserves over the maintenance period, the conclusion is qualitatively the same. In this case, a reduction of 1 b.p. of the spread is hit with excess reserves of 3.5 billion euro in the last week of the maintenance period before the full allotment policy.

Chart 5

RELATIVE DAILY LIQUIDITY IMBALANCES



Sources: ECB and authors' calculations.

prices less sensitive to quantity variations.

Additionally, it seems that full allotment at refinancing operations was effective in reducing the end of period money market volatility, although not at controlling the interest rates. This result may be related to the fact that market participants systematically expect the realization of a fine-tuning operation in the last weekday of the maintenance period in order to re-balance aggregate liquidity conditions, although this variable did not reveal statistically significant.[24] Hence, they could avoid trading in the market to adjust their liquidity position. Without availability for trading, the rate remains inflexible. However, during the rest of the maintenance period, the existence of liquidity imbalances generates additional volatility in the EONIA spread, which did not happen before the crisis. The high level of liquidity imbalance and its volatile evolution may contribute to explain this change. The simulated model of Cassola and Huetl (2009) shows that larger volatility in liquidity was not responsible for the observed developments in the overnight market during the crisis, which concurs with our findings. This behavior of the spread would require market segmentation and credit constraints.

The bidding behavior and the allotment results at the MRO also reveal important for the behavior of the conditional mean and variance, contrary to what occurred before the turmoil. As expected, the coefficient of the bid-to-cover ratio is positive and statistically significant. The larger the amount bid that was not satisfied (larger bid-to-cover ratio), the larger is the share of liquidity needed by banks that has to be satisfied in the market, which, as a consequence, creates upward pressure on the EONIA spread and in the volatility of this market segment. Linzert and Schmidt (2008) also find a positive effect of the bid-to-cover ratio, but smaller and referring to the period before the crisis.

The CDS spread itraxx senior financials has a slightly positive but significant coefficient in the mean equation of the EONIA spread. The expected sign of this variable is not entirely clear, given that the

(24) In order to capture these expectations, we also included a dummy variable equal to one in the last day of the maintenance period if the ECB performed a fine-tuning operation in the end of the previous maintenance period (Linzert and Schmidt (2008)). However, this variable proved statistically insignificant.

overnight market is not subject to credit risk due to the maturity, but may suffer contagion effects from other unsecured market segments, which are exposed to credit and counterparty risks. For example, a substitution effect may occur due to a reduction in the activity at longer maturities given that an increase in perceived risk may lead to a greater demand for transactions at shorter maturities. This effect may explain the obtained results. However, the impact is relatively small, given that an increase of 100 b.p. in the CDS spreads only increases the EONIA spread by 0.6 b.p. Akram and Christophersen (2010) also conclude that the measures associated to credit risk are more important for the behavior of the overnight interest rates of the norwegian market during the crisis than before.

No significant effect was found regarding the expectations relatively to the evolution of the spread beyond the current maintenance period, which confirms that, even during the crisis, the overnight segment remained isolated from the official interest rate expectations. The variable for the expectations regarding the evolution of the spread within the maintenance period introduced autocorrelation in the residuals, and was therefore excluded from the model. We have also tested whether changes in the corridor of the standing facilities rates have an impact on the spread, but no statistically significant effect was found both in the conditional mean and variance. This result is in line with the findings of Perez-Quirós and Mendizábal (2010), who argue that an asymmetric corridor would be necessary in order to impact on the demand for reserves.

The provision of a long-term liquidity buffer had a strong impact on the market through the reduction of volatility.[25] When the ECB conducted the first operation with a one year maturity, the logarithm of the variance of the EONIA spread decreased by 1 b.p. The results suggest that during the financial crisis, monetary policy was more effective in the reduction of market volatility than in controlling interest rates.

Finally, with regards to the EGARCH parameters, it is observed that variance persistence increased during the crisis, but the reaction to shocks was more controlled. It seems that market participants reacted less to shocks to the EONIA spread over this period. The parameter that captures asymmetric effects is still not significant. About one in every three observations are drawn from the distribution with the highest variance (about 6.6 times more than the variance from the regime with low volatility). In comparison with the period previous to August, 2007, the discrepancy between the two regimes and the frequency of extreme observations diminished.

6. CONCLUSION

The financial markets turmoil, initiated in 2007, brought a high degree of uncertainty and volatility to the financial markets, from which the overnight segment did not remaine isolated. Since monetary policy implementation starts in this market segment, it is important to understand how far the ability of the central bank in steering the market according to its objectives might have changed with the financial crisis. This study looks to answer this question.

(25) As an alternative, the liquidity provided at regular operations weighted by maturity was used as an explanatory variable, but did not improve the quality of the model.

We consider a methodology widely used in previous studies on the reference overnight interest rate for monetary policy purposes, either the EONIA for the euro area or the fed funds rate for the US. The EONIA spread is modelled assuming that the conditional variance obeys two regimes, following the EGARCH model for the behaviour of the conditional variance proposed by Nelson (1991) with the particular features of two regimes introduced by Hamilton (1996). Given the structural changes introduced in 2004 with the new operational framework, we only model the EONIA spread since then. The behaviour of the EONIA has also changed substantially with the financial markets turmoil; therefore, we estimate the model in two periods separated by August 2007. This study has the advantage of using a relatively common technique to assess a time period for which there are only few empirical studies available.

The results suggest a greater difficulty during the financial markets turmoil on the ECB steering the level of the EONIA spread relative to the main reference rate. The liquidity effect was reduced since 2007 and especially since the full allotment policy at the refinancing operations. This reduction is probably related to the non-linear response of the interest rate to changes in quantity, which is likely to be highly determined by the existence of the interest rate corridor. On the other hand, the liquidity policy followed was effective in reducing market volatility. This effect has probably resulted from the provision of a substantial liquidity buffer, both in terms of quantity and maturity. The liquidity provision conditions were also found to have influenced the EONIA spread, but only during the financial market turmoil, which might be due to the elevated stability in liquidity provision before that period. The effect of fine-tuning operations is in line with its objectives, although the impact is more pronounced during the turmoil.

The banking system credit risk seems to have pressured the EONIA spread upwards during the crisis, but the effect is not economically significant. The EGARCH parameters results also suggest a structural change in the behaviour of the EONIA spread in reaction to shocks. Before the turmoil, extreme shocks were less regular but more extreme in comparison with more common shocks. During the turmoil, the discrepancy between the two regimes and the frequency of extreme observations reduced, and the persistence in both the conditional mean and variance increased.

Given that market segmentation was one of the likely prevailing features of the behaviour in the money market during the crisis, it would be interesting to study the impact it might have had on the EONIA spread. Indeed, there is some evidence suggesting that banks preferred to get more primary liquidity in regular operations and deposit the excess in the deposit facility instead of trading in the market. This behaviour would probably make central banks task of steering the overnight rate more difficult.

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DETERMINANTS OF SOVEREIGN BOND YIELD SPREADS IN THE EURO AREA IN THE CONTEXT OF THE ECONOMIC AND FINANCIAL CRISIS*

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1. Introduction

The economic and financial crisis that started in mid-2007 has had an unprecedented impact on the euro area government bond market. Although differing from country to country, sovereign yield spreads to German bonds have been much higher than in the period preceding the start of the third stage of Economic and Monetary Union.

The widening of sovereign bond yield spreads took place against a background of deteriorating public finances in several countries, as well as an increase in risk aversion and a deterioration in liquidity conditions in international financial markets. This suggests the evolution of spreads to Germany reflected both an increase in country credit risk and liquidity premiums and, that the increase in such premiums is a result of the interaction between common factors and idiosyncratic factors. The purpose of this study is to identify such factors' contribution to the different evolution of government bond yields in euro area countries in the current crisis.

According to the results, euro area sovereign spreads observed during the current crisis may be explained by a common factor, interpreted as the risk premium in international financial markets, as well as by idiosyncratic factors related with sovereign credit risk and the liquidity characteristics of domestic government bond markets. There has been a change in the relative importance of each of these factors in explaining the spreads since the beginning of 2007. This situation resulted both from the evolution of spread determining factors and changes in spreads' sensitivity to them. In the period prior to the collapse of Lehman Brothers, euro area sovereign spreads were mainly driven by the international risk premium. With the deepening of the economic and financial crisis, factors specific to each economy increased in relevance. Initially, the increase in spreads was largely due to liquidity premiums. However, as the financial crisis spilled over into a strongly deteriorating macroeconomic environment, there was an increase in the importance of country credit risk factors. In the first five months of 2010, the heterogeneity of sovereign credit risk premiums and a further increase in global risk aversion were major determining factors behind the evolution of spreads.

* The authors are grateful to Isabel Gameiro, Carlos Santos and João Sousa for their most helpful comments. The opinions expressed in the 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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This paper is organized as follows: Section 2 describes the euro area sovereign determinants and briefly reviews the literature; Section 3 provides a descriptive analysis of the data used; the econometric results are presented in Section 4; and, finally, Section 5 includes the main conclusions.

2. EURO AREA SOVEREIGN BOND YIELD SPREAD DETERMINANTS

In the euro area, given the single monetary policy and the relative integration of national bond markets, long term sovereign yield spreads mainly reflect differences related to issuers' credit risk and the liquidity of securities. The economic literature has, accordingly, attached particular importance to the breakdown of spreads between credit risk and liquidity premiums.

The credit risk premium of a security corresponds to the compensation demanded by investors to cover the risk of future cash flows being different from those agreed, due to default. This premium depends on each issuer's idiosyncratic factors, which determine the level of risk, as well as on the risk premium in the financial markets. This risk premium, in turn, is determined by the degree of investors' risk aversion and by the global uncertainty prevailing in international financial markets. Therefore, in terms of credit risk, sovereign bond yield spreads should be related with each country's public finances sustainability indicators and with risk indicators in international financial markets. In times of lower risk appetite, as in the current economic and financial crisis, the global risk premium tends to increase. This fact, *per se*, contributes to an increase in the yield spreads of countries which the market assesses as having a higher default risk in comparison to lower risk countries. In situations of the deterioration of a country's default risk, the increase in the global risk premium also amplifies the impact of this deterioration on spreads.

Regarding liquidity, the return demanded by investors is expected to be lower for bonds that can be traded quickly, at low cost and without major price changes. Differences in liquidity among national securities may reflect several factors, such as the value of outstanding amounts, the time elapsed since their issue, whether they are eligible for delivery in the futures market, as well as the degree of efficiency in primary and secondary markets in which they are traded. The liquidity premium included in the price of each bond should contain a component associated with the security's expected level of liquidity, and a compensation for unanticipated changes in liquidity (liquidity risk). This last component depend both on factors that specifically affect the future liquidity of the security, as well as on the global liquidity demand conditions prevailing in international markets. In times of increased macroeconomic uncertainty and greater volatility in financial markets, there is a higher likelihood of the need to unwind an investment position quickly. This should increase the demand for assets that can be traded at low cost. In these periods, higher liquidity risk contributes to an increase in liquidity premiums, suggesting the existence of a positive correlation between liquidity and credit risk premiums.

A breakdown of sovereign yield spreads into components determined by credit quality and related to liquidity is not easy to perform empirically, as these characteristics are not directly observable and are not completely independent. Additionally, the relative importance of credit and liquidity risks tends to change over time in line with structural changes in economies, as well as their cyclical position and, consequently, the risk premium in international financial markets.

A robust finding in the literature, regardless of the sample period, is that euro area sovereign yield spreads are largely determined by a common factor. This factor, which is interpreted as the global risk appetite, is usually measured by credit risk premium indicators on corporate bonds and uncertainty in international financial markets. Empirical results also support the relevance of governments' creditworthiness in determining the spreads. This conclusion is relatively independent from the variables used to measure country credit risk, namely variables related with public finances, credit ratings or information from financial markets, such as Credit Default Swaps (CDS).[1] In the case of liquidity, the evidence is mixed. Bernoth *et al.* (2006) and Schuknecht *et al.* (2010) conclude that liquidity is not a significant determinant of sovereign yield spreads in euro area countries. Codogno *et al.* (2003) and Sgherri and Zoli (2009) also indicate a very limited effect of liquidity. In turn, Gómez-Puig (2006), Beber *et al.* (2009), Schwartz (2009), Ejsing and Sihvonen (2009), Attinasi *et al.* (2009), Barrios *et al.* (2009), Haugh *et al.* (2009) and Gerlach *et al.* (2010) find liquidity effects, which in some cases are quantitatively limited and only relevant for some countries. In most of these papers, liquidity is measured by indicators based on transaction costs (bid/ask spreads), trading volumes or bonds' outstanding amounts. Schwartz (2009) uses a different liquidity measure, which consists of the yield spread between bonds issued by KFW and German government bonds, and obtains a higher liquidity impact on euro area sovereign spreads than usually found in the literature.[2] According to Schwartz (2009), this indicator captures the pricing of liquidity risk, *i.e.* the compensation that investors demand for the possibility that market liquidity will worsen in the future.

The literature on euro area sovereign spreads has also focused on the identification of changes in the relative importance of the determining factors over time. For the current economic and financial crisis, most of the empirical evidence suggests an increase in the importance of domestic factors, namely country credit risk and, to a lesser extent, liquidity factors (e.g. Barrios *et al.* (2009), Ejsing and Sihvonen (2009) and Mody (2009)). The results found by Mody (2009) suggest that, at the beginning of financial market turmoil, *i.e.* in the second half of 2007 and early 2008, spreads were largely determined by common factors. During this period, the increases in international risk aversion lead to flight-to-quality movements to German bonds. After the problems experienced by Bear Stearns in mid March 2008, the different degrees of vulnerability of national financial sectors contributed to a differentiation in yield spreads in euro area countries. The impact of financial sector risk on sovereign risk increased in the period following the collapse of Lehman Brothers. The results of Ejsing and Lemke (2009), Attinasi *et al.* (2009) and Gerlach *et al.* (2010) suggest that the vulnerabilities of national banking sectors and governments' rescue packages contributed to a risk transfer from the financial to the public sector. After September 2008, country credit risk, in particular when evaluated by public finance indicators, appears to have been a major underlying factor behind changes in the yield spreads of euro area countries (Mody (2009), Sgherri and Zoli (2009), Barrios *et al.* (2009) and Schuknecht *et al.* (2010)). According to Caceres *et al.* (2010), in this period the risk of contagion among euro area countries was also a relevant factor in determining the spreads.

(1) A *Credit Default Swap* is a financial derivative that allows investors to hedge credit risk, *i.e.* protect themselves against the possibility of a debt default.

(2) KFW is a banking group owned by the German State that aims to promote economic, social and ecological development. KFW's bonds are explicitly guaranteed by the German government and have several characteristics similar to German sovereign bonds, particularly in terms of taxes, issuance policy and investors base. In this context, KFW's yield spread against German government bonds should essentially reflect a liquidity premium.

3. DESCRIPTION AND ANALYSIS OF THE DATA

The first part of this section presents the data used in this study and discusses the potential problems related with their interpretation. In the second part a brief analysis of data is carried out as an introduction to the econometric analysis of the following section.

3.1. Data Description

In line with the previous section, the variables included in the model for euro area sovereign spreads aim to capture the price of risk in international financial markets, sovereign credit risk premiums and liquidity premiums.

The countries under analysis are the first twelve countries joining the euro area, with the exception of Luxembourg. The sample period runs from January 2007 to the end of 2009 or mid May 2010, depending on the variables included in the specifications. This period includes a similar number of observations before and after the collapse of Lehman Brothers, which helps the analysis of possible changes in the model determining sovereign spreads given the current economic and financial crisis. The variables for each country are defined in differences against Germany. The option of using Germany as the reference country is justified by the fact that German government bonds have reinforced their safe heaven and benchmark status during the current crisis, as a consequence of their relatively high credit quality and liquidity.[3]

The yields on government bonds were calculated using the data from the MTS electronic trading platforms for securities with a residual maturity of around 5 and 10 years.[4]

Two types of alternative variables were used to measure country risk premiums: sovereign CDS premiums and macroeconomic variables. The interpretation of CDS premiums defined against Germany as measures of country credit risk premiums, which is usual in the literature, should be undertaken with caution in the current context. Changes in liquidity conditions in financial markets may impact on CDS premiums thus leading to possible under/over estimates of sovereign risk premiums.[5] Additionally, movements in sovereign CDS premiums may not only reflect changes in the assessment of the credit quality of the underlying country, but may also reflect changes in global risk perception prevailing in financial markets.[6] Regarding macroeconomic indicators, we computed monthly series for variables related to public finances and the external position of each country, based on forecasts released by the European Commission, IMF and OECD. These series aim to reflect the one-year-ahead forecast at any point of time and correspond to a weighted average of the most recent forecasts, for the current year and the following year, provided by the three institutions. The use of these indicators instead of observed data appears to be more suitable for explaining

(3) One factor often mentioned as a determinant for the higher liquidity of German bonds is the existence of a highly efficient and liquid derivatives market on these securities (EUREX stock exchange), which is not the case for government bonds of other euro area countries. The results found by Ejsing and Sihvonen (2009) confirm the importance of this factor and suggest that its impact on sovereign spreads has increased over the current crisis.

(4) The methodology used for the construction of all indicators obtained from the MTS database is described in Barbosa and Costa (2010).

(5) See Buhler and Trapp (2009) and Alexopoulou *et al.* (2009).

(6) According to the results of Alexopoulou *et al.* (2009), based on data up to October 2008, the common risk factors have greatly increased their contribution to the CDS premiums of European firms during the current crisis.

sovereign yield spreads in the current crisis, a period which has been characterized by frequent reassessments of country credit risk.

Bond liquidity premiums are relatively difficult to evaluate empirically. On the one hand, there is no consensual measure for liquidity in the literature. Empirical applications for gauging liquidity focus on several alternative indicators, related, for instance, with transaction costs, speed of transactions, trading volumes or market depth, which aim to capture its different dimensions. Obtaining representative data on the liquidity of government bonds is also hindered by the fact that these securities are traded in several markets, including non-organized markets for which no data are available. In the particular case of euro area government bonds, many studies construct liquidity measures from the MTS database, given the high weight of these platforms in the secondary market trading of European government bonds. In this study, we have used several alternative measures to assess liquidity premiums.

Based on data from the MTS platforms for the period 2007-2009, we obtained several liquidity indicators, expressed in relation to Germany. These included measures of transaction costs (*bid/ask spread* - *ba*), volumes available for trade (average volume of proposals posted at the best bid and ask prices – *depth*; and maximum volume of proposals for the best three prices - *max*), transactions (trading volume – *vol*; and number of transactions - *trs*), as well as the ratio between transaction costs and the volume available for trade (*adepth*).[7] These variables have the advantage of representing direct measures for the liquidity of the securities under analysis. However, they also have the disadvantage of being highly dependent on the representativeness of MTS platforms in the overall market. This situation is particularly relevant in the crisis period, when unorganized over-the-counter markets have increased their importance *vis-à-vis* electronic platforms.[8] During this period there have also been several regulatory changes which may have contributed to a reduction of the MTS market share in several countries.[9]

In order to overcome the distortions associated with changes in market structure, the liquidity premiums were also assessed using measures not related with a specific market infrastructure (indirect liquidity measures). Given that information and transaction costs may decline with the dimension of the market, the relative size of each country's government bond market was used as a liquidity premium proxy. This indicator was based on the outstanding amounts of long term euro-denominated debt securities issued by euro area central governments, published by the ECB. Additionally, as a proxy for the price of liquidity risk, *i.e.* the risk that liquidity may deteriorate in the future, we calculated the yield spreads between the 5 and 10 years bonds issued by KFW and German bonds with similar maturities, in line with the approach adopted by Schwartz (2009).

Finally, the risk premium in international financial markets was assessed by the first principal component of a set of variables, for the euro area and the United States, usually found in the literature as

(7) Details on the construction of liquidity measures are presented in Barbosa and Costa (2010).

(8) The greater difficulty in performing transactions on large amounts on the electronic platforms without greatly affecting the prices appears to have contributed for this change.

(9) Since 2008, several euro area countries have been allowing primary dealers to fulfil their quote obligations on electronic platforms other than MTS.

measures of risk premiums in corporate bond markets and uncertainty in financial markets. The input variables were BBB corporate bond spreads, several CDS indices for financial and non-financial sectors and stock and bond markets implied volatilities.[10]

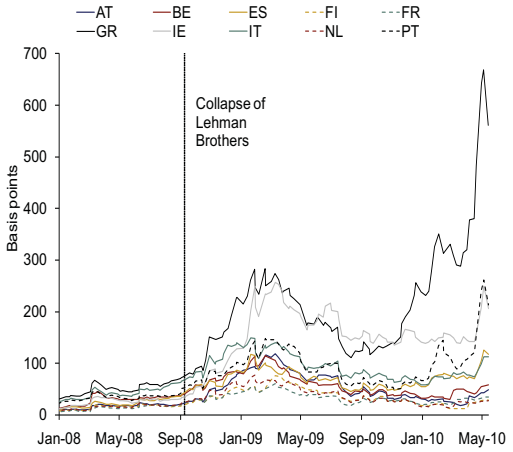
3.2. Analysis of the evolution of spreads and explanatory variables

Throughout the current crisis, there have been substantial changes in the path of sovereign bond spreads in euro area countries. In the months following the collapse of Lehman Brothers, there was a significant widening of sovereign spreads (Chart 1). Between the second quarter of 2009 and early summer, spreads moved generally downwards. Since October 2009, the disclosure of a significant deterioration in Greece's public finances generated substantial concerns over their sustainability, which spilled over to other euro area countries with weaker macroeconomic positions. In Greece, Portugal and, to a lesser extent, Ireland, Spain and Italy, spreads were significantly up in first half 2010. Although there was also an increase in other countries' spreads, they did not exceed the levels recorded in the months following the bankruptcy of Lehman Brothers.

The principal components of spreads and their determinants were calculated for the purpose of evaluating the relevance of common factors to the path of these variables. The first principal components of the yield spreads, of the differences with Germany in CDS premiums and in bid/ask spreads explain, at least, about 75 percent of the respective variances in the period 2007 to 2009.[11] The major importance of the first principal components suggests that the evolution of sovereign risk and liquidity premiums may, to a large extent, be determined by a single common factor. Indeed, in the sample pe-

Chart 1

10 YEAR EURO AREA GOVERNMENT BOND YIELD SPREADS TO GERMANY



Source: Thomson Reuters.

(10) The option to compute the principal components derived from the fact that there is a certain variability in the estimation results obtained from the individual variables. The first principal component explains about 85 percent of the variance of these variables.

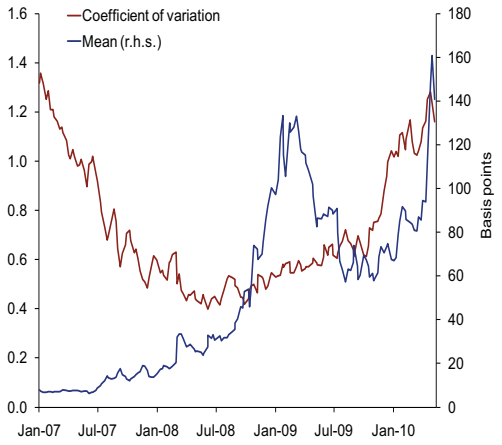
(11) In the case of the MTS liquidity variables referring to quantities, the first principal components explain lower proportions, pointing to the greater importance of idiosyncratic factors. This may be explained by a higher sensitivity of quantities to changes in market structure or to different market making rules in the domestic MTS platforms.

riod, the first principal components of yield spreads, of CDS premiums and of bid/ask spreads defined against Germany are highly correlated either between each other or with the international financial markets global risk indicator or even with the KFW indicator, designed to capture liquidity risk.

In the period under review, there appears to have been a change in the relevance of common factors explaining the spreads. To illustrate the evolution of the dispersion of country spreads, Chart 2 presents the yield spreads coefficient of variation. In the period before the current crisis, this coefficient tended to move downwards, which is in line with the idea that the high liquidity prevailing in international financial markets contributed to a lower level of risk differentiation. The fact that this downward trend continued through the first two months of 2008 suggests that, at the beginning of the crisis, the increase in global risk aversion led to a flight to the government bond markets in general.[12] Between the liquidity problems with the Bear Stearns investment bank, in mid March, and until September 2008, German bonds appear to have benefited from flight-to-quality movements, but there is no evidence of significant differentiation among bonds of other euro area countries. The increase in spreads observed in this period should, accordingly, have mainly been determined by the reduction in risk appetite in financial markets. The coefficient of variation increased, however, from late 2008 and, more markedly so, from late October 2009, which suggests an increase in the importance of idiosyncratic factors. The increased relevance of these factors took place in a context of the deteriorating outlook for public finances, initially due to the support measures for the financial system and economic stimulus plans, and later to the economic recession of 2009. These developments suggest that, at least, part of the idiosyncratic spreads movements were associated with a deterioration in credit quality in several countries. Indeed, the largest increases in spreads since the onset of the

Chart 2

MEAN AND DISPERSION OF 10 YEAR EURO AREA GOVERNMENT BOND YIELD SPREADS TO GERMANY



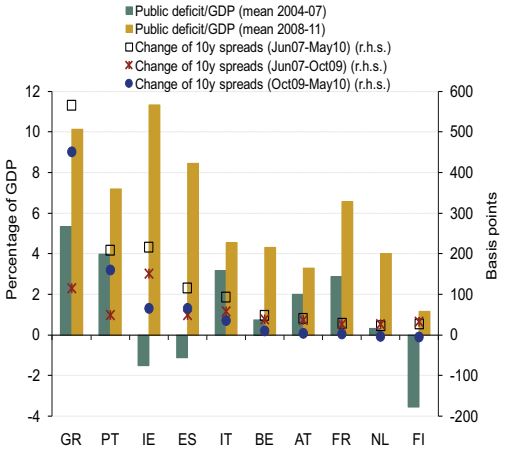
Source: Thomson Reuters.

(12) There was an increase in trading volumers on MTS platforms in this period.

financial crisis, and especially since late 2009, occurred in countries with an adverse macroeconomic situation at the onset of the crisis and/or where it has deteriorated significantly afterwards (Chart 3 and Chart 4).

Chart 3

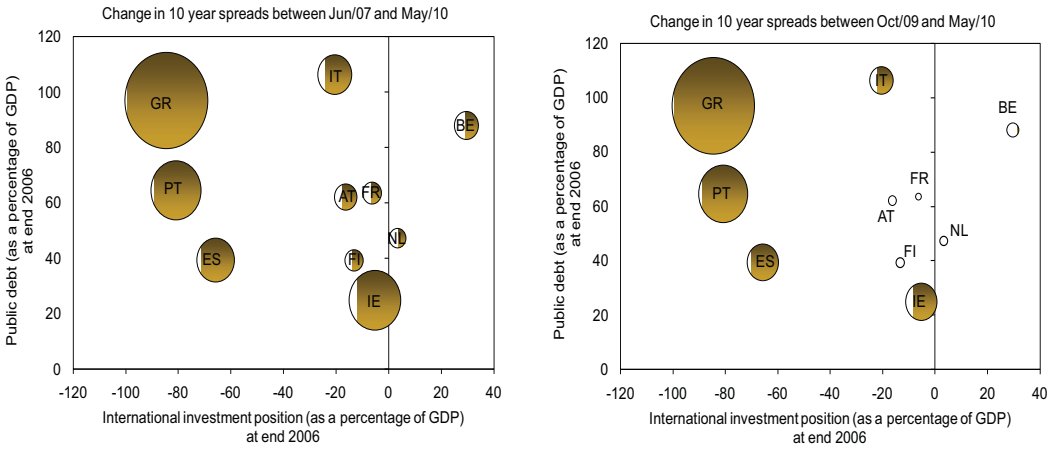
PUBLIC DEFICIT AND EURO AREA GOVERNMENT BOND YIELD SPREADS



Sources: European Commission and Thomson Reuters.

Chart 4

MACROECONOMIC IMBALANCES AND SPREADS EVOLUTION[(a)]



Sources: ECB, European Commission and Thomson Reuters.
Note: (a) Circle area = Change in 10 year government bond spread (unfilled circles correspond to negative values).

4. ECONOMETRIC RESULTS

The first part of this section presents the estimated results for euro area sovereign bond spreads, when credit risk premiums are measured by the sovereign CDS spreads. Although the data are available daily, the volatility of the series in several periods justifies the use of weekly averages. In the second part of the section, we present specifications in which credit risk is measured by macroeconomic variables, using monthly data. In both approaches, the liquidity premium and risk premium in international financial markets are evaluated using the variables outlined in the previous section. The estimates were performed for the period 2007-2009. In the last part of this section, the specification for the monthly spreads has been re-estimated for a longer period, including data up to mid May 2010.

Both equations were estimated using a panel data approach (unbalanced panel). This solution appears to be more appropriate to the small size of the sampling period, particularly in the specifications based on monthly data. The characteristics of the data raise several econometric problems. In addition to heterogeneity across countries (a typical problem in cross section), the temporal dimension of the data and the (spatial) correlation between countries must be taken into account, particularly given the single monetary policy. The econometric method applied is the Pooled OLS, in which the variance and covariance matrix of the residuals is obtained on the basis of the Driscoll and Kraay (1998) approach. This method makes it possible to correct heteroscedasticity and simultaneously to obtain robust residuals for temporal and country correlations.[13,14]

4.1. Credit risk premium measured by CDS

Equation (1) corresponds to the specification for the sovereign bond yield spreads of ten euro area countries against Germany, for the period 2007-09, with data based on weekly averages.

$$spread_{i,t}^{m} = c + \beta_1 cds_{i,t}^{m} + \beta_2 liq_{i,t}^{m} + \beta_3 pr_t + \beta_4 lb + \beta_5 C_i + \beta_6 mat_{i,t}^{m} + \beta_7 Dm + u_{i,t}^{m} \qquad (1)$$

In this equation, i and t represent the country and the time period, respectively, while m corresponds to the bonds' residual maturity (5 and 10 years). The variables $spread$, cds and liq are, respectively, the sovereign bond yield, the CDS premium and the liquidity indicator, all defined relative to Germany. The six MTS liquidity indicators are included alternatively in the specification. The variable pr is a proxy for the risk premium in international financial markets. lb corresponds to a dummy that takes value 1 in the period following the collapse of Lehman Brothers. C represents the country dummies, which make it possible to take into account the differences in the average spread for each country, which are not justified by the remaining variables. mat represents the difference between the aver-

(13) The estimates were made in the STATA econometric programme, applying the command xtcss - Regression with Driscoll-Kraay standard errors.

(14) Given the temporal dimension of data, the impact of persistence in spreads was evaluated with the estimation of regressions that include among the explanatory variables the lag of spreads (applying FGLS estimation methods for panel data, correcting heteroskedasticity and autocorrelation of residuals). In these specifications, although the lagged term is significant, the conclusions concerning the impact of sovereign credit risk, liquidity risk and global risk remained broadly unchanged.

age residual maturity of the bonds of country i and German bonds.[15] Finally, the dummy *Dm* has the value 1 for bonds with a residual maturity of 10 years.

The first six columns of Table 1 present the estimated results of equation (1). The fact that the coefficients of CDS spreads and financial markets risk premium indicator are statistically significant and positive suggests the importance of credit risk and risk aversion in international financial markets in determining sovereign yield spreads. In the case of liquidity indicators, there is no statistical evidence of their relevance in determining the spreads. However, liquidity seems to play a role for bonds with a residual maturity of 5 years.[16]

Given the relevance of the common component in the path of CDS premiums identified in the previous section, it is important to assess to what extent the significance of cds does not stem solely from this component. The previous specifications have therefore been re-estimated replacing the CDS spreads by the residuals obtained in auxiliary regressions performed for each country, in which the endogenous variable is the CDS spread and the explanatory variables are a constant term and the first principal component of the CDS spreads. According to the results, CDS residuals are statistically significant, which confirms the relevance of idiosyncratic factors related with credit risk for the determination of sovereign bond yield spreads.[17] In general terms, there is an increase in liquidity indicator coefficients, which have the expected signs and are in some cases statistically significant. The global risk factor coefficient has also increased and remains significant. These developments are in line with the positive correlations between the common component of CDS spreads, the common component of liquidity indicators and the risk premium in financial markets indicator. The interaction between sovereign credit risk premiums, liquidity premiums and global risk is further corroborated by the results of regressions that include, as an alternative to the MTS variables, the indicator of liquidity risk *kfw*.[18]

To identify possible changes in the relation between the sovereign spreads and the respective determinants arising from the crisis, equation (1) was re-estimated to include the interaction terms between the dummy *lb* and the variables related with global risk, sovereign credit risk and liquidity. The results, which are presented in the last six columns of Table 1, confirm the relevance of global risk aversion for the determination of spreads and suggest its impact has not changed with the deepening of the crisis, after the collapse of the Lehman Brothers. For liquidity premium, the results are not conclusive. With regard to sovereign credit risk, the results suggest an increase in its contribution with the deepening of the crisis. In the regressions with the CDS residuals, the fact that only the interaction term is significant suggests that prior to the collapse of Lehman Brothers spreads were not significantly determined by idiosyncratic credit risk factors.

(15) This variable aims to control the effects arising from the fact that the yields for each maturity were based on bonds with differences in their residual maturity (albeit within a limited range), and from the fact that there are changes in the bonds used throughout the series. The alternative of having estimated yields with constant maturity would not have been a better solution given that, for some periods, there are many days with missing observations and the data is highly volatile.

(16) For simplicity, this article only presents the results obtained for both maturities simultaneously. The results for each maturity are presented in Barbosa and Costa (2010).

(17) The results of these regressions are presented in Barbosa and Costa (2010).

(18) As can be seen in Barbosa and Costa (2010), in these specifications the global risk indicator loses statistical significance, and the t-ratio of *kfw* increases when the CDS are replaced by the CDS residuals.

Table 1

RESULTS OF SPREADS ESTIMATION IN THE PERIOD 2007-2009
Credit risk measured by CDS

	All bonds						All bonds - regressions with interaction terms					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
cds	0.854***	0.851***	0.848***	0.851***	0.873***	0.872***	0.330**	0.320**	0.316**	0.323**	0.290*	0.314**
	(24.64)	(24.09)	(23.45)	(24.58)	(28.41)	(28.35)	(2.39)	(2.27)	(2.13)	(2.34)	(1.86)	(2.09)
cds_lb							0.511***	0.522***	0.516***	0.514***	0.566***	0.538***
							(3.95)	(4.03)	(3.92)	(3.95)	(3.89)	(3.87)
pr	0.031***	0.031***	0.031***	0.031***	0.031***	0.031***	0.031***	0.037***	0.037***	0.032***	0.038***	0.036***
	(4.21)	(4.18)	(4.21)	(4.15)	(4.13)	(4.12)	(5.20)	(6.11)	(5.70)	(5.68)	(5.64)	(5.65)
pr_lb							0.010	0.005	0.004	0.009	0.008	0.010
							(0.99)	(0.42)	(0.31)	(0.86)	(0.83)	(1.03)
ba	-0.005						0.163					
	(-1.01)						(1.66)					
ba_lb							-0.169*					
							(-1.72)					
depth		-1.612						-2.275***				
		(-1.63)						(-3.23)				
depth_lb								2.667				
								(0.69)				
max			-0.641						-0.459			
			(-1.37)						(-0.96)			
max_lb									-0.187			
									(-0.16)			
adepth				0.0000528						0.002		
				(0.40)						(1.70)		
adepth_lb										-0.002		
										(-1.69)		
trs					-0.001						-0.00003	
					(-1.28)						(-0.06)	
trs_lb											-0.00565**	
											(-2.39)	
vol						-0.176						-0.062
						(-1.56)						(-0.93)
vol_lb												-0.421
												(-1.54)
mat	0.087***	0.088***	0.087***	0.087***	0.074***	0.074***	0.082***	0.084***	0.083***	0.082***	0.067***	0.066***
	(5.41)	(5.49)	(5.42)	(5.35)	(3.82)	(3.83)	(5.77)	(5.87)	(5.72)	(5.70)	(3.95)	(3.90)
Dmat	0.086***	0.084***	0.080***	0.085***	0.094***	0.094***	0.093***	0.091***	0.090***	0.093***	0.107***	0.106***
	(6.43)	(6.06)	(4.99)	(6.35)	(6.97)	(7.01)	(6.83)	(6.99)	(5.71)	(6.83)	(8.00)	(7.99)
lb	0.085**	0.091***	0.090***	0.085**	0.087**	0.088**	0.021	0.008	0.008	0.017	0.006	0.004
	(2.87)	(3.13)	(3.00)	(2.88)	(2.70)	(2.72)	(0.74)	(0.30)	(0.27)	(0.62)	(0.26)	(0.17)
constant	0.032	0.021	0.026	0.031	0.058	0.059	0.082*	0.089**	0.099**	0.086*	0.129***	0.129***
	(1.28)	(0.83)	(1.01)	(1.23)	(2.05)	(2.09)	(2.58)	(2.97)	(3.28)	(2.77)	(4.00)	(4.01)
Country dummy	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	3066	3066	3066	3066	2479	2479	3066	3066	3066	3066	2479	2479
R-sq	0.902	0.902	0.902	0.902	0.911	0.911	0.910	0.910	0.909	0.909	0.921	0.920

Sources: European Commission, IMF, MTS, OECD and authors' calculations.

Notes: The table presents the estimated coefficients and the respective significance levels (*** 1%, ** 5% and * 10%). The t-statistics are presented in brackets. *cds* represents the CDS spread; *pr* corresponds to the risk premium in international financial markets; *lb* is a dummy for the period after the collapse of Lehman Brothers; *mat* corresponds to a maturity variable; *Dmat* has the value 1 for bonds with 10 year residual maturity; *ba, depth, max, adepth, trs* and *vol* correspond to liquidity indicators based on MTS data. The interaction terms between *lb* dummy and the other variables are identified by *_lb* at the end of the variable name. The variables for each country are defined in differences against Germany.

In short, the above analysis suggests that an increase in the global risk premium in financial markets has a positive and significant impact on euro area government bond yield spreads, contributing apparently to increases in credit and liquidity risk premiums. These premia also seem to have been conditioned by factors specific to each economy. With the deepening of the financial crisis, after mid-September 2008, the positive impact of CDS on yield spreads increased, which stems apparently from the greater relevance of country credit risk.

4.2. Credit risk premium measured by macroeconomic variables

4.2.1. Data up to end 2009

In this subsection sovereign credit risk is measured by macroeconomic variables instead of CDS spreads. Macroeconomic data are not affected by changes in liquidity conditions or by changes in the risk premium in financial markets. This approach therefore enables us to evaluate the robustness of the importance of country credit risk, as measured by CDS spreads, found in previous specifications.

The path of credit risk premiums in euro area countries is likely to have reflected not only developments in economies over time, but also the baseline position concerning macroeconomic imbalances. Therefore, in addition to macroeconomic forecasts, explanatory variables also include the international investment position and public debt, as a percentage of GDP, at the end of 2006, *i.e.* in the period preceding the beginning of the sample.

In this context, we tested several specifications. We found evidence that the initial macroeconomic situation of each economy is relevant in determining the average level of spreads. We also noted that changes in spreads over time are related to the outlook for the public finances. Table 2 displays the results of the estimation of equation (2).

$$spread_{i,t}^{m} = c + \beta_1 so_{i,t} + \beta_2 iip_i^{06} + \beta_3 div_i^{06} + \beta_4 share_i^{06} + \beta_5 liq_{i,t}^{m} + \beta_6 pr_t + \beta_7 lb + \beta_8 Dm + u_{i,t}^{m} \quad (2)$$

In addition to the previously defined variables, $so_{i,t}$ corresponds to the forecast in t (for the one-year-ahead period) of the fiscal balance, as a percentage of GDP, for country i against Germany. div_i^{06} and iip_i^{06} respectively represent the differentials with Germany in the public debt and international investment position of country i at the end of 2006 (both as a percentage of GDP). Finally, $share_i^{06}$ represents the relative size of the public debt market in country i in late 2006, defined in comparison to Germany.

The fact that the coefficient of fiscal balance is negative and statistically significant indicates that a deterioration in the outlook for the fiscal balance in comparison to Germany leads to an increase in the spread. The public debt and international investment position coefficients are also significant, suggesting that the differences between the average levels of spreads in the various countries are related to macroeconomic imbalances. Countries which, in late 2006, already had higher public debt ratios or poorer international investment positions should have noted, only taking these effects into account, an average level of spreads higher than countries with a more favourable macroeconomic

Table 2

RESULTS OF SPREADS ESTIMATION IN THE PERIOD 2007-2009
Credit risk measured by macroeconomic variables

	All bonds						All bonds - regressions with interaction terms					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
so	-0.048***	-0.052***	-0.051***	-0.037**	-0.055***	-0.055***	-0.002	-0.004	-0.003	-0.002	-0.003	-0.003
	(-3.36)	(-4.38)	(-4.03)	(-2.84)	(-3.88)	(-3.92)	(-1.17)	(-1.71)	(-1.38)	(-1.20)	(-1.42)	(-1.56)
so_lb							-0.095***	-0.072***	-0.082***	-0.081***	-0.102***	-0.103***
							(-7.70)	(-6.62)	(-7.41)	(-6.36)	(-8.69)	(-8.88)
div_06	0.004***	0.004***	0.005***	0.004***	0.004**	0.004**	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***
	(3.02)	(3.04)	(3.31)	(3.17)	(2.79)	(2.71)	(7.25)	(7.41)	(5.73)	(7.58)	(6.69)	(6.58)
div06_lb							0.008***	0.008***	0.008***	0.008***	0.009***	0.008***
							(6.72)	(6.18)	(6.35)	(6.05)	(6.26)	(5.60)
iip_06	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002**	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(-3.82)	(-3.62)	(-4.08)	(-3.67)	(-3.63)	(-3.51)	(-7.66)	(-7.58)	(-7.28)	(-7.53)	(-7.11)	(-7.05)
iip06_lb							-0.002**	-0.002**	-0.001*	-0.002**	-0.002**	-0.002**
							(-2.43)	(-2.38)	(-1.76)	(-2.40)	(-2.39)	(-2.37)
pr	0.058***	0.071***	0.070***	0.052**	0.071***	0.074***	0.045***	0.052***	0.053***	0.045***	0.052***	0.052***
	(3.53)	(4.19)	(4.51)	(3.43)	(4.21)	(4.16)	(6.76)	(8.53)	(8.47)	(6.59)	(8.94)	(8.73)
pr_lb							0.045	0.043	0.031	0.034	0.051	0.059*
							(1.44)	(1.48)	(1.03)	(1.12)	(1.72)	(1.97)
share_06	-0.011**	-0.014**	-0.013**	-0.010**	-0.012***	-0.013***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
	(-2.87)	(-3.16)	(-3.14)	(-2.89)	(-3.03)	(-3.18)	(-4.14)	(-4.28)	(-4.40)	(-4.38)	(-4.37)	(-4.81)
share_06_lb							-0.024***	-0.027***	-0.024***	-0.021***	-0.026***	-0.027***
							(-4.76)	(-5.73)	(-4.88)	(-4.74)	(-5.51)	(-4.97)
ba	0.239***						0.235**					
	(6.30)						(2.43)					
ba_lb							-0.073					
							(-0.67)					
depth		-13.300**						-0.815				
		(-2.28)						(-1.06)				
depth_lb								-59.190***				
								(-3.96)				
max			-5.048**						-0.206			
			(-2.84)						(-0.37)			
max_lb									-12.550**			
									(-3.85)			
adepth				0.006***						0.004**		
				(10.12)						(2.81)		
adepth_lb										0.001		
										(0.38)		
vol					-0.598						-0.191	
					(-1.72)						(-1.46)	
vol_lb											-1.371*	
											(-2.02)	
trs						0.001						-0.000341
						(1.10)						(-0.52)
trs_lb												0.005
												(0.89)
Dmat	0.097***	0.104***	0.069**	0.089***	0.129***	0.122***	0.101***	0.136***	0.116***	0.095***	0.131***	0.123***
	(4.04)	(4.02)	(2.63)	(3.48)	(5.34)	(5.48)	(4.37)	(4.23)	(3.93)	(3.81)	(5.42)	(5.70)
lb	0.247***	0.309***	0.289***	0.242***	0.259***	0.254***	-0.232**	-0.228**	-0.104	-0.210*	-0.248**	-0.310**
	(4.40)	(5.63)	(5.83)	(5.01)	(3.73)	(3.51)	(-2.19)	(-2.39)	(-1.12)	(-2.06)	(-2.31)	(-2.45)
constant	-0.029	-0.082	-0.010	-0.032	-0.015	-0.036	0.105***	0.105***	0.119***	0.107***	0.118***	0.117***
	(-0.49)	(-0.89)	(-0.14)	(-0.57)	(-0.23)	(-0.52)	(4.83)	(4.42)	(4.76)	(4.62)	(6.06)	(6.11)
N	710	710	710	710	696	696	710	710	710	710	696	696
R-sq	0.665	0.662	0.665	0.707	0.652	0.650	0.762	0.794	0.775	0.786	0.769	0.767

Sources: ECB, European Commission, IMF, MTS, OECD and authors' calculations.

Notes: The table presents the estimated coefficients and the respective significance levels (*** 1%, ** 5% and * 10%). The t-statistics are presented in brackets. *so* corresponds to the fiscal balance forecast; *div_06* corresponds to the public debt at end 2006; *iip_06* corresponds to the international investment position at end 2006; *pr* represents the monthly average of the risk premium in the international financial markets; *share_06* represents the relative size of the public debt market at end 2006; *ba, depth, max, adepth, vol* and *trs* correspond to the monthly average of the liquidity indicators based on MTS data; *Dmat* has the value 1 for bonds with 10 year residual maturity; *lb* is a dummy for the period after the collapse of Lehman Brothers; The interaction terms between *lb* dummy and the other variables are identified by *_lb* at the end of the variable name. The variables for each country are defined in differences against Germany.

position. In the case of liquidity indicators, the results suggest that the size of the long term government bond market has a favourable impact on the average level of spreads.[19] For the MTS variables, the indicators based on quotes data (*ba, depth, max* and *adepth*) are generally significant and have the expected signals. The fact that the indicators associated with transactions (*vol* and *trs*) are not significant may possibly be due to the fact that, in months with a low level of trading activity, the monthly averages do not correctly reflect market liquidity. The risk premium in financial markets coefficient remains positive and statistically significant.

In line with the approach for weekly data, Table 2 also presents the results of equation (2) when the cross-terms with the dummy *lb* are included. These results confirm the sharper impact of the macroeconomic situation in the period following the bankruptcy of Lehman Brothers. The results even suggest that the outlook for fiscal balances only began to affect yield spreads with the deepening of the crisis. With regard to liquidity, when measured by $share_i^{06}$, there is evidence of an increased effect. The conclusions based on MTS variables are still not clear. The interaction term for the risk premium in financial markets suggests that in the period of deepening of the crisis there were no significant changes in the way in which risk aversion in financial markets affected spreads.

Chart 5 compares the levels of observed spreads with those estimated for the period before and after the bankruptcy of Lehman Brothers. It also provides a breakdown of estimated spreads by their determinants. The estimated figures capture relatively well the levels of spreads, both in the period prior to and after the collapse of Lehman Brothers.[20] With regard to the breakdown of spreads, the results illustrate the reduction of the relative importance of the global risk factor during the economic and financial crisis. Although in absolute terms this variable's contribution to the level of spreads has increased from about 15 bp to about 35 bp, in relative terms it declined, on average, from around 70 per cent to around 50 per cent. The contributions made by credit risk and liquidity premiums increased both in absolute terms in the period following the bankruptcy of Lehman Brothers. In most countries the liquidity premium increased in comparison to credit risk premium.

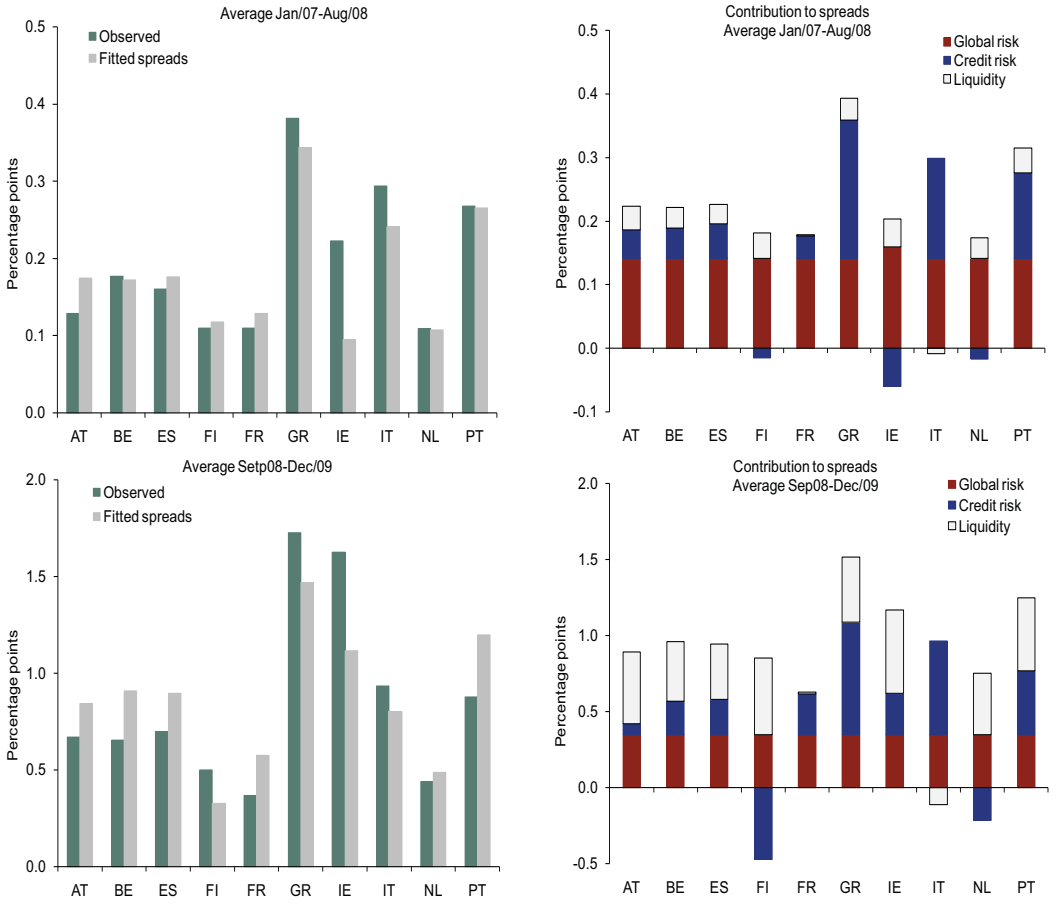
Chart 6 provides a breakdown of changes in spreads for different periods. Between January 2007 and August 2008, the increase in spreads was determined by increased risk aversion in financial markets. In the months following the bankruptcy of Lehman Brothers, the risk premium in financial markets continued to contribute to a widening of spreads, although it was no longer the main factor behind changes in spreads. In that period, most countries witnessed a significant increase in the liquidity premium and, to a lesser extent, in the credit risk premium. The narrowing of spreads recorded between March and September 2008 reflected a reduction in the risk premium in international financial markets, as well as slight reductions in liquidity premiums. These developments were, however, partially offset by an increase in sovereign risk premiums in most countries. In the last quarter of 2009, country credit risk explained the increases in spreads.

(19) The variable corresponding to the evolution over time of each country's share of the euro area long term government bond market (defined relative to Germany) also presents a negative and significant coefficient when included in the equation (2), as an alternative to $share^{06}$. However, the results with this variable are unstable, which may suggest they are also capturing sovereign credit risk effects. In fact, changes in the sovereign debt outstanding amounts in the current crisis were largely determined by increased public sector borrowing requirements.

(20) The chart is based on the results for the specification with *adepth* and *lb* interaction terms estimated for 10 year residual maturity bonds. The use of the alternative specifications does not lead to significant differences in the results. For simplicity, only the results for bonds with residual maturity of 10 years are presented. The conclusions for bonds with residual maturity of 5 years are similar.

Chart 5

FITTED 10 YEAR GOVERNMENT BOND YIELD SPREADS



Sources: ECB, European Commission, IMF, MTS, OECD and authors' calculations.

To sum up, the results based on macroeconomic data up to the end of 2009 confirm that, while in the period before the collapse of Lehman Brothers global risk aversion was the main factor determining the spreads, with the deepening of the crisis there was an increase in the relevance of idiosyncratic factors.

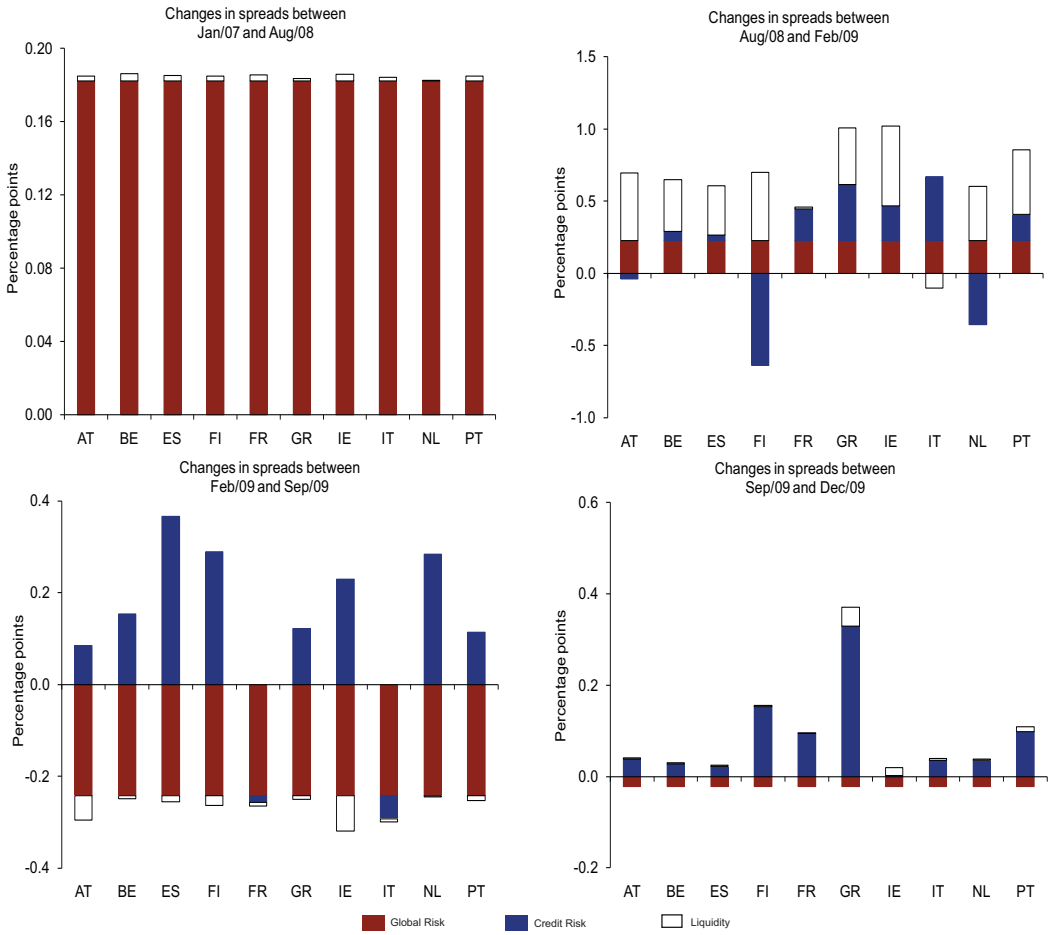
4.2.2. Data up to March 2010

The analysis performed in Section 3 suggests that the widening in euro area sovereign spreads recorded from late 2009 was related with an increase in the importance of country specific factors and, in particular, the increased possibility of default by several countries. This period of renewed turbulence in euro area sovereign bond markets was largely triggered by the perception that Greece's public finances were on an unsustainable path. These concerns spilled over rapidly to other euro area countries such as Portugal, Ireland, Italy and Spain, with a poorer level of economic performance, giving rise to some concerns over the stability of the euro area as a whole.

In this subsection we have re-estimated the previous specifications for a sample period extended to May 2010. The cut-off date was May 9, in order to exclude possible effects arising from the Eurosys-

Chart 6

DETERMINANTS OF CHANGES IN 10 YEAR GOVERNMENT BOND YIELD SPREADS



Sources: ECB, European Commission, IMF, MTS, OECD and authors' calculations.

tem's purchases of euro area government debt securities in the secondary market, under the Securities Market Programme. As we do not have MTS data for 2010, liquidity premiums are measured only by the variable $share^{06}$, while yield spreads are calculated using the yields on benchmark bonds with residual maturities of 5 and 10 years provided by Thomson Reuters (which do not differ significantly from the yields obtained from the MTS database). The exclusion of MTS variables does not change the conclusions for the period 2007-09.

The results based on data up to May 2010 are given in Table 3. In addition to the previously defined variables, *lb** corresponds to a dummy with the value 1 for the period between the collapse of Lehman Brothers and October 2009, while *nov* takes the value 1 for the subsequent period. In line with previous subsections, the table also includes a specification containing the interaction terms with the temporal dummies. In the regression without these cross terms, all variables have the expected signals and are statistically significant. The results of the specification with the cross terms confirm that spreads' sensitivity to country factors has changed in the current crisis. Both in the case of macroeconomic variables, which aim to capture sovereign credit risk, and the liquidity variable the coefficients of cross terms with the dummy *nov* are higher than those of the cross terms with the dummy

Table 3

RESULTS OF SPREADS ESTIMATION IN THE PERIOD 2007- MAY 2010
Credit risk measured by macroeconomic variables

	All bonds	
	(1)	(2)
so	-0.083***	-0.002
	(-3.62)	(-0.80)
so_lb*		-0.107***
		(-7.99)
so_nov		-0.232***
		(-4.92)
div_06	0.008**	0.003***
	(2.64)	(8.79)
div06_lb*		0.010***
		(5.87)
div06_nov		0.028***
		(3.42)
iip_06	-0.003**	-0.001***
	(-2.53)	(-9.42)
iip06_lb*		-0.001**
		(-2.18)
iip06_nov		-0.008**
		(-2.37)
share_06	-0.020***	-0.001
	(-2.93)	(-1.35)
share_06_lb*		-0.029***
		(-4.89)
share_06_nov		-0.052***
		(-3.51)
pr	0.076***	0.052***
	(4.03)	(7.81)
pr_lb*		0.044
		(1.35)
pr_nov		0.457***
		(3.51)
lb*	0.223**	-0.283**
	(2.57)	(-2.30)
nov	0.494**	-0.569**
	(2.73)	(-2.29)
Dmat	0.068***	0.059**
	(2.98)	(2.50)
constant	-0.182	0.161***
	(-1.34)	(6.79)
N	798	798
R-sq	0.454	0.693

Sources: ECB, European Commission, IMF, OECD and authors' calculations.

Notes: The table presents the estimated coefficients and the respective significance levels (*** 1%, ** 5% and * 10%). The t-statistics are presented in brackets. *so* corresponds to the fiscal balance forecast; *div_06* corresponds to the public debt at end 2006; *iip_06* corresponds to the international investment position at end 2006; *pr* represents the monthly average of the risk premium in the international financial markets; *share_06* represents the relative size of the public debt market at end 2006; *Dmat* has the value 1 for bonds with 10 year residual maturity; *lb** is a dummy for the period between the collapse of Lehman Brothers and October 2009; *nov* is a dummy for the period after November 2009. The interaction terms between the time dummies and the other variables are identified by *_lb** and *_nov* at the end of the variable name. The variables for each country are defined in differences against Germany.

*lb**. This result confirms the analysis in Section 3, which suggested that there had been an increase in the impact of each economy's specific factors since the end of 2008, and, more sharply so, since October 2009. In turn, the impact of the risk premium in financial markets remained unchanged until October 2009, increasing thereafter.

5. FINAL REMARKS

Euro area government bond spreads to Germany, recorded since early 2007, can largely be explained by differences between countries regarding the creditworthiness of national governments, liquidity in domestic bond markets, as well as by the risk premium in international financial markets. This latter factor is strongly correlated with the principal components of the sovereign CDS premiums and of the *bid/ask* spreads, defined in comparison to Germany, as well as with an indicator of the liquidity risk in euro area bond markets. This situation suggests that the decline in risk appetite in international financial markets noted during the current crisis has amplified the credit and liquidity risk premiums of euro area bonds against Germany. After the deepening of the crisis in September 2008, idiosyncratic factors have increased their effect on spreads reflecting both the adverse developments in sovereign credit risk and deteriorating liquidity conditions, but also the fact that markets have gone to penalize more the interest rates of countries with major macroeconomic imbalances and/or less liquid sovereign debt markets. The increase in sovereign credit risk premiums has been more marked in countries whose fiscal balance outlook has deteriorated more and/or in countries which, prior to the onset of the crisis, already had higher public debt ratios and poorer international investment positions. In turn, there has been a greater increase in liquidity premiums in countries with smaller public debt markets.

In the period before the collapse of Lehman Brothers, the risk premium in financial markets accounted on average for around 70 percent of euro area sovereign bond yield spreads. Since September 2008, the indicators for country differences in terms of credit quality and liquidity have played a more important role in determining the yield spreads. These indicators, as a whole, accounted for around 50 per cent of the average level of spreads noted between September 2008 and December 2009. Differences between countries in terms of liquidity were particularly important in explaining the increase in yield spreads in the months following the collapse of Lehman Brothers. In turn, idiosyncratic credit risk factors appear, to a large extent, to explain the increase in spreads at the end of 2009. In the first five months of 2010, the evolution of spreads was largely determined by greater heterogeneity in sovereign credit risk premiums, together with a further increase in risk aversion in financial markets.

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FORECASTING INFLATION WITH MONETARY AGGREGATES*

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*Ana Pereira***

> *I am concerned that this encouraging but brief period of success will foster the opinion, already widely held, that the [ECB's] monetary pillar is superfluous, and lead monetary policy analysis back to the kind of muddled eclecticism that brought us the 1970s inflation.*
>
> *Lucas (2006)*

Although few would disagree that "inflation is always and everywhere a monetary phenomenon" (Friedman 1963), the last decades have seen a diminished role assigned to money in the conduct of monetary policy. On one hand, mainstream so-called New-Keynesian monetary analysis lives in cashless economies where money demand is considered redundant given an interest rate policy (see, *e.g.*, Woodford 2007a) or, similarly, the long-run relation between money and inflation is seen as just one among many steady-state relations (see Galí 2002). This does not come without criticisms as steady state inflation is taken as exogenous (the central bank target), independent of money supply (see Nelson 2008). On the other hand, issues of instability of money demand and the fact that money seems useless in forecasting inflation (see *e.g.*, Estrella and Mishkin 1997 for an earlier reference) contribute to the de-emphasis of the role of money in monetary policy analysis. In any case, there is broad recognition of the long-run relation between money growth and inflation.

The voluminous literature on inflation forecasting points to the fact that, in the words of Stock and Watson (2007), "inflation has become both easier and harder to forecast" since the early 1980's. Easier in the sense that forecast errors have been smaller, and harder because it has become extremely difficult to beat simple univariate forecasts. The use of large panels does not help and Phillips curve forecasts are in bad shape (Stock and Watson 2008) whereas Ang, Bekaert and Wei (2007) ironically conclude that survey forecasts (especially the Philadelphia survey of professional forecasters) deliver inflation forecasts that are superior to a host of alternative methods.

Against this background, this article shows how monetary aggregates can be usefully incorporated in forecasts of US inflation and how these dominate a wide range of competing forecasts. The crucial aspect of our approach comes from fully disregarding the high-frequency fluctuations blurring the money/inflation relation. This has the flavour of the exercise in Lucas (1980), where focusing on low frequencies reveals in a clearer way the relation between inflation and money growth. With a suitably designed projection we are able to explore that clear relation in the production of timely forecasts.

* The authors thank Nuno Alves, Mário Centeno, Ana Cristina Leal and José Ferreira Machado for their comments and suggestions. The opinions expressed in the 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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The novelty of our approach justifies the striking tension in the literature between the characterization of the money/inflation relation, including the conclusions of Granger causality (of money to inflation) at low frequencies (see, *e.g.*, Assenmacher-Wesche and Gerlach 2008a, 2008b), and the lack of marginal predictive power of money with respect to inflation in out-of-sample forecasting exercises (see *e.g.*, Ang, Bekaert and Wei 2007 for a recent overview). We will note that in the euro area case this evidence vanishes and discuss reasons for why this occurs.

We thus contend with Woodford's (2007a) view that "it might be thought that the existence of a long-run relation between money growth and inflation should imply that measures of money growth will be valuable in forecasting inflation, over the "medium-to-long-run" even if not at shorter horizons. But this is not the case". We will show this is the case, at least in the US. We would agree that the existence of a long run relation does not preclude a special role for money in forecasting inflation, except if there was evidence that money leads inflation. We will show this is the case as did Assenmacher-Wesche and Gerlach (2008a, 2008b) while taking on their challenge on "...how to best make use of the low-frequency information in money growth to construct out-of-sample forecasts of inflation [...]".

The remainder of the article is organized as follows. In Section 2 we review the money/inflation relation, giving special attention to the estimation of the lead from money to inflation at low frequencies. We also make clear how the projections in the article are constructed. Section 3 presents a pseudo out-of-sample forecasting exercise, comparing money based forecasts with a host of alternatives. Section 4 discusses the results, confronting them with theory, and Section 5 offers a summary of the main conclusions.

2. MONEY AND INFLATION

Cross-country analyses of the long-run relation between money and inflation (see *e.g.*, McCandless and Weber 1995, King 2002 and Haug and Dewald 2004) typically show that long averages of both variables concentrate around a 45 degrees line (an exception is de Grawe and Polan 2001, see criticisms to their analysis in Nelson 2003). Frequency domain analyses of the money/inflation relation (*e.g.*, in Thoma 1994, Jaeger 2003, Benati 2005, Brugemann *et al.*, 2005 Assenmacher-Wesche and Gerlach 2007, 2008a and 2008b) show typically a high correlation at low frequencies. It is true that uncovering these relations does not lend by itself a special role for money in the conduct of monetary policy or as an indicator of policy stance. We thus agree with Woodford (2007a): "But the mere fact that a long literature has established a fairly robust long-run relationship between money growth and inflation does not, in itself, imply that monetary statistics must be important sources of information when assessing the risks to price stability". But what if, besides the long-run relation, money leads inflation, even if only at low frequencies?

2.1. In-sample characterization in the frequency domain

We focus here on in-sample evidence of the lead of money with respect to inflation. This is the first step towards investigating if money has predictive power over inflation. Here and throughout, we take

into consideration a few aspects in the choice of variables and data treatment that are typically associated with the search for a stable demand function for real money balances. Specifically:

i. the monetary aggregates should clearly reflect transactions motives hence our focus on the aggregates M2, M2(-) and MZM (Money Zero Maturity, see Teles and Zhou 2004 for a discussion of the stability of MZM demand). In the euro area case we must resort to M3, which contains a much wider array of instruments, some with a loose connection with transactions motives;

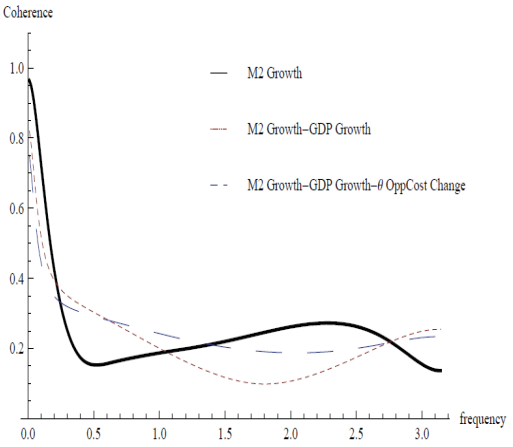
ii. we focus often on the difference between money growth and output growth (*i.e.*, we implicitly impose a unitary income elasticity in the demand for real money balances), although results hold strong without this adjustment;

iii. it is often helpful, but not crucial, to control for changes in velocity by including in the projections measures of the opportunity cost of holding money, defined as the difference between the own rate on the aggregate and a short term interest rate (3-month T bill rate in the US case only).

Chart 1 presents coherence (a measure of the correlation at each frequency[1]) and chart 2 the phase shift (the time delay between the series at each frequency) between inflation, π_t and mg_t in the US case. π_t^1 is quarter on quarter inflation, *i.e.*, $\pi_t^1 = \ln(P_t / P_{t-1})$ where P_t is the price level (measured by the GDP deflator) whereas mg_t is either: $\ln(M_t / M_{t-1})$, $\ln(M_t / M_{t-1}) - \ln(y_t / y_{t-1})$ or $\ln(M_t / M_{t-1}) - \ln(y_t / y_{t-1}) - \theta\left(R_t - R_{t-1}\right)$ where M_t is the monetary aggregate (M2 in this case, results for other aggregates are similar), y_t is output (measured by real Gross Domestic Product, GDP), R_t is a measure of the opportunity cost of holding the instruments in the aggregates and θ is a semi-elasticity of the demand for real balances with respect to R_t. In the back of our minds we

Chart 1

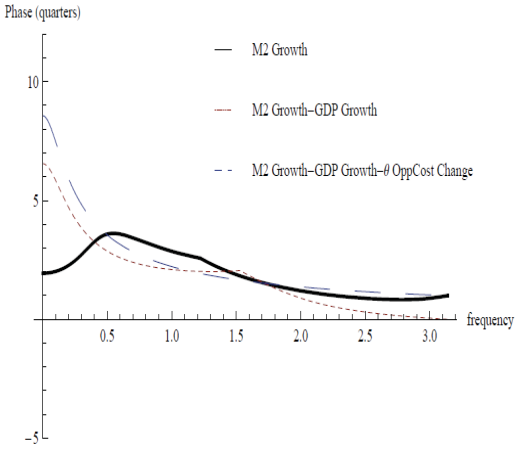
ESTIMATED COHERENCE BETWEEN INFLATION AND M2 GROWTH UNDER VARIOUS ADJUSTMENTS FOR US
Period 1984Q1-2009Q3



Source: Authors' calculations based on data from Federal Reserve Bank of St. Louis (FRED).
Note: Inflation measured by GDP deflator growth.

Chart 2

ESTIMATED PHASE BETWEEN INFLATION AND M2 GROWTH UNDER VARIOUS ADJUSTMENTS FOR US
Period 1984Q1-2009Q3



Source: Authors' calculations based on data from Federal Reserve Bank of St. Louis (FRED).
Note: Inflation measured by GDP deflator growth.

(1) Low frequencies correspond to fluctuations with high period, *i.e.*, the long waves of the time series.

have thus a Cagan (1956) demand for real balances with unitary income elasticity. We report results for the sample 1984Q1-2009Q3, after Atkeson and Ohanian (2001).

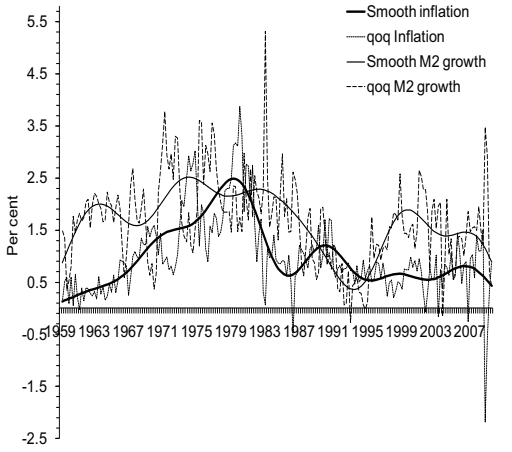
As easily concluded from chart 1, coherence is lower if money growth is adjusted for real GDP growth and even lower, at low frequencies if we adjust for the change in the opportunity cost. In all cases, coherence is very high but only at low frequencies, moving towards 1 when the frequency goes to zero only when no adjustment is made. On the other hand, the phase effect is positive, decreasing in the frequencies and highest if both adjustments are performed. The fact that it is positive reveals immediately that money growth leads inflation.

The characterization above is well documented in the literature (in terms of coherence, we are not aware of the estimation of phase, only of Granger causality tests for different frequencies), so that begs the question: Why isn't this information useful when forecasting inflation? Our conjecture is that the consideration of the noisy information at high frequencies obscures the signal provided by money growth. We will thus project only low frequencies of inflation on money growth. This amounts to targeting a smooth version of inflation. Smooth versions of GDP deflator inflation and M2 growth, disregarding fluctuations with period below 8 years (or 32 quarters), are plotted in chart 3. Despite the well-know correlation between these smoothed series, an obvious problem arises in practice for forecasting since these moving averages, being two-sided, cannot be computed in real-time. That is, the dependent variable in a projection would not be available in real-time. We deal with this issue in the next session.

In the euro area case the conclusions above do not hold. Although coherence between HICP (Harmonised index of consumer prices) inflation and M3 growth is high at low frequencies (see charts 4 and 5) the estimated phase effect is only slightly positive at the very low frequencies (chart 6). These

Chart 3

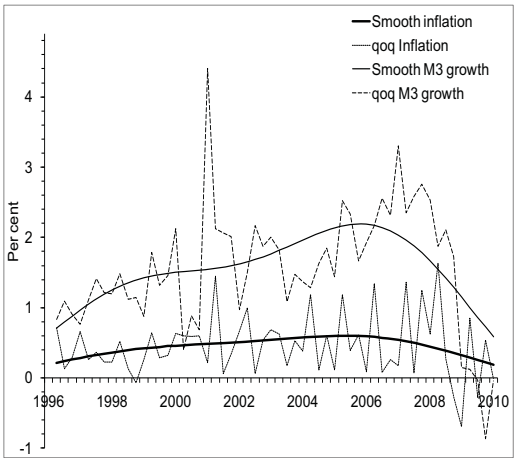
INFLATION, M2 GROWTH AND FILTERED VERSIONS OF BOTH SERIES FOR US
Period 1959Q2-2009Q3



Sources: *Federal Reserve Bank of St. Louis (FRED)* and authors' calculations.
Notes: Inflation measured by GDP deflator growth. The smooth version of a series is obtained disregarding from the series fluctuations with period below 32 quarters.

Chart 4

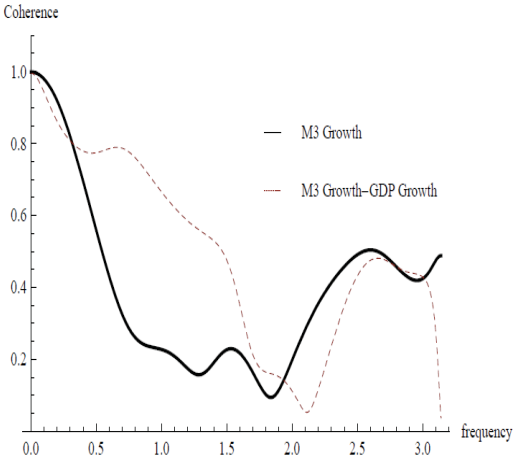
INFLATION, M3 GROWTH AND FILTERED VERSIONS OF BOTH SERIES FOR EURO AREA
Period 1996Q2-2010Q1



Sources: European Central Bank (Statistical Data Warehouse), European Commission (Eurostat) and authors' calculations.
Notes: Inflation measured by HICP growth. The smooth version of a series is obtained disregarding from the series fluctuations with period below 32 quarters.

Chart 5

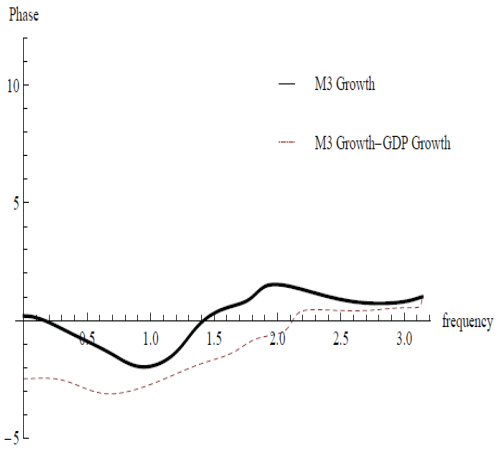
ESTIMATED COHERENCE BETWEEN INFLATION AND M3 GROWTH WITH AND WITHOUT ADJUSTMENT FOR EURO AREA
Period 1996Q2-2010Q1



Sources: European Central Bank (Statistical Data Warehouse), European Commission (Eurostat) and authors' calculations.
Note: Inflation measured by HICP growth.

Chart 6

ESTIMATED PHASE BETWEEN INFLATION AND M3 GROWTH WITH AND WITHOUT ADJUSTMENT FOR EURO AREA
Period 1996Q2-2010Q1



Sources: European Central Bank (Statistical Data Warehouse), European Commission (Eurostat) and authors' calculations.
Note: Inflation measured by HICP growth.

estimates are surrounded by great uncertainty due to the short sample size available and to the low variability of inflation during most of the period. In any case, this reveals immediately that one should not expect great results in terms of forecasting inflation using M3 in the euro area, confirming recent findings in, *e.g.* Hofmann (2008) and Lenza (2006).

2.2. How to explore low frequency correlation out-of-sample

Suppose we are interested in forecasting y_t (say, smoothed inflation) that defines a signal on x_t (say, inflation). Suppose we want to isolate the signal in the finite sample $\{x_t\}_{t=1}^{T}$. Suppose also we have c series of covariates $z_1,\ldots,z_c$. The estimate $\hat{y}_t$ of the signal y_t will be a weighted sum of observations of x and of $z_1,\ldots,z_c$:

$$\hat{y}_t = \sum_{j=-f}^{p} \hat{B}_j^{p,f} x_{t-j} + \sum_{s=1}^{c}\sum_{j=-f}^{p} \hat{R}_{s,j}^{p,f} z_{s,t-j} \qquad (1)$$

where p denotes the number of observations in the past that are considered and f the number of observations in the future that are considered. To obtain $\hat{y}_t$ we will choose the weights $\{\hat{B}_j^{p,f}, \hat{R}_{1,j}^{p,f},\ldots,\hat{R}_{c,j}^{p,f}\}_{j=-f,\ldots,p}$ associated with the series of interest and the available covariates that minimize the mean of the square deviations between y_t and $\hat{y}_t$. Since f is allowed to be negative, it is straightforward to forecast the signal y_{T+k} for $k>0$. One just needs to set $f=-k$ in the solution, so that only the available information (that is, up to period T in this case) is taken into consideration. We use the solution to this problem discussed in Valle e Azevedo (2010) to approximate smoothed inflation. We will approximate smoothed inflation at various horizons (quarters ahead) and compare its estimates with the actual observations of quarterly inflation. We thus see approximations to smoothed inflation as forecasts of inflation itself.

A choice that has to be made is the cut-off frequency. On one hand, if we exclude more (high) frequencies (or increase smoothness in the target) we will be giving up on more of the variance of inflation. On the other hand, this may lead to more accurate estimation of the relevant projection coefficients since correlation at those frequencies is higher. Given the previous analysis, we chose to eliminate fluctuations with period below 32 quarters. Obviously, the optimal degree of smoothness may vary with the forecast horizon, but results are similar when the cut-off period is between 20 and 40 quarters. We should also add that it would be feasible to construct a forecast combining a projection at low frequencies (with, *e.g.*, money growth as covariate) with an (orthogonal) projection at high frequencies, with measures of supply shocks as covariates. The improvements (if any) are slight.

3. FORECAST RESULTS

3.1. Data and pseudo out-of-sample design

We focus on CPI and GDP deflator inflation in the US case and HICP inflation in the euro area case. We will report forecast results using the monetary aggregates M2 and MZM for the US (results using M2(-) are close to those obtained using MZM) and M3 for the euro area. In some exercises in the US case, we use the activity variables considered more promising by Stock and Watson (1999): the unemployment rate (all, 16+, seasonally adjusted), the capacity utilization rate, housing starts, industrial production index, real disposable income and employees payrolls. All (transformed) data are aggregated quarterly as three months averages. In the euro area case we use the unemployment rate and employment expectations for the months ahead.

Subscript $|t$ on a variable denotes a forecast using information up to time t. We focus throughout the article in year on year quarterly inflation π_t^4. If P_t is the quarterly price level we define $\pi_t^4 = \ln(P_t / P_{t-4})$ whereas we will usually forecast $\pi_t^1 = \ln(P_t / P_{t-1})$ and produce forecasts of π_{t+h}^4 at t, $\pi_{t+h|t}^4$, as the sum of the forecasts $\pi_{t+h|t}^1 + \pi_{t+h-1|t}^1 + \pi_{t+h-2|t}^1 + \pi_{t+h-3|t}^1$ where $\pi_{t+i|t}^1 = \pi_{t+i}^1$ whenever $i \leq 0$. This is just one way of summarizing the forecast performance of the various methods. Nothing changes in terms of conclusions if we focus on forecasts of π_t^1.

All forecasts for all methods simulate a real-time situation: transformations in the data, estimation of projection coefficients, computation of filter weights etc., are done as if the forecaster stood at the forecast moment without further information (the one exception is that we neglect the release delay of GDP, approximately 1 quarter).

3.2. Competing forecasts

The results obtained with the multivariate approximation to smooth inflation (denoted *Multivariate Filter*) aimed at exploring the low-frequency relation between inflation and the growth in the monetary aggregates, will be confronted with those obtained with several alternative methods and models (in the euro area case only a few methods will be used due to data constraints):

- Random walk forecast $\pi^4_{t+h|t} = \pi^4_t$, analyzed by Atkeson and Ohanian (2001), denoted *AO*. The focus there was on $h = 4$ but since it is essentially a random walk forecast we use it for all h.

- Recursive mean forecast as $\pi^4_{t+h|t} = \frac{1}{t}\sum_{j=1}^{t} \pi^4_j$ for all h, denoted *Mean*;

- Median forecasts from the Philadelphia *Survey of Professional Forecasters* (US case only);

- Recursive direct autoregressive forecasts, denoted *Recursive*, computed from the model $\pi^1_{t+h} = \mu^h + \beta^h(L)\pi^1_t + \lambda^h(L)x_t + \varepsilon_{t+h}$, where $\beta^h(L)$ and $\lambda^h(L)$ are polynomials in the lag operator L. Lag length is chosen by AIC and parameters are estimated by OLS. We consider restricted/unrestricted versions of $\beta^h(L)$ to account for a unit-root in π^1_t. The chosen variables x_t are the unemployment rate (all, 16+, seasonally adjusted), the capacity utilization rate, housing starts, industrial production index, real disposable income and employees payrolls for the US and the unemployment rate and employment expectations for the months ahead for the euro area;

- Integrated moving average (IMA) model for inflation, that is, $\pi^1_t - \pi^1_{t-1} = \varepsilon_t - \theta\varepsilon_{t-1}$, where $\theta = 0.65$ as in Stock and Watson (2007) for the post 1984 period. Forecasts are obtained with the Kalman filter. Stock and Watson set a different θ for the sub-sample 1960-1984. The more general setting is an unobserved components model with time-varying variances where $\pi_t = \tau_t + u_t$, where $\tau_t = \tau_{t-1} + \upsilon_t$ and $\upsilon_t \sim N(0, \sigma^2_{\upsilon,t})$ and $u_t \sim N(0, \sigma^2_{u,t})$. θ can be recovered from the ratio of these variances and seems stable for the post 1984 period in the US. We fix it but it should be noted that it cannot be seen as a real-time forecast. This is useful for our purpose as it makes it a tough competitor;

- In order to check whether results are driven by the method employed we also apply the *Multivariate Filter* approximation using the activity indicators;

- Gordon's (1982) triangle model with a constant natural rate of unemployment $\pi^1_t = \beta(L)\pi_{t-1} + \lambda(L)(u_t - u^*) + \gamma(L)z_t + \varepsilon_{t+h}$, where $\beta(L)$ and $\lambda(L)$ are polynomials in the lag operator L whereas u^* is the natural rate and z_t is a measure of supply shocks (we consider oil prices here). Again, we consider restricted/unrestricted versions of $\beta(L)$ to account for a unit root in π^1_t. To produce forecasts using this model the right hand side variables are forecasted with an auto-regressive model, while projection coefficients are estimated by OLS.

With respect to the forecasts that use monetary aggregates we consider some variations in the settings:

- we use the growth rate of the monetary aggregate or the growth of the monetary aggregate adjusted for real GDP growth (*i.e.*, the difference between money growth and real GDP growth);

- we include in the projection the change in the opportunity cost of holding the instruments contained in the aggregates.

3.3. Results

A summary of the results for the US is in Table 1 for the period 1989Q1 - 2008Q3. Several conclusions emerge:

- Survey forecasts (only available for CPI inflation and $h \leq 4$) have a poor performance when $h = 1,2$ but prove hard to beat when $h = 4$, confirming results in Ang, Bekaert and Wei (2007);

- *Recursive* activity based forecasts are only useful when $h = 1,2$ with the notable exception of housing starts when $h = 12$ and less so when $h = 8$;

- The use of the *Multivariate Filter* does not improve significantly (if at all) the performance of the forecasts based on housing starts, real disposable income, employees payrolls and industrial production. On the other hand, it clearly improves the forecasts based on capacity utilization and on the unemployment rate at all horizons. We should notice that these series have little power at high frequencies;

- *Recursive* money based forecasts perform rather poorly at all horizons (notable exception is M2 growth when $h = 12$);

- The use of the *Multivariate Filter* clearly reveals the power of money (MZM) based forecasts. Forecasts based on M2 are only mildly boosted by the *Multivariate filter* when GDP growth is taken into account. In the case of MZM the improvements occur in the case of CPI and much more clearly with the GDP deflator, for all horizons, with or without the corrections for GDP growth and with or without the inclusion of opportunity cost measures. With a few exceptions results are best when one considers MZM adjusted for GDP growth but without inclusion of the opportunity cost. This is actually the general picture, it is helpful to correct the monetary aggregates for GDP growth but unhelpful to include measures of the opportunity cost;

- Money based *Multivariate Filter* forecasts are nonetheless clearly outperformed when $h = 4$ by the SPF forecasts (CPI) and by the capacity utilization rate *Multivariate Filter* forecasts. In relative terms, the significant departures from other methods occur when $h = 6,8,12$.

Putting it simply, in this pseudo out-of-sample forecasting exercise money growth (specially as measured by MZM) is a privileged predictor of inflation. A few caveats must be pointed however: First, we rely on stationarity of inflation and money growth. This is definitely conceivable for a sub-sample starting in the mid 1980's but hard to believe in the full post 1960 sample. Since we use long lags of the predictors and estimate high order autocovariances we need a relatively long estimation sample, hence the consideration of the full-sample. We have however verified that forecasts starting in the mid 1990's using an estimation sample beginning in 1984 are very close to the ones obtained with the full sample. Still, in the first case, forecasts including the period 1984-1988 weaken substantially our results as it becomes more difficult to beat the univariate benchmarks, although the basic distinctions between methods and variables still apply. This is due to a clear failure of the long-run forecasts for the period 1984 -1988. Our sense is that we don't control "enough" for the violent decrease in velocity

due to the decrease in the opportunity cost of holding money during the end of a period of disinflation. This kind of correction is typically employed in order to re-establish a stable demand for real balances (see *e.g.*, Reynard 2007), but we explicitly avoid any correction in the monetary aggregates that could not have been done in real-time.

With respect to long-run forecasts of 2009 and the last quarter of 2008, we should refer that all methods proved disastrous in forecasting inflation. In such a degree that the (squared) errors for those few observations are as large as the cumulative squared errors of the last 20 years. However, the basic picture does not change. A table including these forecasts would deliver basically the same information as it is still true that the methods approximating smooth inflation using money growth are superior.

Finally, another concern is the choice of frequencies that are disregarded, which is essentially arbitrary. We have indeed considered different cut-off frequencies but 32 quarters proved a good compromise for all horizons. The optimal degree of smoothing generally increased with the forecast horizon, but the differences were slim. This is consistent with evidence in Reichlin and Lenza (2007) for the euro area, who forecast in-sample moving averages of inflation, concluding that longer moving averages improve the forecast performance when the horizon increases. Our idea is very similar in spirit to theirs, but we are able to perform the projection in real-time.

Regarding the euro area, results for the (short) evaluation period 2007Q1-2010Q1 are presented in table 2. The main conclusions are:

- *Mean* forecasts outperform all competing methods, except at uninteresting short horizons, where forecasts based on monetary aggregates or activity indicators seem better regardless of the forecasting method;

- there is no superior predictive ability of the money based forecasts relative to the activity indicators based forecasts;

- if we disregard (results not shown) from the evaluation period the last 5 observations (2009 and 2010Q1) all forecast methods perform poorly at all horizons, except recursive forecasts based on the unemployment rate.

Despite these results, we believe that the predictive power of monetary aggregates in forecasting inflation may be hidden in the euro area data (see Benati 2009 on reasons why this might occur). Further, the short available sample and the low variability of inflation complicate any estimation process while limiting the possibility of drawing strong conclusions. We could consider augmenting the sample with historical data of the participating countries prior to 1996, but aggregation of series with different definitions is undesirable, and even more so in the presence of a clear a regime shift. Second, in recent years the relation between M3 and inflation seems to have weakened (see Alves, Marques and Sousa 2007, Reichlin and Lenza 2007), but we are still unable to conclude if this is a robust feature and/or if it is the result of the undesirable characteristics of M3, namely the fact that it drifts from the concept of money. So, it may be that recovering the predictive ability of money requires

Table 1 (to be continued)

SIMULATED PSEUDO OUT-OF-SAMPLE FORECASTING RESULTS FOR US
Evaluation period 1989Q1-2008Q3

h – horizon	h=1		h=2		h=4		h=6		h=8		h=12	
Inflation measure	**CPI**	**GDP**	**CPI**	**GDP**	**CPI**	**GDP**	**CPI**	**GDP**	**CPI**	**GDP**	**CPI**	**GDP**
NAIVE (AO)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
RMSFE	0.004973	0.002338	0.007162	0.003526	0.010774	0.005590	0.011327	0.006818	0.012197	0.008121	0.014157	0.009804
Mean	2.20	3.98	1.55	2.68	1.06	1.74	1.02	1.47	0.97	1.26	**0.85**	1.09
IMA θ=0,65	0.70	0.77	0.77	0.84	0.95	0.99	0.98	0.98	0.95	0.97	0.97	0.97
Survey Professional Forecasters Median	1.31		1.06		0.83							
Forecasts with multivariate filter												
MZM growth	0.70	0.76	0.77	0.82	0.94	0.92	0.97	0.84	0.93	0.82	0.96	0.91
MZM growth-GDP growth	0.68	**0.73**	0.73	**0.76**	0.86	**0.83**	0.89	**0.79**	0.86	0.83	0.93	0.96
MZM growth & opp cost	0.70	0.76	0.77	0.81	0.93	0.92	0.97	0.89	0.93	0.90	0.98	1.02
MZM growth-GDP growth & opp cost	0.70	0.78	0.77	0.85	0.95	1.03	1.01	1.04	0.99	1.08	1.05	1.20
M2 growth	0.78	0.89	0.92	1.04	1.19	1.32	1.27	1.28	1.29	1.23	1.30	1.22
M2 growth-GDP growth	0.72	0.78	0.81	0.84	1.00	0.96	1.04	0.87	1.02	0.83	1.06	0.90
M2 growth & opp cost	0.79	0.87	0.92	1.01	1.19	1.26	1.26	1.24	1.28	1.21	1.30	1.25
M2 growth-GDP growth & opp cost	0.74	0.78	0.83	0.84	1.02	0.97	1.05	0.89	1.01	0.87	1.07	0.97
Industrial production	0.68	0.79	0.73	0.87	0.87	1.03	0.90	1.01	0.87	1.03	0.96	1.14
Capacity utilization	**0.66**	0.79	**0.69**	0.86	**0.81**	1.04	**0.86**	1.08	0.86	1.14	0.97	1.33
Unemployment	0.67	0.76	0.73	0.82	0.86	0.92	0.88	0.88	0.84	0.90	0.96	1.04
Housing starts	0.74	0.88	0.85	1.01	1.04	1.27	1.09	1.26	1.06	1.22	1.13	1.29
Real disposable income	0.71	0.86	0.81	1.01	1.01	1.28	1.09	1.28	1.11	1.30	1.19	1.34
Employees payrolls	0.68	0.79	0.73	0.87	0.89	1.06	0.95	1.06	0.95	1.09	1.06	1.21

Table 1 (continued)

SIMULATED PSEUDO OUT-OF-SAMPLE FORECASTING RESULTS FOR US
Evaluation period 1989Q1-2008Q3

h – horizon	h=1		h=2		h=4		h=6		h=8		h=12	
Inflation measure	**CPI**	**GDP**	**CPI**	**GDP**	**CPI**	**GDP**	**CPI**	**GDP**	**CPI**	**GDP**	**CPI**	**GDP**
Recursive forecasts												
MZM growth	0.72	0.81	0.82	0.92	1.10	1.14	1.19	1.25	1.19	1.33	1.23	1.45
MZM growth-GDP growth	0.71	0.81	0.81	0.91	1.08	1.11	1.16	1.23	1.18	1.33	1.25	1.47
MZM growth & opp cost	0.70	0.83	0.79	0.97	1.07	1.26	1.19	1.36	1.19	1.37	1.26	1.46
MZM growth-GDP growth & opp cost	0.70	0.83	0.82	0.98	1.10	1.26	1.20	1.37	1.20	1.39	1.18	1.47
M2 growth	0.73	0.81	0.85	0.91	1.18	1.02	1.33	1.04	1.36	1.04	1.06	**0.88**
M2 growth-GDP growth	0.70	0.82	0.80	0.93	1.06	1.18	1.15	1.29	1.10	1.32	1.08	1.39
M2 growth & opp cost	0.74	0.85	0.87	0.94	1.14	1.13	1.19	1.17	1.25	1.04	1.08	0.88
M2 growth-GDP growth & opp cost	0.72	0.85	0.85	1.00	1.08	1.24	1.10	1.27	1.03	1.25	1.06	1.38
Industrial Production	0.74	0.82	0.83	0.91	1.08	1.13	1.13	1.23	1.14	1.30	1.15	1.40
Capacity Utilization	0.76	1.00	0.93	1.26	1.33	1.74	1.53	1.95	1.60	1.97	1.78	1.81
Unemployment	0.70	0.83	0.81	0.95	1.06	1.23	1.16	1.35	1.17	1.40	1.23	1.46
Housing Starts	0.73	0.80	0.85	0.90	1.11	1.03	1.13	1.04	0.93	0.96	**0.78**	1.01
Real Disposable Income	0.72	0.83	0.81	0.91	1.06	1.09	1.10	1.16	1.08	1.13	1.19	1.26
Employees Payrolls	0.72	0.84	0.80	0.94	1.02	1.18	1.08	1.30	1.06	1.38	1.13	1.37
Inflation Change, Industrial Production	0.73	0.82	0.83	0.93	1.08	1.13	1.17	1.22	1.13	1.29	1.12	1.39
Inflation Change,Capacity Utilization	0.75	0.99	0.89	1.25	1.24	1.74	1.44	1.83	1.43	1.66	1.26	1.49
Inflation Change, Unemployment	0.70	0.83	0.79	0.96	1.07	1.27	1.24	1.39	1.24	1.42	1.31	1.50
Inflation Change, Housing Starts	0.73	0.80	0.86	0.91	1.15	1.06	1.24	1.08	1.05	1.06	1.02	1.36
Inflation Change, Real Disposable Income	0.72	0.84	0.81	0.97	1.09	1.16	1.17	1.24	1.11	1.32	1.16	1.38
Inflation Change, Employees Payrolls	0.72	0.83	0.82	0.95	1.06	1.14	1.12	1.21	1.08	1.29	1.08	1.37
Gordon's Triangle Model												
Inflation	0,72	0,88	0,79	1,07	1,03	1,41	1,09	1,43	0,98	1,36	1,39	1,56
Inflation Change	0,72	0,89	0,78	1,08	1,02	1,41	1,07	1,43	0,97	1,34	1,23	1,50

Source: Authors' calculations.
Notes: Ratio of the Root Mean Squared Forecast Error (RMSFE) with each method to the RMSFE of Atkeson Ohanian (AO) forecasts. Evaluation period: 1989Q1-2008Q3. Bottom 20% values of each column are highlited, lowest value of each column is in bold.

Table 2

SIMULATED PSEUDO OUT-OF-SAMPLE FORECASTING RESULTS FOR THE EURO AREA
Evaluation period 2007Q1-2010Q1

h – horizon	h=1	h=2	h=4	h=6	h=8	h=12
Inflation measure	**HICP**	**HICP**	**HICP**	**HICP**	**HICP**	**HICP**
NAIVE (AO)	1.00	1.00	1.00	1.00	1.00	1.00
RMSFE	0.007808	0.013500	0.020048	0.019911	0.014506	0.013657
Mean	1.77	1.07	0.74	**0.71**	0.93	1.02
Forecasts with Multivariate Filter						
M3 growth	0.93	0.75	0.80	0.78	0.94	0.99
M3 growth-GDP growth	0.92	0.74	0.79	0.77	0.94	**0.99**
Unemployment	0.89	**0.70**	**0.72**	0.74	1.01	1.05
Employment expectation	0.90	0.71	0.75	0.74	**0.93**	0.99
Recursive Forecasts						
Univariate	0.97	0.86	0.91	0.82	0.93	1.01
M3 growth	**0.89**	0.84	0.87	0.80	0.95	1.04
M3 growth-GDP growth	1.01	0.93	0.95	0.81	0.97	1.02
Unemployment	0.97	0.87	0.86	0.79	1.12	1.01
Employment expectation	0.91	0.81	0.91	0.88	1.02	1.02

Source: Authors' calculations.
Notes: Ratio of the Root Mean Squared Forecast Error (RMSFE) with each method to the RMSFE of Atkeson Ohanian (AO) forecasts. Evaluation period: 2007Q1 - 2010Q1. Bottom 20% values of each column are highlited, lowest value of each column is in bold.

a more thorough treatment (or pruning...) of the available M3. The use of M3 for monetary analysis is far from consensual but the current practice of using a corrected (for portfolio shifts) M3 series (see Hofmann 2008 and Fisher; Lenza, Pill and Reichlin 2006), seems a non-starter as it is contaminated by judgment.

4. DISCUSSION

Here we contrast the results above with the implications of two simple theoretical models, to show how current theory is at odds with forecastability of inflation given money growth. Money is absent in most so-called New-Keynesian models or it is often seen as redundant. The point is easily seen in the simplest prototypical model (taken from Nelson 2008) composed of a Phillips curve, an IS equation and a monetary policy rule:

$$\pi_t - \pi^* = \kappa \ln(Y_t / Y_t^*) + \beta E_t[\pi_{t+1} - \pi^*] + u_t$$

u_t is a white-noise shock, $\kappa > 0$ and $0 < \beta < 1$ whereas π_t denotes inflation, π^* the central bank target for inflation, Y_t output and Y_t^* potential output.

$$\ln(Y_t / Y_t^*) = E_t[\ln(Y_{t+1} / Y_{t+1}^*)] - \sigma(R_t - E_t[\pi_{t+1}] - r_t^*)$$

where $\sigma > 0$, r_t^* is the short-term natural real interest rate, and R_t is the short-term nominal interest rate. Assume the policy rule is a Taylor type rule:

$$R_t = R^* + \phi_\pi(\pi_t - \pi^*) + \phi_y \ln(Y_t / Y_t^*)$$

π^* is the inflation target, $\phi_\pi > 1$ (Taylor principle) and $\phi_y \geq 0$. Append to these equations the following money demand function:

$$m_t - p_t = c_0 + c_1 \ln(Y_t) + c_2 R_t + \eta_t$$

$m_t - p_t$ is log of real balances, η_t is a white-noise money-demand shock, $c_1 > 0$ and $c_2 < 0$. Forgetting the last equation one could state that in steady-state the following three conditions hold:

$$\begin{aligned} E[\pi_t - \pi^*] &= 0 \\ E[\ln(Y_t / Y_t^*)] &= 0 \\ R^* = E[R_t] &= E[r_t^*] + \pi^* \end{aligned} \qquad (2)$$

The argument goes, in steady state inflation equals target inflation and, given money demand (accommodated by supply), it is true that inflation and money growth move one to one in the long-run if Y_t is growing at a constant rate (just another steady state relation, as Galí 2002 puts it). Money demand (and supply) is nonetheless seen as redundant in the determination of inflation or, in other way, it is possible to explain inflation dynamics without reference to money. This position is clearly summarized in Woodford (2007a, 2007b) although the argument goes back to McCallum (2001). This does not come without counter-arguments. For instance, Nelson (2008) argues that the last steady state relation would imply that in the long-run, when prices are flexible, the central bank can control the nominal interest rate with open market operations. Now, regardless of the reasonableness of the arguments, the matter of fact is that observations on money growth would be useless in forecasting inflation. It is easy to show that once the output gap $\left(\ln\left(Y_t / Y_t^*\right)\right)$ and current inflation are taken into account, money growth would be irrelevant in forecasts of inflation. In models with a real balances effect (*e.g.*, when money enters the utility function, opening a direct channel from money to aggregate demand), money helps forecasting inflation through it's relation with the output gap. However, most studies (*e.g.*, Ireland 2004) argue that the real balances effect is negligible.

Consider now the following simple model with flexible prices, taken from Marcet and Nicolini (2009). The argument goes through in more general environments. It can be seen as an extreme interpretation of the quantity theory, although no monetarist would endorse it. Households maximize utility given $E_0 \sum_{t=0}^{\infty} \beta^t U\left(\left(1 - v_t\right)C_t^1, v_t C_t^2\right)$, with $U = \min\left\{\left(1 - v_t\right)C_t^1, v_t C_t^2\right\}$, where C_t^1 is a cash good and C_t^2 a credit good. v_t is a preference shock (or velocity shock, see below) and output is exogenously given by $Y_t = Y_0(1+g)^t \varepsilon_t$, where ε_t is a productivity shock. A cash-in-advance constraint $M_t \geq P_t C_t^1$ is imposed and the budget constraint is given by $P_t C_t^1 + P_t C_t^2 + M_t + B_{t+1} \leq M_{t-1} + (1 + R_t)B_t + P_t Y_t$ where P_t is the price level, M_t is money holdings, B_t bond holdings and R_t the nominal interest rate. The resource constraint is given by $Y_t = C_t^1 + C_t^2$. Optimization and market clearing leads to $M_t v_t = P_t Y_t$. Take logs and subtract from period $t+1$ to get:

$$\ln(M_{t+1}/M_t)+\ln(v_{t+1}/v_t)=\ln(1+g)+\ln(\varepsilon_{t+1}/\varepsilon_t)+\ln(P_{t+1}/P_t)$$

or

$$\pi_{t+1}=-\ln(1+g)+\mu_{t+1}-\xi_{t+1}$$

where $\xi_{t+1}=\ln(v_{t+1}/v_t)-\ln(\varepsilon_{t+1}/\varepsilon_t)$, $\mu_{t+1}=\ln(M_{t+1}/M_t)$ and $\pi_{t+1}=\ln(P_{t+1}/P_t)$. Now, if the central bank sets μ_t so as to minimize $E_{t-1}(\pi_t-\pi^*)^2$, where π^* is the central bank target, subject to $\pi_t=-\ln(1+g)+\mu_t+\xi_t$, the solution is $\mu_t=\pi^*+\ln(1+g)-E_{t-1}[\xi_t]$. Hence, $\pi_t=\pi^*+\xi_t-E_{t-1}[\xi_t]=\pi^*+\xi_t^*$, say. Therefore π_t is a white noise process contemporaneously uncorrelated with μ_t. The bottom line is that while long averages of π_t and μ_t will move one-to-one, μ_t is useless in forecasting inflation.

These simple examples illustrate how current models don't lend any special role for money in forecasting inflation. It's reasonable to argue that the focus on a narrow range of financial liabilities and interest rates (or only one as has been usual) neglects the channels through which monetary policy affects the prices of a wide range of assets, whose behavior or effects are summarized by information in monetary aggregates (see Nelson 2003 for an example where money serves this purpose).

5. CONCLUSIONS

We have shown how to usefully integrate money in inflation forecasts in the US case. This amounts to projecting only the low frequencies of inflation on money growth, thus giving up from the onset on a sizeable fraction of the variance of inflation. Whereas it has long been recognized that low frequencies of money growth and inflation are highly correlated (and less often that money leads inflation), current practice does not lend money growth any special role in inflation forecasts or in the assessment of monetary policy stance, specially in the US. In the euro area case results were not promising but raise important issues. Comparing the results obtained for the US with M2 (which includes several illiquid instruments) with those using MZM (which includes only very liquid instruments), we are lead to suggest that the euro area aggregate M3 may be far from providing an important and stable source of information for monetary analysis within the Eurosystem. It is reasonable to speculate that an aggregate more closely related to the concept of money could perform this task.

The results were contrasted with the implications of two standard models where money growth is surely correlated with inflation, but it does not help forecast inflation. We finish with Lucas (2006):

"New Keynesian models define monetary policy in terms of a choice of a money market rate, and so make direct contact with central banking practice. Money supply measures play no role in the estimation, testing, or policy simulation of these models. A role for money in the long run is sometimes verbally acknowledged, but the models themselves are formulated in terms of deviations from trends that are themselves determined somewhere off stage. It seems likely that these models could be

reformulated to give a unified account of trends, including trends in monetary aggregates, and deviations about trend but so far they have not been. This remains an unresolved issue on the frontier of macroeconomic theory."

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PARAMETER IDENTIFICATION IN DYNAMIC ECONOMIC MODELS*

*Nikolay Iskrev***

1. INTRODUCTION

Parameter identification is a concept which every student of economics learns in their introductory econometrics class. The usual textbook treatment of identification leads one to think of identification as a technical issue relevant only to empirical work, and to regard identification problems as caused by either deficiencies of the available data, or of the statistical methodology used to estimate the models. In this note I will argue that the analysis of identification has an important economic modeling aspect, and that it may be very useful to researchers who are not interested in estimation. I will focus the discussion on the class of dynamic stochastic general equilibrium (DSGE) models which have become one of the main analytical tools of modern macroeconomics. The essence of my argument is that when the economic model supplies a complete characterization of the data generating process, parameter identification may be treated as a property of the underlying theoretical model. Parameters will be unidentifiable or weakly identified if the economic features they represent have no empirical relevance at all, or very little of it. This may occur either because those features are unimportant on their own, or because they are redundant given the other features represented in the model. These issues are particularly relevant to DSGE models, which are sometimes criticized of being too rich in features, and possibly overparameterized (Chari, Kehoe, and McGrattan, 2009).

A second reason why it is important to study identification is its econometric implications. The reliable estimation of a model is impossible unless its parameters are well identified. Again, this is crucial for DSGE models as their use for quantitative policy analysis often hinges upon having accurate parameter estimates.

Treating parameter identification as a property of the model means that we can study it without a reference to a particular data set. Such an a priori approach to identification is not always possible in econometrics since typically the relationship between the economic model and the observed data is known only partially. For instance, the degree of correlation between instruments and endogenous variables in the simple linear instrumental variables model depends on nuisance parameters which, in the absence of a fully-articulated economic model, have no structural interpretation. In contrast, when we are in a general equilibrium setting, as in the case of DSGE models, all reduced-form parameters become functions of structural parameters. In this setting we can study how the instruments' strength is determined by the properties of the underlying model.

* The author thanks the comments of João Sousa. The opinions expressed in the article 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.

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In what follows I will use three examples, one purely statistical and two simple DSGE models, to illustrate the a priori analysis of identification and the kind of questions we can answer with its help. The presentation here is based on several papers: in Iskrev (2010a) it is explained how to determine if the parameters of a DSGE model are identified; Iskrev (2010a) shows how to evaluate the strength of identification of identified parameters; Iskrev (2010b) discusses the role of observables in the estimation of DSGE models.

2. A SIMPLE EXAMPLE

In this Section I use a simple model to discuss the problem of identification and to explain the main idea behind the *a priori* approach to identification analysis.

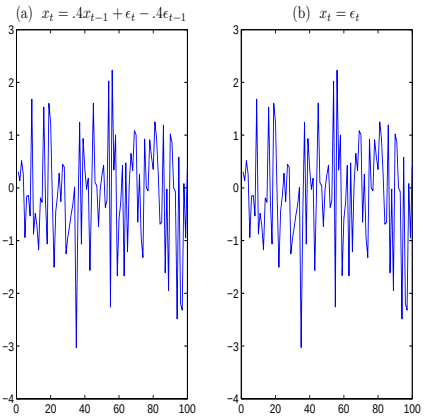
Consider the following autoregressive moving average (ARMA(1,1)) process:

$$x_t = \phi_1 x_{t-1} + \varepsilon_t - \phi_2 \varepsilon_{t-1}, \quad |\phi_1| < 1, |\phi_2| < 1, \quad \varepsilon_t \sim \mathbb{N}(0, \sigma^2) \tag{2.1}$$

Panel (a) of Chart 1 shows 100 observations generated by (2.1) with $\phi_1 = \phi_2 = 0.4,\ \sigma = 1$. Panel (b) shows the realizations of $\varepsilon_t,\ t = 1,...,T$ used to generate the observations for x_t. The two series x_t and ε_t are identical.

Chart 1

OBSERVATIONAL EQUIVALENCE WITH AN ARMA(1,1) PROCESS



Source: Author's calculations.

This example illustrates what in econometrics is called observational equivalence: there are two values of the vector of parameters $\boldsymbol{\theta} = [\phi_1, \phi_2, \sigma]'$, $\boldsymbol{\theta}_1 = [.4, .4, 1]'$ and $\boldsymbol{\theta}_2 = [0, 0, 1]'$, which can produce the same observations for x_t. In fact, in the ARMA(1,1) model there are infinitely many such values; as long as σ is kept the same, and ϕ_1 is equal to ϕ_2, the realizations of x_t would be indistinguishable from those of ε_t.

The reason for this observational equivalence is easy to understand if we consider the autocovari-

ance function (ACF), which for an ARMA(1,1) process is given by:

$$\gamma_0 = (x_t^2) = \frac{(1+\phi_2^2 - 2\phi_1\phi_2)\sigma^2}{1-\phi_1^2}$$

$$\gamma_1 = (x_t x_{t-1}) = \frac{(\phi_1 - \phi_2)(1-\phi_1\phi_2)\sigma^2}{1-\phi_1^2} \qquad (2.2)$$

$$\gamma_h = (x_t x_{t-h}) = \phi_1 \gamma_{h-1}, \quad h \geq 2$$

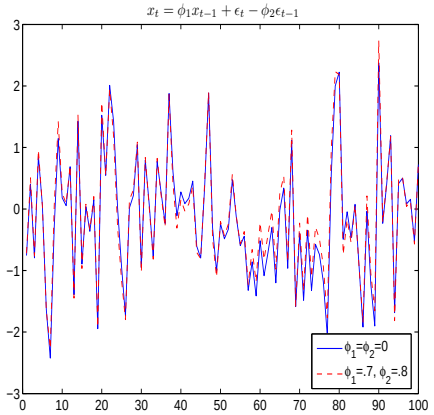
From the definition it is clear that $\phi_1 = \phi_2$ is equivalent to $\gamma_0 = \sigma^2,\ \gamma_k = 0,\ k \geq 1$. Therefore, when the autoregressive and moving average coefficients are equal, the ACF of the ARMA(1,1) process x_t is identical to that of the white noise process ε_t. This implies that we cannot distinguish data generated from ARMA(1,1) process with arbitrary $\phi_1 = \phi_2$ from data generated from ARMA(1,1) process with $\phi_1 = \phi_2 = 0$.

Now consider Chart 2, which shows two series of 100 observations generated by (2.1) with $\boldsymbol{\theta}_1 = [0,0,1]'$ (solid line) and $\boldsymbol{\theta}_2 = [.7,.8,1]'$ (dashed line), using the same realizations of ε_t. Clearly, the two series are very similar, though not identical. In this case we have an example of near observational equivalence: data generated from ARMA(1,1) model with $\phi_1 \approx \phi_2$ is difficult to distinguish from data generated by the model with arbitrary $\phi_1 = \phi_2$ and the same value of σ.

How can we detect observational equivalence (lack of identification) and near observational equivalence (weak identification)? A powerful result, due to Rothenberg (1971), provides a general necessary and sufficient condition for identification, namely, that the information matrix is non-singular.

Chart 2

NEAR OBSERVATIONAL EQUIVALENCE WITH AN ARMA(1,1) PROCESS



Source: Author's calculations.

As Rothenberg (1971) points out, the information matrix "is a measure of the amount of information about the unknown parameters available in the sample". A parameter is unidentified when there is no information about it in the sample, or if the existing information is insufficient to distinguish that parameter from other parameters in the model. Both cases result in a singular information matrix.

In the case of the ARMA (1,1) model, the information matrix is given by:

$$\mathcal{I}(\phi_1,\phi_2)=\begin{bmatrix}\dfrac{1}{1-\phi_1^2} & \dfrac{-1}{1-\phi_1\phi_2}\\ \dfrac{-1}{1-\phi_1\phi_2} & \dfrac{1}{1-\phi_2^2}\end{bmatrix} \tag{2.3}$$

From (2.4) we can compute the determinant of $\mathcal{I}(\phi_1,\phi_1)$

$$det\left(\mathcal{I}(\phi_1,\phi_2)\right)=\frac{(\phi_1-\phi_2)^2}{(1-\phi_1\phi_2)^2(1-\phi_1^2)(1-\phi_2^2)} \tag{2.4}$$

Since non-singularity is equivalent to the determinant of the matrix being different from zero, from (2.4) it is immediate that $\phi_1 \neq \phi_2$ is necessary and sufficient for identification in the ARMA(1,1) model.

The information matrix is also useful for detecting weak identification problems. A parameter is identified but poorly when the information in the sample is very little, or if it is barely possible to distinguish that parameter from the other parameters. In this case the information matrix has full rank, but is very close to being singular. The strength of identification may be measured using the result that the asymptotic covariance matrix of an efficient estimator is equal to the inverse of the information matrix divided by the sample size. Thus, the asymptotic variances of the estimators of the ARMA parameters ϕ_1 and ϕ_2 are:

$$\text{var}(\hat{\phi}_1)=\frac{(1-\phi_1\phi_2)^2(1-\phi_1^2)}{T(\phi_1-\phi_2)^2},\quad \text{var}(\hat{\phi}_2)=\frac{(1-\phi_1\phi_2)^2(1-\phi_2^2)}{T(\phi_1-\phi_2)^2} \tag{2.5}$$

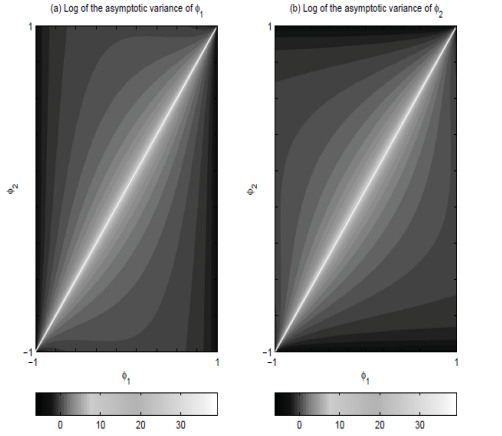
The formulas in (2.5) reveal that the asymptotic variances are large when $\phi_1 \approx \phi_2$. This suggests that the estimates of the autoregressive and moving average parameters will be very imprecise when their true values are similar. Therefore, ϕ_1 and ϕ_2 are weakly identified.

Note that both variances in (2.5) depend on the values of ϕ_1 and ϕ_2. Thus, for a given sample size T, the strength of identification of either parameter is determined by the true values of both parameters. This can be seen very clearly in Chart 3 which shows how the asymptotic variances vary across different regions in the parameter space.

To gain some intuition about the relationship between the parameter values and the strength of identification, consider the following decomposition of the information matrix (2.4)

Chart 3

ASYMPTOTIC VARIANCES OF THE PARAMETERS OF AN ARMA(1,1) PROCESS



Source: Author's calculations.

$$\mathcal{I}(\phi_1,\phi_2)=\begin{bmatrix}\frac{1}{\sqrt{1-\phi_1^2}} & 0\\ 0 & \frac{1}{\sqrt{1-\phi_2^2}}\end{bmatrix}\begin{bmatrix}1 & \frac{\sqrt{(1-\phi_1^2)(1-\phi_2^2)}}{\phi_1\phi_2-1}\\ \frac{\sqrt{(1-\phi_1^2)(1-\phi_2^2)}}{\phi_1\phi_2-1} & 1\end{bmatrix}\begin{bmatrix}\frac{1}{\sqrt{1-\phi_1^2}} & 0\\ 0 & \frac{1}{\sqrt{1-\phi_2^2}}\end{bmatrix} \quad (2.6)$$

Note that the first and the last terms on the right hand side are the same diagonal matrix with elements equal to the square roots of the diagonal elements of $\mathcal{I}(\phi_1,\phi_2)$. This matrix tells us how much information there is in the sample about each parameter if the other parameter was known. For instance, $(1-\phi_1^2)/T$ is the asymptotic variance of an efficient estimator of ϕ_1 if ϕ_2 was known. Therefore, the closer is $|\phi_1|$ to 1, the more information there is about ϕ_1, for a given value of ϕ_2. Similarly, the closer is $|\phi_2|$ to 1, the more information there is about ϕ_2, for a given value of ϕ_1.

Next, consider the matrix in the middle. It is a correlation matrix which tells us how similar is the effect on the distribution of x_t of a small change in one parameter, say ϕ_1, to that of a small change in the other parameter ϕ_2. Note that $\mathcal{I}(\phi_1,\phi_2)$ is singular only when the correlation matrix in (2.6) is singular, which occurs if and only if the off-diagonal element, $\frac{\sqrt{(1-\phi_1^2)(1-\phi_2^2)}}{\phi_1\phi_2-1}$ is equal to -1. In this case a small change, say increase in ϕ_1, is exactly the same as a small decrease in the other parameter. When the correlation is close to, but different from 1 in absolute value, the effect of changing one parameter is almost the same as, though different from, that of changing the other one. Therefore, the middle term in (2.6) accounts for the loss of information about either parameter due to the uncertainty regarding the true value of the other parameter.

The information matrix approach to identification is possible only when the distribution of the data is known. What if we can not or do not want to assume that ε_t in (2.1) normally distributed? A reasonable approach in this case is to base the identification analysis on the ACF of x_t. As we already saw, it is straightforward to establish the non-identifiability of the autoregressive and moving average pa-

rameters at $\phi_1 = \phi_2$ using the theoretical ACF of the ARMA(1,1) process. More formally, we may proceed as follows: let $\gamma = [\gamma_0, \gamma_1, ..., \gamma_{k-1}]'$ be the vector of the first k -autocovariances of x_t. Then $\boldsymbol{\theta}$ is identified at $\boldsymbol{\theta}_0$ if the $(k \times 3)$-dimensional matrix $\partial\gamma / \partial \boldsymbol{\theta}$ has rank equal to 3 when evaluated at $\boldsymbol{\theta}_0$. The intuition behind this condition is very simple: the matrix has full column rank (equal to the dimension of $\boldsymbol{\theta}$) if and only if the vectors $\partial\gamma / \partial\phi_1, \partial\gamma / \partial\phi_2, \partial\gamma / \partial\sigma$ are linearly independent. For this to hold it must be impossible to match the effect on the moments of changing one parameter by changing the other two parameters. That is, each parameter plays a distinct role in determining the properties of the model, which is what identification requires.

Weak identification, on the other hand, means that the effect of changing one parameter on the moments of x_t can be approximated very closely by that of changing other parameters. This results in derivatives which are almost linearly dependent; for instance, having collinearity between $\partial\gamma / \partial\phi_1$ and $\partial\gamma / \partial\phi_2$ of nearly one (in absolute value) means that the effect of changing ϕ_1 on γ is very similar to that of changing ϕ_2 .

Table 1 illustrates the moments-based approach to identification in the ARMA(1,1) model. Columns 2 to 4 show the values of the derivatives of the first 10 autocovariances when the true values of the parameters are $\phi_1 = \phi_2 = 0, \sigma = 1$. As we can see, the derivatives with respect to ϕ_1 and ϕ_2 are perfectly negatively correlated. Thus the rank of $\partial\gamma / \partial\theta$ is only 2 and the ϕ_1 and ϕ_2 are not identified. Columns 5 to 7 similarly show the derivatives of γ evaluated at $\phi_1 = .7, \phi_2 = .8, \sigma = 1$. The degree of collinearity between $\partial\gamma / \partial\phi_1$ and $\partial\gamma / \partial\phi_2$ is $-.98$, which is high but less than -1. Thus, ϕ_1 and ϕ_2 are still identified though weakly.

Table 1

DERIVATIVE OF THE ACF OF A NARMA PROCESS

$\gamma(i)$	$\phi_1 = 0, \phi_2 = 0, \sigma = 1$			$\phi_1 = .7, \phi_2 = .8, \sigma = 1$		
	$\partial\gamma / \partial\phi_1$	$\partial\gamma / \partial\phi_2$	$\partial\gamma / \partial\sigma$	$\partial\gamma / \partial\phi_1$	$\partial\gamma / \partial\phi_2$	$\partial\gamma / \partial\sigma$
0	0.00	-0.00	4.00	-1.35	1.57	4.08
1	4.00	-4.00	0.00	3.13	-2.90	-0.35
2	1.60	-1.60	0.00	1.85	-2.03	-0.24
3	0.64	-0.64	0.00	1.05	-1.42	-0.17
4	0.26	-0.26	0.00	0.57	-1.00	-0.12
5	0.10	-0.10	0.00	0.28	-0.70	-0.08
6	0.04	-0.04	0.00	0.11	-0.49	-0.06
7	0.02	-0.02	0.00	0.02	-0.34	-0.04
8	0.01	-0.01	0.00	-0.03	-0.24	-0.03
9	0.00	-0.00	0.00	-0.05	-0.17	-0.02
10	0.00	-0.00	0.00	-0.05	-0.12	-0.01

Source: Author's calculations.

3. DSGE MODELS

In this section I discuss parameter identification in DSGE models. I will start with a brief outline of the general setup and then turn to analysis of two prototypical DSGE models.

3.1. Generalities

A DSGE model is summarized by a system of non-linear equations. Currently, most studies involving either simulation or estimation of DSGE models use linear approximations of the original models. That is, the model is first expressed in terms of stationary variables, and then linearized around the steady-state values of these variables. Once linearized, most DSGE models can be written in the following form:

$$\Gamma_0(\theta)z_t = \Gamma_1(\theta)E_t z_{t+1} + \Gamma_2(\theta)z_{t-1} + \Gamma_3(\theta)u_t \tag{3.1}$$

where z_t is a $m-$dimensional vector of endogenous and exogenous state variables, and the structural shocks u_t are independent and identically distributed n -dimensional random vectors with $Eu_t = 0, Eu_t u_t^{'} = I_n$. The elements of the matrices $\Gamma_0, \Gamma_1, \Gamma_2$ and Γ_3 are functions of a $k-$dimensional vector of deep parameters $\boldsymbol{\theta}$, where $\Theta \subset \mathbb{R}^k$ is a point in $\subset^k$. The parameter space Θ is defined as the set of all theoretically admissible values of $\boldsymbol{\theta}$.

There are several algorithms for solving linear rational expectations models (see for instance Blanchard and Kahn (1980), Anderson and Moore (1985), Klein (2000), Christiano (2002), Sims (2002)). Depending on the value of $\boldsymbol{\theta}$, there may exist zero, one, or many stable solutions. Assuming that a unique solution exists, it can be cast in the following form

$$z_t = A(\theta)z_{t-1} + B(\theta)u_t \tag{3.2}$$

where the $(m \times m)$ matrix A and the $(m \times n)$ matrix B are unique for each value of θ.

The model in (3.2) cannot be taken to the data directly since some of the variables in z_t are not observed. Instead, the solution of the model is expressed in a state space form, with a transition equation given by (7), and a measurement equation

$$x_t = s(\theta) + C(\theta)z_t \tag{3.3}$$

where x_t is a l -dimensional vector of observed state variables, s is a l -dimensional vector, and C is a $l \times m$ matrix.

The log-likelihood function of the data $X = [x_1, ..., x_T]$ may be computed using the Kalman filter if the structural shocks u_t are (assumed to be) jointly normally distributed. In this case the expected information matrix may be derived analytically as discussed in Iskrev (2008).

3.2. Identification in the RBC model

The first model I consider is a version of the one-sector stochastic growth model of Hansen (1985) with investment-specific technology shock. Below I outline the main features of the model.

3.2.1 The model

The representative household preferences are characterized by the lifetime utility function:

$$E_0 \sum_{t=0}^{\infty} \beta^t \left(\ln(c_t) - \phi n_t \right) \tag{3.4}$$

where c_t is consumption in period t and n_t is the total labor supplied by the household.

Aggregate output is produced using capital k_t and labor using the following production function:

$$y_t = \exp(z_t) k_t^{1-\alpha} n_t^{\alpha} \tag{3.5}$$

where z_t is total factor productivity and follows an AR(1) process:

$$z_t = \rho_z z_{t-1} + \varepsilon_t^z, \quad \varepsilon_t^z \sim (0, \sigma_z^2) \tag{3.6}$$

The law of motion for aggregate capital is:

$$k_{t+1} = (1-\delta) k_t + \exp(u_t) i_t \tag{3.7}$$

where u_t is investment-specific technology and follows an AR(1) process:

$$u_t = \rho_u u_{t-1} + \varepsilon_t^u, \quad \varepsilon_t^u \sim (0, \sigma_u^2) \tag{3.8}$$

The resource constraint of the economy is:

$$c_t + i_t = y_t \tag{3.9}$$

3.2.2 Identification analysis

The model is log-linearized around the deterministic steady state of the variables, and the system is expressed as in (3.2). There are four potentially observable variables: output, consumption, hours worked and investment. Since there are only two structural shocks, we can use at most two variables to estimate the model with maximum likelihood; those may be any two of the for variables, or some linear combinations of them. The model has 8 deep parameters, which are collected in the vector $\boldsymbol{\theta} = [\alpha, \beta, \delta, \phi, \rho_z, \rho_u, \sigma_z, \sigma_u]$.

Let us first consider the case of using only one variable. This is an useful exercise as it tells us which variable is most informative for which of the (identifiable) parameters In this case in the measurement equation (3.3) x_t and s are scalars, and C is a row vector with 1 in the position of the observed

variable, and zeros elsewhere.

The identifiability of θ may be established using either the information matrix or the moment-based approach. Both show that 2 of the 8 parameters are not identified; these are β and δ, which, when there is only one observable variable, and irrespectively which one it is, cannot be identified separately. This is easy to see from the fact that the derivatives of the moments with respect to β and δ are collinear. However, if either β or δ is known, the remaining 7 parameters are identified. Table 2 shows the relative asymptotic standard deviations, defined as $\frac{std(\hat{\theta}_i)}{|\theta_i|}$, with each observable assuming that either β or δ are known. Note that there are substantial differences in the precision with which the parameters may be estimated depending on which variable is used and also on whether β or δ is known. For instance, output (y) is most informative for α if β is known and δ is estimated, but hours worked (n) is most informative when β is estimated and δ is known.

The reason why the relative standard deviations are reported is that they provide a measure of the identification strength which is independent of the value of the parameter. This permits us to determine which parameters are relatively better and which are relatively worse identified.

The results in Table 2 suggest that although it is possible to estimate most parameters with only one observable, the estimates are likely to be very imprecise. With two observed variables there is much more information about the parameters, and thus the estimation uncertainty, captured by the asymptotic standard deviation, is greatly reduced. This can be seen in Table 3, which reports the relative asymptotic standard deviations with each pair of observables. From the table we can see that all parameters are identified; generally, the best identified parameters are β, ρ_z and ρ_u, while the worst identified are ϕ, σ_z and σ_u.

To determine the causes for why some parameters are better and other worse identified, we can use a decomposition of the information matrix analogous to that in equation (2.6). Using it, we can express the relative standard deviation for a given parameter as a product of two terms: a sensitivity component, which is large for parameters which do not play an important role in the model, and a collinearity component, which is large for parameters whose role in the model is easy to approximate with other parameters. This decomposition is shown in Table 4. We can see that the reason why β

Table 2

IDENTIFCATION STRENGTH IN THE RBC MODEL WITH ONE OBSERVABLE

Par.	true	c	y	i	n	c	y	i	n
α	0.670	187	35	135	62	197	97	11797	30
ϕ	0.025	981	3103	656	268	*fixed*	*fixed*	*fixed*	*fixed*
δ	0.980	*fixed*	*fixed*	*fixed*	*fixed*	26	98	1667	6.1
β	2.000	287	652	918	8.4	289	1246	58	47
ρ_z	0.950	5.6	20	37	29	5.6	20	37	29
ρ_u	0.970	8.6	17	32	20	8.6	17	32	20
σ_z	1.000	241	103	545	952	250	257	7497	1097
σ_u	1.000	306	1843	2401	1051	289	2102	927	929

Source: Author's calculations.

Note: Each column of the table shows the relative asymptotic standard deviations of θ when there is only one observed variable (shown in the first row)and either β or δ is assumed known. The results are obtained using the expected information matrix and T=100.

Table 3

IDENTIFCATION STRENGTH IN THE RBC MODEL WITH TWO OBSERVABLES

Par.	true	(c,y)	(c,i)	(c,n)	(y,i)	(y,n)	(i,n)
α	0.670	0.325	0.274	0.321	0.285	0.307	0.288
δ	0.025	1.027	0.454	1.125	0.454	1.119	0.453
β	0.980	0.024	0.025	0.025	0.018	0.025	0.021
ϕ	2.000	3.005	1.958	1.178	1.420	1.164	0.726
ρ_z	0.950	0.033	0.059	0.033	0.050	0.033	0.043
ρ_u	0.970	0.052	0.051	0.051	0.051	0.050	0.052
σ_z	1.000	0.299	0.381	0.295	0.264	0.283	0.346
σ_u	1.000	0.604	0.606	0.590	0.679	0.582	0.717

Source: Author's calculations.

Note: Each column of the table shows the relative asymptotic standard deviations of θ when there are only two observed variables (shown in the first row) The results are obtained using the expected information matrix and T=100 .

is so well identified is that its sensitivity component is very low; this implies that β is a very important determinant of the empirical properties of the model variables. On the other extreme is ϕ , which has very large sensitivity component, and because of that is the worst identified parameter. Strong collinearity explains the different strength of identification of σ_z and σ_u which have the same sensitivity components. Other parameters with strong collinearity are α , δ and ρ_u . As was already discussed in Section 2, strong collinearity implies that two or more parameters play similar role in the model. It is interesting to know what these parameters are. A simple way to find out is to compute coefficients of pairwise collinearity, which measure how similar the effects of two parameters are. This is done in Table 5 and we can see that there is a strong negative collinearity between σ_u and ρ_u on one hand and between β and δ , on the other. Thus, having higher volatility of the investment specific shock is similar to having lower persistence of the same shock, and having more patient consumers is similar to having lower depreciation rate. Furthermore, we can also see that when the included observables

Table 4

SENSITIVITY AND COLLINEARITY IN THE RBC MODEL WITH TWO OBSERVABLES

Par.	(c,y)		(c,i)		(c,n)		(y,i)		(y,n)		(i,n)	
	sens.	col.	sens.	col.	sens.	col.	sens.	col.	sens.	col.	sens.	col.
α	0.056	5.8	0.028	9.7	0.057	5.7	0.014	19.8	0.057	5.4	0.003	93.2
δ	0.191	5.4	0.087	5.2	0.191	5.9	0.045	10.0	0.192	5.8	0.015	30.0
β	0.005	4.8	0.005	5.0	0.005	5.0	0.001	13.6	0.005	5.0	0.000	73.4
ϕ	2.374	1.3	1.799	1.1	1.127	1.0	1.195	1.2	1.100	1.1	0.647	1.1
ρ_z	0.014	2.4	0.014	4.2	0.014	2.4	0.014	3.6	0.014	2.4	0.014	3.1
ρ_u	0.008	6.5	0.008	6.5	0.008	6.4	0.008	6.5	0.008	6.4	0.008	6.5
σ_z	0.071	4.2	0.071	5.4	0.071	4.2	0.071	3.7	0.071	4.0	0.071	4.9
σ_u	0.071	8.5	0.071	8.5	0.071	8.3	0.071	9.6	0.071	8.2	0.071	10.1

Source: Author's calculations.

Note: Each column of the table shows the sensitivity and collinearity components of the relative asymptotic standard deviations of θ when there are two observed variables (shown in the first row).The results are obtained using the expected information matrix and T=100 .

Table 5

STRONGEST PAIRWISE COLLINEARITY IN THE RBC MODEL WITH TWO OBSERVABLES

Par.	(c,y)		(c,i)		(c,n)		(y,i)		(y,n)		(i,n)	
	pcol	par.	pcol	par.	pcol	par.	pcol	par.	pcol	par.	pcol	par.
α	0.70	σ_z	-0.95	β	0.71	σ_z	-0.98	δ	0.71	σ_z	-0.999	β
δ	-0.97	β	-0.74	α	-0.98	β	-0.98	α	-0.98	β	-0.997	α
β	-0.97	δ	-0.95	α	-0.98	δ	-0.96	α	-0.98	δ	-0.999	α
ϕ	0.12	α	0.04	α	-0.04	α	0.04	α	-0.06	α	-0.004	α
ρ_z	-0.56	β	-0.65	α	-0.56	β	-0.49	α	-0.56	β	-0.12	β
ρ_u	-0.97	σ_u	-0.97	σ_u	-0.97	σ_u	-0.97	σ_u	-0.97	σ_u	-0.97	σ_u
σ_z	0.70	α	0.72	α	0.71	α	0.45	α	0.71	α	-0.71	δ
σ_u	-0.97	ρ_u	-0.97	ρ_u	-0.97	ρ_u	-0.97	ρ_u	-0.97	ρ_u	-0.97	ρ_u

Source: Author's calculations.

Note: The table shows which parameters are most strongly related to each deep parameter as well as the value of the pairwise collinearity ($pcol$) coefficients. The results are obtained using the expected information matrix and T=100.

are output and investment, α is strongly collinear with both β and δ. This means that the effect of these parameters on the moments and cross moments of output and investment are difficult to distinguish.

3.3. Identification in the New Keynesian model

In this section I consider a small-scale New Keynesian model studied in An and Schorfheide (2007). A brief description of the model follows.

3.3.1 The model

The representative household maximizes lifetime utility function

$$E_t[\sum_{s=0}^{\infty}\beta^s(\frac{(C_{t+s}\ /\ A_{t+s}-1)^{1-\tau}}{1-\tau}-N_{t+s})], \tag{3.10}$$

subject to a budget constraint:

$$P_tC_t+B_t+T_t=P_tW_tN_t+R_{t-1}B_{t-1}+P_tD_t+P_tSC_t, \tag{3.11}$$

where C_{t+s} is consumption, $N_{t+s}(j)$ is hours worked, P_t is the price of the final good, W_t is the real wage, R_t is the interest on the government bonds B_t, D_t is the residual real profit, T_t is lump-sum taxes and SC_t is net cash flow from trading state-contingent securities. A_t is stock of habit given by the level of technology in the intermediate good sector, and evolves according to

$$\Delta\ln A_t=\ln\gamma+\ln z_t,\qquad \ln z_t=\rho_z\ln z_{t-1}+\varepsilon_t^z,\quad \varepsilon_t^z\sim\mathbb{N}(0,\sigma_z^2)$$

There is a perfectly competitive sector producing a single final good from intermediate inputs $Y_t(j)$ using the technology

$$Y_t = (\int_0^1 Y_t(j)^{1-\nu} dj)^{\frac{1}{1-\nu}} \tag{3.12}$$

The final goods firm maximize profits given by

$$P_t Y_t - \int_0^1 P_t(i) Y_t(i) di, \tag{3.13}$$

where $P_t(i)$ is the price of intermediate good $Y_t(i)$.

Intermediate goods are produced in a monopolistically competitive sector. Each variety i is produced by a single firm using the following production technology:

$$Y_t(i) = A_t N_t(i) \tag{3.14}$$

The intermediate goods firm j maximizes the present value of its future profits

$$E_t[\sum_{s=0}^{\infty} \beta^s Q_{t+s|t} (\frac{P_{t+s}(j)}{P_{t+s}} Y_{t+s}(j) - W_{t+s} N_{t+s}(j) - AC_{t+s}(j))], \tag{3.15}$$

where $Q_{t+s|t}$ is the time t value to the consumers of a unit of the final good in period $t+s$; $AC_t(j) = \frac{\phi}{2}(\frac{P_t(j)}{P_{t-1}(j)} - \pi)^2 Y_t(j)$ is the cost of adjusting prices and π is the steady state rate of inflation.

The central bank sets the nominal interest rate according to the following rule

$$\frac{R_t}{r^* \pi^*} = \exp(\varepsilon_t^r)(\frac{R_{t-1}}{r^* \pi^*})^{\rho_r} [(\frac{\pi_t}{\pi^*})^{\psi_1} (\frac{Y_t}{Y_{t-1}\gamma})^{\psi_2}]^{1-\rho}, \tag{3.16}$$

where r^* is the steady state real interest rate, π_t is the gross inflation rate, π^* is the inflation target rate, and $\varepsilon_t^r \sim \mathbb{N}(0, \sigma_r^2)$ is a monetary policy shock.

The government collects lump-sum taxes in order to finance its consumption so as to respect the following budget constraint

$$P_t G_t + B_{t-1} R_{t-1} = T_t + B_t, \tag{3.17}$$

where $G_t = \zeta_t Y_t$ is government consumption in terms of final good, and $\zeta_t = 1 - 1/g_t$ where g_t is random variable evolving according to

$$\ln g_t = (1 - \rho_g) \ln g + \rho_g \ln g_{t-1} + \varepsilon_t^g, \quad \varepsilon_t^g \sim \mathbb{N}(0, \sigma_g^2)$$

3.3.2 Identification analysis

Again, the model is log-linearized around the deterministic steady state of the variables, and the system may be expressed as in (3.2). There are four potentially observable variables: output, consumption, inflation and the nominal interest rate. Since there are only three structural shocks, we can use at most three variables to estimate the model with maximum likelihood. The model has 14 deep

parameters, which are collected in the vector $\boldsymbol{\theta} = [\tau, \nu, \phi, \psi_1, \psi_2, \rho_r, \rho_g, \rho_z, r^*, \pi^*, \gamma, \sigma_r, \sigma_g, \sigma_z]$.

Let us first consider identification with only two observed variables. Two of the 14 parameters, ϕ and ν, are not identified with any pair of observables. Examining the derivatives of the moments shows that this is due to the perfect collinearity of the derivatives with respect to these two parameters. Therefore, if either one of the two parameters is fixed, the other one would be identified along with the other 12 parameters. An exception to this conclusion is the case when only output and consumption are observed. Then we have to fix three more parameters, in addition to ν or ϕ. For example, if we fix ν, ψ_2, π^* and σ_r, we could identify the remaining 10 parameters.

The reason why the (output,consumption) pair is less informative is that the behavior of the two variables in the model is very similar. Therefore, consumption adds very little information to that already contained in output. This can be seen in Table 6, which shows the asymptotic standard deviations for each pair of observables assuming that some of the elements of $\boldsymbol{\theta}$ are known. The estimation uncertainty of most parameters is much larger, compared to the other pais of observables, even though more parameters are assumed known. Note that, as in the RBC model, there is a substantial difference in the information content of different variables. Also, which pair of variables is best to use for estimation depends on the parameters one is most interested in. For instance, the policy response to inflation parameter ψ_1 is best identified with (π, r) while the policy response to output growth ψ_2 is best identified with (y, r).

Next, consider using three out of the four observables to estimate $\boldsymbol{\theta}$. Table 7 reports the asymptotic

Table 6

PARAMETER IDENTIFCATION IN THE NKM MODEL WITH TWO OBSERVABLES

Par.	true	(y,π)	(y,r)	(y,c)	(π,r)	(π,c)	(r,c)	(y,π)	(y,r)	(y,c)	(π,r)	(π,c)	(r,c)
τ	2.00	3.9	3.3	554	689	2.3	12	3.9	3.3	554	689	2.3	12
ν	0.10	*fixed*	*fixed*	*fixed*	*fixed*	*fixed*	*fixed*	7.5	786	614	32	2.7	3160
ϕ	7.50	8.3	873	682	36	3.0	3511	*fixed*	*fixed*	*fixed*	*fixed*	*fixed*	*fixed*
ψ_1	1.50	20	11	2719	8.9	206	90	20	11	2719	8.9	206	90
ψ_2	1.00	18	14	*fixed*	230	193	72.7	18.4	14.5	*fixed*	230	193	72
ρ_r	0.96	0.7	0.5	118	21	7.5	4.5	0.7	0.5	118	21	7.5	4.5
ρ_g	0.95	0.95	0.7	0.1	*fixed*	*fixed*	21	0.2	0.7	0.1	*fixed*	21.7	0.2
ρ_z	0.65	0.8	0.9	111	34	0.3	0.3	0.8	0.9	111	34	0.3	0.3
r^*	0.40	3927	4432	293802	13845	562	17825	3927	4432	293802	13845	562	17825
π^*	4.00	0.3	443	*fixed*	0.3	0.3	1782	0.3	443	*fixed*	0.3	0.3	1782
γ	0.50	0.3	0.3	0.3	2769	0.3	0.3	0.3	0.3	0.3	2769	0.3	0.3
σ_r	0.20	26	1.9	*fixed*	493	18	11	26	1.9	*fixed*	493	18	11
σ_g	0.80	2.7	2.0	0.1	596	276	80	2.7	2.0	0.1	596	276	80
σ_z	0.45	1.5	1.7	207	139	0.5	0.5	1.5	1.7	207	139	0.5	0.5

Source: Author's calculations.

Note: Each column of the table shows the relative asymptotic standard deviations of θ when there are two observed variables (shown in the first row)and some deep parameters are assumed known. The results are obtained using the expected information matrix and T=100.

Table 7

PARAMETER IDENTIFCATION IN THE NKM MODEL WITH THREE OBSERVABLES

Par.	true	(y,π,r)	(y,π,c)	(y,r,c)	(π,r,c)	(y,π,r)	(y,π,c)	(y,r,c)	(π,r,c)
τ	2.00	0.36	0.56	0.26	0.32	0.36	0.56	0.26	0.32
ν	0.10	*fixed*	*fixed*	*fixed*	*fixed*	0.71	1.36	188.38	0.72
ϕ	7.50	0.79	1.52	209.31	0.80	*fixed*	*fixed*	*fixed*	*fixed*
ψ_1	1.50	1.24	1.37	1.06	3.58	1.24	1.37	1.06	3.58
ψ_2	1.00	1.41	1.36	1.18	3.28	1.41	1.36	1.18	3.28
ρ_r	0.96	0.03	0.10	0.03	0.14	0.03	0.10	0.03	0.14
ρ_g	0.95	0.03	0.04	0.04	0.03	0.03	0.04	0.04	0.03
ρ_z	0.65	0.27	0.29	0.27	0.21	0.27	0.29	0.27	0.21
r^*	0.40	3.40	323.22	1062.13	3.39	3.40	323.22	1062.13	3.39
π^*	4.00	0.31	0.31	106.21	0.31	0.31	0.31	106.21	0.31
γ	0.50	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
σ_r	0.20	0.39	2.32	0.28	0.35	0.39	2.32	0.28	0.35
σ_g	0.80	0.15	0.07	0.07	2.22	0.15	0.07	0.07	2.22
σ_z	0.45	0.30	0.35	0.33	0.17	0.30	0.35	0.33	0.17

Source: Author's calculations.

Note: Each column of the table shows the relative asymptotic standard deviations of θ when there are two observed variables(shown in the first row) and and either ν or ϕ is assumed known. The results are obtained using the expected information matrix and T=100.

standard deviations for each triplet of observables assuming that either ν or ϕ is known. As in Table 6, which one of the two parameters is fixed has no effect on the standard deviation of the other parameters. Worst identified with all combinations of observables are the response coefficients of the Taylor rule (ψ_1 and ψ_2), the price stickiness and inverse elasticity of demand parameters (ϕ and ν), and the steady state interest rate (r^*); best identified are the interest rate smoothing parameter (ρ_r) and the government consumption shock parameter ρ_g.

Table 8 shows the decompositions of the relative standard deviations into sensitivity and collinearity components. Note that most of the worst identified parameters are also the ones with the largest collinearity components. Thus, these parameters are poorly identified because their effects on the empirical properties of the observables are easy to mimic with other parameters. An exception is r^*, which is poorly identified because of the very large sensitivity component. This implies that the value of r^* is of little consequence empirically. Note that both r^* and π^* have huge collinearity components when π is not among the observables. For example, the value for π^* translates into a multiple collinearity coefficient of $.999999875$.[1] This means that π^* is almost impossible too distinguish from other model parameters unless its effect on inflation is accounted for. Computing the pairwise collinearity coefficients, reported in Table 9, shows that when inflation is not among the observables, the collinearity between π^* and r^* is $.966$. There we also see that the policy response to inflation ψ_1 is highly collinear with either the price stickiness parameter ϕ or the interest rate smoothing parameter

(1) The multiple collinearity coefficient measures the degree of collinearity between a given parameter and all other model parameters.

Table 8

SENSITIVITY AND COLLINEARITY IN THE NKM MODEL WITH THREE OBSERVABLES

Par.	(y,π,r)		(y,π,c)		(y,r,c)		(π,r,c)	
	sens.	**col.**	**sens.**	**col.**	**sens.**	**col.**	**sens.**	**col.**
τ	0.045	8.1	0.043	13.1	0.027	9.7	0.030	10.7
ϕ	0.022	36.8	0.067	22.6	0.402	520.5	0.038	21.3
ψ_1	0.011	116.4	0.073	18.9	0.029	36.5	0.016	220.6
ψ_2	0.021	66.7	0.295	4.6	0.058	20.4	0.035	93.6
ρ_r	0.001	44.5	0.003	34.3	0.002	15.7	0.001	152.7
ρ_g	0.010	2.9	0.041	1.0	0.026	1.5	0.013	2.4
ρ_z	0.109	2.4	0.100	2.9	0.078	3.5	0.088	2.4
r^*	0.431	7.9	21.597	15.0	0.550	1932.4	0.432	7.9
π^*	0.010	29.7	0.033	9.3	0.053	2003.3	0.017	18.2
γ	0.082	3.1	0.247	1.0	0.107	2.4	0.082	3.1
σ_r	0.071	5.5	0.070	33.0	0.071	4.0	0.070	5.0
σ_g	0.071	2.1	0.071	1.0	0.071	1.0	0.071	31.4
σ_z	0.071	4.3	0.071	4.9	0.071	4.6	0.071	2.4

Source: Author's calculations.

Note: Each column of the table shows the sensitivity and collinearity components of the relative asymptotic standard deviations of when there are three observed variables (shown in the first row).The results are obtained assuming $\nu = .10$ is known, and using the expected information matrix with T=100.

Table 9

STRONGEST PAIRWISE COLLINEARITY IN THE NKM MODEL WITH THREE OBSERVABLES

Par.	(y,π,r)		(y,π,c)		(y,r,c)		(π,r,c)	
	pcol.	**par.**	*pcol.*	**par.**	*pcol.*	**par.**	*pcol.*	**par.**
τ	-0.76	ρ_r	-0.90	ϕ	-0.95	ρ_r	-0.68	ρ_r
ϕ	0.96	π^*	0.99	π^*	0.76	σ_r	0.90	π^*
ψ_1	0.92	ϕ	-0.97	ρ_r	-0.91	ρ_r	-0.89	ρ_r
ψ_2	-0.91	ψ_1	-0.87	r^*	-0.89	ψ_1	-0.89	ψ_1
ρ_r	-0.96	ϕ	0.99	σ_r	-0.95	τ	-0.89	ψ_1
ρ_g	-0.70	σ_g	-0.04	σ_g	-0.21	ψ_2	-0.90	σ_g
ρ_z	-0.29	ψ_2	0.87	σ_z	0.95	σ_z	0.80	σ_z
r^*	0.94	γ	0.98	ϕ	0.97	π^*	0.94	γ
π^*	0.96	ϕ	0.99	ϕ	0.97	r^*	0.90	ϕ
γ	0.94	r^*	0.03	π^*	0.91	r^*	0.94	r^*
σ_r	0.11	ρ_r	0.99	ρ_r	0.76	ϕ	0.35	ρ_r
σ_g	-0.70	ρ_g	-0.04	ρ_g	-0.01	ρ_g	-0.90	ρ_g
σ_z	0.42	ψ_2	0.87	ρ_z	0.95	ρ_z	0.80	ρ_z

Source: Author's calculations.

Note: The table shows which parameters are most strongly related to each deep parameter as well as the value of the pairwise collinearity coefficients ($pcol$). The results are obtained assuming $\nu = .10$ is known, and using the expected information matrix with T=100.

ρ_r , while the response to output ψ_2 is highly collinear with either ψ_1 or r^* .

4. CONCLUDING REMARKS

In the recent years DSGE models are increasingly becoming an important tool for quantitative policy analysis. This has lead to a considerable research effort aimed to increasing the models' complexity and realism. As the number of number of features represented in the models increases, it becomes very difficult to understand by reasoning alone their separate contribution to the model performance vis-a-vis the reality they are supposed to explain. In this note I have tried to show that studying parameter identification may provide useful insights regarding the model parameters and the structural features they represent. The strength of parameter identification reflects their importance in determining the empirical implications of the model. Weak identification arises when some model features have little empirical relevance; this may occur either because they are unimportant on their own, or because they are redundant given the other features represented in the model. Since DSGE models provide a complete characterization of the dynamics of the model variables, parameter identification may be treated as a property of the underlying model and studied without a reference to a particular data set. I have illustrated this approach to parameter identification using two canonical macroeconomic model - a real business cycle model and a new Keynesian model. One limitation of this analysis is that only a single parameter value was considered. To obtain a complete picture of identification as a property of the model, one has to study it across different theoretically plausible parameter values. For a more detailed discussion of this and other important aspects of the a priori analysis of identification, the reader may consult the papers cited in the introduction.

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CHRONOLOGY OF MAJOR FINANCIAL MEASURES

January to September 2010

2010

January

• 4 January (Circular-Letter No 1/2010/DET, Banco de Portugal, Issue and Treasury Department)	Informs that, within the scope of application of Decree-Law No 195/2007 of 15 May, regarding contracts on the euro banknote recycling activity, the cash-in-transit companies ESEGUR, S.A., PROSEGUR, Lda., LOOMIS, S.A. and GRUPO 8, Lda., shall maintain in 2010 the conditions under which they are authorised to carry on such activity. In 2009, they concluded with success the process of full adjustment to the above legal system.
• 5 January (Decree-Law No 2/2010, Official Gazette No 2, Series I Ministry of Finance and Public Administration)	Approves the reprivatisation process of the whole capital stock of BPN (Banco Português de Negócios), SA.
• 5 January (Decree-Law No 3/2010, Official Gazette No 2, Series I, Ministry of Finance and Public Administration)	Establishes that the collection of any charges for payment services and cash operations in ATMs shall be prohibited.
• 7 January (Instruction No 1/2010, Official Gazette No 16, Series II, Part C, Ministry of Public Administration, Portuguese Treasury and Government Debt Agency)	Approves the conditions of issue of Treasury bills and the market operator status.
• 14 January (Instruction of Banco de Portugal No 01/2010 BNBP 2/2010)	Establishes the procedures to be followed when retaining counterfeit/suspect banknotes and coins. Revokes Instruction No 9/2009, published in the Official Bulletin No 8/2009 of 17 August 2009.
• 15 January (Instruction of Banco de Portugal No 27/2009 BNBP 1/2010)	Determines, without prejudice to other regulations, which Instructions shall be applicable to payment institutions.
• 15 January (Instruction of Banco de Portugal No 28/2009 BNBP 1/2010)	Amends a number of Instructions, so that they may apply to payment institutions, i.e. the new type of payment service providers.
• 15 January (Instruction of Banco de Portugal No 29/2009 BNBP 1/2010)	Determines which accounting data shall be reported to Banco de Portugal by payment institutions which carry out any business other than the provision of payment services.
• 26 January (Notice of Banco de Portugal No 1/2010, Official Gazette No 27, Series II, Part E)	Lays down the information to be released in the statement on the remuneration policy of management and auditing board members of institutions subject to the supervision of Banco de Portugal. This Notice shall enter into force on the day following its publication and shall apply to financial years started on 1 January 2010 or thereafter.

February

- 1 February (Circular Letter No 2/10/DSBDR, Banco de Portugal, Banking Supervision Department)

  Lays down the recommendations applicable to the remuneration policy of management and auditing board members of institutions subject to the supervision of Banco de Portugal as well as of the respective staff earning variable remuneration and carrying on their activities at auditing level or any other level that may have a material impact on the institution's risk profile. This is aimed at bringing compensation mechanisms closer into line with prudent and appropriate risk control and management.

- 4 February (Decision No 5166/2010, Ministry of Finance and Public Administration. Minister's Office, Official Gazette No 57; Series II, Part C)

  Approves the new Chart of Accounts of Banco de Portugal, pursuant to Article 63(1) of the Organic Law of Banco de Portugal (Law No 5/98 of 31 January).

- 22 February (Instruction of Banco de Portugal No 4/2010, BNBP 3/2010)

  Amends Instruction No 10/2007, published in the Official Bulletin No 5/2007 of 15 May 2007, relating to external rating agencies.

March

- 4 March (Instruction of Banco de Portugal No 7/2010, BNBP 3/2010)

  Publishes the maximum rates in credit agreements for consumers within the scope of Decree-Law No 133/2009 of 2 June, applicable in the second quarter of 2010.

- 10 March (Instruction of Banco de Portugal No 8/2010, BNBP 4/2010)

  Determines that credit institutions shall send to Banco de Portugal information on deposit and credit agreements, in line with the attached Table, for the analysis and evaluation of the number of customers' complaints.

- 15 March (Instruction of Banco de Portugal No 5/2010, BNBP 3/2010)

  Amends Instruction No 33/2007, published in the Official Bulletin No 1 of 15 January 2008, which regulates the operation of the TARGET2 national system.

- 15 March (Instruction of Banco de Portugal No 6/2010, BNBP 3/2010)

  Amends Instruction No 24/2009, published in the Official Bulletin No 11 of 16 November 2009, which regulates the granting of intraday credit and the contingency liquidity facility.

- 30 March (Notice of Banco de Portugal No 2/2010, Official Gazette No 74, Series II, Part E)

  Establishes the minimum reporting requirements to be met by credit institutions having their head office or a branch in the national territory, when negotiating or signing housing loans or linked credit agreements or during the life of the agreement. The present Notice enters into force on 1 November 2010, and shall apply to loans to be agreed after that date.

April

- 5 April (Instruction of Banco de Portugal No 9/2010, BNBP 4/2010)

  Introduces changes in Instruction No 1/99 of 15 January 1999, which laid down the general rules governing the Intervention Operations Market. Revokes Circular Letter No 6/2009/DMR of 26 February 2009.

• 6 April (Notice of Banco de Portugal No 3/2010, Official Gazette No 74, Series II, Part E)	Defines the new contribution system for the Mutual Agricultural Credit Guarantee Fund by the Central Agricultural Credit Bank and Mutual Agricultural Credit Banks belonging to the Integrated System of Mutual Agricultural Credit (Portuguese acronym: SICAM), bringing it closer to the system applicable to the institutions participating in the Deposit Guarantee Fund. It sets at 0.10% the base contributory rate in 2010.
• 16 April (Instruction of Banco de Portugal No 10/2010, BNBP 5/2010)	Establishes the reporting requirements to be met by credit institutions *vis-à-vis* their customers when negotiating or signing housing loans or linked credit agreements or during the life of the agreement.
• 22 April (Instruction No 5/2010, Official Gazette No 86 – Series II, Part C, Ministry of Finance and Public Administration. Portuguese Treasury and Government Debt Management Agency)	Approves the conditions for the issue of Treasury Bills (TB) and the market operators' statutes. The present Instruction enters into force on 1 May 2010.
• 22 April (Resolution No 17/2010 of the Presidency of the Council of Ministers, Official Gazette No 111, Series II, Presidency of the Council of Ministers. Council of Ministers)	Appoints, pursuant to Article 27 of the Organic Law of Banco de Portugal, approved by Law No 5/98 of 31 January, Mr. Carlos da Silva Costa as Governor of Banco de Portugal, with effect from 7 June 2010.
• 23 April (Decree No 7/2010, Official Gazette No 79 – Series I, Ministry of Foreign Affairs)	Approves the Economic Cooperation Agreement between the Portuguese Republic and the Democratic Republic of São Tomé and Príncipe with a view to strengthening the macroeconomic and financial stability of São Tomé and Príncipe, signed in São Tomé on 28 July 2009. For that purpose, it creates the Economic Cooperation Agreement Commission (Portuguese acronym: COMACE), within which a Macroeconomic Monitoring Unit is forecast to be created.

May

• 10 May (Executive Order No 260/2010, Official Gazette No 90 – Series I, Ministry of Finance and Public Administration)	Approves, under Article 5(1) of the Regime Excepcional de Regularização Tributária de Elementos Patrimoniais (Extraordinary scheme for the tax adjustment of financial assets), approved by Article 131 of Law No 3-B/2010 of 28 April, the respective model of declaration and filling-in instructions. Banco de Portugal shall be responsible for retaining such documents in the archives for a period of 10 years.
• 17 May (Instruction of Banco de Portugal No 11/2010, BNBP 5/2010)	Revokes Instruction No 49/96, published in the BNBP 1/96 of 17 June, which enabled Mutual Agricultural Credit Banks to open housing savings accounts under certain conditions.
• 17 May (Instruction of Banco de Portugal No 12/2010, BNBP No 5/2010)	Regulates statistical data reporting to Banco de Portugal. Revokes Instruction No 19/2002, published in the Official Bulletin No 8 of 16 August 2002.

• 18 May (Law No 8-A/2010, Official Gazette No 96, Series I, Assembly of the Republic)	Approves a system enabling the Government to lend funds and carry out other lending operations to euro area Member States and to grant personal State guarantees to operations intended to finance these States, within the scope of an initiative to strengthen financial stability.
• 20 May (Resolution No 40/2010 of the Council of Ministers, Official Gazette No 112, Series I, Presidency of the Council of Ministers)	Creates a new public debt instrument denominated Treasury Certificate. Its aim is to promote long-term savings by citizens and to boost the government debt market. This Resolution enters into force on 1 July 2010.
• 26 May (Decree-Law No 52/2010, Official Gazette No 102, Series I, Ministry of Finance and Public Administration)	Approves procedural rules and evaluation criteria for the prudential assessment of acquisitions and increase of holdings in the financial sector, transposing into national legislation Directive No 2007/44/EC of the European Parliament and of the Council of 5 September. The present Decree-Law enters into force on the day following its publication.
• 28 May (Information No 7, OJ C 138, Luxembourg)	Extract from the decision on the opening of winding-up proceedings concerning the Banco Privado Português, S.A. under Article 9 of Directive 2001/24/EC of the European Parliament and of the Council on the reorganisation and winding up of credit institutions. Publication provided for in Article 13 of that Directive and in Article 21 of Decree-Law No 199/2006 of 25 October. Withdrawal of authorisation of Banco Privado Português, S.A., is effective as of 12 p.m. on 16 April 2010.

June

• 09 June (Instruction of Banco de Portugal No 14/2010, BNBP 7/2010)	Amends Clause 3 (3) of the Standard Contract regarding participation in the BPnet system, annexed to Instruction No 30/2002, published in the Official Bulletin No 10 of 15 October 2002.
• 9 June (Circular Letter No 13/10/DSBDR, Banco de Portugal, Banking Supervision Department)	Provides clarification on Instruction No 13/2009, due to doubts and errors detected in the filling-in of the annexed forms. It also informs that the service "Data collection/Prudential reporting in the BPnet System Supervision Area" is available, which is a new information collection application envisaged in the above Instruction.
• 11 June (Council Resolution No 40/2010, Official Gazette No 112 Series I, Presidency of the Council of Ministers)	Creates a new public debt instrument, the so-called Treasury Certificates.
• 11 June (Circular Letter No 13/2010/DET, Banco de Portugal, Issue and Treasury Department)	Informs on the implementation of procedures between Banco de Portugal and credit institutions within the scope of the *Regime Excepcional de Regularização Tributária* (extraordinary scheme for tax adjustment), approved by Article 131 of Law No 3-B/2010 of 28 April, and governed by Executive Order No 260/2010 of 10 May. It includes in annex a list of operational procedures to be adopted upon reception of the tax adjustment declaration and the corresponding payment.
• 15 June (Instruction of Banco de Portugal No 13/2010, BNBP 6/2010)	Amends Annex V (Pricing and penalties) of Instruction No 3/2009, published in the Official Bulletin No 2/2009 of 16 February 2009, which regulates the Interbank Clearing System (Portuguese acronym: SICOI).

- 16 June (Circular Letter No 17/2010/DET, Banco de Portugal, Issue and Treasury Department)

  Releases a new version of the "recycling of euro banknotes and coins" form (annexed to Instruction No 14/2009 of 15 October), to be adopted by 1 October 2010.

- 16 June (Circular Letter No 18/2010/DET, Banco de Portugal, Issue and Treasury Department)

  Requests that credit institutions and professional cash handlers intending to access information on euro banknotes and coins and their counterfeits give identifying details on potential users. This will serve to accredit them with the Banco de Portugal National Counterfeit Centre for access to data on counterfeiting.

- 18 June (Decree-Law No 71/2010, Official Gazette No 117, Series I, Ministry of Finance and Public Administration)

  Lays down the legal regimes governing undertakings for collective investment in transferable securities under a corporate form and real estate funds under a corporate form. Hence, this Decree-Law allows for the establishment of collective investment undertakings (UCITS) and real estate funds (REF) under a corporate form, naming them *sociedades de investimento mobiliário* and *sociedades de investimento imobiliário* respectively.

- 22 June (Instruction of Banco de Portugal No 15/2010, BNBP 7/2010)

  Releases for the third quarter of 2010 the maximum rates to be applied to consumer credit agreements, signed within the scope of Decree-Law No 133/2009 of 2 June.

- 30 June (Circular Letter No 16/10/DSBDR, Banco de Portugal, Banking Supervision Department)

  Underlines the importance for institutions intending to adopt the Advanced Measurement Approach (AMA) to adequately comply with the guidelines of the Committee of European Banking Supervisors (CEBS) included in the guidance paper on operational risk mitigation techniques, released by Banco de Portugal.

- 30 June (Circular Letter No 17/10/DSBDR, Banco de Portugal, Banking Supervision Department)

  Provides clarification on the prudential treatment of the repurchase of eligible instruments for the calculation of own funds.

July

- 15 July (Instruction of Banco de Portugal No 16/2010, BNBP No 8/2010)

  Amends Instruction No 10/2007, published in the Official Bulletin No 5/2007 of 15 May 2007, on External Credit Assessment Institutions.

August

- 11 August (Circular Letter No 22/10/DSBDR, Banco de Portugal, Banking Supervision Department)

  Pursuant to paragraph 6 of Instruction No 17/2010, sends the technical specifications to be followed when notifying Banco de Portugal of transfers to offshore jurisdictions.

- 16 August (Instruction of Banco de Portugal No 17/2010, BNBP No 8/2010)

  Requires that the items of information listed in Article 118 (3) and (4) of the Legal Framework of Credit Institutions and Financial Companies be sent trough the BPnet electronic communication system.

- 16 de August (Resolution of the Council of Ministers No 57-B/2010, Official Gazette No 158, 2nd Supplement, Series I, Presidency of the Council of Ministers)

More than one year after the nationalisation of Banco Português de Negócios, S. A. (BPN), and given that there is no reason for BPN to be maintained in the public sector, Decree-Law No 2/2010 of 5 January, implementing the legal system laid down in Law No 11/90 of 5 April, approves the reprivatisation of BPN. This implies the sale of all shares representative of its capital stock, through both open tender and offer for sale exclusively to employees within the BPN group.

September

- 2 September (Law No 36/2010, Official Gazette No 171, Series I, Parliament)

Creates in Banco de Portugal a database on the bank accounts existing in the banking system, which includes the identification of accounts and respective holders and the persons authorised to operate them, including those empowered with written mandates. This law shall enter into force 180 days following its publication.

- 15 September (Instruction of Banco de Portugal No 18/2010, BNBP No 8/2010)

Amends Instruction No 21/2008, published in the Official Bulletin No 1/2009 of 15 January, which introduced changes in the Regulation Governing the Central Credit Register.