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Outlook for the Portuguese Economy: 2009-2010

OUTLOOK FOR THE PORTUGUESE ECONOMY: 2009-2010[1]

1. INTRODUCTION

The outlook for the Portuguese economy for the 2009-2010 period is marked by the interaction between an unprecedented crisis in international financial markets and strong slowdown in economic activity worldwide. In turn, expectations point to a recessionary scenario in almost all advanced economies and low growth in emerging market economies. Thus, the current projections for the Portuguese economy encompass a contraction in economic activity in 2009, followed by moderate recovery in 2010, in a context where the persistence of several fragilities of a structural nature will continue to condition the performance of the economy (Table 1.1).

Economic activity in some of the major advanced economies had already followed a decelerating trend since the end of 2006, in part, due to rising commodity prices in international markets and to the downward adjustment of housing market prices in several countries. The financial crisis that emerged in mid-2007 accelerated this profile, in particular due to its negative impact on economic agents' expectations and on their financial situation, which will likely contribute to both a recession in major advanced economies and to a significant deceleration in activity in emerging market and developing economies,

Table 1.1

PROJECTIONS OF BANCO DE PORTUGAL 2009-2010
Rate of change in percentage

	Weights 2007	Current projection 2008(e)	Current projection 2009(p)	Current projection 2010(p)	EB Autumn 2008 2008(e)	EB Summer 2008 2008(p)	EB Summer 2008 2009(p)
Gross Domestic Product	100.0	0.3	-0.8	0.3	0.5	1.2	1.3
Private consumption	65.0	1.4	0.4	0.6	1.4	1.3	0.7
Public consumption	20.3	0.2	-0.1	-0.2	0.2	-0.2	0.0
Gross fixed capital formation	21.8	-0.8	-1.7	-0.3	-0.8	1.0	1.2
Domestic demand	107.6	1.0	0.0	0.3	1.0	1.0	0.7
Exports	32.6	0.6	-3.6	1.8	1.4	4.4	4.0
Imports	40.1	2.4	-1.0	1.5	2.6	3.3	2.1
Contribution to GDP growth (in p.p.)							
Net exports		-0.8	-0.8	0.0	-0.6	0.1	0.5
Domestic demand		1.1	0.0	0.3	1.0	1.0	0.8
of which: change in inventories		0.3	0.1	0.0	0.2	0.0	0.0
Current+capital account (% of GDP)		-9.0	-7.9	-9.4	-8.9	-10.6	-11.1
Trade balance (% of GDP)		-8.0	-7.0	-7.5	-8.0	-7.8	-7.5
HICP		2.7	1.0	2.0	2.8	3.0	2.5

Source: Banco de Portugal.
Note: (e) - estimated; (p) - projected. The central projections for each aggregate is shown (considered to be its most likely value, depending on the set of assumptions in question). As described in Section 7, probability distributions assigned to the possible values of the aggregate may be asymmetrical. Therefore, the probability of observing a value below the central projection may be different from the probability of observing a value above the central projection.

(1) This section is based on data available up to mid December. The assumptions underlying interest rates, exchange rates and oil prices are based on figures up to 11 December 2008.

in which the pace of growth was above trend. A small open economy fully integrated in economic and financial terms like the Portuguese economy tends to be affected by these developments, in particular considering its high level of indebtedness.

The pass through of the international economic and financial developments into the Portuguese economy will continue to influence economic growth over the projection horizon through multiple channels. First, the slowdown in economic activity and deteriorating prospects for world growth and demand tend to affect negatively both the external demand for Portuguese goods and services and commodity prices in international markets, and in particular oil prices. Second, the expectations of national economic agents will tend to be negatively affected by an international environment marked by the increasing economic slowdown and high uncertainty surrounding the size and duration of the current downturn of the economic cycle, not only in the euro area and major advanced economies, but also in relevant emerging markets for Portugal. Finally, developments in financing conditions over the projection horizon reflect, on the one hand, expectations of lower money market interest rates, in a context where market anticipate further cuts in the key ECB interest rates, and lower risk premia in these markets over the projection horizon, against the background of a gradual easing of financial market instability. In turn, in the current stage of the economic cycle, developments in money market interest rates are not expected to be fully passed through on to bank interest rates. This follows from both the tighter access conditions of banks to international financial markets, and from the deteriorating households and corporate balance sheets. At the same time, these factors may also translate into more stringent borrowing conditions for some economic agents.

The deterioration of the financial crisis and the lower inflation expectations in the second half of 2008, combined with the deceleration in world economic activity, led to more accommodative monetary policies across countries, as well as in the euro area. In addition, several measures were announced to strengthen confidence and to restore the smooth functioning of financial markets.[2] On the other hand, many countries adopted fiscal policy measures, intending to stabilise economic activity. With regard to the specific fiscal policy measures in Portugal, in line with the procedure adopted in the Eurosystem staff projection exercises, the current projection only includes the measures already approved in legal terms or specified with sufficient detail at the cut-off date of this article. This criterion is applied to both the measures included in the State Budget for 2009 and to those announced subsequently, namely those approved in the Council of Ministers on 13 December 2008.

The latest estimates point to an increase in Gross Domestic Product (GDP) of 0.3 per cent in 2008, versus the 1.9 per cent growth in 2007. This slowdown was marked by the interaction between the international financial crisis and world economic activity, in an environment in which the persistence of a set of fragilities of a structural nature seems to have continued to condition the growth of the Portuguese economy. In 2009 economic activity is expected to contract by 0.8 per cent. This contraction mainly reflects the dynamic effects associated with the deterioration of the external environment, which, on the one hand, will directly affect the growth of exports and, on the other, will imply the postponement of consumption and investment decisions by domestic economic agents. In the context of the assumed reduction in international financial market tensions over the projection horizon, accompanied by a gradual recovery in demand prospects in the markets of destination of Portuguese exports, GDP is projected to grow 0.3 per cent in 2010.

The degree of uncertainty surrounding the current projection remains particularly high, namely as regards the scale and persistence of the slowdown in the global economy, the new level around which international financial markets will stabilise, and the effects of government measures. The balance of

(2) For the Portuguese case, see "Box 1 Main measures taken by the Portuguese authorities regarding the financial system in the context of the international financial crisis", in the text "The Portuguese banking system in 2008", Banco de Portugal, *Economic Bulletin-Autumn 2008*.

risks referring to economic activity lies to the downside in both 2009 and 2010 (see "Section 7 *Uncertainty and risk analysis*"). This risk arises mainly from a potentially longer international crisis environment, which may lead to a larger contraction in the advanced economies and to an even more marked slowdown in emerging market and developing economies.

The materialisation of this situation would affect considerably economic growth in Portugal, due to both its transmission through the international trade channel and through the financial channels which would tend to determine the persistence of liquidity problems and of credit risk premia at particularly high levels until the end of the projection horizon, translating into particularly adverse financing conditions.

As to developments on the supply side, the current estimates regarding GDP growth are consistent with a reduction in total factor productivity in 2008. These developments seem to have occurred against a background characterised by a significant reduction in the degree of capacity utilisation and by the fact that so far employment has not fully reflected the slowdown in economic activity, suggesting the maintenance of a level of employment not fully used in the production process.[3] Total factor productivity is expected to decrease further in 2009 and to increase marginally in 2010. The current context of unfavourable developments in demand, in particular in export markets, stresses the need for an additional restructuring effort of the Portuguese economy, in order to channel the production of goods and services to segments with higher value added and to markets with higher growth prospects over the medium term. Maintaining this effort is essential for the creation of conditions that will ensure, after the current period of slowdown, the resumption of a sustained growth process of the Portuguese economy.

The slowdown in GDP in 2008 was driven by a deceleration in the several components of global demand, in particular investment (that decreased) and exports, amid an increasing deterioration in demand prospects both in the domestic and external markets. The contraction in economic activity projected for 2009, reflects besides a further decline in investment and a reduction in exports, a significant slowdown in private consumption, in particular in the durable goods component, which is more sensitive to developments in the economic cycle and to the deterioration of economic agents' expectations. In comparison with the period before the emergence of the financial crisis and, despite the fall in money market interest rates, the more difficult financing conditions for the national banking system will likely imply tightening of credit standards for loans. Hence the intertemporal budget constraints of firms and households will become particularly active, given the high level of indebtedness of the non-financial private sector. The mild pick-up in economic activity in 2010 mainly stems from the favourable developments in exports and, to some extent, in private investment, in the context of the assumed likely recovery of worldwide economic activity and, hence of the external demand for Portuguese goods and services, amid the progressive easing of tensions in financial markets.

The inflation rate, as measured by the annual average change in the Harmonised Index of Consumer Prices (HICP), increased from 2.4 per cent in 2007 to 2.7 per cent in 2008. In 2009 and 2010, the current projection points to inflation standing at 1.0 and 2.0 per cent respectively. Developments in 2009 are likely to be marked by the fall in prices in the energy component of the HICP, in line with the assumptions for oil price and to a lesser extent, by the deceleration in the non-energy component. After the strong upward trend between the end of 2007 and mid-2008, oil prices have declined sharply, driven by the impact on the demand for commodities, resulting from the interaction between the world economic deceleration and the crisis in financial markets (see "Section 2 *Assumptions underlying the projection exercise*"). The non-energy component of the HICP, reflects, on the one hand, the impact of

(3) The retention of workers (labour hoarding) prevents the destruction of specific human capital, i.e. unrecoverable costs for a firm resulting from the transmission of specific skills to workers. In situations of brisk slowdown in economic activity, firms tend to avoid firing workers with specific skills, which contributes to the lag between employment and the output cycles.

falling food commodity prices in international markets and, on the other, the expected developments in both unit labour costs and import prices of non-energy goods, for which annual average growth rates are expected to be over 2 per cent in 2009. In 2010 the projected increase in inflation is based on developments in the energy component, as the non-energy component is likely to slow down further, in line with the projected developments in the import prices of non-energy goods and in unit labour costs.

The net borrowing requirements for the Portuguese economy, as measured by the combined current and capital account deficit as a percentage of GDP, is estimated to increase from 8.2 per cent of GDP in 2007 to 9.0 per cent in 2008. This evolution reflects essentially the marked deterioration of the goods and services deficit, chiefly translating unfavourable developments in terms of trade, owing to the strong rise in oil prices in annual average terms and to a sharp reduction in the growth of exports, while import penetration continued to increase. In 2009 the net external borrowing requirements are projected to decline to around 8 per cent of GDP, as a result of the reduction in the goods and services deficit, due to favourable developments in the terms of trade, reflecting falling oil prices in the second half of 2008. The current projection points to an increase in net borrowing requirements in 2010, to 9.4 per cent of GDP, reflecting the worsening of the income balance as a result of the limited and gradual rise in interest rates, as well as the further deterioration of the international investment position of the Portuguese economy.

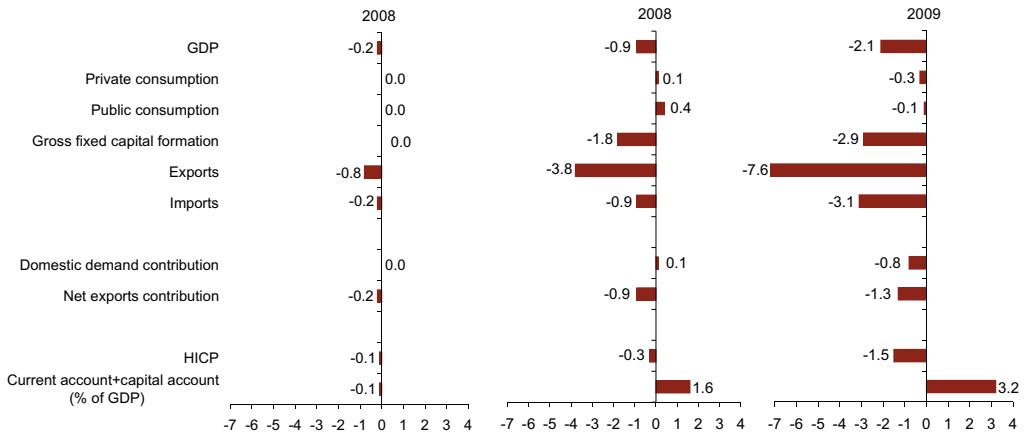
In comparison with the estimate published in the Economic Bulletin-Autumn 2008, GDP growth for 2008 was revised downwards by 0.2 percentage points (p.p.), which involves mainly the incorporation of more negative developments in exports, in line with data released in the meantime (Chart 1.1).

Versus the projection published in the Economic Bulletin-Summer 2008, the current projection portrays a considerable downward revision of GDP growth (-0.9 p.p.) in 2008, largely due to the downward revision of exports and investment. The deepening of the international financial crisis since the end of the summer 2008 and, in particular, its impact on expectations on households' income and wealth, as well as the persistence of high uncertainty, determined a contraction in consumption and investment worldwide. This process seems to have affected, first, the advanced economies, having subsequently

Chart 1.1

REVISIONS VIS-À-VIS THE PROJECTIONS OF PREVIOUS ISSUES OF THE ECONOMIC BULLETIN

Percentage points



Source: Banco de Portugal.

been transmitted onto emerging market economies, affecting the levels and expectations of global demand and thereby of exports and investment in a wide range of economies, including the Portuguese economy.

The projection for economic growth in 2009 is revised downwards by 2.1 p.p., owing to the dynamic effects resulting from the deterioration of the economic situation which have significantly affected exports and investment developments at the end of 2008. This revision also reflects the deepening of the financial crisis and the increased effects of its interaction with world economic growth, leading to a substantial revision of the external demand for Portuguese goods and services (around -6 p.p.). Private consumption growth was also revised downwards, in part due to the deterioration of labour market conditions. In the same vein, the envisaged downward revision of investment reflects the sharp fall in economic agents' expectations about their future income and wealth developments. These expectations will certainly affect residential investment, which will also be penalised by the deteriorating labour market conditions, and corporate investment, which will suffer the impact of less favourable demand prospects than assumed in the previous projection. Finally, it should be noted that both private investment and durable goods consumption will be affected by the increase in bank loan spreads (although the reference interest rates is expected to decrease) and by more difficult access to bank credit, despite the downward revision of money market rates amidst higher tensions in international financial markets than assumed in the previous projection.

The current projection incorporates a downward revision of the net borrowing requirements of the Portuguese economy: 1.6 p.p. of GDP in 2008 and 3.2 p.p. in 2009. The revision in 2008 mainly reflects a reassessment of the income and of the current and capital accounts deficit, taking on board data released in the meantime.[4] In 2009 the current projection for net borrowing requirements benefits from the more substantial revision of the income deficit, in the context of a more favourable than expected developments in interest rates and a lower goods and services deficit that mainly stems from the favourable evolution of terms of trade, which reflects the significant downward revision of the prices of imported commodities, in particular oil prices.

Finally, the revision in the inflation rate is -0.3 p.p. in 2008 and -1.5 p.p. in 2009. This revision reflects the reassessment of the prices of the energy component portraying the unanticipated fall in the price of oil at the end of 2008, which has a strong effect on the average inflation projected for 2009.

2. ASSUMPTIONS UNDERLYING THE PROJECTION EXERCISE

These projections are based on a set of assumptions regarding future developments of variables defining the framework underlying the Portuguese economy. They incorporate data available until 11 December 2008 and rely on several assumptions on interest rates, exchange rates and international commodity prices, as well as on developments in external economic activity and their implications for the external demand for Portuguese goods and services.

The interaction between the international financial crisis and the deterioration of economic activity worldwide affected the variables underlying the framework of the projection, in particular the expectations on developments in world demand, reflected inter alia in the evolution of commodity prices – especially oil prices – and the global re-evaluation of risk. The latter was triggered by the significant increase in default in the US sub-prime mortgage market, which severely affected the functioning of both the interbank money market and debt markets, and led to a substantial increase in risk premia. Over the projection horizon, short-term interest rates in the interbank money market (3-month

(4) The reduction of the income deficit relative to the previous estimate stems mainly from the updating of base information used in the estimation process of the income of foreign direct investment within the scope of the balance of payments statistics.

EURIBOR) are assumed to decline significantly, reflecting expectations of a reduction in the key ECB interest rates, as well as a reduction in risk premia in this market. Furthermore, the current projection incorporates some judgement referring to the financing conditions in the Portuguese economy, reflecting both the tightening of the credit standards applied by banks for the approval of new loans, and an increase in the credit risk premium for the non-financial private sector, resulting from the tighter financing conditions for banks borrowing in international markets and the deterioration of the household and corporate balance sheets.

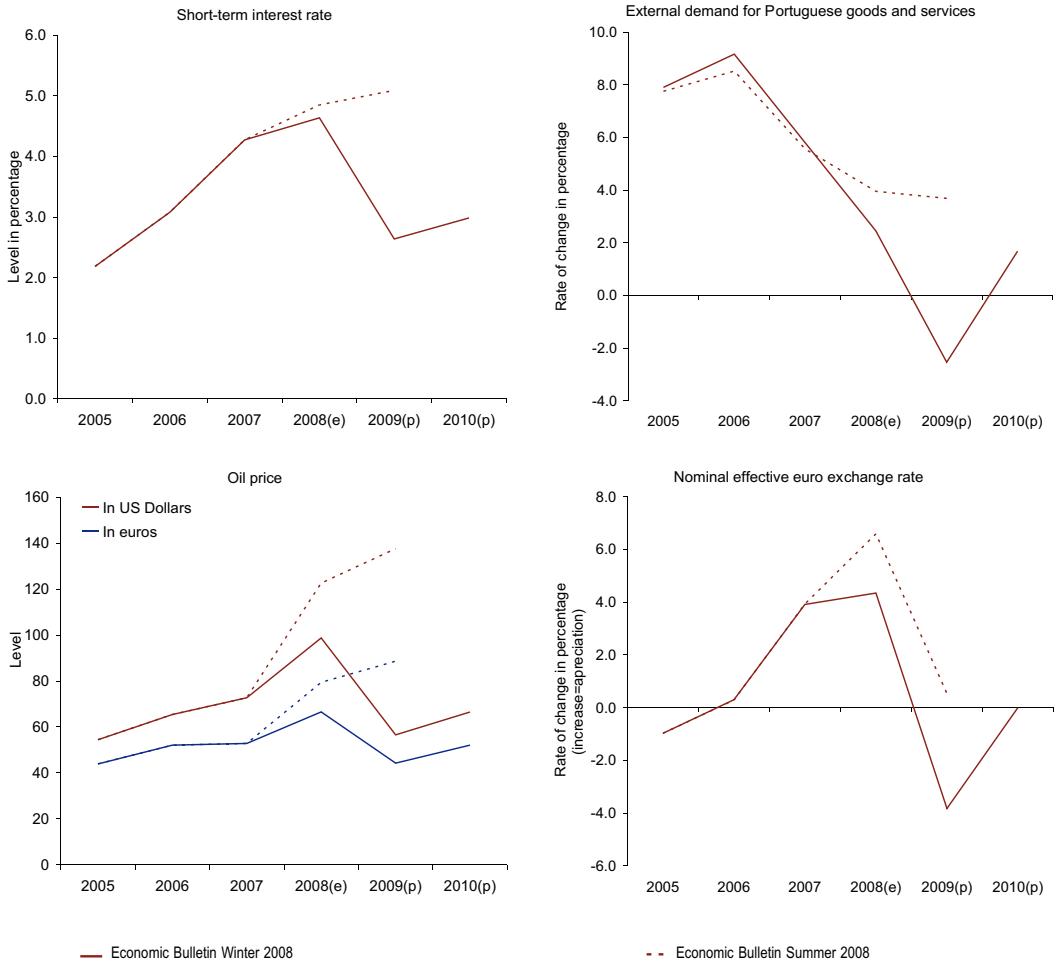
With regard to developments in economic activity abroad, the assumptions considered in this projection exercise result are a mere update of the data on which the December 2008 Eurosystem staff projections were based, in a context of a rapid deterioration of global economic growth prospects.

As usual, the current projection includes a set of specific assumptions for the Portuguese economy relating to public finances and administered prices.

In comparison with the assumptions underlying the projections published in the *Economic Bulletin-Summer 2008*, the current external environment for the Portuguese economy includes certainly

Chart 2.1

REVISIONS OF THE PROJECTIONS' UNDERLYING ASSUMPTIONS *VIS-À-VIS* THE SUMMER 2008 ISSUE OF *THE ECONOMIC BULLETIN*



Sources: BCE, Bloomberg, Thomson Reuters and Banco de Portugal calculations.
Note: (e) - estimated; (p) - projected.

less favourable developments in external demand as well as a significant downward revision of interest rates and commodity prices, especially oil and food commodity prices (Chart 2.1). It is worth noting that this set of revisions essentially portrays the materialisation of the risk identified in the *Economic Bulletin-Summer 2008*, which mentioned the possibility of a deepening of the financial crisis and a marked slowdown in global economic activity. However, the materialisation of the risk identified in the previous projection does not imply that the current projection is surrounded by a lower degree of risk and uncertainty, in particular as regards the scale and persistence of the ongoing economic slowdown.

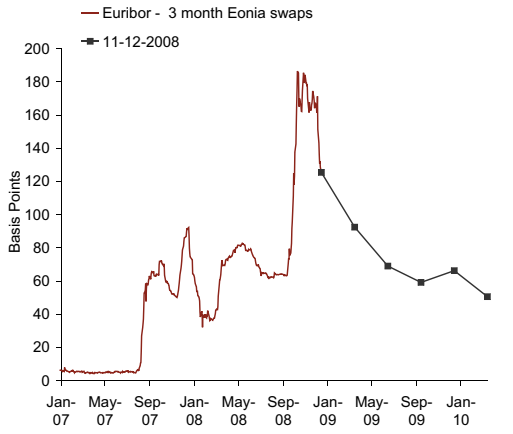
2.1. Interest rates and exchange rates

The assumptions on short-term interest rates developments are based on expectations of economic agents and are calculated from the three-month EURIBOR futures. Financial market participants anticipate a fall in this rate until the third quarter of 2009, followed by a moderate and increase until the end of the projection horizon to levels clearly below the average values recorded in 2008. Thus, in annual average terms, the level of the three-month EURIBOR is likely to fall from 4.6 per cent in 2008 to 2.6 per cent in 2009, increasing to 3 per cent in 2010. In this context, the developments in short-term interest rates are conditioned not only by expectations about the key ECB interest rates, but also by the expected evolution of risk premia in the money market, as measured by the spread between collateralised and uncollateralised interest rates. The risk premia increased sharply in mid 2007 with the outbreak of the current financial crisis, having remained at high levels throughout 2008, having increased significantly further at the end of the summer of 2008 (Chart 2.1.1). The profile for the interest rates included in the current projection implicitly assumes a gradual reduction of credit risk in the interbank money market, in a context of a gradual easing of financial market instability.

Furthermore, the recent widening of the yield differentials between non-financial private corporate bonds and Treasury bonds suggests that credit risk premium for these corporations, has risen which may potentially imply tightening of credit standards, and consequently higher bank financing costs

Chart 2.1.1

ACTUAL AND EXPECTED SPREADS BETWEEN EURIBOR AND 3-MONTH EONIA SWAPS [(a)]



Sources: Bloomberg, Thomson Reuters and Banco de Portugal calculations.
Note: **(a)** Expected spread measured as the difference between the three-month Euribor implied in futures contracts and the average expected three-month EONIA (derived from the EONIA swap index) starting from the future's maturity date.

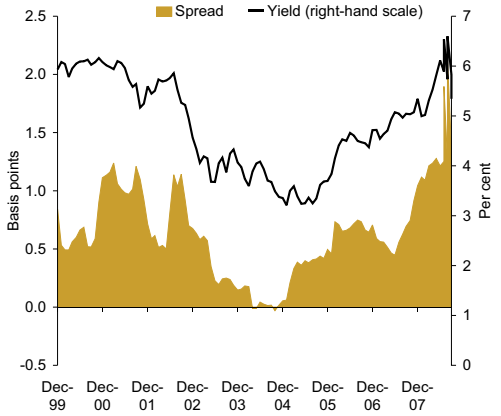
(Chart 2.1.2). This element was taken on board in the current projection, assuming the widening of the spread between bank lending rates and money market rates from the end of 2008 onwards.

According to implicit ten-year nominal government bond yields data, the benchmark long-term interest rates are projected to remain at around 4.5 per cent over the projection horizon (4.5 per cent in 2008, 4.4 per cent in 2009 and 4.6 per cent in 2010).

Future exchange rates developments rely on the technical assumption of unchanged rates at the average levels prevailing in mid-December 2008, implying an annual average depreciation of the euro in nominal effective terms of 3.8 per cent in 2009 (around 13 per cent against the US dollar), following the 4.3 per cent appreciation in 2008 (6.9 per cent against the US dollar).

Chart 2.1.2

YIELD OF BONDS ISSUED BY PORTUGUESE NON-FINANCIAL CORPORATIONS AND SPREAD VIS-À-VIS GOVERNMENT BONDS WITH COMPARABLE MATURITY



Source: Barclays Capital.
Note: The non-financial corporations' bonds considered have an average maturity of about 7 years.

2.2. International prices

The price of oil in US dollars recorded an upward trend until the second quarter of 2008, reaching a monthly peak value of USD 134 per barrel in July 2008. Thereafter, the oil price declined somewhat in the third quarter and fell sharply in the last quarter of the year, averaging USD 59 per barrel in that quarter. On 11 December, the oil price per barrel was approximately USD 45. According to expectations implied by the futures markets, the price of oil is likely to resume a moderate upward trend from the second quarter of 2009 until the end of the projection horizon. In annual average terms, this pattern implies a reduction of oil prices from USD 99 per barrel in 2008 to around USD 57 in 2009, followed by an increase to USD 67 per barrel in 2010. Along with the assumptions already mentioned with regard to the euro/USD exchange rate, these developments imply an annual average price of EUR 67 per barrel in 2008, EUR 44 in 2009 and EUR 52 in 2010.

As regards non-energy commodities prices, available data point to an increase in food commodity prices of approximately 29 per cent in 2008, while the price of other non-energy commodities is likely to have increased by only 3 per cent. Available data on the path of commodity prices implied by futures markets suggest a fall of around 10 per cent in food commodity prices and 23 per cent in the other

non-energy commodities in 2009, reflecting the impact of the sharp reduction in demand expectations on prices. In 2010 the prices of both components are expected to increase by approximately 5 per cent, in the context of the assumed recovery in global demand, and hence in demand for commodities.

2.3. International environment and external demand

In the context of high uncertainty, due to the deepening of the international financial crisis observed since the summer of 2008, the December 2008 Eurosystem staff projections, published in the Monthly Bulletin of the European Central Bank, based on data available until 20 November 2008, point to GDP growth for the euro area in a range between 0.8 and 1.2 per cent in 2008, and between -1.0 and 0.0 per cent in 2009. These developments reflect not only a deceleration in exports, in line with the pattern mentioned for external demand for euro area goods and services, but also weak domestic demand growth. The latter is likely to be conditioned by the effects of the situation in financial markets, in particular the financing conditions, and also by the deterioration of the labour market situation, with a negative impact on disposable income. According to the Eurosystem staff projections, the fall in GDP is expected to be temporary and a modest recovery of overall activity is expected to take place in 2010, with a growth rate in the range of 0.5 and 1.5 per cent.

Projections for consumer prices developments, prepared within the same projection exercise, point to a significant reduction in euro area inflation, as measured by the annual average change in the HICP, in the range of 3.2 and 3.4 per cent for 2008 to in the range of 1.1 and 1.7 per cent for 2009. These developments reflect largely the anticipated reduction in commodity prices, being also conditioned by the effects of the moderation projected for overall economic activity. For 2010, the annual average rate of change in the HICP is projected to lie in the range of 1.5 and 2.1 per cent, reflecting higher growth rates of import prices that portray the effects of the recent depreciation of the euro, as well as some recovery in profit margins. The Eurosystem staff projections expect a slowdown in unit labour costs over the projection horizon, reflecting wage moderation and an improvement in productivity.

The assumptions on the external environment of the Portuguese economy, published in the Winter Economic Bulletins, are traditionally based on the information underlying the December Eurosystem projection exercises. However, the rapid deterioration of the outlook for world economic activity at the end of 2008 led to a revision of the external environment of the Portuguese economy relative to the December 2008 Eurosystem projection exercise. This update was performed using the NIGEM model,[5] by simulating a global GDP deterioration of 0.7 p.p. in 2009, in line with the Consensus Economics surveys that encompass a downward revision of world GDP growth in 2009 of that magnitude, according to results provided by the November and December surveys (Chart 2.3.1). The deterioration of the global growth prospects was particularly significant and sharp in the last quarter of 2008. This simulation considered that the revision of world GDP growth may stem from the observed rise in the interest rate maturity premia as from the last quarter of 2008, and leaving the technical assumptions regarding the evolution of short-term interest rates and nominal exchange rates unchanged. Under these conditions, the growth rates of world GDP and imports in 2009 and 2010 were revised downwards relative to the Eurosystem projection exercise, conveying lower expected growth for the external demand for Portuguese goods and services (Table 2.3.1).

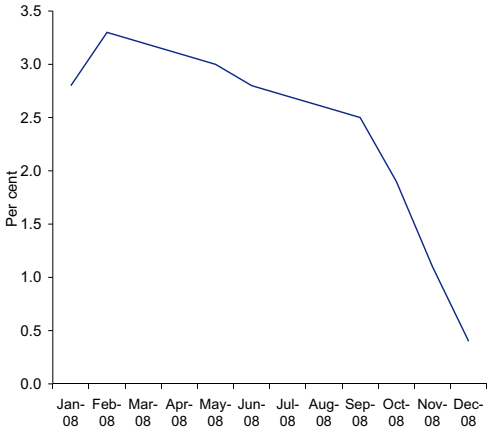
Thus, the external environment of the current projection implies a fall in the external demand for Portuguese goods and services of 2.5 per cent in 2009, which follows a 2.5 per cent increase in 2008. This reduction in external demand reflects a decline in demand in all countries, and in particular in the euro

(5) NIGEM is a multi-country model for the world economy, developed by the National Institute of Economic and Social Research, which is based on a larger number of countries whose economies are linked through trade and competitiveness channels and through the financial markets.

Chart 2.3.1

FORECASTS FOR WORLD ECONOMIC ACTIVITY GROWTH IN 2009

Consensus Economics



Source: Consensus Economics - Consensus Forecasts.

area countries. It is worth mentioning that since the start of the 1980s,[6] the external demand indicator recorded a fall in annual average terms only once in 1993 (-1.8 per cent), illustrating the atypical feature of the ongoing international economic situation. The current projection for the international environment envisages some recovery in external demand in 2010, assuming a growth of around 1.7 per cent. The temporary nature and the limited magnitude of the deterioration of world economic activity included in this set of assumptions are the main risk and uncertainty factor surrounding this projection (see "Section 7 *Uncertainty and risk analysis*").

Table 2.3.1

UPDATE OF THE EUROSYSTEM'S DECEMBER 2008 PROJECTION EXERCISE EXTERNAL ENVIRONMENT

Rates of change, in percentage

	Updated External Environment			Revisions vis-à-vis the Eurosystem's December 2008 Projection Exercise [a]		
	2008	2009	2010	2008	2009	2010
World Imports	4.3	0.3	3.5	0.0	-1.9	-1.6
External demand for Portuguese goods and services						
Total	2.5	-2.5	1.7	0.0	-1.8	-1.7
Intra euro area	2.1	-3.6	1.1	0.0	-1.9	-1.7
Extra euro area	3.1	-0.3	2.9	0.0	-1.7	-1.5

Source: Banco de Portugal.
Note: (a) Percentage points.

(6) Data underlying the calculation of this indicator are only available from 1980 onwards.

2.4. Assumptions underlying public finances and administered prices

The current projections also reflect a series of specific assumptions for the Portuguese economy, namely regarding developments in public finances and administered prices.[7]

The assumptions on the public finances variables only include, as a rule in the Eurosystem projection exercises, the fiscal policy measures already approved in legal terms or specified with sufficient detail and with a strong probability of being approved in legal terms. Relying on this procedure, the measures approved in the course of 2008 and those specified in the State Budget for 2009 were included, as well as those approved by the Council of Ministers on 13 December 2008. However, the potential fiscal effects of the recently announced measures to stabilise the financial system and the settlement of general government debts to non-financial corporations were not considered. Public consumption developments in the coming years are also expected to depend on the effects of the general government reform, which essentially comprises measures already approved in legal terms, the impact of which is still highly uncertain. In this context, public consumption is assumed to level off in real terms in 2009, followed by a minor reduction in 2010. These developments reflect the assumption of a reduction in the number of civil servants, albeit at a slower pace than in the past few years and small increases in the volume of intermediate consumption and in expenditure referring to cofinancing medicines. However, the 2.9 per cent increase in the civil servants wage scale in 2009 (2.1 per cent in 2008) will contribute to the acceleration of nominal public consumption.

As to the volume of public investment, a significant rise is assumed for 2009, followed by a reduction in 2010. This profile is significantly affected by the set of measures approved by the Council of Ministers on 13 December 2008.

The current projection assumes for indirect taxation in 2009 the additional impact of the reduction in the standard VAT rate from 21 to 20 per cent as from 1 July 2008. Furthermore, the maintenance of the value of the tax on oil products until the end of the projection horizon and a rise in the car and tobacco taxes in 2009 are assumed, as displayed in the State Budget for 2009. With regard to the car tax, the State Budget for 2009, in addition to updating the CO_2 emissions table, also penalises vehicles with higher particle emissions, implying some rise in the consumer price of cars. The State Budget for 2009 sets out a clearly smaller rise in tobacco tax for 2009 than in the previous year, determining a smaller growth in tax revenue and consumer prices.

As to the other administered prices, the current projection incorporates a rise in electricity prices of 4.4 per cent in 2009, according to data released by the energy services regulatory authority (ERSE), while the rise in 2010 is assumed to be in line with its average historical evolution.[8] All the other administered prices, are assumed to increase in line with the average growth recorded in the past few years.

(7) For further details on administered prices, see the ECB's methodological note available at: *http://www.ecb.europa.eu/stats/pdf/hicp_ap.pdf*.

(8) For further information, see the *ERSE press* release on electricity prices in 2009.

3. SUPPLY

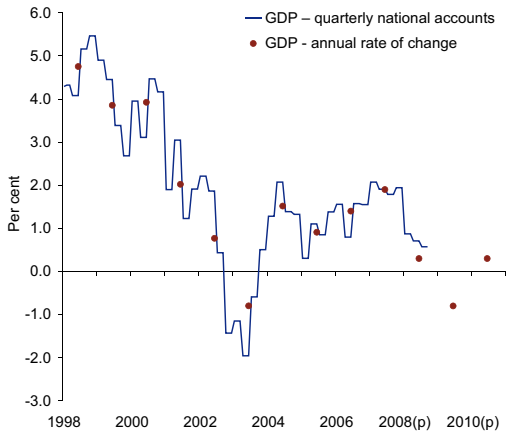
The current projection indicates a slowdown in economic activity from 1.9 per cent in 2007 to 0.3 per cent in 2008, followed by a 0.8 per cent contraction in 2009. This was largely influenced by the external environment, which was marked by the interaction between the international financial crisis and global economic deceleration, amid persistent structural weaknesses in the Portuguese economy (Chart 3.1). This projection points to a moderate recovery in economic activity in 2010, and GDP is projected to grow by 0.3 per cent, as the current international financial market crisis is expected to gradually ease. The economic activity profile over the horizon is strongly marked by projected developments in the private sector, given that growth of public sector activity[9] is assumed to be virtually nil.

At the sectoral level, on the basis of data available for 2008, manufacturing activity is estimated to have contracted by around 1 per cent, associated with the significant slowdown in goods exports in 2008 and stagnating corporate investment, amid deteriorating demand prospects. The current projection is consistent with lower activity in this sector in 2009, in a context where the slowdown in world economy is likely to result in lower demand for Portuguese goods and services and corporate investment is projected to decrease significantly. Furthermore, this projection implies a moderate recovery in industrial activity in 2010, which reflects the gradual improvement in demand prospects, in a context of expected gradual easing of the current international financial crisis, and a moderate recovery in confidence among economic agents (see "Section 2 *Assumptions underlying the projection exercise*").

Current estimates indicate a 4 per cent contraction in the construction sector in 2008, reflecting stagnating corporate investment and lower public and residential investment. The current projection points to a further but gradually smaller contraction in this sector's activity in 2009 and 2010. In 2009 this is likely to occur amid the marked deterioration in the agents' expectations regarding their future situation and, despite the downward path that interest rates are assumed to follow, credit standards applied by

Chart 3.1

DEVELOPMENTS IN ECONOMIC ACTIVITY
Year-on-year rate of change



Sources: INE and Banco de Portugal.
Note: (e) - estimated; (p) - projected.

(9) Public sector output corresponds to general government expenditure on primary factors intended for the supply of public goods and services, particularly staff costs and fixed capital consumption. Private sector output is obtained as the difference between total output and public sector output, thus including general government intermediate consumption expenditure on goods and services produced by the private sector.

banks are expected to tighten, in a context of persisting difficulties in obtaining international market financing. The improvement in demand prospects in export markets, associated with the gradual easing of financial market tensions, should facilitate a subdued recovery in corporate and residential investment with an impact on the construction sector in 2010.

With regard to the services sector, activity is expected to slowdown significantly throughout the projection horizon, following an estimated growth of around 1.5 per cent in 2008. Expected developments of activity in this sector mainly reflect the deceleration in household consumption expenditure included in the current projection and the slowdown in services exports in 2009. Exports of tourism services will likely continue to be significantly affected by the deteriorating economic activity in advanced economies and, in particular, in the main home countries of tourists visiting Portugal (namely the United Kingdom and Spain).

Economic activity growth in 2008 seems to have clearly fallen short of the estimates available for potential output growth, determining a negative change in the output gap, which is expected to be marginally positive.[10] The current projection continues to imply GDP growth below the estimates available for potential output growth, which will result in a negative change in the output gap in 2009 and 2010. According to this projection, the output gap is expected to be negative at the end of the projection horizon (Charts 3.2 and 3.3).

Chart 3.2

GDP AND POTENTIAL OUTPUT

Year-on-year rate of change

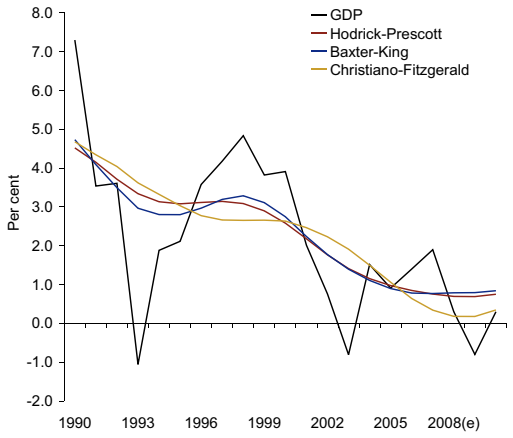
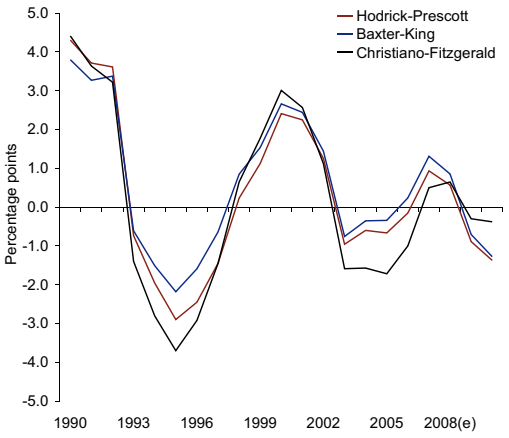


Chart 3.3

OUTPUT GAP



Sources: INE and Banco de Portugal.
Note: (e) - estimated. For further details on the output gap calculation methods, see Almeida, V. and Félix, R. (2006), "Computing potential output and the output gap for the Portuguese economy", Banco de Portugal, *Economic Bulletin-Autumn 2006*.

(10) The calculation of potential output and output gap on the basis of univariate statistical filters is subject to well known limitations. In particular, near turning points of the business cycle, such as that included in the current projection, statistical filters tend to be less accurate. However, although the output gap level may be affected by this inaccuracy, in general these methods do not significantly affect their variation. For further details, see Almeida, V. and Félix, R. (2006), "Computing potential output and the output gap for the Portuguese economy", Banco de Portugal, *Economic Bulletin-Autumn 2006*.

3.1. Employment

Developments in labour supply over the recent years were characterised by the upward trend in the participation rate, reflecting, inter alia, the growing participation of women in the labour market, the demographic dynamics and the promotion of active ageing through employment retention policies targeted for older age groups. However, some of these factors are likely to have matured, and therefore their impact on the participation rate throughout the projection horizon should be negligible. In this context, the current projection assumes a stable participation rate near to 74 per cent, corresponding to labour force growth over the projection horizon below the average increase of the past few years (around 1 per cent in the 2000-2007 period).

Latest estimates point to average employment growth of 0.5 per cent in 2008, which is clearly higher than expected, in a context where activity is estimated to have grown modestly. This seems to have implied a slight decline in output per worker. As mentioned in the Economic Bulletin -Summer 2008, strong employment growth in the first half of 2008, when some slowdown in economic activity was apparent, suggested that these developments could be temporary, which was to some extent confirmed by the data released in the Employment Survey for the third quarter of 2008. The current projection indicates that this trend will continue into 2009, with employment projected to fall by around 1 per cent, which in addition to the dynamic effects associated with developments in late 2008 also reflects the contraction in economic activity. In 2010 employment is projected to decline further, although to a smaller extent (-0.2 per cent), amid a moderate rebound in economic activity and some restraint by companies in hiring new staff in order to bring their productivity levels closer to potential.

Developments projected for employment chiefly reflect the profile of its private component, given that general government employment is expected to follow the net reduction trend in the number of civil servants, although at a lower pace than in the past few years (see "Section 2 *Assumptions underlying the projection exercise*").

3.2. Economic growth factors

Economic activity growth may be broken down according to relative contributions from the accumulation of productive factors (labour and capital) and total factor productivity growth through a simple growth accounting exercise. However, this exercise, which analyses the production function properties and makes it possible to organise information regarding the aggregate supply of the economy, embodies some limitations. In particular, total factor productivity reflects not only greater efficiency in the use of productive factors, but also the impact of variables not explicitly included in the growth accounting exercise, e.g. the quality of productive factors, their actual degree of utilisation and changes in the institutional framework of the economy.

The degree of capital utilisation seems to have played an important role in terms of both the significant contribution from total factor productivity to GDP growth in 2007 and the slowdown in 2008 (1.3 p.p. and -0.4 p.p. respectively), given that the indicator for capacity utilisation in manufacturing published by the European Commission recorded the highest growth rates of recent years in 2007, moving back in 2008 to values close to the troughs of the past few years (Chart 3.2.1). The pro-cyclical behaviour of total factor productivity seems to also reflect pro-cyclical developments in the use of labour input. This was likely associated *inter alia* with specific human capital and persistent structural rigid factors in the labour market that may prevent a more significant adjustment in the number of hours worked. These effects tend to be more significant during periods of sudden economic activity slowdown. Moreover,

given the structural weaknesses of the Portuguese economy, restructuring efforts must proceed, in order to direct the production of goods and services to segments with higher added value and to markets with a more favourable growth outlook in the medium term. Maintaining this effort is crucial in facilitating the pick up of a sustained growth process, following the current slowdown period.

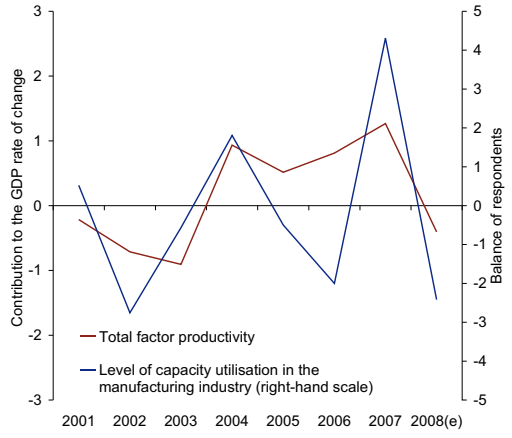
After a contribution of +1.3 p.p. in 2007, total factor productivity is expected to contribute -0.4 p.p. and -0.6 p.p. to GDP growth in 2008 and 2009 respectively, and is projected to move back to slightly positive values only in 2010 (+0.1 p.p.) (Chart 3.2.2). The contribution from capital stock to GDP growth in 2008 seems to have remained close to the 2007 value (0.4 p.p.), while a marginally smaller contribution is projected for 2009 and 2010.

The contribution from labour input increased from 0.1 p.p. in 2007 to around 0.3 p.p. in 2008, reflecting strong employment growth in the first half of the year. In 2009 employment is projected to contribute negatively to economic activity growth (-0.5 p.p.), and a marginally negative contribution is expected to persist in 2010, amid moderate demand growth.

When comparing the 2007-2010 period with previous periods of economic downturns in Portugal (1991-1994 and 2001-2004), it is possible to conclude that lower output growth in the latest period reflects a lower contribution of the productive factors, particularly capital stock. The contribution from capital stock is likely to decline significantly in the 2007-2010 period, reflecting the depreciation of high investment flows in the 1990s together with subdued investment growth in this period. With regard to labour input, the current projection implies a marginally negative contribution from employment at this stage of the current cycle. The contribution from labour input reflects weaker growth of employment in the private sector and the recent downward trend in the number of civil servants, which is projected to continue throughout the projection horizon (see "Section 2 *Assumptions underlying the projection exercise*") (Chart 3.2.3). The contribution from total factor productivity in this period should be close to zero, similarly to the 2001-2004 period, which mirrors various structural weaknesses that have significantly influenced the increase in productivity in recent years.

Chart 3.2.1

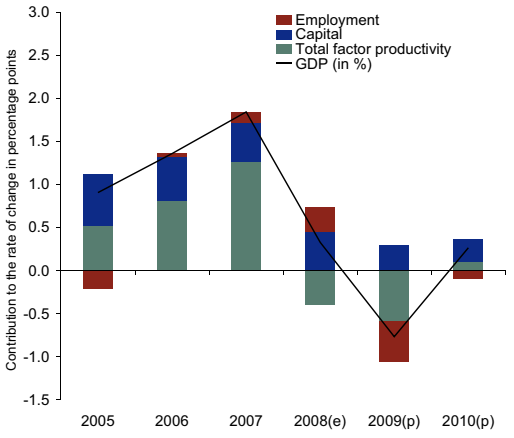
TOTAL FACTOR PRODUCTIVITY AND CAPACITY UTILISATION IN THE MANUFACTURING INDUSTRY



Sources: INE and Banco de Portugal.
Note: (e) - estimated.

Chart 3.2.2

FACTORS OF OUTPUT GROWTH

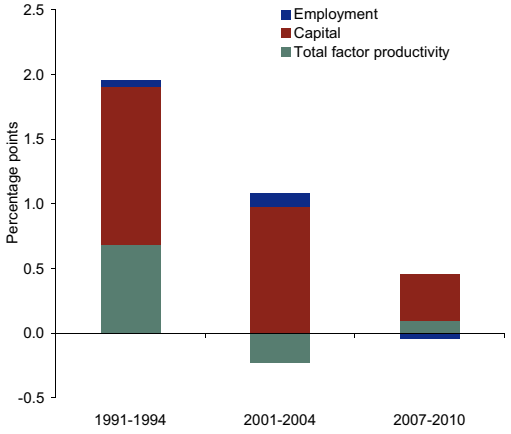


Sources: INE and Banco de Portugal.
Note: (e) - estimated; (p) - projected.

Chart 3.2.3

FACTORS OF OUTPUT GROWTH 1991-1994, 2001-2004 AND 2007-2010

Contribution to the rate of change



Source: Banco de Portugal.

4. DEMAND

In 2008 the Portuguese economy was significantly influenced by the effects of the interaction of financial crisis with world economic activity, which implied a decrease in confidence of economic agents amid high uncertainty surrounding the size and duration of the crisis, as well as a deterioration in financing conditions. In fact, short-term interest rates increased and financing difficulties in international market intensified, which seems to have implied greater difficulties in obtaining bank loans by some economic agents. Consequently, prospects for global demand deteriorated strongly in the second half of 2008, which affected economic growth in Portugal and in Portuguese export markets.

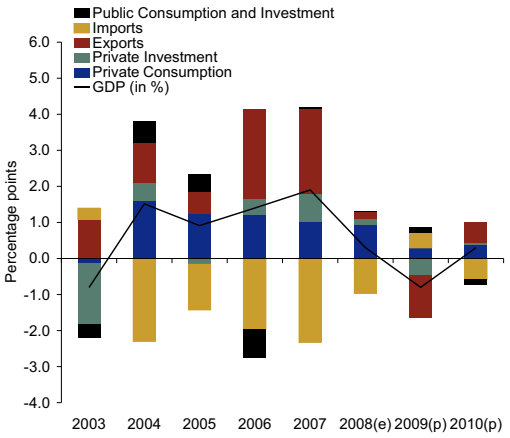
In a context of a slowdown in global economic activity, the Portuguese economy decelerated markedly throughout 2008, with annual average GDP growth estimated to stand at 0.3 per cent (1.9 per cent in 2007). In terms of composition of demand, this slowdown was essentially evident in exports and investment, reflecting the strong deterioration in demand prospects in both domestic and external markets. By contrast, private consumption has decelerated only marginally, proving to be highly resilient to slowdown in this environment, particularly taking into account the high indebtedness level of Portuguese households. These developments in consumption have been partly sustained by credit, implying a decrease in the households' saving rate. In this context, the contribution of domestic demand to output growth declined from 1.9 p.p. in 2007 to 1.1 p.p. in 2008. In turn, the contribution of net external demand, which stood at zero in 2007, declined to -0.8 p.p. in 2008, given that the strong deceleration in exports was accompanied by a less marked slowdown in imports, with a continued increase in the import content of overall demand (Chart 4.1).

Throughout the projection horizon, the evolution of economic activity in Portugal is expected to be significantly influenced by the global economic developments and, particularly, by the evolution of economic activity in the euro area. The assumptions underlying the projection entail that the current financial crisis will have a significant impact on overall economic activity in 2009. However, the gradual easing of financial market tensions, assumed to occur over the projection horizon, is likely to facilitate a recovery in global demand and economic activity in 2010, including in the euro area (see "Section 2

Chart 4.1

BREAKDOWN OF GDP GROWTH

Contribution to the rate of change



Source: Banco de Portugal.
Note: (e) - estimated; (p) - projected.

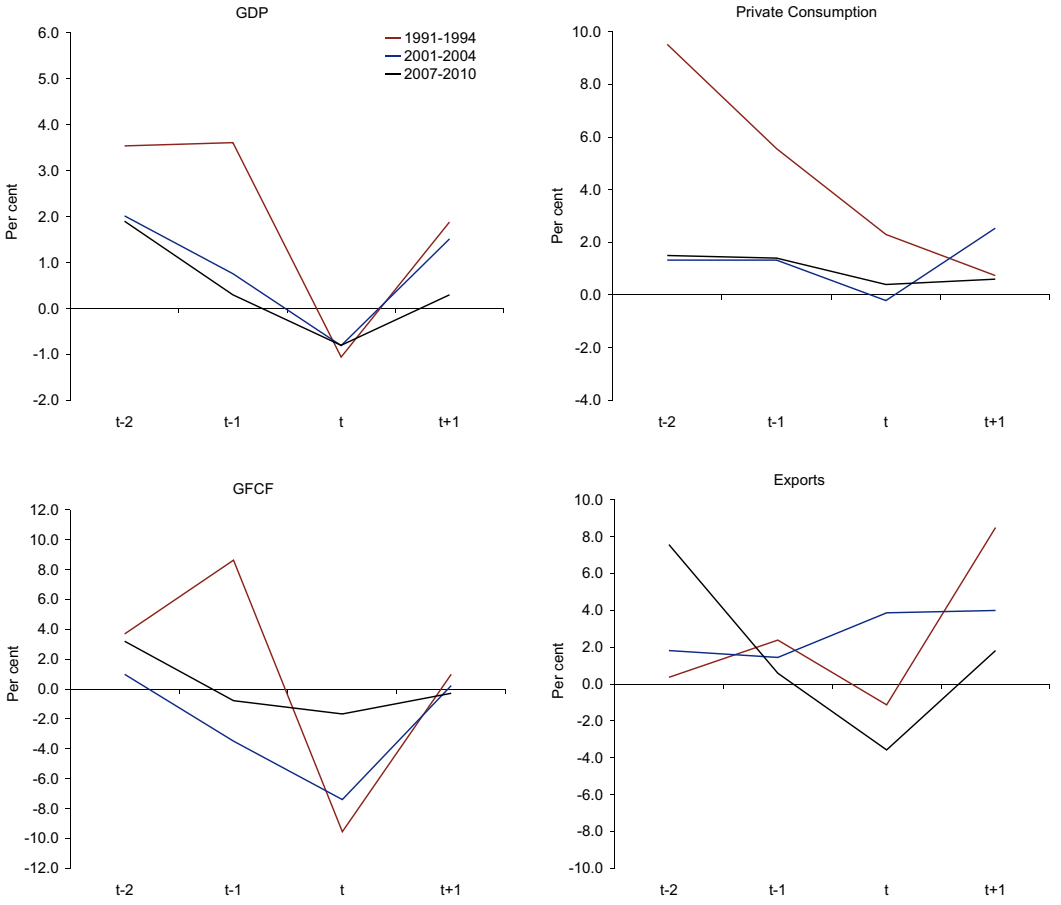
Assumptions underlying the projection exercise"). Hence, the current projection points to a 0.8 per cent fall in economic activity in 2009, due to a decrease in exports, amid strongly contracting external demand for Portuguese goods and services, a significant decrease in GFCF and a slowdown in private consumption. These developments are explained by, *inter alia*, deteriorating expectations among economic agents regarding developments in their income and wealth situation, labour market conditions and some difficulties in obtaining bank loans, although interest rates are assumed to maintain a downward trend. For 2010, economic activity is projected to recover very moderately (0.3 per cent), mainly due to export growth, in a context of a moderate recovery of the world economy, since that the contribution of domestic demand to activity growth is likely to show a limited increase, reflecting favourable developments in corporate investment due to improving prospects for external demand.

By comparing the growth of GDP and of the demand components in the 2007-2010 period with previous periods of economic contraction (namely 1991-1994 and 2001-2004) it is possible to identify some features of the current recessive situation (Chart 4.2). The projected evolution of GDP over the recent period is distinct from that seen in the 2001-2004 period, as the recovery in 2010 is expected to be slower than in 2004. This profile reflects the current financial crisis situation and its growing interaction with overall economic activity, which will likely determine a very significant contraction in the external demand for Portuguese goods and services, in contrast with some world economic buoyancy in the 2003-2004 period (see "Section 2 *Assumptions underlying the projection exercise*"). Moreover, the current projections point to lower GFCF contraction in comparison with previous recessions, which encompass downward risks in this variable (see Section 7). Furthermore, the private consumption profile projected for the 2007-2010 period is smoother than in 2001-2004 and characterised by much more moderate growth rates than in 1991-1994.

Chart 4.2

DECOMPOSITION OF GDP GROWTH IN PREVIOUS ECONOMIC CYCLES

Annual average rate of change



Source: Banco de Portugal.
Note: Period *t* corresponds to years when a reduction of GDP was observed, namely 1993, 2003 and 2009.

4.1. Private consumption

Private consumption growth is estimated to be 1.4 per cent in 2008, which represents a marginal slowdown from 2007 (1.5 per cent). Nonetheless, as seen since 2002, this is clearly higher than GDP growth (Chart 4.1.1). The households' saving rate has decreased further, maintaining a behaviour registered since 2001 that has been partly supported by credit (Chart 4.1.2). However, the current financial crisis will tend to limit the maintenance of a consumption growth above that of household disposable income, in a context where, despite the assumed downward path for interest rates, credit standards are likely to be tightened. In fact, the tightening of the financing conditions in international markets, in comparison with the conditions prevailing before the onset of the market turmoil, will tend to reduce the availability of bank products that adapt the debt servicing to the payment capacity of households.

Private consumption developments estimated for 2008 resulted from the combination of relatively high growth in the consumption of non-durable goods and a fall in the consumption of durable goods. The intra-annual profile of private consumption was marked by irregular developments in the consumption

Chart 4.1.1

PRIVATE CONSUMPTION AND GDP

Rate of change

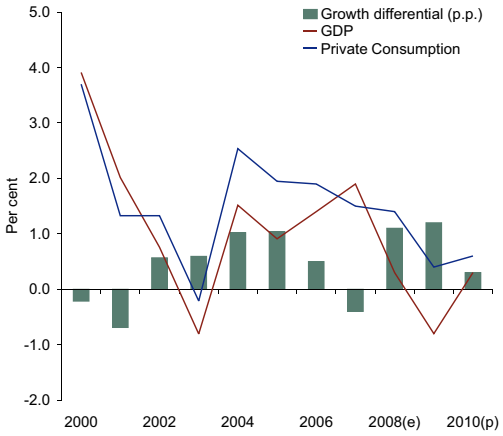
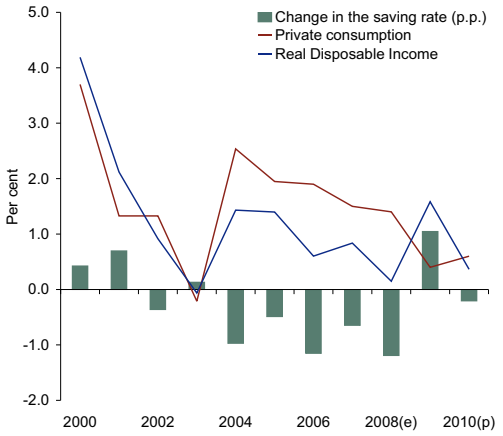


Chart 4.1.2

CONSUMPTION, DISPOSABLE INCOME AND SAVING RATE

Rate of change



Source: Banco de Portugal.
Note: (e) - estimated; (p) - projected.

of durable goods, which was strongly affected by tax changes, in particular regarding motor vehicles in mid-2007 and January 2008. In turn, growth in the consumption of non-durable goods slowed down throughout the year, albeit moderately. However, according to available data, private consumption seems to have slowed down more intensely over the last quarter, possibly associated with factors such as the deteriorating financial situation of households and labour market conditions, as well as the possible tightening of credit standards applied to households (available data show a deceleration in consumption credit in the second half of 2008).

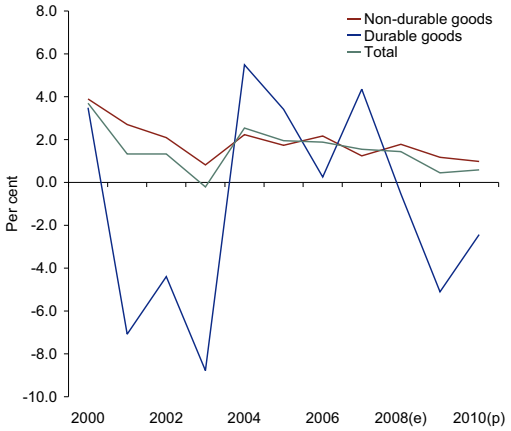
The current projection points to private consumption growth at around 0.5 per cent in both 2009 and 2010. This accounts for a significant slowdown in private consumption, particularly in the durable goods component, given that, due to its nature, this type of consumption is more likely to be postponed and to exhibit a pro-cyclical behaviour with a high volatility. In contrast, the consumption of non-durable goods, which accounts for around 90 per cent of private consumption and includes an important component of current consumption, is likely to show a limited slowdown, maintaining close to 1.0 per cent growth in 2009 and 2010 (Chart 4.1.3). This pattern reflects, mainly, the postponement of consumption expenditures in a context of high uncertainty regarding the size and duration of the financial crisis and its interaction with economic activity, particularly regarding wealth and income developments and labour market conditions. The growth rate projected for households' consumption implies a recovery in their savings rate, which interrupts the downward trend recorded in recent years. Against a background of decreasing interest rates, these developments in the saving rate reflect, on the one hand, an unexpected additional gain in real disposable income due to the sudden and unexpected decrease in the inflation rate. On the other hand, it reflects increasing savings for precautionary reasons, amid heigh uncertainty and deteriorating prospects regarding economic agents future developments in their income and wealth, as well as a possible reduction of banks' ability to adjust the debt servicing of households to their payment capacity.

Private consumption developments over the projection horizon are likely to be strongly conditioned by the previously mentioned factors, as well as from low real disposable income growth. This will likely be

Chart 4.1.3

PRIVATE CONSUMPTION DURABLE AND NON-DURABLE GOODS

Rate of change



Source: Banco de Portugal.
Note: (e) - estimated; (p) - projected.

marked by the deteriorating labour market conditions, namely a drop in employment and a slowdown in nominal wages. The sudden reduction of inflation in 2009, resulting from the decline in energy and food prices, should allow for a higher then expected increase of real disposable income in 2009. However, as previously mentioned, in the current context of uncertainty regarding the future financial situation, this increase will probably not imply an acceleration in consumption in that year, which would facilitate the increase in the saving rate.

4.2. Gross Fixed Capital Formation

Most recent estimates point to a 0.8 per cent decline of GFCF in 2008, after an increase of 3.2 per cent in 2007 (Chart 4.2.1). The fall in GFCF in 2008 reflects a decelerating profile over the year, which is associated with both the sharp increase in financing costs, amid rising interest rates and increasing credit risk premium, and the deepening of the international financial crisis and its interaction with world economic activity. These factors gave rise initially to a strong deterioration in the demand outlook in the main markets of destination of Portuguese exports. The GFCF contraction that is estimated to have occurred in 2008 represents an interruption in the recovery trend started in 2007, following an accumulated fall of more than 12 per cent from 2002 to 2006.

As regards the sectoral composition of GFCF in 2008, residential investment and government investment are estimated to have fallen markedly, while business GFCF growth was virtually nil. The intra-annual profile shows that such a fall took place along the year, in a context of gradual slowdown in economic activity at the global level, and was broadly based across all GFCF components. This pattern was particularly sharp in business investment, which may have been influenced by the dissipating base effect associated with the purchase of air transport material in the second half of 2007 and in the first half of 2008, which did not continue in the second half of 2008.

This projection points to a 1.7 per cent contraction of GFCF in 2009. This reflects a deterioration in the demand prospects of domestic and external markets, a fall in the expectations of economic agents and the maintenance of unfavourable financing conditions, notwithstanding the assumed downward trend

of interest rates, in a context in which the international financial crisis, coupled with the deterioration of the household and corporate balance sheet, is likely to imply a tightening of bank credit standards regarding new loans. In 2010, GFCF growth is projected to be virtually nil, reflecting the impact on external demand prospects of the gradual easing of the international financial crisis over the projection horizon. It should be mentioned that the projected GFCF developments imply a fall in its weight in GDP over the projection horizon, similar to developments in the 2002-2006 period (Chart 4.2.2).

As regards GFCF sectoral developments, residential investment is projected to fall further in 2009 and 2010, *albeit* in a progressively less intensive way than in 2008, against the background of a deterioration in the labour market situation and, as a result, of household income prospects. Moreover, the high household indebtedness level and the associated required resources that are needed to comply with the debt service may also contribute to residential investment being especially affected by the current financial crisis. In the present context, banks will also face more difficulties in providing credit products that adjust the debt service to the payment capacity of households.

The projection for corporate GFCF also points to negative growth in 2009, chiefly due to deteriorating demand prospects and increased uncertainty, which will tend to lead to a postponement of planned investment projects. According to the April INE business investment survey published in July 2008, more than half of the companies reporting limits for investment point to deteriorating sales prospects as the major factor limiting investment. The deterioration of investor confidence levels, according to confidence indicators in manufacturing and services, and the tightening of credit standards on loans to companies will also contribute to constrain business investment. From 2010 onwards business investment is expected to recover slightly, following the gradual recovery of external demand. In annual average terms, these developments lead to marginally positive growth of this component in GFCF in 2010, in line with developments projected for economic activity in the private sector (Chart 4.2.3).

Government investment is forecast to increase around 8 per cent in 2009, and to decline subsequently approximately 4 per cent in 2010, in line with assumptions (see "Section 2 *Assumptions underlying the projection exercise*").

Chart 4.2.1

BREAKDOWN OF GFCF
Contribution to the growth rate

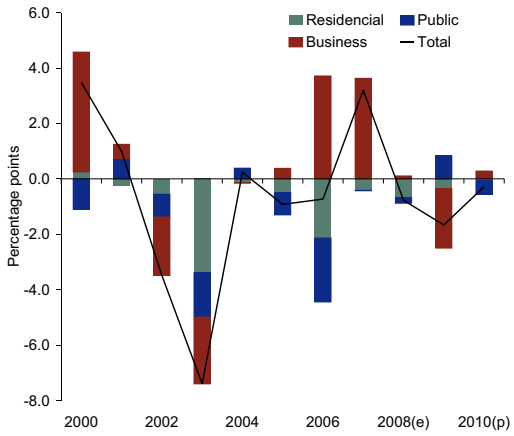
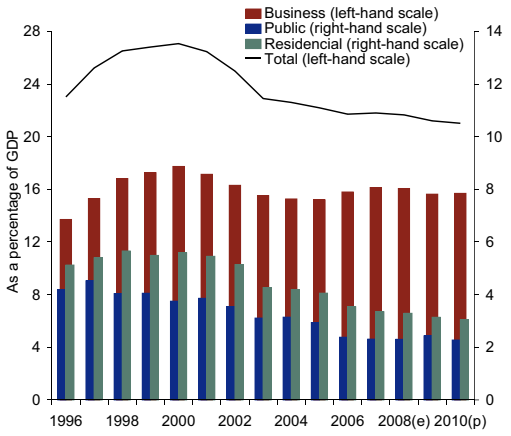


Chart 4.2.2

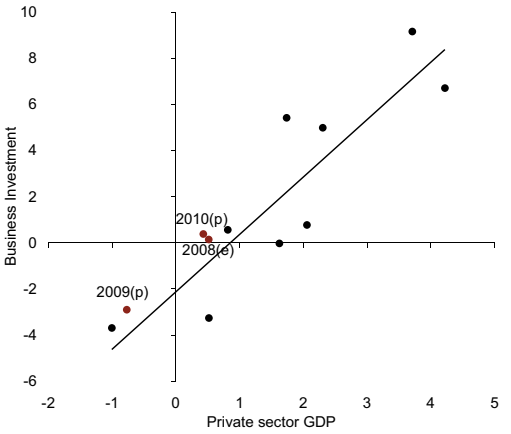
BREAKDOWN OF GFCF BY INSTITUTIONAL SECTOR



Source: Banco de Portugal.
Note: (e) - estimated; (p) - projected.

Chart 4.2.3

BUSINESS INVESTMENT AND PRIVATE GDP



Source: Banco de Portugal.
Note: (e) - estimated; (p) - projected.

4.3. External trade

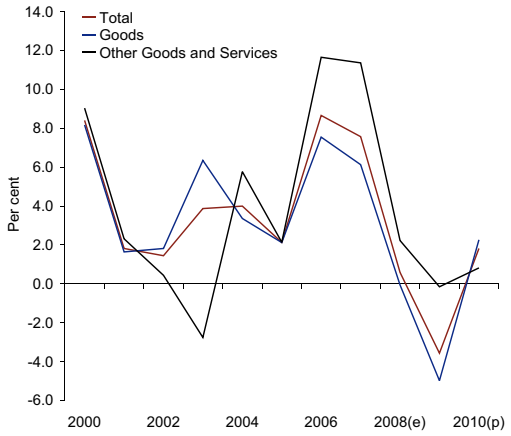
The evolution of exports of goods and services contributed significantly to the sharp deceleration in economic activity in 2008. The current estimates point to a growth rate of exports in volume of 0.6 per cent in 2008 (7.6 per cent in 2007). The current projection envisages a fall in exports in 2009 (-3.6 per cent) and 1.8 per cent growth in 2010 (Chart 4.3.1), which corresponds to an evolution close to the external demand indicator considered in the international environment of this projection (see "Section 2 *Assumptions underlying the projection exercise*").

The profile of exports in 2008 followed the decelerating trend observed since the beginning of the previous year, which deteriorated gradually as of mid-2007, in the wake of the growing turmoil in international financial markets. The interaction between the financial crisis and the global economic activity implied a sharp slowdown of world demand, which converged to an intense and progressive deceleration of external demand. The intra-annual profile of exports in the course of 2008 clearly points to a deterioration of the situation in the second half of the year, reflecting the sharp deceleration of the external demand for Portuguese goods and services as from the third quarter of 2008. This pattern was not only seen in exports of goods but has also extensive to exports of services, which grew by 2.2 per cent in 2008, in contrast with developments in previous years, when the growth rate exceeded 10 per cent. Exports of services decelerated sharply both in tourism exports, amid a clear slowdown in economic activity in the markets of origin of tourists visiting Portugal (namely Spain and the United Kingdom), and in other services, where the revenues associated with transports and services supplied by companies has a significant weight.

The current projection points to a decline in exports of approximately 3.5 per cent in 2009, reflecting the sharp deceleration of external demand envisaged in the international environment underlying these projections (see "Section 2 *Assumptions underlying the projection exercise*"). The fall in exports in 2009 maintains the trend already observed at the end of 2008 and is linked not only to exports of goods but also to exports of tourism and other services. In 2010, exports are expected to grow by 1.8 per cent, associated with the gradual recovery of activity in the economies of the main trading partners, which will likely contribute to the recovery of exports of goods. Exports of services are expected to in-

Chart 4.3.1

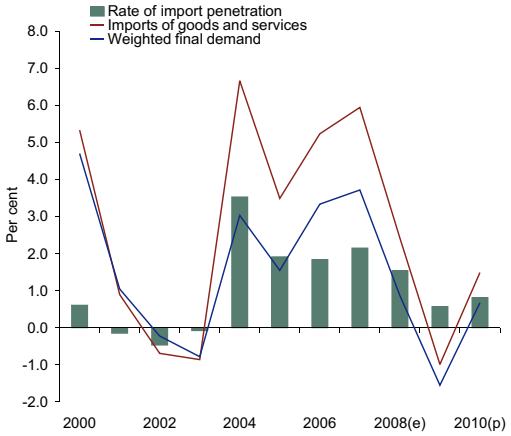
EXPORTS
Rate of change



Source: Banco de Portugal.
Note: (e) - estimated; (p) - projected.

Chart 4.3.2

IMPORTS AND WEIGHTED FINAL DEMAND
Rate of change



Source: Banco de Portugal.
Note: (e) - estimated; (p) - projected.

crease moderately, in a context where exports of tourism will continue to reflect low demand growth in the markets of origin of tourists visiting Portugal.

Imports of goods and services are estimated to have grown by 2.4 per cent in 2008, which represents a sharp slowdown from the 5.9 per cent increase in 2007. This deceleration, largely determined by overall demand developments, is chiefly centred in imports of goods, since imports of services slowed down moderately. Over the projection horizon, imports of goods and services are anticipated to decline by 1 per cent in 2009 and to increase by around 1.5 per cent in 2010, approximately in line with the projected evolution of the import weighted overall demand (Chart 4.3.2). The projected fall in 2009 mainly reflects the expected negative evolution of the consumption of durable goods, gross fixed capital formation and exports, corresponding to the expenditure items with higher import content. Furthermore, the current projection envisages a continued upward trend in import penetration, in the context of the integration in international trade of emerging countries with low production costs.

5. INFLATION

According to the current projection, the annual average rate of change of the HICP is foreseen to decline from 2.7 per cent in 2008 to 1.0 in 2009 and 2.0 per cent in 2010 (Chart 5.1). This evolution is marked by the performance of the energy component of the HICP, which reflects the assumed oil price developments throughout the projection horizon. As regards the non-energy component, projections point to a gradual deceleration in prices of these goods and services both in 2009 and 2010, in a context where inflationary pressures arising from internal and external determinants are likely remain relatively moderate.

Inflation projected for 2009 (1.0 per cent) is particularly low and is highly influenced by the expected evolution of energy prices. These prices are expected to decrease by approximately 10 per cent (Chart 5.2), reflecting a sharp decline in oil prices in international markets, in the context of deteriorating growth and demand prospects worldwide. The contribution of the energy component of the HICP to in-

Chart 5.1

TOTAL HICP AND HICP EXCLUDING ENERGY
Rate of change

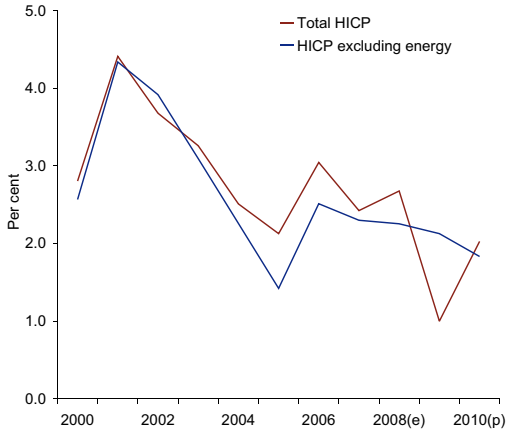
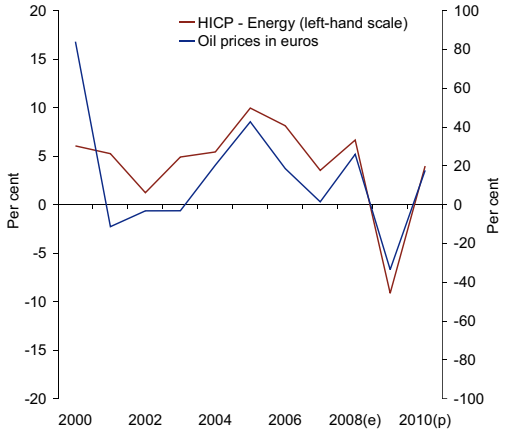


Chart 5.2

HICP - ENERGY AND OIL PRICES
Rate of change



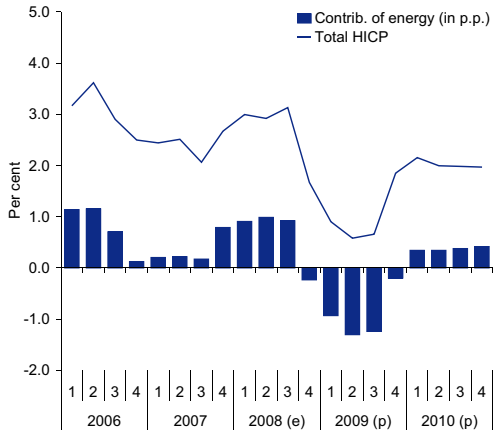
Source: Banco de Portugal.
Note: (e) - estimated; (p) - projected.

flation is expected to be negative during 2009 (Chart 5.3), corresponding to the first decline in fuel prices since the price liberalisation in 2004.[11]

According to the current projection, inflation of the non-energy component of the HIPC is forecasted to moderate from 2.3 per cent in 2008 to 2.1 per cent in 2009. This profile largely reflects the expected developments in processed food prices, pointing to an annual average growth in 2009 closer to its histori-

Chart 5.3

INFLATION AND CONTRIBUTION OF ENERGY
Year-on-year rate of change



Source: Banco de Portugal.
Note: (e) - estimated; (p) - projected.

(11) The change in energy prices in the HICP had been negative only once in 1999 (-1.8 per cent). However, that episode was chiefly determined by administrative decisions. Although fuel taxes continue to represent a large share of the final price paid by consumers, since 2004 the change in consumer prices has been freely determined by market participants.

cal average. The deceleration of this component is in line with the assumed evolution of food commodity prices in international markets and with the assumption on tobacco prices, which will create a significant base effect related to the smaller rise of taxes on tobacco in 2009 than in 2008 (see "Section 2 *Assumptions underlying the projection exercise*").

The impact of food prices on inflation prospects for 2009 is partly offset by the projected evolution of the other prices of non-energy goods and services, which are expected to accelerate gradually over 2009 (Chart 5.4). These developments are based on the maintenance of growth rates of unit labour costs, as well as of import prices of non-energy goods above 2 per cent in 2009 (Chart 5.5). Moreover, information in the State Budget for 2009 points to an increase in taxes on motor vehicles as of the start of 2009.

The year-on-year rate of change of the HICP is likely to maintain a downward trend up to mid-2009, reaching very low levels. From then onwards a reversal of such trend is foreseen. This trend reflects the impact of the assumptions for commodity price developments in international markets, and is chiefly associated with the expected developments in energy and processed food prices.[12] In the second half of 2009, the year-on-year growth rate of change of energy prices is expected to increase and the HICP will likely accelerate, reflecting the upward trend in oil prices included in the assumptions underlying the current projection.

In 2010, the inflation rate is expected to remain at relatively low levels, but higher than in 2009. Even though the assumptions regarding oil price developments may imply that the change in the HICP energy component prices points to an upward trend, the deceleration in import prices of non-energy goods and the further moderation in unit labour cost developments are expected to act as dampening factors of consumer price increases.

As regards domestic inflation driving forces, it should be highlighted that in a small open economy integrated within a monetary union, as is the Portuguese economy, labour market plays a key role in the

Chart 5.4

HICP OF FOOD AND HICP EXCLUDING FOOD AND ENERGY

Year-on-year rate of change

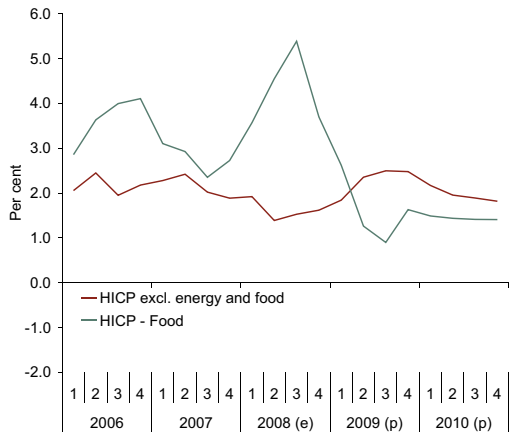
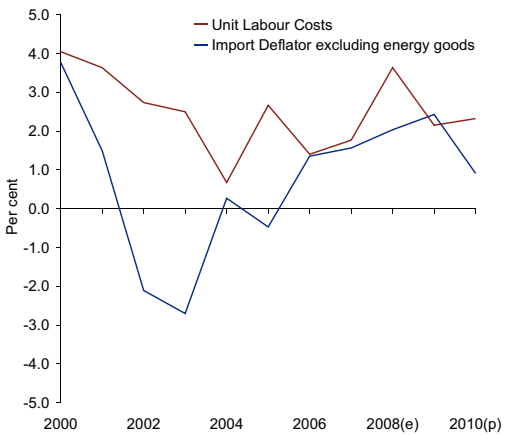


Chart 5.5

UNIT LABOUR COSTS AND IMPORT DEFLATOR EXCLUDING ENERGY

Rate of change



Source: Banco de Portugal.
Note: (e) - estimated; (p) - projected.

(12) Inflation developments in 2009 will also be marked by a temporary effect in June. In this month, the year-on-year rate of change of unprocessed food prices is projected to fall rather sharply, as its abnormally high growth in June 2008 was largely due to disturbances in the road distribution circuit of such goods.

adjustment to shocks. Against a background of a sharp slowdown in domestic and external demand, the current projection points to a significant deceleration of nominal wages in 2009, reflecting lower wage growth in the private sector, amid continued high levels of the unemployment rate. These developments are in contrast to those of wages in the public sector, since, according to available information, the update of the civil servants wage scale schedule is expected to exceed that adopted in 2008. In this context, reference should be made to uncertainty as to the slowdown in private sector wages increases, namely as a reflection of the indirect impact stemming from the update of both public sector wages and the minimum wage, or other institutional and structural factors, which may jeopardise this adjustment and translate into rising unemployment.

6. CURRENT AND CAPITAL ACCOUNT

The projection for the net external borrowing requirements of the Portuguese economy in 2009-2010 maintains the trend observed since 2006 (Chart 6.1). After an increase from 2003 to 2006, the current and capital account deficit hovered around 8.5 per cent of GDP, which remains unchanged in the current projection. According to available information, this relative stabilisation includes a rise in the income account deficit, associated with the continued deterioration of the international investment position of the Portuguese economy, a relative stabilisation in the trade balance in goods and services and a widening in the capital account surplus.

Net external borrowing requirements of the economy increased from 8.2 per cent in 2007 to 9.0 per cent of nominal GDP in 2008. This deterioration reflects the fall in the domestic saving rate, the maintenance of the investment rate of the economy at a level relatively close to that recorded in 2007 and the widening of the capital account surplus (Chart 6.2). Net external borrowing requirements are projected to stand at 7.9 and 9.4 per cent of GDP in 2009 and 2010, respectively. The fall expected for 2009 reflects the narrowing of the trade account of goods and services deficit, in a context where the other items are projected to remain fairly stable as a percentage of GDP. In 2010 the deterioration of the income account and of trade account of goods and services is a key factor underlying the rise in the current and capital account deficits.

Chart 6.1

CURRENT AND CAPITAL ACCOUNT

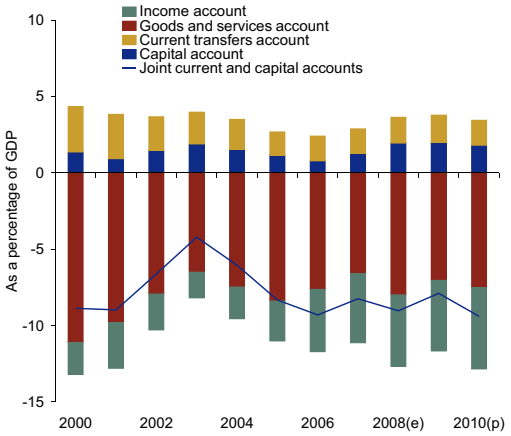
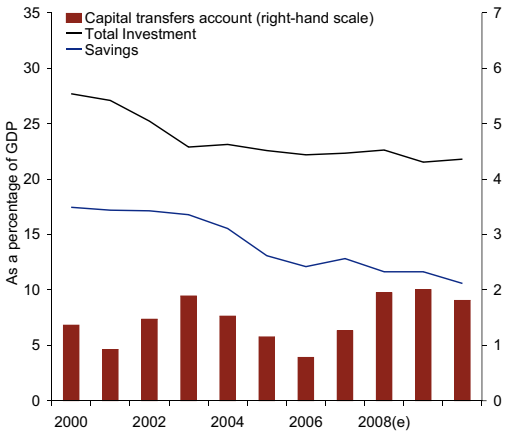


Chart 6.2

SAVINGS, INVESTMENT AND CAPITAL ACCOUNT



Source: Banco de Portugal.
Note: (e) - estimated; (p) - projected.

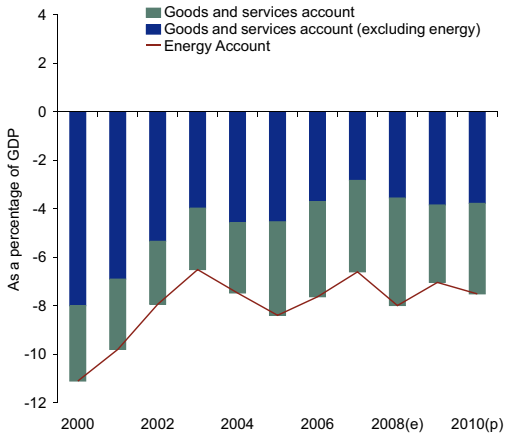
Following the deterioration estimated for 2008, the trade account of goods and services deficit as a percentage of GDP is expected to fall to 7.0 per cent in 2009, subsequently increasing to 7.5 per cent in 2010. Such developments are partly conditional on the terms of trade developments, which incorporate the impact of the oil price fluctuation over the projection horizon. The average price of this commodity is expected to fall sharply in international markets in 2009, in the context of a decline in economic growth and world demand prospects, and to recover somewhat subsequently. The energy account deficit is expected to decrease from 4.4 per cent of GDP in 2008 to 3.2 per cent in 2009 and to rise to 3.7 per cent in 2010. Excluding energy, the trade account of goods and services deficit is projected to stabilise in 2009 to 2010, at a level close to that estimated for 2008 (3.6 per cent of GDP) (Chart 6.3). Terms of trade excluding energy goods will likely remain stable, thus discontinuing the upward trend associated with the impact of the integration into international trade of countries with low unit production costs.

According to the current projection, the income account deficit is forecast to stand in 2009 at a level close to that observed in 2008 (4.7 per cent of GDP), and to increase to 5.3 per cent in 2010. The relative stabilisation of the income account in 2009, despite the deteriorating trend of the international investment position of the Portuguese economy, reflects the favourable impact of the assumed decline in short-term interest rates, in the context of the relative stabilisation of the long-term interest rates (see "Section 2 *Assumptions underlying the projection exercise*"). In 2010, the small but gradual rise in interest rates assumed in the projection will imply that the income account deficit may resume the previous upward trend, in the context of the further deterioration projected for the international investment position.

As for the combined current transfers and capital accounts, a surplus of around 3.7 per cent of GDP is assumed for 2009 and 2010, similar to that estimated for 2008.

Chart 6.3

GOODS AND SERVICES ACCOUNT AND ENERGY ACCOUNT



Source: Banco de Portugal.
Note: (e) - estimated; (p) - projected.

7. UNCERTAINTY AND RISK ANALYSIS

The projections in this article are conditional on the range of assumptions presented in "Section 2 *Assumptions underlying the projection exercise*". In the present international economic context, marked by the financial crisis, stress should be laid on the assumptions related to the international framework developments. The non-materialisation of these assumptions, as well as the possible occurrence of other idiosyncratic factors with a direct impact on the macroeconomic scenario, leads to the identification of major risk and uncertainty factors that play a key role in the present context. This section presents a quantified assessment of risks for 2009 and 2010 as regards growth of GDP and its components, as well as the inflation rate.[13]

7.1. Risk and uncertainty factors

The main risk factor for the Portuguese economy in the current projection is associated with the duration, magnitude and implications of the ongoing financial crisis and its interaction with the economic activity level in Portugal and worldwide. There is therefore a clear possibility that the ongoing financial crisis may be more protracted and deeper than assumed in the external framework of these projections, implying greater impact on world economic activity, both on advanced economies and emerging market economies. Moreover, it is worth mentioning that the persistence of the macroeconomic imbalances worldwide, whose disorderly unwinding cannot be excluded in the present international context.

A world recession would certainly have strong spillover effects on the external framework of the Portuguese economy. In this context, the identified risk factor would imply lower growth of external demand for Portuguese goods and services, and specially on the euro area, the United Kingdom and the United States economies, as well as on some emerging market economies, where demand for Portuguese exports has grown rather sharply in the recent past.

Similarly to 2008, the possibility of lower growth of the world economy, marked by the more pronounced and protracted slowdown in advanced economies and emerging market economies than envisaged in the current projection, will continue to affect demand for commodities, in particular oil, pushing their prices significantly downwards, in a context where supply of these commodities remains relatively stable (see "Section 2 *Assumptions underlying the projection exercise*").

As regards wholesale market financing conditions, the projections assume a gradual normalisation of the situation over the projection horizon. However, the possibility that the financial crisis might last longer than envisaged in the international framework of these projections would translate into a postponement of the reduction in credit risk premia, implying the maintenance of the interbank money market interest rates at a higher level than those considered.

In addition, the significant and encompassing changes in interbank money market conditions, in public and private debt markets and in the stock markets have constrained the financing capacity of Portuguese banks in wholesale markets at the international level. Such a situation has been reflected in a tightening of credit standards reported by banks participating in the Bank Lending Survey and will necessarily imply a slowdown in credit over the horizon, with an impact on credit conditions for households and companies and on their expenditure decisions. In this context, a deterioration of the financial crisis would tend to imply the maintenance of tighter financing conditions, due either to the adoption of tighter

(13) The methodology followed in this analysis was published in Novo, A. and Pinheiro, M., "Uncertainty and Risk Analysis of Macroeconomic Forecasts", Banco de Portugal, *Working Paper 19-2003*.

criteria for new loans, or to the widening of the differentials between bank interest rates and money market interest rates. Moreover, the longer persistence of the financial crisis and its interaction with economic activity worldwide would tend to determine a further deterioration of the agents' expectations as regards to the future developments of their income and wealth. In a framework dominated by uncertainty, this would tend to induce a postponement of investment and consumption decisions and, as a result, longer accumulation of savings, either due to difficulties in obtaining bank financing or for precautionary reasons.

The degree of uncertainty surrounding these projections continues to be particularly high, namely as regards the magnitude and persistence of the slowdown in the global economy, the new level around which international financial markets will stabilise, as well as the impact of government measures.

7.2. Quantification of risk factors

The risk factors identified above allow for the possibility of setting a subjective probability for the non-materialisation of the technical assumptions and the potential occurrence of a specific impact that may affect the aggregates included in the projection (Table 7.2.1.). With regard to risks stemming from the international framework of the Portuguese economy, the following has been considered: a 55 per cent probability that in 2009 and 2010 growth of external demand for Portuguese goods and services may stand below the level envisaged in the current projection, corresponding to a stronger impact of the financial crisis on world economic activity in 2009 and to the persistence of this situation into 2010; a probability of around 55 per cent that in 2009 and 2010 the oil prices may drop below the level considered in these projections; and a probability of 55 per cent that in 2009 the short-term interest rate may stand above the projected level.

The risks due to possible financing difficulties of Portuguese banks in wholesale markets, namely in terms of interest rates cost, warrant the introduction of specific risk factors in consumption and investment. Hence, a probability of 55 per cent was considered that in 2009 and 2010 the growth rates of private consumption and investment may fall short of the projections.

Table 7.2.2 and Charts 7.2.1 and 7.2.2 display the main impact of the above risks on the projected variables, namely GDP, its components and the inflation rate. As regards projections for economic activity, the quantified risk analysis identifies a clearly downward risk, i.e. a probability of around 59 per cent that in 2009 and 2010 GDP growth may come out to be below the current projection, reflecting the impact of such risks on the overall demand components.

Turning to the inflation rate, risks are slightly on the downside, reflecting the possibility of oil prices standing below the level assumed in the projection, in the context of a more pronounced and protracted slowdown of overall economic activity.

Table 7.2.1

SUBJECTIVE PROBABILITIES OF RISK FACTORS
Per cent

	2009	2010
Conditioning variables		
Oil prices	55	55
External demand	55	55
Interest Rate	45	50
Endogenous variables		
Private consumption	55	55
Investment	55	55

Source: Banco de Portugal.

Table 7.2.2

PROBABILITY OF AN OUTTURN BELOW THE CENTRAL PROJECTION
Per cent

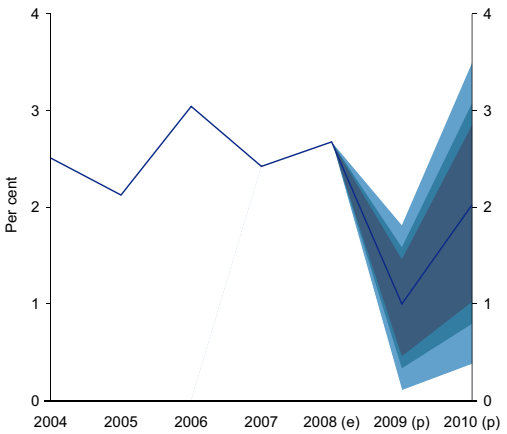
	Weights (%) 2008	2009	2010
Gross domestic product	100	59	59
Private consumption	66	60	60
GFCF	22	59	61
Exports	33	54	54
Imports	42	59	60
HICP		52	53

Chart 7.2.1

GROSS DOMESTIC PRODUCT
Rate of change

Chart 7.2.2

HARMONISED INDEX OF CONSUMER PRICES
Rate of change



Sources: INE and Banco de Portugal.
Note: (e) - estimated; (p) - projected.

8. CONCLUSION

A small economy fully integrated in economic and financial terms, as Portugal, is necessarily affected by the interaction between the ongoing international financial crisis and the world economy slowdown. This framework spills over into the Portuguese economy via multiple channels and in different ways, including the decline in external demand addressed to companies operating in Portugal, the deterioration of agents' economic growth expectations, or the high uncertainty surrounding the future development of the economic and financial situation. Notwithstanding the money market interest rates to levels below the ones recorded in 2008, the increased tightening of bank financing conditions in international financial markets relative to the situation prevailing in the period prior to the outbreak of the financial turmoil and the deterioration of the household and corporate balance sheet imply some tightening of bank credit standards. Therefore, the solvency conditions arising from the intertemporal budget constraints of households and firms will tend to become more binding, due to the high indebtedness of the non-financial private sector. In this unfavourable external environment, and in spite of the assumed gradual easing of disturbances in international financial markets, the current projection points to a contraction in economic activity in 2009, followed by a moderate recovery in 2010. A strong slowdown in private consumption and a contraction in investment are anticipated over the projection horizon, along with a strong slowdown in exports.

In terms of inflation, the projection points to a significant deceleration in consumer prices, largely determined by the fall in commodity prices, which chiefly reflects expectations of a sharp decline in the world demand. Thus, after the strong rise in oil and food commodity prices from mid-2007 to mid-2008, the sharp fall in global economic growth prospects may have induced a downward correction of these prices, implying a revision of inflation prospects worldwide and also in Portugal. Hence, the inflation rate is projected to stand at a low level in 2009, but to recover to levels consistent with the price stability definition in 2010.

The deepening of the financial crisis and the declining inflation expectations, together with the decelerating world economic activity, determined a more accommodative monetary policy stance. In addition, a number of measures have been announced intending to reinforcing confidence and re-establishing the regular functioning of financial markets. In turn, several fiscal policy initiatives have been undertaken aiming at the stabilisation of economic activity. As regards specifically fiscal policy measures in Portugal, the current projection includes only the measures approved in legal terms or specified with sufficient detail as at the cut-off date of data in this article. The same criterion is applied to the measures included in the State Budget for 2009 and to subsequent measures, namely those approved at the Council of Ministers of 13 December 2008.

The degree of uncertainty and risk underlying these projections is rather high. The international context, marked by the financial market turmoil, whose interaction with economic activity may determine a lower world growth than herein envisaged, implies downward risks on economic activity in Portugal. Moreover, the maintenance of a high degree of uncertainty surrounding the magnitude and persistence of the present financial crisis situation, namely the impact of the measures taken by the authorities, will tend to induce a postponement of agents' expenditure decisions, also implying downward risks on economic activity.

The current projections are marked by the ongoing international economic and financial situation. However, amid gradual but belated adjustments of the institutional framework, the Portuguese economy continues to be characterised by a range of structural fragilities, which have translated into weak factor productivity growth over the years. Therefore, it is important that the economic agents assimilate

the advantages of pursuing a macroeconomic stability-oriented fiscal framework in the medium and long term and, on the other hand, maintain the restructuring dynamics of the Portuguese economy, with a view to directing the production of goods and services to higher value added segments and markets with stronger growth prospects in the medium term. This dynamics is crucial to create conditions that ensure the re-establishment of a sustained growth of the Portuguese economy, following the current slowdown period.

Finally, the low growth of economic activity in Portugal in the recent years has shown not only weak productivity dynamics, but also a low growth of employment and capital stock, which cannot be assessed from a merely cyclical perspective. Against this background, the implementation of reforms leading to higher efficiency in the allocation of resources is crucial for promoting a sustained increase in productivity and employment levels, as well as creating conditions conducive to investment and innovation.

The cut-off date for data in this article is mid-December 2008. The assumptions on interest rates, foreign exchange rates and oil prices are dated 11 December 2008.

ARTICLES

THE GAINS OF UNEMPLOYMENT INSURANCE TO JOB MATCH QUALITY IN THE PORTUGUESE LABOR MARKET*

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*Álvaro A. Novo***

1. INTRODUCTION

The job search effort of the unemployed is one of the most important investments in the labor market. The efficiency of this activity is crucial to the success of the unemployed, not only in terms of the likelihood of returning to work, but also in terms of wage progression. As in all investments, there are costs involved. The more important of these costs in job search are (i) the opportunity cost in terms of foregone wages and (ii) the out-of-pocket expenses while unemployed. The unemployment insurance system was designed to smooth transitions between employment and unemployment, and back to employment; it partially supports the unemployed's consumption and welfare. It is a crucial component of the social safety net of a modern economy.

In this paper, we investigate the ability of the unemployment insurance (UI) system to allow the unemployed to search not only for a job, but for the right job. If the unemployed are given enough time to search, they may end up with a better search outcome: a higher paying job and/or a job that lasts longer. Exploring two exceptionally rich identification strategies available in the Portuguese labor market, we infer the causal effect of longer UI entitlement periods on reemployment wages. The methodologies used provide a counterfactual estimate of the reemployment wages. In other words, we estimate the wage gains relatively to the situation with shorter unemployment insurance coverage. The evidence presented in this article is based on Social Security administrative records covering all subsidized unemployment spells initiated between January 1998 and December 2002. The results are mixed.

We find that, on average, the impact of longer subsidized unemployment spells on reemployment wages is quite small. However, we conclude that workers with lower pre-unemployment wages gain the most. Interestingly enough, they are also the ones that extend their unemployment spells the least. When entitled to a longer benefit period, a worker in the first quartile of the pre-unemployment wage distribution has an average relative wage gain larger than 3 per cent and a small increase in unemployment duration. However, a worker from the top quartile experience a large increase in unemployment duration and suffers a relative wage penalty larger than 4 per cent. Also interestingly from a policy point of view, we conclude that any relative wage gains occur early on in the unemployment spell. In other words, waiting too long for a new employment carries a wage penalty, maybe due to labor market stigma or decreasing labor market attachment of the worker. Females gained the most from the longer entitlement periods, similarly to what has been found for other countries, namely Austria.

Our results show the important role of individuals' liquidity constraints, measured by pre-unemployment wages, in shaping their reaction to extended UI benefits. The impact on duration, together with the fact that the more constrained gain the most in terms of reemployment wages, gives better pros-

* We thank *Instituto de Informática (II)* of the Portuguese Social Security for making the data available to us, in particular, João Morgado for insightful discussions. Opinions expressed herein do not necessarily reflect the views of the *Banco de Portugal* and *II*. Any errors are of our responsibility.

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pects to UI policies targeting these individuals. These transitions out of unemployment are characterized by a positive reemployment wage elasticity to the duration of subsidized unemployment. The pressure to accept low quality jobs is reduced through the liquidity effect, generating better matches.

2. THEORETICAL BACKGROUND AND PREVIOUS EVIDENCE

The main theoretical results that we draw upon can be derived from the standard nonstationary job search model in Mortensen (1986). The simple result of observing longer unemployment spells as a response to increased UI benefits (usually interpreted as a distortionary substitution/moral hazard effect) does not preclude the existence of a liquidity effect for agents who face liquidity constraints. The liquidity effect introduces heterogeneity in the UI impact on unemployment duration for constrained and unconstrained individuals. If the liquidity effect is important, it can mitigate the disincentive created through the moral hazard effect, and the total effect of UI becomes less distortionary than previously thought (Chetty, 2008).

To add intuition to these outcomes, we first think of the workers' liquidity constraints as in Mortensen (1986). The liquidity constraint is introduced in the model with the assumption that the worker is able to self-finance the job search costs only for a finite time. This implies that constrained workers find it more difficult to smooth consumption over labor market states, and for them, UI might create a liquidity effect that occurs in addition to, and independently, of the usual moral hazard effect. When a constrained worker relies on UI benefits to maintain consumption, increases in the duration or financial coverage of the UI benefit would reduce the pressure to find a job. On the other hand, if the worker is unconstrained, the liquidity effect channel is less relevant, since UI benefits would be a small portion of lifetime wealth. Thus, the liquidity effect would predict a larger increase in unemployment duration for constrained individuals.

This extra time to search for a new job can also have a positive impact on post-unemployment outcomes, improving job match quality . The impact of the UI system on productivity and job mismatch has been examined in several theoretical papers. Marimon and Zilibotti (1999) present a model of the role of UI on mismatch and unemployment and show the positive impact of the UI system on the reduction of job mismatch. In a related paper, Acemoglu and Shimer (2000) analyze the productivity gains from more generous UI systems. Considering risk-averse workers, they show that UI increases labor productivity by encouraging both workers to seek higher productivity jobs and firms to create such jobs. In their setting, the UI is more than a search subsidy, and affects the type of jobs that workers look for and accept.

The impact of UI on match quality remains, nonetheless, an empirical issue. There are only a limited number of studies addressing the impact of UI on post-unemployment outcomes, and they have concentrated almost exclusively on the wage dimension of job match quality (see Addison and Blackburn, 2000). Belzil (2001) looks at job duration by exploring a reduction in the initial entitlement period rule in Canada to study the impact of UI duration on subsequent job duration for young individuals, and reports a weak but positive impact. More recently, Centeno (2004), Centeno and Novo (2006) and McCall and Chi (2008) look at the US system, using UI variation across states, and find evidence that a more generous UI increases the tenure of reemployment and that this impact is stronger at longer tenures.

Recently, a number of papers considered the impact of UI on post-unemployment outcomes using administrative data for European countries. Lalive (2008) and Lalive (2007) use Austrian data from an extension of UI benefits and report a significant impact on unemployment duration but no impact on wages. Lalive reports that an extension of 170 weeks of UI benefits increases quite significantly unem-

ployment duration for women, and has only a small impact for men. With respect to the change in earnings in the post-unemployment job compared to the pre-unemployment job, the impact was null for men, whereas for women there is a statistically non-signifficant gain of 1 per cent. Similar results are obtained in the studies by Fitzenberger and Wilke (2007) for Germany and in van Ours and Vodopivec (2008) for Slovenia. In particular, van Ours and Vodopivec (2008) analyse the impact of a reduction in the entitlement period. They report for men a small and insignificant decline in wages and for women, a positive and insignificant increase. Card, Chetty and Webber (2007) also uses data from Austria and finds some impact of severance payments on reemployment job tenure, but no impact on wages.

3. DATA

Our study uses administrative data collected by *Instituto de Informática* of the Portuguese Social Security bureau. The dataset registered all subsidized unemployment spells initiated between January 1998 and the end of 2002. The data include all relevant information in terms of subsidized unemployment duration, pre-unemployment wage and date and wage of the first job after the subsidized unemployment spell. The data also include information on the individual's age at the beginning of the unemployment spell, the gender, regional (22 districts) location and the starting month of unemployment.

We are able to follow individuals until their benefits expired or they found a job. Thus, we consider complete spells of subsidized unemployment, which correspond to a single-cycle/flow sampling scheme as defined in Lancaster (1992).

4. A REGRESSION DISCONTINUITY APPROACH

Our exercise takes advantage of the rules of the Portuguese UI system to identify the causal effect of longer UI entitlement periods on job search duration and reemployment match quality. After July 1999, for individuals younger than 45 years at the moment of entering unemployment, the entitlement period is fully determined by their age. Thus, the law generates two sharp discontinuities in the entitlement period at ages 30 and 40 (Table 1).

In this setting, it is extremely appealing to use the regression discontinuity design. This method is rather intuitive. In the present context, it compares the behavior (unemployment duration and reemployment wages) of the unemployed aged 29(39) to that of those aged 30(40); arguably, these individuals share (on average) rather similar characteristics, except for the entitlement period: 12(18) months for the 29(39) years old and 18(24) months for the 30(40) years old. Thus, any differences in the outcome variables between individuals that differ by one year of age is attributed, with a causal interpretation, to the only difference between them, namely the entitlement periods.

Table 1

AGE AND ENTITLEMENT PERIODS (IN MONTHS)

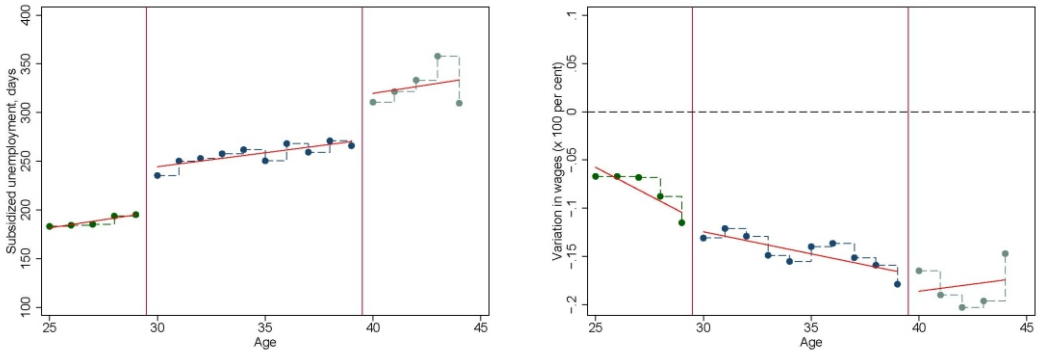
Age [a]	[15, 29]	[30, 39]	[40, 44]	[45, 64]
Entitlement period	12	18	24	30 (+8) [b]

Notes: The information refers to the UI law in place between July, 1999 and December, 2006. **(a)** The entitlement period is determined by the age of the unemployed at the moment of unemployment. **(b)** For each 5 years of social security contributions, the UI benefits are prolonged 2 months up to 8 months.

Chart 1

SUBSIDIZED UNEMPLOYMENT DURATION AND REEMPLOYMENT WAGE CHANGE

Panel A Panel B



Source: II MTSS' data - authors calculations.
Note: Average subsidized unemployment spells by age (left panel) and log difference between pre-unemployment and reemployment wages (right panel). Individuals aged 30-39 have an entitlement period 6 months longer than the youngest cohort and 6 months shorter than the oldest cohort, 40-44. See Table 1 for exact entitlement periods.

Chart 1 summarizes the essence of the identification strategy followed in this paper. On the left-hand side panel, which plots average subsidized unemployment duration (in days) by age, there are two clear discontinuity points at ages 30 and 40. These coincide with the 6 months discontinuities introduced by the legislator in the age-based UI entitlement periods: from 12 to 18 months at age 30 and 18 to 24 months for older individuals. To these increases in the UI entitlement period, individuals respond unequivocally by extending their subsidized unemployment spells; there are significant discontinuities at ages 30 and 40, which suggests that adding a sizeable 6 months to potential benefits results in longer average subsidized unemployment duration.[1]

The right-hand side of Chart 1 presents evidence of the impact of longer UI entitlement periods on post-unemployment job match quality, indexed by the log difference between pre-unemployment and reemployment wages. Overall, this chart suggests a much smaller impact than for the case of duration. Indeed, superimposed regression lines at the discontinuity points suggest a tiny negative impact at the first discontinuity (29/30 years), and a small impact for older individuals (39/40 years). In the following section, these results will be further exploited in an appropriate econometric setting.

4.1. Econometric results

The regression discontinuity design can be formalized by specifying the following model:

$$y_i \qquad D_i \quad (a) \quad _i \qquad (1)$$

where y_i is the outcome variable for individual i, and the effect of the forcing variable a (age in our case determines (forces) the length of the benefits) on the dependent variable is captured by the function . , typically a polynomial. D_i is a dichotomous treatment variable, assuming value 1 if the individual i belongs to the group with longer entitlement period. In particular,

(1) Using survey data, Addison and Portugal (2007) study the impact of the Portuguese UI rules on transitions out of unemployment into employment. They use survey data from the *Inquérito ao Emprego* for a different time period (more precisely 1992-97). They do not study the impact on reemployment wages, nor any other post-unemployment outcome.

$$D_i \quad \begin{array}{ll} 1, & \text{if } 30 \text{ a } 39 \\ 0, & \text{if } 25 \text{ a } 29 \end{array} \qquad \text{or} \qquad D_i \quad \begin{array}{ll} 1, & \text{if } 40 \text{ a } 44 \\ 0, & \text{if } 30 \text{ a } 39, \end{array}$$

depending on the discontinuity threshold that is under analysis. The impact of participation in the treatment is given directly by the estimate of the parameter at the point where the treatment variable switches from 0 to 1. Hann, Todd and van der Klaauw (2001) and Imbens and Lemieux (2008) discuss at length this method.

Table 2 summarizes the regression discontinuity design estimates for the two discontinuity points, based on the sampling period after July, 1999 covering 18,457 unemployment spells for individuals aged 25 to 44 that ended up in reemployment.

Confirming the visual inspections of the previous section, the results in Table 2 show a sizeable impact on duration. Indeed, the estimates point to an average increase on subsidized unemployment duration of 43.5 days for individuals aged 30 and 36.1 days for older individuals.

The increase in the entitlement period and the additional duration of subsidized unemployment did not bring about, on average, higher reemployment wages. On the contrary, the impact is minus 1 percent at both discontinuity points.

Note that the addition of control variables does not have any significant impact on the estimates, as it is expected in these settings (Imbens and Lemieux , 2008). Therefore, for reasons of statistical efficiency (Lee, 2008), we will use the specification with control variables in the following analysis.[2]

Table 2

IMPACT ON THE DURATION OF SUBSIDIZED UNEMPLOYMENT (IN DAYS) AND ON REEMPLOYMENT WAGES (RATE OF CHANGE)

	Discontinuity: 30 years		**Discontinuity: 40 years**	
	Pre-unemployment wages		**Pre-unemployment wages**	
	Below median	**Above median**	**Below median**	**Above median**
	(1)	**(2)**	**(3)**	**(4)**
Subsidized unemployment duration	44.8	43.5	44.4	36.1
	(5.82)	(5.59)	(8.46)	(8.10)
	0.000	0.000	0.000	0.000
Reemployment wage gains	-0.009	-0.010	-0.015	-0.012
	(0.013)	(0.012)	(0.015)	(0.015)
	0.480	0.416	0.343	0.429
Number of observations	15,497	15,497	11,891	11,891
Polynomial order	1	1	1	1
Bandwidth				
Control variables	No	Yes	No	Yes

Source: II MTSS' data - authors' calculations.
Notes: Includes all UI claims from July, 1999 to December, 2002. Authors' computations. The point estimates are based on local linear regression with rectangular kernel. The impact is expressed in days for duration and log points difference for reemployment wages. Standard errors in parentheses, and below the p-values. The bandwidth " " weights equally all observations; for example, at the 30-years discontinuity threshold, point estimates to the left are based on 5 age-points (25 to 29) and to the right on 10 age-points (30 to 39). The control variables included are: women, district, unemployment month, reemployment month, and unemployment year. For the regression of subsidized unemployment duration, pre-unemployment wages are also included in the set of control variables.

(2) The set of control variables included are listed in the notes to Table tab:all. We experimented with other bandwidths, but the results resemble those reported in the Table 2.

Liquidity effect: The impact on unemployment duration

The above analysis collapses the impact into a simple average, but the identification of the liquidity effect rests on individual differences in the degrees of liquidity constraints. This is particularly important in the analysis of UI regimes in which the extension of benefits accrues only after a long period of unemployment. In such cases, it is expected that the nonstationarity of the job search environment will affect one group of workers more than another.

To identify the liquidity effect, the first task is to identify individual differences in the degrees of liquidity constraints. However, the 'constrained' status is a latent variable. As such, it is not feasible to classify individuals, directly from the data, into distinct groups of liquidity constraints. The approach followed to identify these groups is to use the 12-month average of pre-unemployment wages as an index for the distribution of liquidity constraints.

The use of wages as an index is justified by the work of Ziliak (2003), who shows that wages are the leading factor driving differences between poor and rich households in terms of net worth to permanent income ratio. Furthermore, he shows also that many low-lifetime-income households accumulate little wealth relative to their incomes. Similar indications for the Portuguese economy are reported in Centeno and Novo (2007).

Thus, to better understand the behavior of workers at each extreme of the income distribution, and at different degrees of liquidity constraints, we split the sample into 4 subsamples, each corresponding to an income quartile of the pre-unemployment income. Additionally, we consider only individuals with pre-unemployment income ranging between 1.5 and 4.5 minimum wages. In the Portuguese UI system, these individuals share the same gross replacement rate, 65 percent, that is, UI represents 65 per cent of the before taxes pre-unemployment wages. This option reduces the scope for different labor supply disincentives (Fitzenberger and Wilke, 2007).

The results support the existence of a UI liquidity effect (Table 3). Except for the unemployed in the first quartile, the response of the remaining individuals by degree of liquidity constraint is as expected: smaller increases in unemployment spells for individuals with lower liquidity constraints. This pattern is common to both age-discontinuities, and compatible with the liquidity effect reported above, but highlights the existence of other mechanisms that condition the response of individuals at each extreme of the wage distribution. The behavior of the more constrained is explained by the nonstationarity characteristics of the labor market faced by these individuals, a fact that may hinder their capability to respond to the increased entitlement periods of the UI system (Cahuc and Zylberberg, 2006). A possible explanation for this result rests on the heterogeneity of the arrival rate of job offers. The importance of the arrival rate of job offers in shaping unemployment duration has been well documented in the literature (Eckstein and van den Berg, 2007). Based on European Panel Household Survey data, in Portugal and France, low-educated workers receive only half of the number of job offers received by workers with college degrees (Addison, Centeno and Portugal, 2009). Such differences in the arrival rate might lead low-wage workers to accept earlier job offers or else face a very high risk of remaining unemployed after UI expires, contributing to explain their smaller reaction to the policy (dis)incentive.

Table 3

IMPACT ON DURATION (IN DAYS) AND REEMPLOYMENT WAGES (RATE OF CHANGE) BY PRE-UNEMPLOYMENT WAGE QUARTILES

	Discontinuity: 30 years				Discontinuity: 40 years			
	Pre-unemployment wages				Pre-unemployment wages			
	1st quartile	2nd quartile	3rd quartile	4th quartile	1st quartile	2nd quartile	3rd quartile	4th quartile
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Subsidized unemployment duration	39.7	58.5	53.0	51.4	34.2	64.1	55.0	20.5
	(12.7)	(13.2)	(12.4)	(13.3)	(19.0)	(18.8)	(20.1)	(18.7)
	0.002	0.000	0.000	0.000	0.072	0.001	0.006	0.273
Reemployment wage gains	0.034	0.027	-0.043	-0.065	0.078	-0.036	-0.019	-0.039
	(0.021)	(0.025)	(0.028)	(0.037)	(0.025)	(0.028)	(0.036)	(0.043)
	0.110	0.273	0.122	0.081	0.002	0.193	0.588	0.374
Number of observations	2945	2982	2985	2911	2189	2284	2211	2349
Polynomial order	1	1	1	1	1	1	1	1
Bandwidth								
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: II MTSS' data - authors' calculations.
Notes: These estimates are based on individuals with gross replacement rates in the 63 to 67 percent range. Standard errors in parentheses and below the *p-values*. See notes to Table 2 for additional details.

Impact on reemployment wages

A differentiated impact is also observed for reemployment wages; gains are concentrated at the low end of the income distribution, while losses appear to be the rule at the high end. At the 30-year-old threshold, relatively to the counterfactual (29-year-old), the sign on log variation at the quartiles below the median is positive (3.4 and 2.7 percent), while the impact on the top two quartiles is negative (reaching -6.5 percent for the 4th quartile) with statistical *p*-values sufficiently close or below 0.10. Older individuals in the first quartile experience a positive and sizeable impact (7.8 percent); at the other quartiles the impact on reemployment wages is negative, reaching -3.9 percent.[3]

5. A DIFFERENCE-IN-DIFFERENCES APPROACH

The reform of the UI system in July 1999 provides an alternative source of identification of the impact of UI on post-unemployment outcomes that is explored in this section. The reform changed the entitlement period for some age groups in the population. Before the reform, the Portuguese legislation divided workers younger than 45 years old into 5 age-groups with different entitlement periods. The reform made this period larger for 3 out of the 5 groups, leaving the remaining two groups unchanged (Table 4). Thus, the legislation created a quasi-experimental setting, that is, it created a situation where there are individuals receiving a "treatment" and individuals receiving a "placebo". The first

(3) Notice that the GRR restriction, *i.e.* wages in the 1.5 to 4.5 minimum wages range, applies only to pre-unemployment wages. In the post-unemployment period, we require only individuals to have a full-time job, meaning that the lower bound of reemployment wages is equal to the minimum wage. Therefore, reemployment wages are not bounded from below, resulting in possible negative wage changes.

group is classified as the treatment group – the group that benefitted from the extension of the entitlement period –, and the second group is designated as control group – the one that kept the same entitlement period.

The characteristics of the reform result in two natural pairs of treatment and control groups, namely, ([15, 24] *vs*. [25, 29]) and ([30, 34] *vs*. [35, 39]). For comparability reasons, we chose the latter. Thus, our treatment group includes all individuals aged 30 to 34 and the control group all individuals aged 35 to 39.

In this application we are also able to use information from the periods before and after the reform. The first period comprises all unemployment spells initiated before July, 1999, which were under the rules prior to the UI reform. The after-period comprises all unemployment spells initiated between July, 1999 and December, 2002. This possibility allows us to control for any differences that might exist between the two groups, provided they were not affected by the treatment itself. Also, the existence of a control group allows us to eliminate the impact of changes in economic conditions overtime, also provided they affect in the same fashion the treatment and control individuals.

The availability of data for the pre- and post-legislative reform periods makes it possible to control for macroeconomic developments that affected the behaviour of both groups over time. Therefore, the difference in the behavior of the control group from the pre- to the post-reform period is used to measure what would be the performance of the treatment group, in the absence of legislative reform. Once the macroeconomic factors and the differences in observable characteristics are controlled for, any other behavioral difference is therefore attributed to the legislative reform.

In this section, we consider only spells terminated with reemployment, and we have a total of 9,675 subsidized unemployment spells. The treatment group is comprised of 4,901 observations, of which 2,232 are observed before July 1999. The control group has 2,725 observations in the before-period and 2,049 in the after-period.

We use this setup to study the determination of post-unemployment wages. We do this by means of an OLS regression model of reemployment wages that explicit controls for the impact of the reform.

$$\log W \quad {}_0 \quad {}_1 After + {}_2 Treat + {}_3 After \quad Treat + X' \quad , \tag{2}$$

where *After* is an indicator variable for the post-July 1999 period, *Treat* indicates the age group affected by the new legislation and the coefficient on the variable *After x Treat* captures the differ-

Table 4

AGE AND ENTITLEMENT PERIODS (IN MONTHS): BEFORE AND AFTER JULY, 1999

Before		After	
Age	**Entitlement period**	**Age**	**Entitlement period**
[15, 24]	10	[15, 29]	12
[25, 29]	12		
[30, 34]	15	[35, 39]	18
[30, 39]	18		
[40, 44]	21	[40, 44]	24

Source: II MTSS' data - authors' calculations.
Note: Information based on the UI law in place between June, 1989 and June, 1999 in the "Before" column, and between July, 1999 and December, 2006 in the "After" column.

ences-in-differences impact of the UI extension. Additionally, the vector *X* includes the previous average income, indicator variables for unemployment duration (piecewise function) and a dummy variable that captures the event of benefits exhaustion. A gender variable and dummy variables for regional labor markets, month of unemployment and of reemployment were also included.

The results are presented in Table 5. Three main conclusions are worth highlighting. First, reemployment wages fall with unemployment duration. This means that the longer an individual remains in unemployment the lower the reemployment wage. Second, individuals re-employed at the benefit exhaustion date or after that moment get a significant wage penalty. This can be seen as evidence that the reservation wage falls in a discrete way at the moment of UI exhaustion, as predicted by the job search theory. Finally, the coefficient of the variable is positive, meaning that on average workers who benefited from the extension of the UI entitlement period may have slightly higher reemployment wages, relative to those who did not benefit from this extension.

To further analyze the decreasing pattern of reemployment wages we finally asked whether the wage gain brought about by longer entitlements is also decreasing with the unemployment spell duration. In order to do this we interact the variable with the unemployment duration variable. The results are presented in Chart 2, for the whole sample and for males and females separately. First, in all three cases the relative wage gains from longer unemployment spells are decreasing in the duration of the spell. Indeed, the gains are concentrated at the beginning of the spell. Second, the impact is much stronger for females than for males, with gains accruing exclusively to females.

Table 5

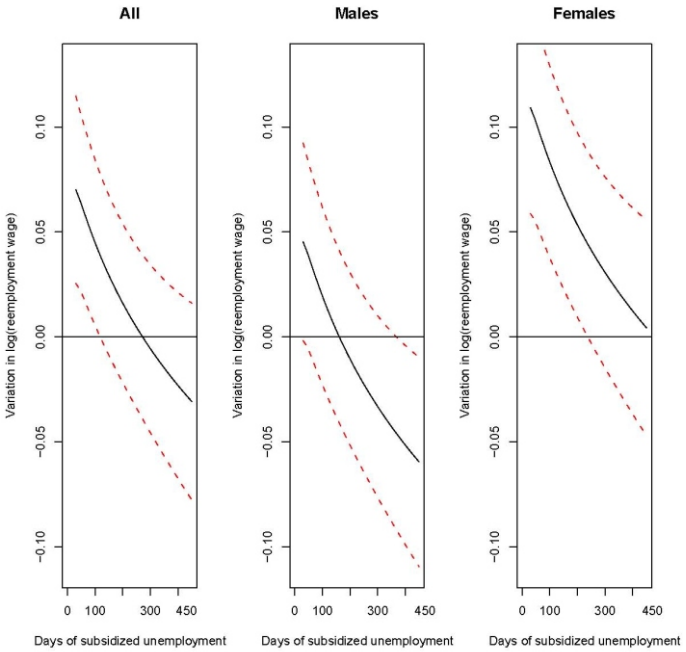
AVERAGE TREATMENT IMPACT ON (LOG) REEMPLOYMENT WAGES: DIFFERENCE-IN-DIFFERENCES

Regression	Coefficient	Standard deviation	p-value
Difference-in-differences			
Intercept	3.042	0.10	0.000
After	0.003	0.01	0.840
Treat	-0.011	0.01	0.400
After x Treat	**0.028**	**0.02**	**0.120**
Log(Pre-unemployment wages)	0.489	0.02	0.000
Days to reemployment:			
[1, 60]	0.140	0.02	0.000
[61, 90]	0.128	0.03	0.000
[91, 120]	0.107	0.03	0.000
[121, 240]	0.086	0.03	0.000
[241, 360]	0.060	0.02	0.010
[361, 449]	0.010	0.03	0.690
At the end of the entitlement period	-0.325	0.03	0.000
After the end of the entitlement period	-0.290	0.02	0.000
Female	0.004	0.01	0.670
Other indicator variables			
District		Yes	
Unemployment month		Yes	
Reemployment month		Yes	

Source: II MTSS' data - authors' calculations.
Note: *Instituto de Informática*'s dataset. Authors' computations considering only individuals that claimed UI between January, 1998 and June, 2003; the reemployment period may surpass June, 2003, but occurs until December, 2004. The estimates are based on the difference-in-differences estimator. The impact on the reemployment wages is given by the coefficient of the variable "After x Treat", and it is expressed in log points. The variable "At the end of the entitlement period" identifies the observations in which the starting month of the job coincides with the exhaustion date of unemployment insurance benefit. The variable "After the end of the entitlement period" identifies the observations in which the starting month of the job is after the exhaustion date of unemployment insurance benefit.

Chart 2

SUBSIDIZED UNEMPLOYMENT DURATION AND REEMPLOYMENT WAGES



Source: II MTSS' data - authors calculations.
Note: Difference-in-differences estimates: Impact on reemployment wages along the duration of the unemployment spell. From left-to-right panels, percentage impact for the overall, males, and females samples. Dashed lines represent 95 percent confidence intervals. The impact on wages is obtained by including in model (2) an interaction term between the indicator of the reform (*After x Treat*) and the duration of unemployment.

6. CONCLUSIONS

When considering the evidence favorable to the existence of a liquidity effect of UI, we detect a positive impact in post-unemployment job match quality for the more constrained individuals, those at the bottom of the income distribution. The non-distortionary nature of the liquidity effect, which reduces the pressure on low income workers to accept low productivity jobs and allows them to wait for a better match, is associated with a greater (and positive) impact on reemployment wages.

Additional evidence shows that the positive impact of extending UI was observed only at short unemployment durations and benefited more groups with poorer labor market prospects. The results reinforce the scope for a reform of the UI system targeting low income individuals, those who benefit the most from it, not only in terms of smoothing consumption, but also in terms of reemployment outcomes. Very long entitlement periods have a limited scope in reaching the main goals of any UI system.

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UNEMPLOYMENT DURATION IN THE PORTUGUESE LABOUR MARKET*

*Pedro Portugal***

"O saber sem inteireza é uã roda de vento"

D. Francisco de Portugal, 1º Conde de Vimioso

1. INTRODUCTION

This article provides a short summary of the empirical literature relating to the effects on unemployment duration in Portugal stemming from the act of receiving unemployment benefit. In this reassessment, there will be a systematic analysis of the individual records from the National Statistical Office (*INE*) Employment Survey (*Inquérito ao Emprego*), using statistical techniques duration analysis .

There are many studies analysing the effect of unemployment benefits on the rate of transition to employment. Job search theory leads to clear theoretical predictions, and these are generally confirmed by empirical studies. One of the expectations that has been confirmed by the data is that more generous unemployment benefit regimes lead to longer spells of unemployment. This hypothesis will be analysed later, in accordance with various identification schemes.

One clear feature of the Portuguese labour market is the extremely high mean duration of unemployment. The low intensity of flows between states of employment and unemployment has led some authors to name Portugal as an extreme case of "eurosclerosis". It is possible, therefore, that labour market stagnation has been a cause of legislation in favour of potentially very long periods for the provision of unemployment benefits. In this context, a very revealing picture can be gained from the characterisation of the impact unemployment benefit system in the definition of the profile of unemployment duration distribution.

2. JOB SEARCH

In the simplest formulation of job search theory, the optimal solution for the unemployed worker looking for a job is the definition of a reserve salary, , so that

$$b \quad \frac{}{p} \quad {}^{t}(w \quad)dF(w)$$

where b is the value of the unemployment benefit net of the costs of looking for a job, p is the discount rate, $F(w)$ is the distribution of available wages and represents the rate at which job offers arrive.[1]

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(1) This can also include the intensity of the job search.

This equation provides an implicit (positive) relationship between the unemployment benefit and the reservation wage and a (negative) relationship between the amount of the subsidy and the hazard rate, defined as:

$$(1 \quad F(\quad))$$

or, expressed in terms of average unemployment duration:

$$T_u \quad \frac{1}{(1 \quad F(\quad))}$$

Basically, an increase in the unemployment benefit b raises the reservation wage (and/or reduces the intensity of the job search). This translates into a reduction in the likelihood of a job offer being accepted, $1 \quad F(\quad)$ leading to a fall in the hazard rate and therefore to an increase in the unemployment duration.[2,3]

3. HOW MUCH DOES AN UNEMPLOYED PERSON RECEIVE? FOR HOW LONG?

Unemployment insurance as a system to protect the unemployed was only introduced into Portugal in 1985, and even then somewhat in a muted way. It was only broadened significantly in 1989. The structure of the system is relatively simple. Unemployment benefits are only available after a minimum period of contributions to social security (currently 450 days in the last 24 months). It is 65 per cent of the value of remuneration prior to unemployment (known as the reference wage), unless this figure is less than the Social Support Indexation (IAS) or more than three times the IAS. In the first case, the benefit is made up to one IAS and in the second is brought down to three. The maximum duration for receiving the benefit depends fundamentally on the age of the unemployed worker and, marginally, on the period during which contributions were made. Duration varies between 270 and 1140 days. Once the allowable number of days has been reached, there is also, for those on very low salaries, an additional period of half the maximum potential duration standard subsidy.

4. METHODOLOGY

Duration analysis is used to look into phenomena where the main interest resides in the counting of time until a certain event takes place or, in more rigorous terms, up to terminal event. In other words, duration analysis is the statistical modelling of the occurrence of transitions between different states. Unemployment duration can thus be seen in terms of the transition between the state of unemployment and the state of employment. The empirical studies reviewed in this article are based fundamentally on notions of duration analysis, described in brief in the following section.

4.1. The loxodrome of human life

Lets define T as a continuous non-negative random variable which represents the duration of a given state (the duration of the unemployment spell). Let $f(t)$ be the corresponding probability density function and $F(t)$ the cumulative distribution function, which will be given by

(2) See Addison *et al.* (2009a), for an empirical analysis of this stylistic model, with international comparisons.

(3) See, however, Coelho (2003) for a revealing insight based on the stock-flow theory.

$$F(t) \quad P(T \quad t) \quad \int_0^t f(v)dv$$

The probability of an individual remaining in this state until t is therefore given by the survival function

$$S(t) \quad P(T \quad t) \quad 1 \quad F(t)$$

The fundamental concept in duration analysis is the hazard function, defined as

$$h(t) \quad \lim_{t \quad 0} \frac{P(t \quad T \quad t \quad t \mid \quad t)}{t}$$

measuring the instantaneous rate of exit (from unemployment) at moment *t,* given that the individual survived in the state (remained unemployed) until *t*.[4] The cumulative hazard function, associated with the hazard function, is defined as follows

$$(t) \quad \int_0^t h(v)dv$$

This is used above all in specification analysis. The temporal evolution of the hazard function is characterised by $\frac{dh(t)}{dt}$, which defines the important notion of duration dependence.

Another interesting function in duration analysis is the residual duration

$$e(s) \quad \int_s \frac{tf(t)dt}{S(s)} \quad s \quad \int_s \frac{S(t)dt}{S(s)}$$

which makes it possible to deduce the expression of mean duration as the integral of the survival function.

$$e(0) \quad E(T) \quad \int_0 S(t)dt$$

However, in the empirical analysis of unemployment, duration cannot be measured in continuous time. In the case of the INE Employment Survey, the information on unemployment is grouped in months. For these data, it is convenient to bear in mind the discrete nature of the duration. Let time be divided into K intervals $c_{0,}c_1$, $c_{1,}c_2$ ... $c_{k\ 1}$, . The investigator observes the discrete time $T \quad 1,\ldots,k$ where $T \quad t$ represents an exit (fault) within the interval $c_{t\ 1,}c_t$. The discrete hazard rate is given as

$$h(t) \quad P(T \quad t \mid T \quad t), \qquad t=1,...,k-1,$$

The discrete survival function is defined as

$$S(t) \quad P(T \quad t) \quad \prod_{j\ 1}^{t} 1 \quad h(j)$$

and the unconditional likelihood of fault is given by

$$f(t) \quad P(T \quad t) \quad h(t)S(t)$$

(4) According to Tiago de Oliveira, "the concept of hazard rate, seen from the point of view of life force (demography) was created in 1757 by Soares de Barros e Vasconcelos. It is not a Portuguese expression. It was used in an article entitled "Loxodromia da Vida Humana", *Mem. Real Academia de Sciencias de Lisboa*, 1ª série, I, 1759. He uses the expression life force correctly. It should be noted that this is an important instrument in the statistics of extremes. The concept was rediscovered later by Gompertz (1825) and Makeham (1860). In *Probabilidades e Estatística* vol. I, 1990, page 158.

4.2. Incomplete durations

There are many times when the observations on the duration of a given episode are not exact. They are frequently incomplete, either because it is only known that the duration goes beyond a given value (in this case they are right censored), or because it is known that the exact count of the duration was started after some time had elapsed (in this case they are left censored). It is also possible to have these two cases simultaneously, giving rise to interval censored observations.

Let T^* be a random variable representing duration in the absence of any censoring and C the censoring time. Observed duration will then be $T \quad \min(T^*, C)$. In these circumstances it is convenient to introduce the censor indicator for the individual i

$$_i \quad \begin{matrix} 0, & se T_i^* \quad C_i ; \\ 1, & se T_i^* \quad C_i \end{matrix}$$

The likelihood function for a pair sample $(t_{i,\ i})$ of size n, where the censoring time gives no information as to the duration distribution parameters, can be simplified to:

$$L \quad \prod_{i\ 1}^{n} f(t_i)^{\ i} S(t_i)^{1\ \ i}$$

4.3. Semi-parametric estimation

The use of flexible specifications for the hazard functions through the segmentation of duration in an adequate number of time intervals[5] provides a procedure that establishes a compromise solution between a strictly non-parametric approach, which frequently introduces an undesirable noise level in the presentation of the empirical survival function, and a parametric approach, which contains the risk of imposing too much structure on the empirical data. A specific hazard function associated with each time interval can be specified. The piecewise constant hazard function solution was adopted because of its convenience as a computation tool:

$$h(t) \quad \begin{matrix} _{1,} & se\ 0 \quad t \quad c_1, \\ _{2,} & se\ c_1 \quad t \quad c_2, \\ _{3,} & se\ c_2 \quad t \quad c_3, \\ . & \\ . & \\ _{M,} & se\ c_{M\ 1} \quad t \end{matrix}$$

where M is the number of intervals.

4.4. Regression analysis

In the regression analysis of duration, it is important to consider the effects of covariates x (where x is a vector of explicative variables) in the behaviour of $f(t|x), h(t|x)$ and $S(t|x)$. In the formulation of the

(5) In any case, see Addison and Portugal (1987) on the use of supermodels in the choice of duration distribution.

proportional hazards model (Cox, 1972) it is taken that the regressors influence the hazard rate in a proportional fashion.

$$h(t|x) \quad h_0(t)\exp(x' \quad)$$

where $h_0(t)$ represents $h(t)$ when $x \quad 0$. Expressed in a different way, x has a linear effect on the log of duration $\log h(t)$. In this specification, therefore, the ratio between the hazard rates of the two sub-populations remains constant over time (taking x constant over time).

A natural way of adapting the Cox model in discrete time is through derivation of the hazard function, allowing for the grouping of continuous durations in time intervals (Prentice and Gloeckler, 1978). In the case of the proportional effects model, the hazard function will be

$$h(t|x) \quad 1 \quad \exp \quad \exp(\quad _t \quad x' \quad)$$

where $_t$ condenses the hazard cumulative function value in the interval t.[6]

4.5. Multiple destinations

Assuming now that $R \quad 1,\ldots,m$ represents the different possible destinations (for example, permanent contract, fixed-term contract and self employment and that the investigator observes the discrete time $T \quad 1,\ldots,k$ where $T \quad t$ represents an exit in the interval t. The specific hazard function associated with the destination r is given by

$$h_r(t) \quad P(T \quad t, R \quad r|T \quad t)$$

the aggregate hazard function is

$$h(t) \quad \sum_{j \quad 1}^{m} h_j(t) \quad P(T \quad t|T \quad t)$$

the corresponding survival function is

$$S(t) \quad \prod_{j \quad 1}^{t} 1 \quad h(j)$$

and finally the probability function is

$$P(T \quad t) \quad h(t)S(t \quad 1)$$

Again assuming a proportional hazards specification, the generalisation of this model to the consideration of multiple destinations will have a formulation that can be derived from the multinomial extension of a type 1 extreme value duration distribution (Fahrmeir, 1991):

$$h_r(t|x) \quad \frac{\exp(\quad _{t_r} \quad x' \quad _r)}{\sum_{j \quad 1}^{m} \exp(\quad _{tj} \quad x' \quad _j)} \quad 1 \quad \exp \quad \sum_{j \quad 1}^{m} \exp(\quad _{tj} \quad x' \quad _j)$$

(6) Equivalently, this formulation could be obtained through the initial specification of the piecewise constant hazard function.

4.6. Sampling plans: the bus paradox

The procedure for generating duration samples observed by the investigator has decisive consequences on the way that the information is interpreted (for example, the notions of mean duration) and therefore on the specification of the likelihood function. It is absolutely crucial in duration analysis to characterise the sampling plan and assess the conditions for identification of parameters that are of interest. When looking into the experience of the unemployed, it is important to separate out three situations: flow sampling; stock sampling; and sampling over a fixed interval.

4.6.1. Flow sampling

The first point to bear in mind is that this sampling is directly linked to the duration distribution of the population. In this way, a random sample, tracking individuals from the start of the episode, will be representative of the population. An example of the flow sampling is the information recorded (from the first day) on the unemployment stay (registered unemployment) is the method used by the *Instituto de Emprego e Formação Profissional – IEFP.* In the case of the flow sampling, the appropriate likelihood function will be:

$$L \quad \prod_{i\ 1}^{n} f(t_i)^{\ i} S(t_i)^{1\ \ i}$$

4.6.2. Stock sampling

In the case of stock sampling – that is elapsed duration point in a state for individuals who are still in that state – it is necessary to bear in mind, on the one hand, that all the durations are incomplete and, on the other hand (and more importantly) that samples collected in accordance with this sampling plan tend towards systematic over-representation of longer durations. This is known in the literature as length-bias sampling. A good example of length-bias sampling is the so-called bus paradox (Feller, 1966). Let us assume that in a given city, the buses run exactly to timetable at 60-minute intervals. A passenger who arrives at a bus stop at a random time will on average wait 30 minutes for a bus. Let us now suppose that the buses arrive at random, in accordance with a Poisson distribution, with one bus on average arriving every 60 minutes. The result, paradoxically, is that this same passenger will now wait, on average, 60 minutes for the bus, double the initial situation. A clear case of stock sampling is the information collected by the Employment Survey carried out by the National Statistical Office (INE). Chart 1 illustrates the effect of the sampling plan of the Employment Survey, where the information collected by the interviewer (the incomplete duration) is shown by the solid lines, in a situation where short unemployment episodes tend to be under-represented.

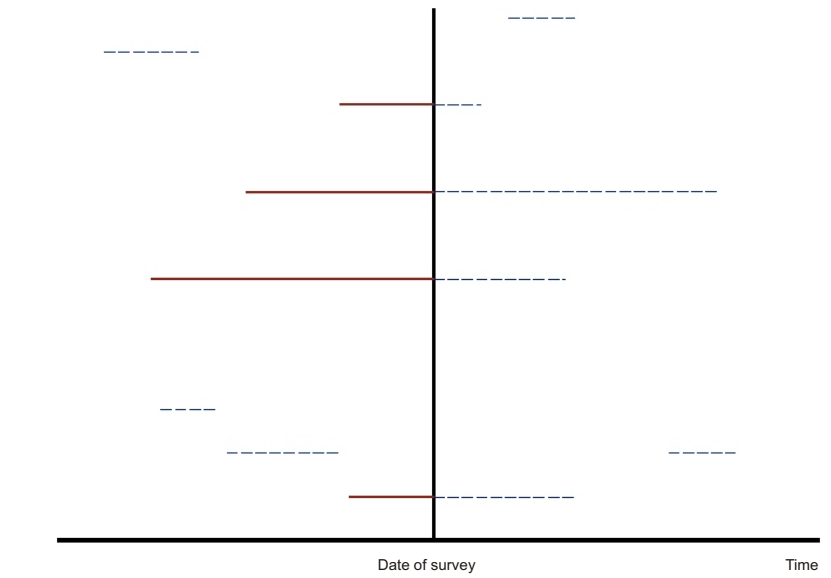
In the case of stock sampling, the likelihood function is weighted by the probability of a given individual being observed, which is proportionate to the mean duration of the unemployment. Assuming a constant entry flow, the expression of the verisimilitude function will be:

$$L \quad \prod_{i\ 1}^{n} \frac{S(t_i)}{}$$

where is the mean duration of the population.

Chart 1

DIAGRAM OF THE SAMPLING PLAN FROM THE EMPLOYMENT SURVEY CARRIED OUT BY *INE* (STOCK SAMPLING)



4.6.3. Observation over a fixed interval

Even under stock sampling, the information on duration may be collected at two or more moments. In the first, information is obtained on the elapsed duration and in subsequent periods, information is obtained on whether a transition has occurred or not. When, for example, the information on unemployment duration is crossed with the employment status in two successive surveys of the INE Employment Survey, the sampling procedure is characterised as an observation over a fixed interval. In this case, it is possible to condition the probability of transition in the elapsed duration and obtain the parameters of the duration distribution function by maximising the function:

$$L \quad {}^{n}_{i\ 1} \quad {}^{i}(1 \quad)^{\ i} \text{ em que } \quad \frac{S(t) \quad S(t \quad h)}{S(t)}$$

where h denotes the observation period.

4.7 Unobserved individual heterogeneity: the tortoise and the hare

The problem of unobserved heterogeneity in duration analysis can be seen, as in the discussion of random effects models, as a problem of incomplete specification. The presence of unobserved individual heterogeneity may derive from errors of measurement relating to duration or regressors, the omission of relevant variables, inadequate formulation of a functional form or of the hazard function. In most situations, unobserved individual heterogeneity causes inconsistency in the estimators.

In particular, it is known that it causes a systematic bias in estimation, favouring negative duration dependence. The reason for this bias stems from the change in composition of this sample over time. This happens because as time passes, the sample is increasingly made up of individuals who have un-

observed attributes which hinder their transition to another state. Let us suppose that in a given sample there are hares and tortoises. The econometrician does not differentiate one from another. Once the race starts, the hares (with higher hazards) tend to complete the route more quickly, and this means that as time passes the samples become more and more laden with tortoises (with lower hazards) and this gives the illusion of negative duration dependence.

A direct way to formalise this problem is through the incorporation of a random term of disturbance which represents a specific individual effect, with density of probability function $g(v)$. This being so, the problem can be approached within the scope of mixturer of distributions. The unconditional survival function is then

$$S(t) \quad E_v \quad S(t|v) \qquad \int_v g(v)S(t|v)dv$$

Two alternative approaches have been proposed to incorporate unobserved individual heterogeneity in duration models. In the case of the parametric function $g(v)$, it is explicit (assumed), making it possible to derive the unconditional survival function (parametric approach). The gamma distribution with unit mean is frequently used because it allows (like the exponential family distributions) for a closed solution to $S(t)$.[7] As an alternative, non-parametric approaches have been proposed. In these cases, the probability density function of non-observed heterogeneity is approximated through the estimation of a discrete empirical function with a pre-determined number (or not) of support points (Heckman and Singer, 1984). In this last case, it will be possible to estimate the proportion of individuals associated with each group (for example, the fraction of hares and tortoises).

4.8. Defective risk: the tortoise's egg

The presence of long-term survivors, that is, individuals where the probability of transition to another state is zero, makes it necessary to specify unemployment duration distribution as a degenerate distribution. In epidemiology, situations of long-term survival can be generated by the presence of immune or cured individuals. In the case of unemployment duration, it is assumed that a fraction of those unemployed will never make the transition to employment. One way of incorporating the presence of long-term survivors is to consider a probability p of the unemployed individual making the transition to employment and a probability $(1 \quad p)$ of remaining always out of work. The unconditional survival function can then be expressed as:

$$S(t) \quad (1 \quad p) \quad pS_2(t) \tag{1}$$

where $S_2(t)$ is the survival function conditioned to the possibility of transition to employment. An interesting feature of this model lies precisely in the possibility of estimating the proportion of long-term survivors $(1 \quad p)$. Since the structure of the survival function is specified as a mixed distribution model, the unconditional hazard function is defined as

$$h(t) \quad \frac{pf(t)}{(1 \quad p) \quad pS_2(t)} \tag{2}$$

Let us assume that the aim is to analyse the time it takes for tortoises to lay eggs using a sample of tortoises. Unfortunately, the sample includes male and female tortoises and the econometrician has no way of differentiating between the two. The long-term survival model can estimate the proportion of male tortoises and the distribution of time until the females lay eggs.

(7) See Addison and Portugal (1997) for a discussion on the choice of mixture distribution.

5. WHAT IS THE MEAN DURATION OF UNEMPLOYMENT?

Standard statistical information on unemployment duration gives a very distorted picture of its distribution. On one side, there is the information collected by the INE, relating naturally to episodes of on-going unemployment and it therefore only records incomplete durations. On the other side, there is the sampling plan of the Employment Survey, (stock sampling), corresponding to a classic example of a snapshot, which means that the longer durations are over-represented relative to the complete number of unemployed. It is however possible, assuming a stationary flow of arrivals in unemployment, to obtain estimates of average unemployment duration for the unemployed as a whole. [8] Using a strictly parametric approach, the main difficulty resides in the choice of distribution function.[9]

Table 1 shows estimates of mean unemployment duration, corrected for length-bias. The figures are based on exponential distribution and on two generalisations of this distribution: the Weibull and a mixture of two exponential distributions. A useful term of reference is provided by the arithmetic average of elapsed unemployment durations, corresponding to the estimator of average unemployment duration for the unemployed as a whole, using the exponential distribution hypothesis. Two interesting conclusions emerge from this picture: in the first place, a comparison between the estimates corresponding to the exponential distribution (the conventional ones) and those supplied by the more general distributions makes it clear that the length-bias effect is very relevant;[10] and in the second place, there is a very significant recent rise in average unemployment duration among the unemployed as a whole, estimated as 443.5 days with the Weibull distribution and 435.7 days using the binomial-exponential distribution.

Table 1

ESTIMATES OF THE MEAN UNEMPLOYMENT DURATION, IN DAYS

	Sample		
	1998 I	**From 1998 I to 2008 II**	**2008 I**
Distribution function			
Exponential (arithmetic average)	550.5	534.7	585.4
Weibull	351.7	404.0	443.5
Binomial-exponential	358.1	414.1	435.7

Source: Employment Survey.

6. WHO AMONG THE UNEMPLOYED HAVE MOST DIFFICULTY IN FINDING AN ACCEPTABLE JOB?

Regression analysis allows us to accommodate the presence of observed heterogeneity among unemployed, and identify the features that have the most decisive influence on the rate of transition to a state other than unemployment. In the context of statistical analysis of duration, the simplest approximation will be the specification of a Cox model of proportionate effects (see Section 4.4). In Table 2, the

(8) In Portugal (1996), the Weibull distribution is used for this effect.) Using a strictly parametric approach, the main difficulty resides in the choice of distribution function.

(9) See Machado and Portugal (2008) for a semi-parametric approach based on the statistical notion of copulas.

(10) Note that when using the exponential distribution hypothesis, the estimate of average duration of the stock of unemployed is, trivially, the double of the arithmetic average (that is, 1101, 1069.4 and 1170.8 days).

Table 2

TRANSITIONS FROM UNEMPLOYMENT

Variable	Estimate of the regression coefficient
Receiving unemployment benefit	-0,550
	(0,064)
Age group	
25-29	-0,030
	(0,075)
30-34	-0,190
	(0,092)
35-39	-0,298
	(0,112)
40-44	-0,143
	(0,110)
45-49	-0,296
	(0,125)
50-54	-0,377
	(0,134)
55+	-0,738
	(0,137)
Schooling (years)	0,015
	(0,008)
Tenure	-0,010
	(0,004)
Number of jobs	0,021
	(0,007)
Skilled worker	-0,109
	(0,074)
Married	0,244
	(0,071)
Handicapped	-0,665
	(0,239)
First job	-0,237
	(0,085)
Collective dismissal	-0,087
	(0,084)
End of fixed-term contract	0,079
	(0,060)
Unemployment rate	-0,056
	(0,026)
Regions	
North	-0,236
	(0,080)
Centre	0,059
	(0,098)
Lisbon	-0,229
	(0,078)
Algarve	-0,256
	(0,107)
Log-likelihood	-4361,755

Source: Portugal and Addison 2008a.

results are shown of the estimation of the discrete version of the model of proportionate effects, using the sampling plan hazard function, correcting the likelihood function piecewise-constant characterised by the observation of a fixed interval (see Sections 4.3 and 4.6.3).

The results of this give us a first estimate of how the transition rate is affected by receipt of unemployment benefit. The unemployed who receive the benefit in quarter t make a transition in t 1 at a rate of

42.3 per cent (exp $^{0.550}$ 1) lower than an unemployed person who does not receive any benefit.[11] Another finding that stems from the estimate is that age is a powerful predictor of unemployment duration. The hazard rate decreases visibly with age, possibly due to a fall in the rate of job offer arrival. Unemployment duration is less for those who are married, educated and have had various jobs. In terms of the causes underlying the job search, the end of a term contract is associated with shorter durations and looking for the first job brings longer durations. The Algarve is the region with longest unemployment duration, as opposed to the centre which has the shortest.[12]

7. WHAT ACTIONS GIVE A GREATER GUARANTEE OF SUCCESS IN THE JOB SEARCH?

In order to be considered as unemployed, a person must search actively one effort to find a job in the previous four weeks. This information makes it possible to characterise the choice of methods used in the job search. As a complement to this, INE asks each worker what was the job finding method that produced results. Table 3 summarises this information for the sample of unemployed workers. On average, the unemployed use around two methods in their job search.

The most popular methods are contact through a employment agency, use of friends and family contacts, and direct contact with an employer. In contrast to the relative frequency of the methods used, the method most frequently cited by unemployed people who have found a job is (disproportionately) the use of friends and family contacts. A closer analysis leads to the conclusion that contacts through the employment agency translate into low probability of finding a job. Moreover, jobs found through such centres offer wages significantly below what is expected and are on the whole of short duration (Portugal and Addison, 2002). Two points should in any case be borne in mind: one is that employment agencies may attract unemployed people with unobserved characteristics, making placement in a job more difficult and generating a negative selectivity situation; and the other is the very nature of the vacancies on offer.

Table 3

EFFECTIVENESS OF THE JOB SEARCH

Method used	Number of unemployed in *t-1* using the method	Number of employed people in *t* per type of method
Direct contact with the employer	7138	505
Friends and family contacts	7921	1067
Reply to adverts	5485	151
Contact through an employment agency	8325	154
Efforts to become self-employed	151	179
Interviews, exams and tests	2061	113
Other methods	924	116

Source: Addison and Portugal 2002.

(11) See Portugal and Addison (2008) for a more detailed analysis of these results.

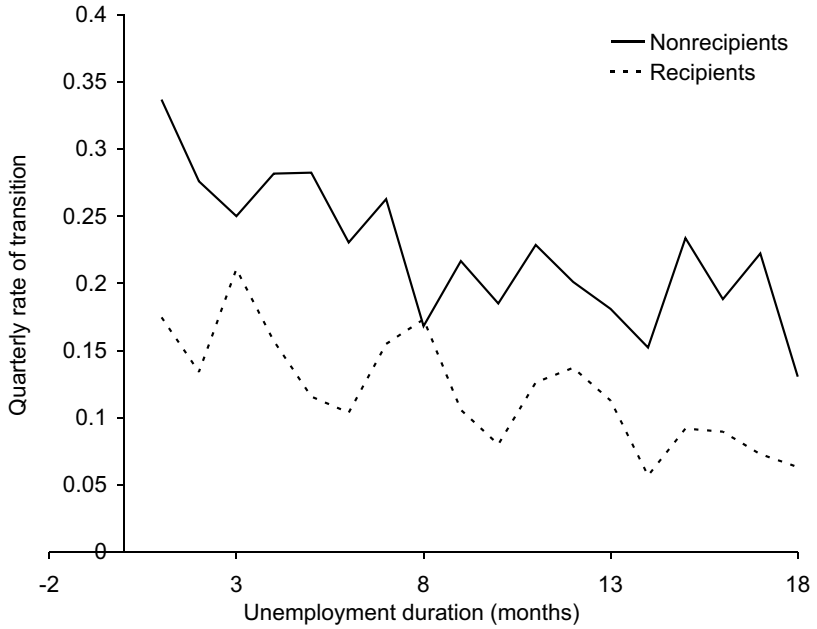
(12) In all the studies referred to here, the same sample of unemployed workers was used, identified in the Employment Surveys between 1992 and 1996. Since the unemployment benefit system has been fundamentally the same over recent decades, there is no reason to assume that the effects of unemployment spells on unemployment duration have changed significantly over recent years. In fact, using an identical regression to that presented in Table 2, a coefficient of -0.485 is obtained for the period 1998 to 2008.

8. WHAT IS THE IMPACT OF RECEIVING UNEMPLOYMENT BENEFIT ON TRANSITIONS INTO EMPLOYMENT?

The difference in the transition rates between those who receive unemployment benefit and those who do not is shown in Chart 2. Those who do not receive a benefit make the transition at a rate which is close to double the rate observed in those who receive benefit. The table also suggests that duration dependence is negative, meaning that the likelihood of moving out of unemployment in period *t*, given that the person remained unemployed until *t*, diminishes with unemployment duration.

Chart 2

TRANSITION FROM UNEMPLOYMENT



Source: Portugal and Addison 2008.

8.1. Comparing those who receive unemployment benefit with those who do not

It is implicit in the comparison between those who receive a benefit and those who do not that the first group would behave the same as the second group if they in their turn did not receive the benefit. This means that identification of the effect of the benefit is reached by the contrast established between the two groups. It is known that among those who do not receive a benefit are those unemployed who are not eligible, those who are eligible but do not ask for it and those who received the benefit until the end.[13] Given the heterogeneity of the control group, it is important to use a control function that is as complete as possible.

It is also important to consider the relative heterogeneity of the destination of the unemployed, who may make the transition to unemployment or inactivity (see Section 4.5). It is worth noting that the re-

(13) Note that the analysis covers only those unemployed persons classified as such by *INE*.

duction in the transition rate is of the same order for employment, at -43.8 per cent, as it is for inactivity, at -43.4 per cent (Table 4).[14]

Table 4

TRANSITIONS FROM UNEMPLOYMENT: THE HAZARD FUNCTION WITH TWO DESTINATIONS

	Transition to:	
	Employment	**Inactivity**
Receiving unemployment benefit	-0.576 (0.067)	-0.570 (0.156)

Source: Addison and Portugal 2003.

8.2. How the transition rate changes as the end of the subsidy period approaches

Job search models maintain that the transition rate into employment should increase as the end of the benefit period approaches. Close to the end, the unemployed will increase their intensity in the job search and/or will reduce their reservation wage. A convincing way of identifying the effect of unemployment benefit is the indication of the increase in the transition rate as a function of the closeness of the maximum potential duration of the benefit. Table 5 presents evidence that suggests this effect, for a specification of six distinct destinations which includes random effects with a gamma distribution for UIH (see Sections 4.5 and 4.7).

It is easy to interpret the coefficients. So, for each month closer to the end of the benefit, the hazard rate goes up, by 4.4 per cent in the case of transition to a permanent contract. Portugal and Addison (2008) also consider various flexible alternatives to the use of the linear function.[15]

Table 5

SUMMARY OF THE EFFECTS OF RECEIVING UNEMPLOYMENT BENEFIT FOR MULTIPLE DESTINATIONS

	Transition to:					
Variable	**Permanent contract**	**Fixed-Term contract**	**part-time**	**Self-employment**	**Occupational programmes**	**Inactivity**
Receiving benefit	-0.652 (0.142)	-0.564 (0.113)	-1.910 (0.513)	-0.962 (0.314)	0.621 (0.324)	-0.605 (0.215)
Time until benefit runs out (in months)	-0.044 (0.010)	-0.045 (0.008)	-0.086 (0.029)	-0.102 (0.024)	0.044 (0.027)	-0.048 (0.014)

Source: Portugal and Addison 2008.

8.3. Long-term unemployment

In a labour market where there is a very low rate of job offer arrivals, a significant fraction of the unemployed may never find a suitable job. In this case, there is said to be a defective risk and the unemployment duration distribution is degenerate, due to the presence of infinite durations (see Section 4.8). In

(14) See Bover *et al.* (2000) for a comparison with Spain.

(15) The use of variable instruments, such as, for example, the imputation of eligibility for receiving unemployment benefit also confirms the results already found.

the study by Addison and Portugal (2003), it is estimated that in fact there is an important fraction of the unemployed who will never make the transition to employment. Two factors have a decisive influence on the proportion of the long-term unemployed: age and the receipt of an unemployment benefit (Table 6). We can simulate that the fraction of unemployed who will never make the transition to employment will be 9.4 per cent for 35-year-olds not receiving benefit and 63.2 per cent for 50-year-olds who receive benefit.[16]

Table 6

SIMULATION OF UNEMPLOYMENT DURATION: DEFECTIVE RISK MODEL

	Age=20		Age=35		Age=50	
	SUB=0	SUB=1	SUB=0	SUB=1	SUB=0	SUB=1
Survival rate at the end of:						
3 months	0.629	0.792	0.672	0.841	0.79	0.92
12 months	0.257	0.466	0.321	0.574	0.474	0.723
36 months	0.05	0.14	0.092	0.25	0.218	0.435
Defective risk:						
Employment	0.029	0.081	0.094	0.231	0.371	0.632
Inactivity	0.39	0.483	0.287	0.37	0.173	0.234
Median of unemployment duration (in months)						
Two destinations	5	11	7	16	11	28
Until employment	7	14	7	21	24	na

Source: Addison and Portugal 2003.

8.4. An estimate based on matched pairs

The rules in Portugal governing the attribution of a maximum period of potential benefit depend in a deterministic way on the age of the unemployed person. During the period under review, those under 25 could receive the subsidy for 10 months. Those between 25 and 29 could receive for 12 months. This rose to 15 months for those between 30 and 34, another 3 months for those between 35 and 39 and then by another 3 months for each 5-year age range until those of 55 and over received 30 months. This structure suggests a comparison between the transition rates of individuals of approximately the same age but with different benefit periods. That is, the analysis would be carried out so as to establish the differences between the likelihood of making the transition to work for the pairs 24 and 25, 29 and 30, 34 and 35, 39 and 40, 44 and 45, 49 and 50 and 54 and 55.

In this context, the regression analysis could be called discontinuity regression (Addison and Portugal, 2008b). The results of the estimation using a mixing distribution with two supporting points (see Sections 4.7 and 4.8) show that younger unemployed persons (less than one year and therefore a shorter

(16) The very high proportion of defective risks among 50-year-olds may be generated by the so-called "unemployment tunnel", the possibility offered by social security to the long-term unemployed to take early retirement with full pension.

period of benefit) make the transition to employment at a rate of 86.8 per cent higher than their equals (one year) older and the proportion of long-term unemployed is 44.4 per cent (Table 7).[17]

Table 7

TRANSITION FROM UNEMPLOYMENT, BINOMIAL MIXTURE MODEL

Variable	
SUB*Youth	**0.625**
	(**0.230**)
SUB	-0.833
=1 1 if unemployment received	(0.170)
Youth	-0.276
=1 I if age = {24, 29, 34, 39, 44, 49 and 54}	(0.118)
Unemployment duration (as a log)	-0.254
	(0.046)
Control for age	Yes
Other control variables	Yes
Constant for type 1 individuals	-10.509
	(0.177)
Changes in the constant for type 2 individuals	8.171
	(0.165)
Probability of being a type 1 individual	0.444
	(0.023)
Log-likelihood	-2061

Source: Addison and Portugal 2008.

9. THE SCLEROSIS PORTUGUESE LABOUR MARKET

The Portuguese labour market is disfunctional, with very weak flows between employment and unemployment.[18] The explanation given by Blanchard and Portugal (2001) for this conspicuous characteristic labour mobility is that it stems from the strong protection of employment embedded in Portuguese labour legislation, above all in terms of the legal framework for firings.[19] Fundamentally, very long unemployment spells – a painful way of experiencing unemployment – are the counterpart of job protection. There is abundant empirical evidence that there is a greater prevalence of long unemployment spells in countries with greater job protection (Blanchard and Portugal, 2001; OECD 2004. Fundamentally, the high costs of firings increase production costs, bringing down feasible wages wages (the wage that guarantees nil profit). Job protection in turn increases workers' bargaining power, and this means higher bargaining wage (the wage to which the worker aspires). In this model, the equilibrium is re-established by making unemployment more painful, that is, by reducing the arrival rate of job offers. This brings down the transition rate from unemployment to employment, and pushes up the mean duration of unemployment. In this framework, guaranteed protection in the case of unemployment through access to unemployment benefit will tend to cushion the cost of unemployment, and can generate an ever steeper fall in the transition from unemployment to employment.

(17) See Centeno and Novo (2007) for an analysis of the change in the maximum potencial duration of unemployment benefit occurring in 1999, which affected different age groups in various ways.

(18) See for example the chart detailing average quarterly flows between labour market states (Chart 3.16), published in the 2007 Banco de Portugal Annual Report.

(19) In international rankings of labour legislation rigidity, Portugal is at or near the top. Fundamentally, very long unemployment spells – a painful way of living through unemployment, are the counterpart of job protection. There is abundant empirical evidence that there is a greater prevalence of long unemployment spells in countries with greater job protection (Blanchard and Portugal, 2001; OECD 2004).

There is direct and indirect evidence on the job arrivals rate in the European Household Panel, where Portugal has the lowest arrival rate of job offers all the countries represented on the panel (Jolivet, Postel-Vinay and Robin, 2006; Addison *et al.*, 2009b). Franco and Torres (2008) calculated the probability of a worker leaving a job and finding a new one, using data from the Employment Survey. They concluded that those probabilities are very low, and show that job separations are almost acyclical and that the finding probabilities are strongly cyclical. In the work of Varejão and Portugal (2007) there is documented evidence, based on the Structured Employment Survey, that in each quarter, only 25% of enterprises change the composition of their work force. Ejarque and Portugal (2007) solve a dynamic model of job search using relevant moments in the characterization of the Portuguese labour market and show that the presence of adjustment costs (even though they are relatively small) can lead to a significant reduction in the flow of jobs.[20]

In a labour market where the arrival job offers is a rare event, it is possible that the dissuasive effect of unemployment benefit increases when the unemployed worker ceases to look for a job for a long period (reducing in the process his or her human capital), or is mitigated if the unemployed worker defines a strategy based on accepting whatever job comes along. The distinction between the two possibilities is, in essence, an empirical issue. The studies revisited here consistently indicate that receiving unemployment benefit has a very pronounced effect on unemployment duration.[21]

10.CONCLUSION

From this survey of studies on the way unemployment duration is impacted by unemployment benefits, the various identification strategies and statistical procedures lead us to the conclusion that workers who receive this benefit move into employment at a significantly lower rate than those who do not.

This effect is not unexpected, and to a certain extent it is desirable. The aim is for access to unemployment benefit to ease the unemployed worker from the pressure of accepting the first job offer and allow for investment in a better match between his or her productive capacities and the features of the job (job matching). The unemployment insurance system also has a crucial role in protecting workers during cyclical fluctuations in employment, avoiding excessive turbulence in consumption patterns. The unemployment benefit system is clearly a valuable social support.

However, the doubling of unemployment duration associated with receiving unemployment benefit is clearly excessive. The existing architecture of the unemployment system on the one hand amplifies the effect of moral hazard in unemployment insurance and on the other weakens labour supply.

This author is of the opinion that a more adequate allocation of resources would be attained by defining the maximum period for receiving unemployment benefit strictly as a function of the accumulation of contributions to social security (and not age), as happened in the early years of the system.

It is also well known that the optimal architecture for unemployment insurance systems should include penalties for enterprises which make more frequent use of firings so as to internalize the social costs of this decision (experience rating). Along the same lines, it would be desirable for the amount of benefit to fall as duration increases, as happens in many other countries.

When redesigning labour market institutions, it should be borne in mind that there is a very strong interaction between the employment protection system (which, in the case of Portugal, favours very long

(20) The statistical information on stocks is of course consistent with the information on flows. The picture in Portugal is not only that the average duration of unemployment is very high, but also the average number of jobs through an active life is low and the average duration of a specific employment is long.

(21) This point is in turn consistent with the results of Addison *et al.* (2009a), where there are for Portugal (compared with other countries in the European Union) very high reservation wages and hazard rate elasticity relating to unemployment benefit.

unemployment durations) and the unemployment protection system, which which tends to increase workers' bargaining powers.

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APPROXIMATING MACROECONOMIC SIGNALS IN REAL-TIME IN THE EURO AREA*

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*Ana Pereira****

1. INTRODUCTION

We present in this article a methodology that aims to estimate in *real-time* relevant macroeconomic signals. The methodology is illustrated for the case of two measures of economic activity in the euro area: business cycle fluctuations and smooth component of output growth. In line with Baxter and King (1999), business cycle fluctuations are defined as those oscillations with period between 6 and 32 quarters in output. This definition reflects the knowledge of the typical duration of the phases of expansion and recession in developed economies. The business cycle fluctuations as defined can be interpreted as fluctuations in real Gross Domestic Product (GDP) not attributable either to long-run growth, or to measurement errors or to other short-run fluctuations usually not related to the business cycle phenomena. Thus, are just deviations (not erratic) of GDP on a long-run trend (statistically well defined). This definition has been extensively used in literature (see, *e.g.*, Stock and Watson 1999).

The smooth growth component of output (henceforth smooth growth) is defined as output growth excluding fluctuations with period less than one year. The smooth growth is a measure of GDP growth cleaned of erratic or short-run oscillations that make difficult to assess the aggregate economic situation. This signal was approximated by Altissimo *et al.* (2007) in the construction of a coincident indicator for the euro area, the EuroCoin (denoted as the medium to long run component of output growth).

The signals just defined can be approximated with arbitrary precision by applying infinite moving averages (or filters) to the series of interest, but this requires the knowledge of all past and future values of that series. Extraction in *real-time* is therefore restricted by the availability of data and is thus a difficult task. Chart 1 presents approximations to the signals of interest for the euro area, obtained with the filter developed by Baxter and King (1999) (BK filter) in the middle of the sample. Additional (past and future) data would lead to negligible differences between these estimates and the desired signal. Using the BK filter implies, however, loosing relevant estimates at the beginning and end of the sample, whereas our interest is in obtaining estimates of these signals in *real-time* (*e.g.*, obtain estimates of the signals for the first quarter of 2009 using only the available data up to that moment).

We will show that the methodology here presented has clear advantages in relation to other alternatives, delivering real activity indicators that have several desirable properties:

i) They are timely, since our approach is flexible enough so as to take into account the release delays of all the variables used in the exercise; both that of GDP, which typically arrives three months after the end of the quarter to which it refers, and also of all the other series included in our panel of predictors;

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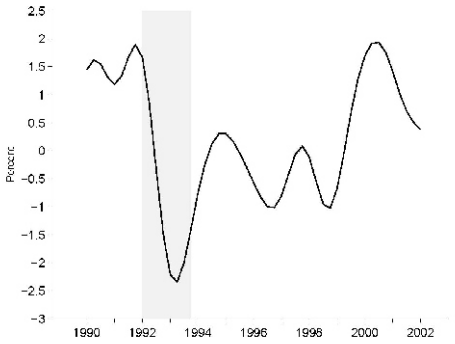
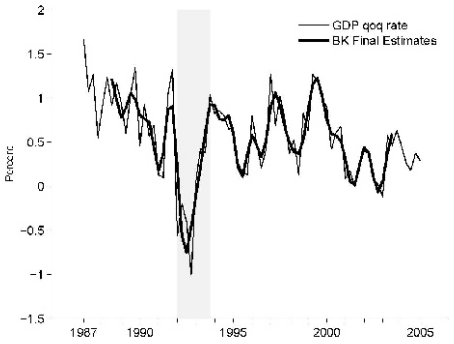
Chart 1

BUSINESS CYCLE FLUCTUATIONS OF EURO AREA GDP, OBTAINED WITH THE BK FILTER



SMOOTH GROWTH OF EURO AREA GDP, OBTAINED WITH THE BK FILTER



Source: Authors' calculations.
Note: Grey areas represent the recession dating of CEPR.

ii) They display little short-run oscillations, thereby giving a clear picture of current cyclical and growth prospects;

iii) Unlike to what usually happens, they are based on a large and comprehensive panel of predictors, whose idiosyncratic and short-run components are eliminated through factor analysis;

iv) They have a remarkable forecasting performance at short horizons (less than one year). To be specific, we view forecasts of the smooth growth indicator as being useful to forecast GDP itself. We highlight and important insight: for forecasting purposes, targeting a smooth version of time series may be more useful than targeting the original series. We offer a possible justification: with conventional models, short-run fluctuations are being approximated despite being possibly unpredictable or idiosyncratic.

Following Stock and Watson (1989), model-based methods assuming a factor structure have also been used to construct growth indicators. There have also been attempts to extract signals similar to those we target in a parametric setting. For instance, Valle e Azevedo, Koopman and Rua (2006) constructed a business cycle indicator which can be seen has a multivariate filter (that eliminates undesirable fluctuations). Although a common factor structure is assumed to describe a small set of time series, the representation is far from general and the method is not aimed at approximating a predefined set of fluctuations. Such is the aim of this paper. The approach closest to ours is that of Altissimo *et al.* (2007) that resulted in the New EuroCoin indicator. This indicator is obtained by projecting estimated factors on the smooth component of output growth, disregarding the information contained in past observations of GDP. We will later contrast in more detail our approach to theirs.

2. APPROXIMATIONS TO THE SIGNALS OF INTEREST

2.1. How to approximate the signals of interest

Our variable of interest throughout the paper will be (logarithm of) real quarterly GDP, the best available proxy of aggregate economic activity. Define x_t as the logarithm of real GDP and $x_t \quad x_t \quad x_{t\ 1}$ as its growth rate. To be general, suppose that we are interested in isolating the signal y_t that defines a signal in x_t (x_t). Unlike almost all of the literature (see Section 4.3.1 for an exception and criticisms), we will explore information contained in an arbitrary number of additional series to approximate the signals of interest. Suppose that are available c series of covariates $z_1,\ldots,z_c$. The estimate $\hat{y}_t$ of the signal y_t (for example, business cycle fluctuations) will be a weighted sum of elements of x (or x) and elements of $z_1,\ldots,z_c$:

$$\hat{y}_t \quad \sum_{j \quad f}^{p} \hat{B}_j x_{t\ j} \quad \sum_{s\ 1}^{c} \sum_{j \quad f}^{p} \hat{R}_{s,j} z_{s,t\ j} \tag{1}$$

or, in the case we are interested in y_t defined in x_t (as smooth growth):

$$\hat{y}_t \quad \sum_{j \quad f}^{p} \hat{B}_j \quad x_{t\ j} \quad \sum_{s\ 1}^{c} \sum_{j \quad f}^{p} \hat{R}_{s,j} z_{s,t\ j} \tag{2}$$

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 the estimate of y_t, we choose the weights $\hat{B}_j, \hat{R}_{1,j}, \ldots, \hat{R}_{c,j} \quad _{j \quad f,\ldots,p}$ associated with the series of interest and the available covariates that minimize the mean squared error between the estimates $\hat{y}_t$ and y_t.

Note f is allowed to be negative, which is of particular interest if at time T (say, the current quarter) the series of interest x_t (or x_t) is not available. Thus, is straightforward to extract the signal $y_{T\ k}$ for $k \quad 0$. One just needs to set $f \quad k$ in the solution, so that only the available information (that is, up to period T in this case) is taken into consideration.

In the remainder of the paper, we will set $p \quad 50$ (larger values of p lead to negligible differences in the approximations). To approximate the signals of interest in *real-time* we set either $f \quad 2$ (in a first or second month of a given quarter) or $f \quad 1$ (in the third month of a given quarter), taking thus into account the release delays of the final estimate of GDP for the euro area.

The signals that we approximate (smooth growth and business cycle fluctuations) have a quarterly frequency (as GDP), but we will seek in each month an estimate of the current quarter.[1] Thus, within each quarter, new monthly information will be used to update the estimates. It turns out that this additional infra-quarterly information is useful in that it provides more precise estimates of the signals of interest. As a by-product, we will seek in each month an estimate of current year GDP growth based on the most up-to-date approximations to smooth growth and its relevant forecasts.

(1) So, *e.g.*, in January we will target the signals regarding the first quarter, in April those of the second quarter and in September those of the third quarter. It would be trivial to target in each month any other quarter.

3. COVARIATES

3.1. Factor Model

In the *real-time* approximations to the macroeconomic signals presented in this paper, the quarterly covariates, $z_1,\ldots,z_c$, will be series derived from (estimated) common factors, that summarize the information contained in a large panel of monthly time series.[2] Consider the following panel of monthly variables:

$$\boldsymbol{W} \quad w_{it} \quad i \quad 1,\ldots,n; \quad t \quad 1,\ldots,T \ ,$$

We stress that all the series in the panel are organized in such a way that for month t they are in fact available. So, if an Industrial Production index refers to a month but it is only and always released one month after, we use the one-period lagged series as an w_{it} . Thus, we effectively take into account the release delays of all the indicators.

Assume that each variable in the panel can be decomposed into a common component, $_{it}$, driven by a small number (say q) of orthogonal shocks (the so-called dynamic factors), and an idiosyncratic component $_{it}$, orthogonal to $_{it}$,i 1,2,…,n, at all leads and lags. Specifically:

$$w_{it} \quad _{it} \quad _{it} \tag{3}$$

where:

$$_{it} \quad _{i1}F_{1t} \quad _{i2}F_{2t} \quad \cdots \quad _{ir}F_{rt} \tag{4}$$

Thus, a potentially (and usually) reduced set of F_{jt} 's, summarizes an important part of the movement of all the variables (the component $_{it}$), resulting in a possibility of parsimoniously incorporate the information contained in $\boldsymbol{W}$ in the approximations to the signals of interest.

3.2. Covariates (quarterly)

The common factors F_{1t} ,F_{2t} ,…,F_{rt} and their number (r) can be approximated in a number of ways. For more details on the estimation of the factors, see Valle e Azevedo and Pereira (2008). We will report only the results obtained with the first two estimated static factors (that will be split into 6 quarterly series). Such always delivered the best approximations. In month t (of quarter t), the set of covariates to be used in the approximations contains 2 estimated static factors as described above (denominated $\hat{F}_{l,t}$), each split into three quarterly series. We have thus the set of covariates updated with the elements of Z_t , where:

$$Z_t \quad (\hat{F}^1_{1,t}\ \hat{F}^2_{1,t}\ ,\hat{F}^3_{1,t}\ ,\hat{F}^1_{2,t}\ ,\hat{F}^2_{2,t}\ ,\hat{F}^3_{2,t}\ )'$$

and:

(2) We thank Giovanni Veronese for providing us with a transformed and realigned version of the dataset used to compute the New EuroCoin Indicator of Altissimo *et al.* (2007). The dataset encompasses 144 monthly economic variables of national and euro area aggregate economies from May of 1987 through August of 2005 (T 220).

$$\begin{array}{llll} \hat{F}^1_{I,t} & \hat{F}_{I,t} & ,\hat{F}^1_{I,t-1} & \hat{F}_{I,t-3},\hat{F}^1_{I,t-2} \quad \hat{F}_{I,t-6},\ldots \\ \hat{F}^2_{I,t} & \hat{F}_{I,t-1},\hat{F}^2_{I,t-1} & \hat{F}_{I,t-4},\hat{F}^2_{I,t-2} & \hat{F}_{I,t-7},\ldots \quad I = 1,2 \\ \hat{F}^3_{I,t} & \hat{F}_{I,t-2},\hat{F}^3_{I,t-1} & \hat{F}_{I,t-5},\hat{F}^3_{I,t-2} & \hat{F}_{I,t-8},\ldots \end{array} \tag{5}$$

As a remainder, our targets are defined on the GDP of the current quarter, but we compute (or update) the approximations every month.

4. PERFORMANCE OF THE INDICATORS

4.1. Evaluation of the indicators in a pseudo *real-time* exercise

The proposed indicators of business cycle fluctuations and smooth growth will be assessed by analysing their real-time performance. Specifically, and in line with Orphanides and Van Norden (2002), we will look at the approximation errors observed by using our method in real-time. These approximation errors can be estimated comparing these estimates with those obtained by considering future data of the series of interest. Obviously, once new data is available, the approximations that explore new information vary near the end of the sample. This variation is due to revisions in the data itself, which we do not analyse here, and revisions due to the nature of the one-sided filters used in the end of the sample (and in our case, along with re-estimation of moments and factors). The magnitude of the revisions is often large, even in a multivariate context (Orphanides and Van Norden 2002). The fact that the filters' performance deteriorates near the end of the sample is not conceptually different from the fact that forecasts generally deteriorate if the forecast horizon is larger. Any approximation to a signal (or yet unobserved variable) will suffer revisions. Our approach is an attempt to mitigate revisions (or approximation errors) in the estimates of signals that we believe are relevant for the policy-maker.

We now make explicit in what dimensions our exercise can be seen as a *real-time* exercise. We make all the necessary transformations in the data, estimate factors, estimate the second moments necessary to solve the projection problem and compute the filter weights in real-time. Further, we take into account all the data release delays.[3]

Several statistics will be computed to compare the real-time estimates with the estimates obtained in the "middle" of the sample, that we will denote as "final" estimates. These final estimates are again obtained by approximating the signals using the whole sample and then disregarding a sufficient number of observations, to ensure that only negligible revisions will occur once more data becomes available. The criteria used to evaluate the real-time performance of the indicators were the following:

a) $Corr_t \quad y_t ,\hat{y}_t$, where $\hat{y}_t$ is the optimal approximation to the signal y_t and, as it can be proved, is a good measure of the variance of the approximation error. We compute the sample counterpart of this statistic, using the estimated signal (say $\hat{y}_t$) as $\hat{y}_t$ and approximating y_t by the "final" estimates, denoted by y_t^F ;

b) Noise to Signal Ratio, computed as $\sum_t (\hat{y}_t \quad y_t^F)^2 \Big/ \sum_t (y_t^F \quad \bar{y}^F)^2$;

(3) As an example, euro area GDP of a given quarter is only available in the third month of the next quarter. So, in the first two months of that quarter, we only use data until the latest observation of GDP, which refers to two quarters before.

c) For the approximations to business cycle fluctuations, the percentage of times $\hat{y}_t$ and y_t^F share the same sign (which gives an indication on whether $\hat{y}_t$ indicates correctly if GDP is below or above the long-run trend).

The benchmark will be the univariate filter of Christiano and Fitzgerald (2003). Additionally, we stress that the estimation of second order moments and factors will take into account only information available at each point (*real-time* approximation) or, alternatively, it uses the whole sample (*today onwards* approximation), while still setting in the filter *f* 1in the third month of each quarter and *f* 2 in the first and second months. With this exercise, we hope to understand the revisions stemming from second moments and factor space uncertainty. We expect these revisions to be less severe as the sample size grows, whereas the *real-time* approximations include poorly estimated objects at least in the beginning of the evaluation period.

4.2. Business cycle fluctuations

First, we report the real-time evaluation of our approximations to business cycle fluctuations in the euro area. Table 1 contains the evaluation statistics, just mentioned, for approximations done in a third month of the quarter and the variations considered. Additionally, Table 2 contains the evaluation of the approximations done in the first and second month of the quarter for a selection of the best performing approximations (in *real-time* and *today onwards*) of Table 1.

The main conclusions are:

- Both the univariate and multivariate filters perform very well in the (nonetheless short) evaluation period;
- The fit of the *today onwards* approximations is similar to that of *real-time* approximations;
- The results obtained with factors estimated by principal components (PC) are very similar to those obtained with generalized principal components (GPC);
- The quality of the approximations is very similar across the months of the quarter, but the multivariate filter performs superiorly in the first two months.

Chart 2 displays the best performing *real-time* and *today onwards* approximations (multivariate filter with 2 factors, MBPF PC KERNEL) in a third month of the quarter as well as the final estimates of business cycle fluctuations for the euro area. Additionally, Chart 3 compares the final estimates to the best multivariate approximations in the third month of the quarter when 4, 3, ..., 0 quarterly observations of GDP as well as the corresponding monthly series of the panel are missing, and also when 1, 2, ..., 5 additional quarters of information are available. All the measures improve as more data becomes available and in all cases the multivariate filter has by far the best performance. The differences across methods tend to disappear after 5 additional quarters of data are considered. We notice again that the performance of the univariate filter is very good and similar to that of the multivariate filters, with the latter performing superiorly when additional data becomes available. These approximations with additional data are in practice relevant given the fact that one is interested in detecting a signal that has (persistent) fluctuations with period between 6 and 32 quarters.

Table 1

EVALUATION STATISTICS FOR THE APPROXIMATIONS TO BUSINESS CYCLE FLUCTUATIONS IN THE EURO AREA IN THE THIRD MONTH OF THE QUARTER

Evaluation period: 1999(2) - 2004(3)

Performance with respect to Business Cycle fluctuations (3rd month of the quarter) [(a)]

	Correlation		Noise to Signal		Sign Concordance	
	Real Time	***Today Onwards***	***Real Time***	***Today Onwards***	***Real Time***	***Today Onwards***
Benchmark Filters						
BPF AR	0.87	0.89	0.41	0.38	0.91	0.91
BPF KERNEL	0.87	0.88	0.43	0.40	0.91	0.91
with 2 factors						
MBPF PC KERNEL	0.86	0.89	0.46	0.48	0.77	0.82
MBPF GPC KERNEL	0.85	0.88	0.48	0.48	0.82	0.86

Source: Authors' calculations.
Note: **(a)** BPF AR - univariate filter with second moments estimated by AR model (BIC criterion for lag length); BPF KERNEL - univariate filter with second moments estimated non-parametrically ; MBPF - multivariate band-pass filter; PC - factor space estimated by principal components; GPC - factor space estimated by generalized principal components; KERNEL - non-parametric estimation of second moments.

Table 2

EVALUATION STATISTICS IN EVERY MONTH OF THE QUARTER, FOR THE APPROXIMATIONS TO BUSINESS FLUCTUATIONS IN THE EURO AREA

Evaluation period: 1999(2) - 2004(3)

Performance with respect to Business Cycle fluctuations [(a)]

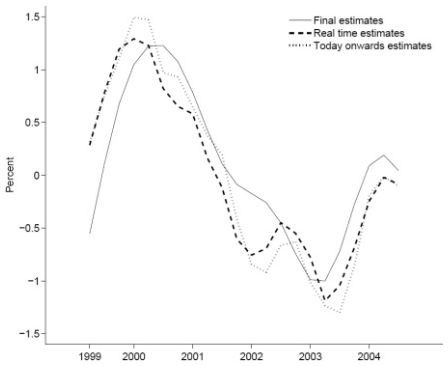
	Correlation		Noise to Signal		Sign Concordance	
	Real Time	***Today Onwards***	***Real Time***	***Today Onwards***	***Real Time***	***Today Onwards***
BPF AR						
1st/2nd month	0.85	0.88	0.46	0.38	0.77	0.91
3rd month	0.87	0.89	0.41	0.38	0.91	0.91
MBPF PC KERNEL						
(2 factors)						
1st month	0.88	0.89	0.41	0.42	0.86	0.86
2nd month	0.87	0.88	0.42	0.41	0.86	0.86
3rd month	0.86	0.89	0.46	0.48	0.77	0.82

Source: Authors' calculations.
Note: **(a)** BPF AR - univariate filter with second moments estimated by AR model (BIC criterion for lag length); MBPF PC KERNEL - multivariate band-pass filter, factor space estimated by principal components and non-parametric estimation of second order moments.

Chart 2

EURO AREA BUSINESS CYCLE FLUCTUATIONS: FINAL ESTIMATES AND *REAL-TIME* (MBPF PC KERNEL, 2 MONTHLY FACTORS) AND *TODAY ONWARDS* (MBPF PC KERNEL, 2 MONTHLY FACTORS)

Evaluation period: 1999(2)-2004(3)

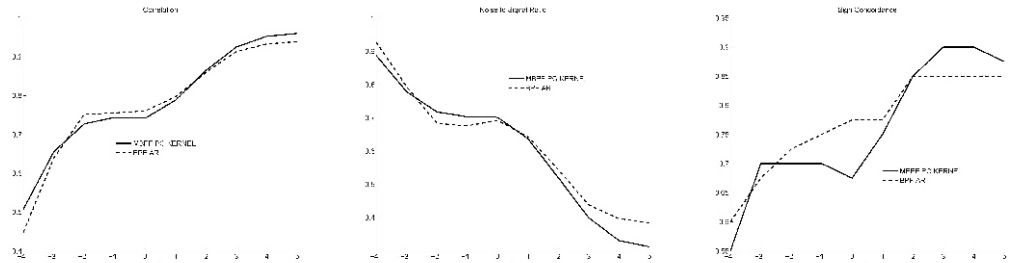


Source: Authors' calculations.

Chart 3

EVALUATION OF EURO AREA *REAL-TIME* APPROXIMATIONS TO BUSINESS CYCLE FLUCTUATIONS. CORRELATION WITH FINAL ESTIMATES, NOISE TO SIGNAL RATIO AND SIGN CONCORDANCE WHEN *f* FUTURE QUARTERS OF DATA ARE CONSIDERED (MBPF PC KERNEL WITH 2 MONTHLY FACTORS)

Evaluation period: 1999(2)-2003(1)



Source: Authors' calculations.
Note: In the horizontal axis, -1 represents the *real-time* estimate (recall, in the filter *f* 1 in a third month of a quarter since the latest available GDP is from the previous quarter, results are already in Table 2), 1 represents the estimate obtained when one future data point is available and so forth.

4.3. Smooth growth

This subsection focus on the real-time evaluation of the approximations to smooth growth in the euro area. Table 3 contains the evaluation statistics for the approximations done in a third month of the quarter and considering all the variations under analysis. Additionally, Table 4 contains the evaluation of the approximations done in the first and second month of the quarter for a selection of the best performing approximations (in *real-time* and *today onwards*) of Table 3.

Table 3

EVALUATION STATISTICS IN A THIRD MONTH OF THE QUARTER, FOR THE APPROXIMATION TO SMOOTH GROWTH IN THE EURO AREA

Evaluation period: 1996(4) - 2004(3)

Performance with respect to Smooth Growth (3rd month of the quarter) [a]				
	Correlation		Noise to Signal	
	Real Time	*Today Onwards*	*Real Time*	*Today Onwards*
Benchmark Filters				
BPF AR	0.77	0.78	0.52	0.51
BPF KERNEL	0.77	0.78	0.53	0.51
with 2 factors				
MBPF PC KERNEL	0.81	0.86	0.47	0.41
MBPF GPC KERNEL	0.79	0.87	0.50	0.41

Source: Authors' calculations.
Note: (a) BPF AR - univariate filter with second moments estimated by AR model (BIC criterion for lag length); MBPF - multivariate band-pass filter; PC - factor space estimated by principal components; GPC - factor space estimated by generalized principal components; KERNEL - non-parametric estimation of second moments.

Table 4

EVALUATION STATISTICS IN EVERY MONTH OF THE QUARTER, FOR THE APPROXIMATION TO SMOOTH GROWTH IN THE EURO AREA

Evaluation period: 1996(4) - 2004(3)

Performance with respect to Smooth Growth [a]				
	Correlation		Noise to Signal	
	Real Time	*Today Onwards*	*Real Time*	*Today Onwards*
BPF AR				
1st/2nd month	0.38	0.42	0.74	0.73
3rd month	0.77	0.78	0.53	0.51
MBPF PC KERNEL				
(2 factors)				
1st month	0.60	0.75	0.65	0.56
2nd month	0.70	0.78	0.59	0.52
3rd month	0.81	0.86	0.47	0.41

Source: Authors' calculations.
Note: (a) BPF AR - univariate filter with second moments estimated by AR model (BIC criterion for lag length); MBPF PC KERNEL - multivariate band-pass filter, factor space estimated by principal components and non-parametric estimation of second moments.

The main conclusions are:

- The multivariate filter clearly outperforms the univariate filters in all the dimensions under consideration. Loosing one observation of GDP, as in a first or second month of the quarter, completely deteriorates the performance of the univariate filter but not so much that of the multivariate filter;

- As referred, the multivariate approximations are more accurate in the third month of the quarter, followed by the second month and then the first. In contrast to the case of business cycle fluctuations, there are now considerable gains if factors are used in the approximations, in particular in the first two months of the quarter;

- The fit of the *today onwards* approximations is very high for the multivariate filters. We found that using exactly 2 monthly factors, split into 6 quarterly series, produced always the best results in *real-time*. Perhaps a larger time dimension would be needed to usefully incorporate a larger number of factors, given the clearly distinct performance of the in-sample (*today onwards*) and out-of-sample (*real-time*) approximations, as documented in Valle e Azevedo and Pereira (2008);

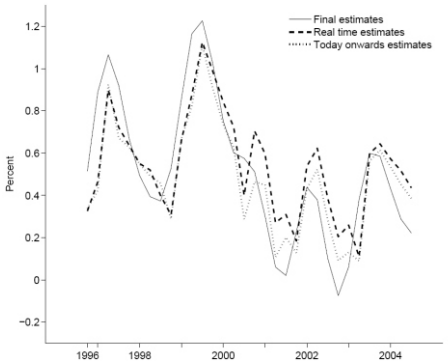
- As before, the results obtained with principal components (PC) are very similar to those obtained with generalized principal components (GPC).

To further inspect the quality of the approximations, Chart 4 displays the final estimates of euro area smooth growth as well as the best performing *real-time* and *today onwards* approximations in a third month of each quarter. As is clear, the multivariate indicator tracks very accurately the signal. Additionally, in Chart 5 is analysed the behaviour of the best indicators in a third month of the quarter when 4, 3, ..., 0 quarterly observations of GDP as well as from the covariates are missing (so we are also analysing the forecasting performance of the approximations to the target), and also when 1, 2, ..., 5 additional quarters of information are available. The main conclusion is that the multivariate approximations still clearly outperform the univariate filter, while giving an informative signal (noise to signal ratio below 1) even when 3/4 quarters of data are missing.

Chart 4

SMOOTH GROWTH OF EURO AREA GDP FINAL ESTIMATES AND *REAL-TIME* AND *TODAY ONWARDS* APPROXIMATIONS (MBPF PC KERNEL, *k* 2 MONTHLY FACTORS)

Evaluation period: 1996(4)-2004(3)

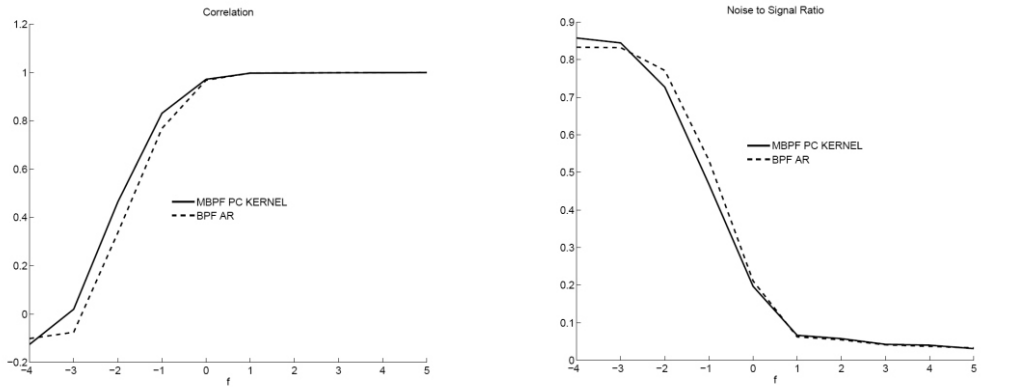


Source: Authors' calculations.

Chart 5

EVALUATION OF EURO AREA *REAL-TIME* APPROXIMATIONS TO SMOOTH GROWTH. CORRELATION WITH FINAL ESTIMATES AND NOISE TO SIGNAL RATIO WHEN *f* FUTURE QUARTERS OF DATA ARE CONSIDERED (MBPF PC KERNEL WITH 2 MONTHLY FACTORS)

Evaluation period: 1996(4)-2004(3)



Source: Authors' calculations.
Note: In the horizontal axis -1 represents the *real-time* estimate (recall, in the filter *f* 1 in a third month of a quarter since the latest available GDP is from the previous quarter, results are already in Table 4), 1 represents the estimate obtained when one future data point is available and so forth.

4.3.1. Comparison with EuroCoin indicator

The New EuroCoin indicator of Altissimo *et al.* (2007) targets a monthly measure of quarterly GDP growth free of fluctuations with period less than one year (denoted there as the medium to long run component of output growth). This monthly measure of quarterly GDP is obtained through linear interpolation of quarterly figures, which we view as undesirable for statistical and aesthetic reasons. We target instead quarterly GDP growth short of fluctuations with period less than one year in the three months of each quarter.

The New EuroCoin is obtained by projecting smooth monthly factors on the medium to long run component of output growth. These smooth monthly factors do not contain fluctuations with period less than 12 months. The objective is to have an indicator free of short-run oscillations, just as the target. In our approach this step is not needed and would be undesirable since every vintage of our indicator (that uses all the available information) is by definition smooth, although subject to revisions. The multivariate filter used optimally mitigates those revisions. Furthermore, we can explore the infra-quarterly dynamics that arises from the partition of the monthly factors, instrumental to update efficiently the indicator in the three months of each quarter. The series obtained from splitting smooth factors would be almost collinear. But more importantly, we are able to incorporate the available observations of GDP in our solution. It turns out that these are the single most important observations in the approximations (as is easily seen by analysing the performance of the univariate filter).

5. FORECASTING PERFORMANCE

5.1. Quarterly growth

In this section we report results concerning the capability that *real-time* approximations to smooth growth have in forecasting quarterly GDP growth. To be clear, we will approximate smooth growth at various horizons (quarters ahead) and compare its estimates with the actual observations of quarterly GDP growth. Although our main objective is to approximate a specific signal, we can justify the use of the method for forecasting if we assume from the onset the impossibility of forecasting the high frequencies of GDP growth (those with period less than one year) given a set of covariates. In theory, if the noisy (or for this matter any other) fluctuations of a time series are unpredictable given a set of covariates, it is not ideal to develop models aimed at approximating them as well. Focusing on approximations to the predictable component of the series may lead to a superior forecasting performance if the assumed restriction (unpredictability at some frequencies) in fact holds. This idea is still far from developed but we believe that important insights are given by our exercise. The exercise focuses on forecasts made in the third month of the quarter, from 1992(1) to 2004(4), considering as competing methods the following:

- Univariate approximation to smooth growth with non-parametric estimation of second moments, denoted BPF KERNEL;

- Univariate approximation to smooth growth with second moments derived from an autoregressive model (BIC criterion for lag length), denoted BPF AR;

- Multivariate approximation to smooth growth with second moments estimated non-parametrically and 2 split monthly factors (estimated by principal components) as covariates, denoted MBPF PC KERNEL;

- The linear projection of 2 split monthly factors (estimated by principal components) on GDP growth, obtained with second moments estimated as in MBPF PC KERNEL, denoted PC KERNEL;

- Regression of GDP on (a maximum of 2) split factors estimated by principal components and past GDP, with lag length determined by the BIC criterion, exactly as in Stock and Watson (2002), denoted DI - AR SW. More factors did not lead to a better performance.

The results are presented in Table 5. The main conclusions are as follows:

- The multivariate approximation to smooth growth ranks very well at one and two steps ahead, dominating overall the no-smoothing comparable approximation, PC KERNEL. That is, using exactly the same estimated second moments while targeting smooth growth instead of GDP growth leads to a superior forecasting performance. This is also generally true for the univariate approximations to smooth growth, but in this case the gains are only relevant at one quarter ahead;

- The regression with factors (DI AR - SW) performs poorly in the euro area;

Table 5

RATIO OF THE MEAN SQUARED ERROR OF THE FORECASTS WITH EACH METHOD TO THE MEAN SQUARED ERROR OF A UNIVARIATE REGRESSION FORECAST (BIC FOR LAG LENGTH)
Evaluation period: 1992(1) - 2004(4)

Simulated Out-of-Sample Forecasting Results: Euro area GDP growth rate

	Relative MSE		
Method	**One step ahead (current quarter)**	**2 steps ahead (1 quarter ahead)**	**3 steps ahead (2quarters ahead)**
PC KERNEL	1.03	0.82	0.8
BPF AR	0.93	0.99	1
BPF KERNEL	0.93	1.03	1.02
MBPF PC KERNEL	0.78	0.84	0.81
DI AR - SW	1.71	1.77	0.79
RMSE, AR	0.00297	0.0035	0.0039

Source: Authors' calculations.

- In the case of 3 quarters ahead (or more, results not reported), all methods perform rather poorly, confirming the well-known difficulty of forecasting quarterly GDP growth at long horizons (for recent overviews, see Runstler *et al.* 2008, and Angelini *et al.*, 2008). In fact, at 3 quarters ahead the root mean squared error (RMSE) of the autoregressive (AR) forecast is basically the standard deviation of GDP growth, informing us that we are as better off with the mean growth rate as forecast.

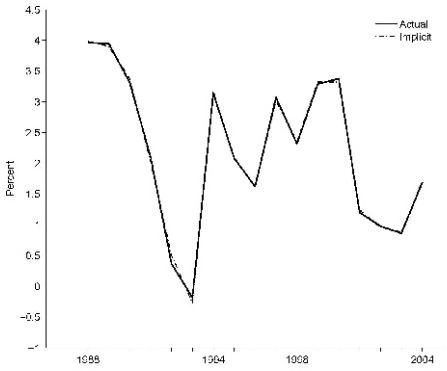
Overall, the results suggest that our multivariate approximation to smooth growth, while designed for a different purpose, is useful for short-term forecasting of GDP quarterly growth. Additionally, this approximation can have a much more striking role in the forecasting of yearly GDP growth. First, the results in Chart 5 reveal that our approximation to smooth growth at longer horizons (up to 4 quarters) still reveals some of the signal, whereas the forecasts of quarterly growth in Table 5 reveal the uselessness of all the methods at more than (at most) 3 quarters ahead. Second, the yearly growth rate implied by the quarterly smooth growth rates is indistinguishable from the yearly growth rate implied by the quarter on quarter GDP growth rates (see Chart 6). Thus, by approximating accurately smooth growth at various horizons, we will approximate accurately yearly growth. If we use instead useless forecasts of quarterly growth to forecast yearly GDP growth, the results are not likely to be promising. The next subsection analyses this issue in more detail, presenting the evaluation of forecasts of yearly GDP growth made throughout the months of the year by various methods.

5.2. Yearly growth

In this subsection we evaluate forecasts of yearly GDP growth at various points throughout the year using various methods. We do so by forecasting the missing quarterly GDP growth rates and then deriving the implied yearly growth. When using our approximations to smooth growth, we derive yearly growth from the most up-to-date approximations to smooth growth of the relevant quarters (Chart 6 justifies this approach). For the methods that do not target smooth growth, yearly growth rates are de-

Chart 6

YEARLY GDP GROWTH RATE: ACTUAL AND IMPLICIT IN SMOOTH GROWTH OF EURO AREA QUARTERLY REAL GDP



Source: Authors' calculations.

rived from known quarterly rates as well as from the relevant forecasts of quarterly growth. In order to be fair in the comparisons, we substituted the useless (worse than the mean in the evaluation period) quarterly growth forecasts by real-time estimates of the mean growth rate of quarterly GDP. Table 6 displays the results for forecasts made in the end of each quarter. In the end of the first quarter (March), no information on quarterly GDP of the current year is available, so that forecasts for the four quarters are necessary. In the end of the fourth quarter (December) we have information on GDP growth from the first three quarters.

Table 7 analyses the forecasting performance of our approximation in the 12 months of the year and Chart 7 shows the forecasts made in March, June, September and December with the actual observations of yearly GDP growth. The results can be summarized as follows:

Table 6

RATIO OF THE MEAN SQUARED ERROR OF THE FORECASTS WITH EACH METHOD TO THE MEAN SQUARED ERROR OF A UNIVARIATE REGRESSION FORECAST (BIC FOR LAG LENGTH)
Evaluation period: 1993(1) - 2004(4)

Simulated out-of-sample forecasting results: Euro area yearly GDP growth rate

	Relative MSE of forecasts made at the end of:			
Methods	**1st quarter**	**2nd quarter**	**3rd quarter**	**4th quarter**
BPF AR	1.00	0.98	1.12	0.72
MBPF PC KERNEL	1.02	0.83	0.99	0.81
DI AR - SW	2.08	1.76	2.23	3.56
RMSE, AR	0.0069	0.0046	0.0018	0.0007

Source: Authors' calculations.

Table 7

ROOT MEAN SQUARED ERROR OF THE FORECASTS OF YEARLY GROWTH MADE AT THE END OF EACH MONTH

Evaluation period: 1993(1) - 2004(4)

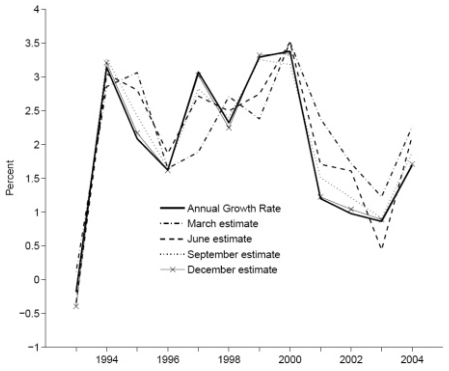
Simulated out-of-sample forecasting results: yearly GDP growth rate

	RMSE of forecasts
Forecast moment	***MBPF PC KERNEL***
January	0.0108
February	0.0108
March	0.0070
April	0.0062
May	0.0058
June	0.0042
July	0.0035
August	0.0029
September	0.0018
October	0.0020
November	0.0018
December	0.0006

Source: Authors' calculations.

Chart 7

YEARLY GDP GROWTH RATE AND REAL-TIME FORECASTS MADE AT THE END OF MARCH, JUNE, SEPTEMBER AND DECEMBER



Source: Authors' calculations.

- The results obtained with factor regression (DI AR - SW) are rather poor. There are significant gains if the multivariate filter (MBPF PC KERNEL) is used to forecast yearly growth while the univariate filter (BPF AR) also performs well;

- Table 7 reveals that the quality of the forecasts improves mainly due to the release of GDP quarterly figures, as evidenced by the significant decrease in the RMSE of the approximations done in the end of each quarter, exactly when GDP from the previous quarter becomes available. Still, within each quarter new monthly information generally improves the forecasts. We note that only in a multivariate context can we explore this information;

- In the period under analysis, only after June can we have a clear and accurate picture of current year growth. Nonetheless, the 1993 recession is clearly well predicted by the end of March.

6. CONCLUSIONS

We have shown how to usefully integrate the recent developments in the analysis of dynamic factor models in the approximation to relevant macroeconomic signals. The resulting multivariate filter, fuelled with factors extracted from a large panel of time series, is reliable and clearly outperforms in various dimensions the optimal univariate approximation. Further, it possesses several advantages over similar (multivariate) attempts to track macroeconomic signals in real-time.

We have analysed in detail the approximations to two relevant macroeconomic signals related to real activity in the euro area: business cycle fluctuations and the smooth growth of real GDP. Our exercise provided real-time approximations that take fully into account the data release delays of all the variables involved. In the analysis of the forecasting performance of smooth growth, we have highlighted

an important insight: targeting a smooth version of a time series may be more useful than targeting the sometimes erratic (or unpredictable at high frequencies) original series. The conventional forecasting models fit the variables of interest at every frequency, regardless of the predictive content of the available covariates at each frequency. In the future, we plan to further explore this idea.

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FORECASTING INVESTMENT IN PORTUGAL USING QUALITATIVE AND QUANTITATIVE DATA*

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*Sara Serra***

1. INTRODUCTION

Investment decisions are always conditioned by numerous factors. Some firms invest as a response to a favourable economic situation, possibly unexpected, while others invest due to expected higher demand over the medium or long run. This may co-exist with firms that do not invest at all simply because they have already achieved their desired capital stock. The objective of this article is to extend the work of Maria and Serra (2008), which assessed the usefulness of business surveys as a potential source of information behind investment developments in Portugal.[1] The information content of survey data has been widely explored in the literature. Larsen (2001), Barnes and Ellis (2005) or Claveria, Pons and Ramos (2007) are examples where the empirical associations between survey data and investment were subject to a special focus.

The analysis presented in this article starts by reviewing the methodology and main conclusions of Maria and Serra (2008). The usefulness of business surveys was analysed in Maria and Serra by promoting a fictional "fishing contest". This contest included bridge models as one of the "participants", *i.e.*, simple econometric formulations that establish a link, or a bridge, between two sets of data, which are typically disclosed with different timings.[2] Models based on principal components (derived from standard and non-standard methods), and models built within a partial least squares (PLS) framework were also included in the "fishing contest".[3] A striking outcome was, among all participants in the "fishing contest", the relative accuracy of bridge models. The accuracy of all models was measured by the Root Mean Squared Error (RMSE) of out-of-sample forecasts. The analysis included herein extends the empirical evidence of Maria and Serra by investigating the impact of additional explanatory variables on the initial specifications of these bridge models, namely industrial production (overall and components), cement sales and cement imports and data on vehicles. The out-of-sample performance of these extended models is then evaluated in order to analyse whether the relative RMSE are further reduced. In addition, the composition of the estimated models is also analysed, allowing the assessment of the complementary or substitution role of survey data against the additional explanatory variables.

This article is organized as follows. The next section presents the database. Section 3 reviews the methodology and main conclusions of Maria and Serra (2008). Additional empirical evidence is reported in Section 4 and Section 5 concludes.

* The analyses, opinions and findings represent the views of the authors; they are not necessarily those of the Banco de Portugal or the Eurosystem. The usual disclaimer applies.

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(1) Earlier versions of the *Working Paper* Maria and Serra (2008) were greatly improved by the discussions with Francisco Dias, having also benefited from the comments of Cláudia Duarte, Rita Duarte, Ricardo Mourinho Félix, Carlos Robalo Marques and Maximiano Pinheiro

(2) According to Baffigi *et al.* (2004), page 1, these models may "bridge the gap between the information content of timely updated indicators and the delayed (but more complete) national accounts".

(3) The multivariate PLS methodology is briefly reviewed in Maria and Serra (2008).

2. THE DATABASE

The database used herein has three main blocks. The first block of information contains survey data released by the European Commission (EC).[4] The second block contains several quantitative indicators that will be described below and, together with the first block, will be used as explanatory variables for the third block of information, which consists of Gross Fixed Capital Formation (GFCF) expenditures and several of its subcomponents. These data are estimates of Banco de Portugal based on national accounts data published by *Instituto Nacional de Estatística* (Statistics Portugal).[5]

The first block of information – the survey data – was divided into two different information sets: a "database of totals", which contains 42 variables with aggregates for the sectors as a whole (manufacturing industry, construction, retail trade and services); and a "database of sectors", which breaks down the industry and the construction surveys into several subsectors and contains 185 variables (see Table 1). Both databases are quarterly, balanced, and in those situations where the survey responses have a monthly frequency, it is assumed that all three months of the quarter are known. The monthly survey data is published on the last working day of the month to which it refers.

The survey data are in most cases published in the form of (seasonally adjusted) balances. Besides being in general unrevised, this data is disclosed in advance of national accounts. The sample period starts in 1997Q3, due to data availability issues, and has 42 observations (ending in 2007Q4).[6]

The second block of information is also quarterly, balanced and derived from indicators that have monthly frequency. Due to availability issues, the information set is restricted to sales of heavy commercial vehicles, Industrial Production Index (IPI), IPI - investment goods, IPI - transportation equipment, IPI - investment goods excluding transportation equipment, cement sales and imports of cement. All data was seasonally adjusted with the X12-ARIMA software. The indicators of the second block of information are disclosed with a delay that ranges from four to thirty days from the end of the month to which they refer.[7]

Finally, the third block of information contains the variables of interest. These are GFCF expenditures and several of its subcomponents, namely Public and Private GFCF, being the latter disaggregated into residential and productive GFCF. The disaggregation into construction and total excluding construction is also considered. In the case of Public GFCF, although the data depends on administrative decisions, it is being allowed that such decisions may have spill-over effects to the private sector of the economy and may eventually have an impact on the behaviour of some survey data. The analysis of the GFCF data will be carried out in quarter-on-quarter (qoq) and in year-on-year (yoy) changes. The two options can be found in the literature.[8]

The survey data were all assumed to be stationary in levels. This is in line with the empirical literature (see, for instance, European Commission (2000)), and in the vast majority of cases also in line with the conclusion stemming from at least one of the standard unit root tests usually considered in the literature (Augmented Dickey-Fuller, Philips-Perron and Kwiatkowski-Phillips-Schmidt-Shin) at a 10 per

(4) The data can be retrieved from the Eurostat website http://europa.eu.int/comm/eurostat.

(5) Total GFCF data is taken from the database of Banco de Portugal. See Banco de Portugal (2008) and the website www.bportugal.pt.

(6) 1997Q3 and 2007Q4 refer to the third quarter of 1997 and the fourth quarter of 2007, respectively.

(7) Between the full availability of a quarter of survey data and the publication of the corresponding first release of the national accounts (around 75 days), several different vintages of data belonging to the second block are available. All information of blocks one and two of a given quarter is available one month after the end of that quarter. An analysis based on the available data vintages is beyond the scope of this article.

(8) Rünstler and Sédillot (2003) use survey data to forecast quarterly changes of GDP. An analysis based on yearly rates of change can be found in Hansson, Jansson and Lof (2005) or Claveria *et al.* (2007). Artís and Suriñach (2003) and Barnes and Ellis (2005) have analyses in both quarterly and yearly terms.

Table 1

LIST OF SURVEY INDICATORS

Questions	Total and subsectors	Frequency	Starts in…
Industry			
Industry Confidence Indicator	Total Manufacturing	m	Jan 1987
Production trend observed in recent months	Consumer Goods	m	Jan 1987
Assessment of order-book levels	Durable Consumer Goods	m	Jan 1987
Assessment of export order-book levels	Non Durable Consumer Goods	m	Jan 1987
Assessment of stocks of finished products	Food, Beverages	m	Jan 1987
Production expectations for the months ahead	Investment Goods	m	Jan 1987
Employment expectations for the months ahead	Intermediate Goods	m	Jan 1987
Assessment of current production capacity		q	Jan 1987
Duration of production assured by current order-book levels		q	Jan 1987
New orders in recent months		q	Jan 1987
Export expectations for the months ahead		q	Jan 1987
Current level of capacity utilization		q	Jan 1987
Competitive position domestic market		q	Jul 1994
Competitive position inside EU		q	Jul 1994
Competitive position outside EU		q	Jul 1994
Factors limiting the production		q	Jan 1987
None		q	Jan 1987
Demand		q	Jan 1987
Labour		q	Jan 1987
Equipment		q	Jan 1987
Other		q	Jan 1987
Construction			
Construction Confidence Indicator	Total Construction	m	Jan 1989
Building activity development over the past 3 months	Building: total	m	Jan 1989
Main factors currently limiting your building activity	Building: residential	m	Jan 1989
None	Building: non-residential	m	Jan 1989
Insufficient demand	Public works (civil engineering)	m	Jan 1989
Weather conditions		m	Jan 1989
Shortage of labour force		m	Jan 1989
Shortage of material and/or equipment		m	Jan 1989
Other factors		m	Jan 1989
Evolution of your current overall order books		m	Jan 1989
Employment expectations over the next 3 months		m	Jan 1989
Operating time ensured by current backlog (in months)		q	Jan 1989
Retail Trade			
Retail Trade Confidence Indicator	Total Retail Trade	m	Jan 1989
Business activity (sales) development over the past 3 months		m	Jan 1989
Volume of stock currently hold		m	Jan 1989
Orders expectations over the next 3 months		m	Jan 1989
Business activity expectations over the next 3 months		m	Jan 1989
Employment expectations over the next 3 months		m	Jan 1989
Services			
Services Confidence Indicator	Total Services	m	Jun 1997
Business situation development over the past 3 months		m	Jun 1997
Evolution of the demand over the past 3 months		m	Jun 1997
Expectation of the demand over the next 3 months		m	Jun 1997
Evolution of the employment over the past 3 months		m	Jun 1997
Expectations of the employment over the next 3 months		m	Jun 1997

Source: European Commission.
Note: The the letter *m* or *q* indicates that the survey data is available with monthly or quarterly frequency, respectively.

cent significance level. According to similar considerations, the levels of the variables of the second and third block of information were taken to be non-stationary.[9]

(9) All results are available at request. It should be noted that in some cases, including in the second block, the results are not always conclusive and unambiguous. For instance, the non-stationarity null hypothesis of sales of heavy commercial vehicles is not rejected only at 5 per cent significance level. At a 10 per cent level that hypothesis is rejected.

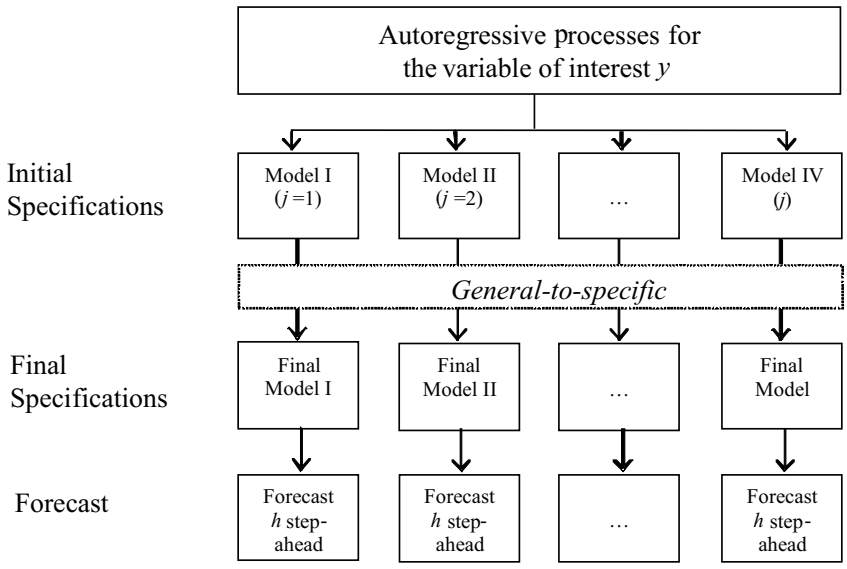
3. BUSINESS SURVEYS AND INVESTMENT

This section briefly reviews the methodology and main conclusions of Maria and Serra (2008), given that their main objective was to assess the usefulness of business surveys as a source of information behind contemporaneous or leading forces driving investment in Portugal. To achieve this goal, Maria and Serra implemented what was named a "fishing contest". The participants in this contest included bridge models, which are simple econometric formulations that explore the existence of links between quarterly national accounts data and other information known in advance of national accounts, thereby establishing an empirical bridge between the two datasets. These models do not necessarily stem from economic theory, and therefore are not behavioural or structural in that sense. Other participants were models based on principal components (derived from standard and non-standard methods), and models built with the outcome of PLS regressions. The performance of these models was then evaluated against a benchmark autoregressive (AR) model. All models were tailored to produce *h*-step ahead direct forecasts, where $h = 1, 2, 3$ and 4.

The process of model building and model selection is summarized in Chart 1. The figure concentrates on AR models, but the process is identical to all participants of the "fishing contest". The first step was always to construct several initial specifications for each variable of interest and for each period ahead. The second step was to eliminate all variables not significant at 10 per cent (one at a time starting from the least significant), following a general-to-specific approach. Lastly, all final specifications derived from all initial specifications were used to implement out-of-sample forecasts for the period 2006Q1-2007Q4, using an expanding window (*i.e.* the sample period increases, sequentially, one observation, for each new out-of-sample forecast).

Chart 1

FORECASTING PROCESS BASED ON AUTOREGRESSIVE MODELS



Source: Maria and Serra (2008).
Note: "*j*" is the initial number of regressors (up to a maximum of 4) in the AR models (besides a constant).

All "fishing contest" participants had the following general form:

$$y_{t-1+h} = \mu + \theta_1 y_{t-1} + \ldots + \theta_4 y_{t-4} + \psi_1 x_1^* + \ldots + \psi_k x_{k,t}^* + \eta_{t-1+h} \quad (1)$$

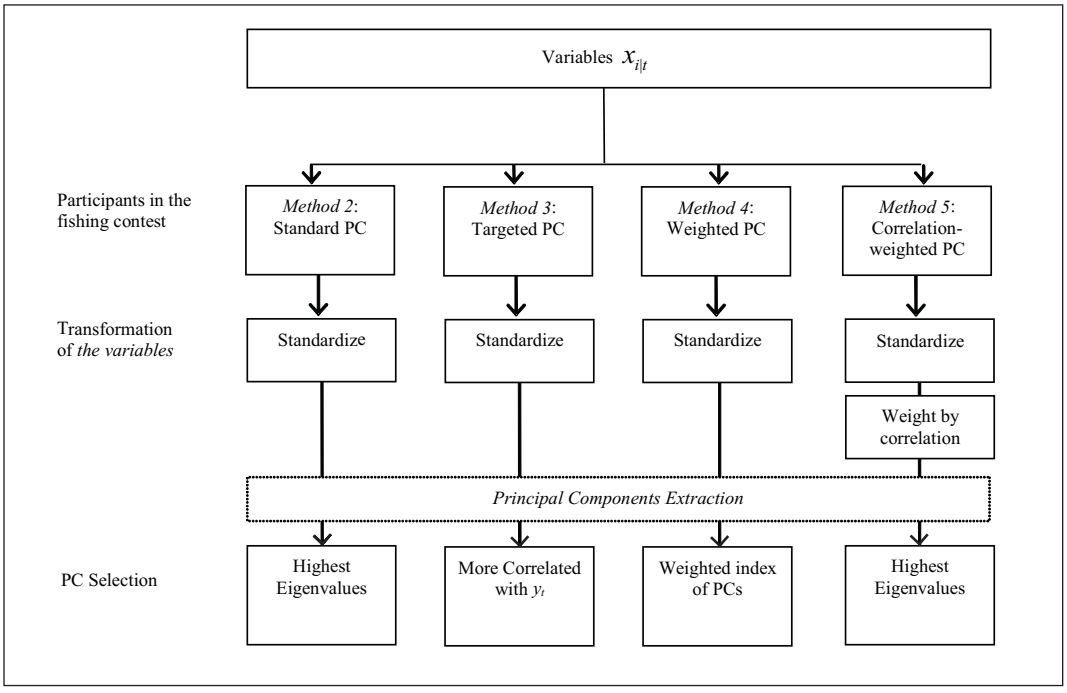
$$\text{where } h = 1\ldots4 \text{ and } k = 1\ldots5$$

Variable y is the variable of interest and is defined in qoq or yoy rates of change. x^* represents the set of regressors. The procedure is implemented for each period ahead (h), thereby implying that the coefficients θ and ψ, as well as the constant μ are conditional on h. Equation (1) was estimated with or without the restriction $\theta_j = 0, \forall j$; with different x^*, defined according to the each participant; and using, alternatively, the "database of totals" and the "database of sectors".

Previous work regarding the usefulness of surveys for short-term forecasting has extensively focused on bridge models and therefore this was naturally the first participant of the "fishing contest".[10] In this case, x^* corresponds to a specific survey dataseries among the "database of totals" or the "database of sectors". These series were listed in Table 1. More precisely, each variable was set to $x_{i|t}^*$, where the subscript $i|t$ indicates which lag i (from zero up to four) for which the survey indicator shows the highest correlation with the dependent variable y, conditional on information up to t. This implies that the lag order of each series in the first block of information was adjusted according to these correlations. The remaining participants also start by computing $x_{i|t}$, but instead of using them directly, reduce the dimensionality of this information set by exploring, in particular, their correlation structure. Methods based on the principal components (PC) methodology are natural participants in this context. These participants are summarized in Chart 2.

Chart 2

FORECASTING PROCESS FOR METHODS BASED ON PRINCIPAL COMPONENTS



Source: Maria and Serra (2008).
Note: $x_{i|t}$ stands for each of the variables listed on Table 1, already adjusted according to the correlation lag that produces the highest correlation with y.

(10) See, for instance, Rünstler and Sédillot (2003).

Method 2 (standard PC) corresponds to the standard principal components methodology. In this case, x^* refers to the components associated to the highest eigenvalues. Method 3 (targeted PC) differs from Method 2 in the selection of the principal components. Instead of choosing the components that are associated with the highest eigenvalues, it selects the ones that are more correlated with the variable of interest, and therefore potentially more appropriate, or "targeted", to forecast. This is in line with Bai and Ng (2007, 2008). These authors emphasise that when the goal is to forecast a specific series, and not just summarizing a particular database, there is no reason to think that the components that best explain a particular economic variable are also the same that explain another (completely different) variable. Method 4 (weighted PC) is derived from the work of Dias, Pinheiro and Rua (2008). These authors suggest the use of all principal components (which are also identical to those obtained with Method 2). After taking into account a particular weighting scheme of all components, x^* collapses in this case to one single regressor. These weights reflect two forces at work - alignment of the PC with the directions of the common movement of all variables present in the survey database and alignment of the PC with the variable of interest. Method 5 (Correlation-weighted PC) relies on the possibility that the principal components methodology can be applied to any second-moment matrix. While on Method 2, all $x_{i|t}$ were considered to "arrive on an equal footing" and are "equally important",[11] this method assumes that the survey indicators are not equally important. The weighting scheme suggested in Maria e Serra to differentiate their relative importance was constructed using the correlation coefficient of each $x_{i|t}$ with the variables of interest.[12]

Finally, the last participant in the "fishing contest" - Method 6 -, was obtained within a PLS framework. This participant includes features from the principal components methodology and from least squares. The variant of PLS used herein is such that the dependent variable is only one and x^* corresponds to one single regressor (as in Method 4). [13] More precisely, x^* is constructed with the goal of predicting a (standardized) dependent variable y, tailored to forecast h steps-ahead, from a database of (standardized) $x_{i|t}$ variables.

According with the empirical evidence of Maria and Serra (2008), models with survey data outperform, in general, simple AR models for the same horizon.[14] This indicates that survey data include relevant information for forecasting purposes that is not included in the dynamics of the dependent variables. In addition, the survey information included in the outperforming models is often obtained from the "database of sectors", which indicates that using a richer information environment produced some gains in terms of forecasting accuracy.

The outperforming models usually combine, in general, survey information and autoregressive terms, particularly when the dependent variable is expressed in yoy terms. Bridge models have a surprising relative performance, as they are in general the best method for all dependent variables and forecasting horizons. This is particularly evident using qoq data, but is also valid for some cases when considering yoy data. Even when bridge models do not produce the lowest RMSE, they often improve on the performance of the benchmark AR model. This suggests that particular survey data series do seem to possess non-negligible leading characteristics that should be explored further.

The forecasting accuracy of bridge models, measured by the ratio between their RMSE and the RMSE of the benchmark AR model, is depicted in Chart 3. As it can be seen, the large majority of outcomes is below 1, indicating a lower out-of-sample accuracy of the AR models in comparison with the bridge models.

(11) See Jackson (1991), Chatfield and Collins (1996) and Jollife (2002).

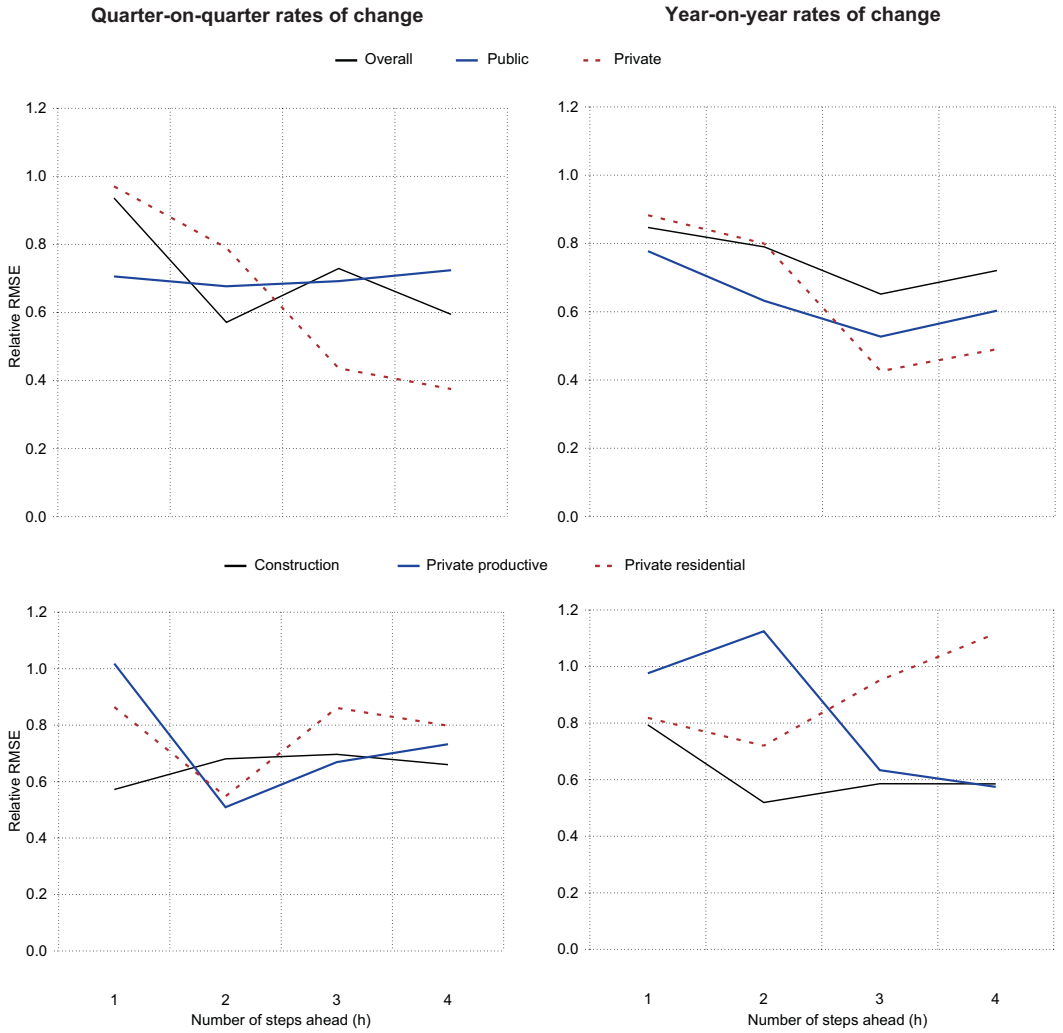
(12) Any set of weights is potentially usable. The definition of the best weighting scheme was beyond the scope of Maria and Serra (2008).

(13) The univariate variant of PLS used herein has been named in the literature as PLS1.

(14) For more detailed data on the results of Maria and Serra (2008), please see Tables 1 and 2 of the Appendix, regardind the qoq and yoy databases, respectively.

Chart 3

THE RELATIVE FORECASTING ACCURACY OF BRIDGE MODELS



Note: The relative RMSE is defined as the ratio between the RMSE of the bridge model and the RMSE of the benchmark AR model for the corresponding period-ahead forecast. A lower than 1 relative RMSE indicates a lower out-of-sample accuracy of the AR model over the period between 1996Q1 and 2007Q4, in comparison with the bridge model. A relative RMSE equal to zero would indicate an exact out-of-sample forecast of the bridge model. The actual numbers behind these graphs are reported in Tables 1 and 2 of the Appendix..

4. BRIDGE MODELS INCLUDING QUANTITATIVE INDICATORS

This section extends the empirical evidence of Maria and Serra by investigating the impact of additional explanatory variables on the initial specifications of bridge models. In contrast with the survey information, which is subjective by definition, these additional variables are of a quantitative nature. The main objectives of the present article are to evaluate if the information content of surveys is still useful when quantitative information is included in the equations, and whether forecast accuracy gains are achieved.

4.1. Database and methodology

The database in this section uses all three blocks presented in Section 2. Furthermore, the empirical evidence will be based on the breakdown of the first block in the "database of totals" and in the "database of sectors" and on the use of qoq and yoy changes of the variables of interest.

Given the relative performance of bridge models, the analysis focuses on the augmentation of equations with the structure defined in (1). To enhance the comparability with the previous results, all equations will be evaluated in terms of out-of-sample forecast accuracy for the period 2006Q1-2007Q4 using an expanding window; all RMSE will be compared with the same benchmark AR model; and the outset follows the structure presented in Chart 1. However, to avoid severe losses in degrees of freedom, a selection criterion has to be defined with the objective of clarifying how many quantitative and qualitative regressors should be used for forecasting purposes.[15] The procedure that was followed starts by introducing one single quantitative indicator at a time in equations (1), with $k = 1, 2, \ldots, 5$. The final specifications of these models are then evaluated by their relative out-of-sample accuracy. The best performing models will then be used to establish a maximum number of surveys and maximum number of quantitative indicators in the initial specifications. To assure a higher comparability with the previous results, the goal is to maintain a total number of regressors that does not exceed five, besides the autoregressive part.

4.2. Empirical results

The empirical evidence based on bridge models that include qualitative indicators and one quantitative indicator show that, in almost all situations, there is at least one survey variable that remains in the final specifications, implying that their information is useful for forecasting investment even when quantitative data is available. In addition, the usefulness of quantitative indicators seems very specific, given that not all lead to an improvement in the survey based bridge model, being often dropped from the final specification of the equations (about 60% of the cases), particularly for longer forecasting horizons. However, when these variables remain in the final specifications, the quantitative indicators lead in general to a reduction in the RMSE.

For models in qoq terms, the quantitative indicators that lead in more cases to a reduction in the RMSE *vis-à-vis* the bridge models composed only by survey data and autoregressive terms are cement sales and IPI - transportation material. For yoy data, besides the same IPI subcomponent, total IPI and imports of cement are also relevant. In general, a close inspection of both databases suggests that the number of survey regressors to be included in the initial specification of the equations in order to avoid a substantial loss of out-of-sample accuracy is around two.

In the case of qoq data, the best final models are in their majority obtained from the "database of sectors" (73% of the cases) and do not include autoregressive terms (56% of the times). On the other hand, the presence of the "database of sectors" is not so expressive for models in yoy terms (42% of the cases), and AR terms are in general included (97% of the cases).

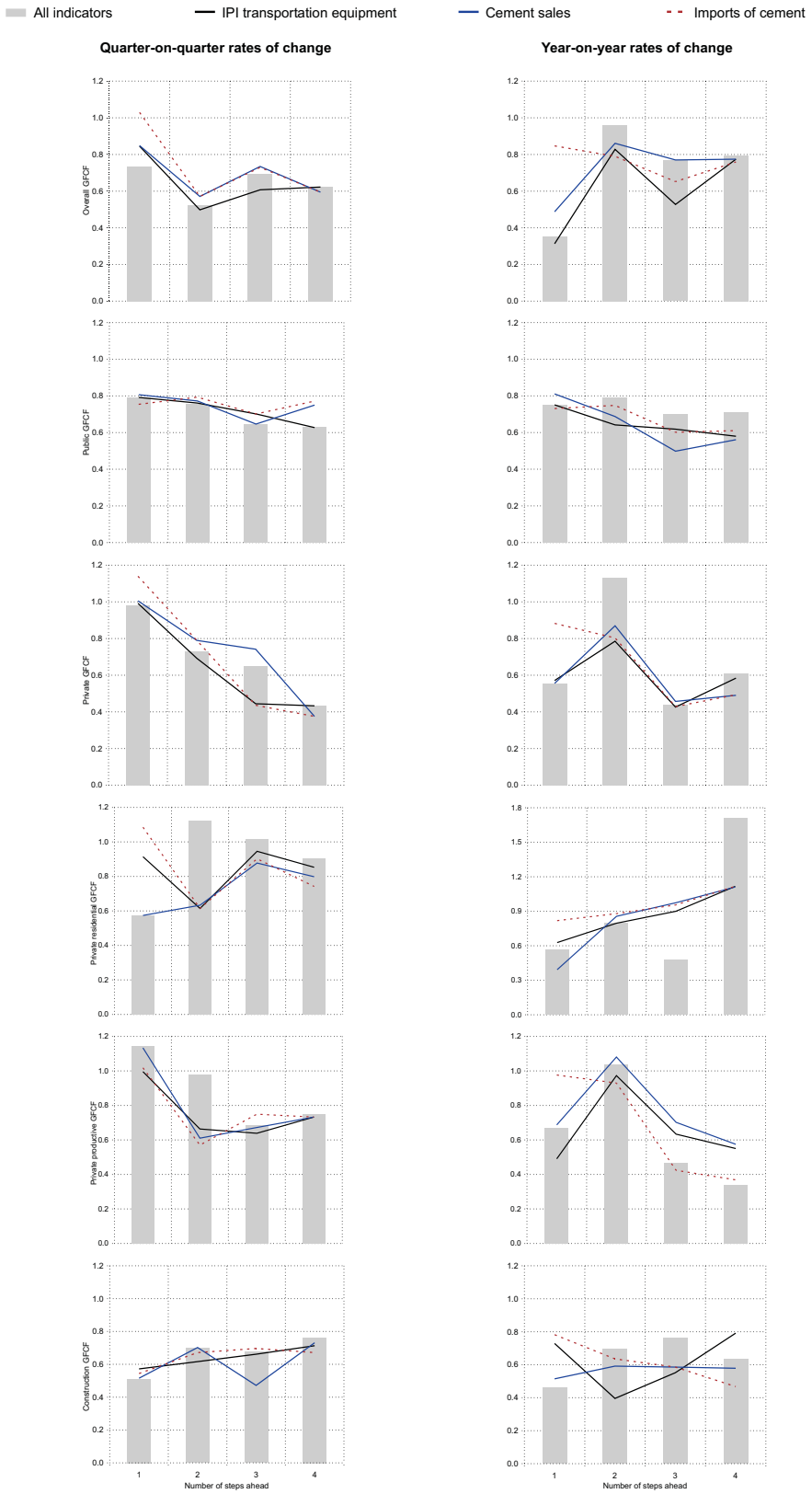
Chart 4 presents the results for those indicators which are more often found to improve on the survey based bridge models.[16] These indicators are IPI - transportation material, cement sales and imports of

(15) With 4 autoregressive terms, 5 survey variables and a total number of 7 quantitative indicators, plus a constant, this adds up to 17 regressors.

(16) The actual data behind Chart 4, results obtained from equations involving other quantitative indicators and information regarding the composition of the final estimated models are presented in Tables 3 and 4 of the Appendix, for qoq and yoy data, respectively.

Chart 4

THE FORECASTING ACCURACY OF BRIDGE MODELS INCLUDING QUANTITATIVE INDICATORS



Source: Authors' calculations.
Note: "Relative RMSE" is defined as the ratio between the RMSE of the bridge model and the AR model. A lower than 1 relative RMSE indicates a lower out-of-sample accuracy of the AR model over the period between 1996Q1 and 2007Q4, in comparison with the bridge model. The actual numbers behind these plots are reported in Tables 3 and 4 of the Appendix.

cement. As it can be seen, the large majority of outcomes for the relative RMSE is below 1. In these situations, Method 1 of Maria and Serra (2008) ceases to be the best performing model.

Based on these conclusions, the analysis proceeded with the estimation of bridge models of two survey indicators (the most correlated with the dependent variable) and three quantitative indicators (IPI - transportation material, sales of cement and imports of cement). In general, the results show that best performing models with dependent variables in qoq terms rely more on the "database of sectors" than in the "database of totals", while the opposite occurs in the case of yoy terms. Regardless of the database, the final specifications of the models are relatively similar, given that AR terms, survey data and quantitative indicators are all present. For nearer term forecasts, these augmented models lead in some cases to reductions in the RMSE against the remaining bridge models. However, this gain is neither systematic across horizons nor valid for all dependent variables, which suggests that an adequate forecast should not neglect the predictive power of alternative specifications or alternative quantitative indicators.

Chart 4 also presents the empirical results showing that the RMSE of bridge models including two qualitative indicators and three quantitative indicators are not always the lower envelope of the corresponding RMSE of models which include only one of these quantitative indicators. For instance, the relative RMSE of the model for current-quarter qoq forecasts (h=1) of private productive GFCF is higher than 1. However, a model including AR terms, survey data and the IPI - transportation material indicator generates a relative RMSE of about 1. When this quantitative indicator is replaced by the overall IPI (which was not selected), the relative RMSE is reduced even further.

5. CONCLUSIONS

This article reviewed and extended the empirical evidence included in Maria and Serra (2008). The usefulness of business surveys was analysed in Maria and Serra by promoting a fictional "fishing contest", where the participants were bridge models, models based on principal components (derived from standard and non-standard methods), and models built within a partial least squares (PLS) framework. In general, the empirical evidence indicated that there was always a participant producing a lower RMSE than the one associated with simple autoregressive models. In several specifications, the augmentation of each of the admitted participants with AR terms produced the lowest RMSE. This conclusion was in general valid for both the qoq and yoy databases, and as well as for two databases of surveys ("database of totals" and "database of sectors"). In addition, bridge models showed a striking performance in relative terms. Even when these models do not produce the lowest RMSE in absolute terms, they often improve on the performance of the autoregressive benchmark. In this context, the information provided by a few survey dataseries does seem to possess leading characteristics that are valuable for forecasting purposes.

The empirical evidence included in Maria and Serra was extended by investigating the impact of adding quantitative explanatory variables to the initial specifications of bridge models. The quarterly figures for these variables are also known in advance of national accounts, although the full set of quantitative indicators is only available with a delay of up to 30 days against the survey data, which are published on the last working day of each month. These properties make them natural competitors of survey variables. The quantitative data considered comprise sales of vehicles, industrial production (overall and components) and cement sales and cement imports.

The conclusions suggest that quantitative indicators work as complements of survey data, given that in the largest majority of cases, the latter remain in the final specification of equations when one or several quantitative indicators are added. Some indicators, namely IPI – transportation equipment, sales

and imports of cement, considered both separately and jointly, lead to an improvement in RMSE in several cases when compared to the exclusively survey based bridge models. This adds to the overall view already present in Maria and Serra (2008) that a richer set of information seems to yield better results. However, this improvement is not systematic across forecasting horizons or across dependent variables, being more concentrated on shorter forecasting horizons, which implies that an adequate forecast should not neglect the predictive power of alternative specifications or alternative quantitative indicators.

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APPENDIX

This appendix presents four tables containing a comprehensive summary of all empirical evidence. Tables 1 and 2, derived using qoq and yoy rates of change, respectively, are a summary of the empirical evidence of Maria and Serra (2008). Tables 3 and 4 are a summary of the empirical results of this article, derived using qoq and yoy rates of change, respectively. All remaining results are available upon request.

In all tables, the first column identifies the models that are being evaluated. The initial rows report the absolute values of the lowest RMSE for the benchmark AR models (obtained following the structure presented in Chart 1). The remaining results are in relative terms against the benchmark model. Therefore, for h = 1, 2, 3 and 4 a relative RMSE higher/lower than 1 indicates a higher/lower RMSE than the corresponding AR model. If the figure is below 1, then the model is considered as depicting higher forecast accuracy than the benchmark AR process. This situation is highlighted in bold on all tables. The lowest relative RMSE among all non-benchmark models is highlighted with a shaded area. Furthermore:

- Column (1) indicates the number of survey regressors included in the initial specification of the equation corresponding to the lowest RMSE.

- Column (2) indicates the database from which the model was obtained: the letter "t" depicts the "database of totals" and the letter "s" the "database of sectors".

- The symbol (*) in column (3) indicates the presence of at least one AR term in the initial specification.

For Tables 3 and 4, in particular, the shading area in the upper part of the tables indicates the lowest relative RMSE within that part. These models include qualitative indicators and one quantitative indicator. For the lower part, shading depicts the situation where the corresponding model outperforms all models. These models include two qualitative indicators and three quantitative indicators. Tables 3 and 4 also include the following information:

- A star (*) in column (4) indicates the presence of at least one survey indicator in the final specification of the equation.

- A star (*) in column (5) indicates the presence of at least one quantitative indicator in the final specification of the equation.

Table 1

OUT-OF-SAMPLE RMSE FOR QUARTER-ON-QUARTER FORECASTS

		Overall				Public				Private				Private Residential				Private Productive				Construction				Overall excl. construction			
		Specification				Specification				Specification				Specification				Specification				Specification				Specification			
		Initial				Initial				Initial				Initial				Initial				Initial				Initial			
		RMSE	k	Dat	AR	RMSE	k	Dat	AR	RMSE	k	Dat	AR	RMSE	k	Dat	AR	RMSE	k	Dat	AR	RMSE	k	Dat	AR	RMSE	k	Dat	AR
	h		(1)	(2)	(3)		(1)	(2)	(3)		(1)	(2)	(3)		(1)	(2)	(3)		(1)	(2)	(3)		(1)	(2)	(3)		(1)	(2)	(3)
Method 0 - AR Model	1	0.021	1			0.069	1			0.018	1			0.034	2			0.018	1			0.033	1			0.030	1		
	2	0.022	3			0.069	1			0.020	4			0.034	1			0.023	2			0.033	1			0.032	3		
	3	0.021	1			0.061	4			0.019	1			0.034	2			0.019	1			0.033	2			0.029	1		
	4	0.021	4			0.060	4			0.019	4			0.034	1			0.019	1			0.033	1			0.028	1		
	Mean	0.022	4			0.070	1			0.020	1			0.034	1			0.020	1			0.033	1			0.030	1		
Method 1 - Bridge Model																													
	1	**0.94**	4	s		**0.71**	3	t		**0.97**	4	s		**0.86**	5	s		1.02	1	s	*	**0.57**	4	s	*	**0.79**	3	s	
	2	**0.57**	3	s	*	**0.68**	5	s		**0.79**	2	s	*	**0.55**	5	s		**0.51**	1	s	*	**0.68**	2	s	*	**0.69**	4	s	
	3	**0.73**	5	s	*	**0.69**	3	s	*	**0.44**	1	t	*	**0.86**	4	t		**0.67**	5	s	*	**0.70**	2	s	*	**0.88**	3	t	*
	4	**0.59**	1	t	*	**0.72**	1	s	*	**0.38**	1	t	*	**0.80**	3	t	*	**0.73**	3	s	*	**0.66**	5	s		**0.78**	1	s	*
	Mean	**0.79**	2	s	*	**0.78**	5	s	*	**0.71**	1	t	*	**0.83**	5	s		**0.79**	1	s	*	**0.73**	4	s	*	**0.81**	1	s	*
Method 2 - Standard PC																													
	1	**0.93**	2	s		**0.87**	5	t		0.97	2	s		1.03	2	s		0.98	2	s		**0.92**	4	t		**0.81**	5	s	*
	2	**0.75**	4	s		**0.82**	5	t		0.82	4	s		1.05	4	s	*	**0.80**	2	s		**0.91**	5	s		**0.78**	4	t	
	3	**0.93**	2	s	*	**0.66**	4	t	*	0.93	2	s		**0.92**	3	s		**0.95**	5	t		**0.80**	4	s	*	**0.99**	2	t	
	4	**0.88**	2	s		**0.79**	3	t	*	0.86	2	t	*	**0.84**	5	s		**0.89**	2	s		**0.81**	2	s	*	1.01	1	s	*
	Mean	**0.90**	2	s		**0.80**	4	t	*	0.89	2	s		1.00	3	s		**0.90**	2	s		**0.90**	2	s	*	**0.91**	2	s	
Method 3 - Targeted PC																													
	1	1.08	1	t		**0.71**	5	t	*	1.13	1	t		**0.87**	4	s		1.03	2	s		**0.98**	5	t		**0.81**	1	s	
	2	**0.77**	3	s		**0.86**	2	t		**0.62**	4	s		1.00	2	s		**0.79**	1	s		**0.86**	4	s		**0.81**	3	s	
	3	**0.89**	2	s		**0.68**	5	t	*	**0.93**	1	s		1.00	1	s		**0.66**	3	t	*	**0.89**	1	t	*	**0.94**	3	s	*
	4	**0.84**	4	s		**0.78**	1	t	*	**0.84**	1	t	*	**0.77**	5	s		**0.87**	2	t		**0.97**	5	s	*	**0.94**	5	s	*
	Mean	**0.89**	2	s	*	**0.82**	4	t	*	**0.97**	1	s		**0.99**	4	s		**0.93**	1	s		**0.97**	1	t	*	**0.90**	1	s	
Method 4 - Weighted PC																													
	1	1.07	1	s		**0.96**	1	t		1.13	1	s		1.05	1	t		1.15	1	s		**0.98**	1	s		**0.92**	1	s	*
	2	1.04	1	s		**0.97**	1	t		1.04	1	s		1.04	1	t		**0.92**	1	s		**0.99**	1	t		**0.98**	1	s	
	3	1.01	1	s	*	**0.93**	1	s	*	1.13	1	t		1.06	1	t		1.17	1	t		**0.79**	1	s	*	**0.94**	1	s	
	4	**0.96**	1	t	*	0.85	1	s	*	**0.99**	1	t	*	1.04	1	t		1.04	1	t		**0.85**	1	s	*	**0.95**	1	s	
	Mean	1.02	1	t	*	0.90	1	s	*	1.04	1	t	*	1.05	1	t		1.07	1	t		**0.90**	1	s	*	**0.96**	1	s	
Method 5 - Correlation Oriented PC																													
	1	**0.95**	2	s		**0.84**	5	t		**0.99**	2	s		1.04	2	s		1.03	2	s		**0.95**	4	s	*	**0.89**	2	s	
	2	**0.92**	2	s		**0.89**	3	t		**0.92**	2	s		1.02	2	s		**0.84**	2	s		**0.92**	5	s		**0.82**	4	t	
	3	**0.99**	2	s		**0.83**	4	t	*	1.12	2	s		**0.97**	4	s		1.12	2	s		**0.79**	1	s	*	**0.95**	1	s	
	4	**0.89**	2	s		**0.76**	3	t	*	**0.93**	5	t	*	**0.86**	4	s		**0.91**	2	s		**0.78**	2	s	*	0.96	1	s	
	Mean	**0.93**	2	s		**0.84**	5	t		**0.95**	2	s		**0.98**	4	s		**0.96**	2	s		**0.90**	1	s	*	0.93	2	s	
Method 6 - PLS																													
	1	**0.88**	2	s	*	1.03	1	s	*	**0.86**	2	s		**0.80**	5	t		**0.89**	2	s		**0.89**	2	s	*	**0.74**	4	t	
	2	**0.91**	4	t		**0.99**	1	t	*	**0.83**	2	s		0.81	5	t		**0.74**	2	t	*	**0.87**	4	t		**0.76**	2	s	
	3	**0.90**	4	t	*	1.22	1	t		**0.87**	5	t		**0.85**	5	t		**0.90**	5	t	*	**0.97**	4	s		**0.87**	1	s	
	4	**0.96**	4	s		1.26	1	t		**0.94**	2	s		0.84	4	t		**0.93**	4	s		**0.95**	4	s		**0.88**	1	s	*
	Mean	**0.95**	4	t	*	1.05	1	t	*	**0.86**	2	s		**0.82**	5	t		**0.90**	2	s		**0.97**	4	t	*	**0.85**	2	s	

Source: Authors' calculations.

Table 2

OUT-OF-SAMPLE RMSE FOR YEAR-ON-YEAR FORECASTS

		Overall				Public				Private				Private Residential				Private Productive				Construction				Overall excl. construction			
		Specification				Specification				Specification				Specification				Specification				Specification				Specification			
		Initial				Initial				Initial				Initial				Initial				Initial				Initial			
		RMSE	k	Dat	AR	RMSE	k	Dat	AR	RMSE	k	Dat	AR	RMSE	k	Dat	AR	RMSE	k	Dat	AR	RMSE	k	Dat	AR	RMSE	k	Dat	AR
	h		(1)	(2)	(3)		(1)	(2)	(3)		(1)	(2)	(3)		(1)	(2)	(3)		(1)	(2)	(3)		(1)	(2)	(3)		(1)	(2)	(3)
Method 0 - AR Model	1	0.026	2			0.094	3			0.022	1			0.030	4			0.022	1			0.033	4			0.029	1		
	2	0.035	4			0.091	3			0.033	4			0.040	2			0.034	4			0.045	3			0.041	1		
	3	0.041	2			0.131	2			0.035	1			0.036	1			0.036	1			0.054	4			0.043	1		
	4	0.040	2			0.143	4			0.032	2			0.034	1			0.034	2			0.055	4			0.044	1		
	Mean	0.036	3			0.122	3			0.031	2			0.036	1			0.032	2			0.048	4			0.039	1		
Method 1 - Bridge Model																													
	1	**0.85**	1	t	*	**0.78**	5	s	*	**0.88**	2	t	*	**0.82**	2	t	*	**0.98**	1	t	*	**0.79**	5	t	*	1.04	1	t	*
	2	**0.79**	3	s	*	**0.63**	5	s	*	**0.80**	4	s		**0.72**	3	t		1.12	1	t	*	**0.52**	5	s	*	**0.89**	4	s	*
	3	**0.65**	2	t	*	**0.53**	4	s	*	**0.43**	2	t	*	**0.95**	3	t	*	**0.63**	1	s	*	**0.59**	3	t	*	**0.47**	5	t	*
	4	**0.72**	5	t		**0.60**	4	t	*	**0.49**	1	s	*	1.12	5	t	*	**0.57**	1	t	*	**0.59**	5	t	*	**0.62**	5	s	*
	Mean	**0.89**	5	s	*	**0.62**	4	s	*	**0.83**	4	s	*	1.06	3	t	*	**0.86**	1	t	*	**0.66**	5	t	*	**0.80**	3	s	*
Method 2 - Standard PC																													
	1	0.88	2	s	*	**0.92**	5	s	*	1.08	1	t	*	1.00	2	s	*	1.05	1	t	*	**0.78**	1	s	*	**0.90**	2	t	*
	2	**0.57**	2	s	*	**0.84**	1	s	*	**0.61**	2	s	*	**0.96**	5	s		**0.63**	2	s		**0.62**	1	s	*	**0.62**	2	s	
	3	**0.53**	2	s	*	**0.87**	1	s	*	**0.50**	2	s	*	**0.95**	2	t		**0.48**	2	s	*	**0.58**	1	s	*	**0.55**	2	s	*
	4	**0.65**	2	t	*	**0.65**	4	t	*	**0.66**	2	s	*	**0.97**	2	t		**0.74**	2	s	*	**0.51**	1	t	*	**0.72**	1	s	*
	Mean	**0.65**	2	s	*	**0.79**	4	t	*	**0.68**	2	s	*	**0.99**	3	s	*	**0.70**	2	s	*	**0.63**	1	s	*	**0.74**	2	s	*
Method 3 - Targeted PC																													
	1	**0.94**	1	t	*	**0.84**	2	s	*	1.08	1	t	*	1.07	1	t	*	1.05	1	t	*	**0.76**	2	s	*	0.92	2	s	*
	2	**0.59**	4	s	*	**0.83**	2	t	*	**0.61**	2	s	*	**0.93**	4	s	*	**0.81**	3	s	*	**0.62**	1	s	*	**0.52**	1	s	
	3	**0.70**	3	s	*	**0.86**	2	s	*	**0.45**	3	s	*	1.07	4	t		**0.48**	2	s	*	**0.58**	1	s	*	**0.49**	1	s	
	4	**0.78**	4	s	*	**0.66**	4	t	*	**0.59**	2	t	*	**0.82**	3	s	*	**0.65**	1	s		**0.49**	5	t	*	**0.82**	4	s	*
	Mean	**0.78**	3	s	*	**0.76**	2	t	*	**0.70**	3	s	*	1.04	3	s	*	**0.78**	1	s	*	**0.63**	1	s	*	**0.78**	1	s	*
Method 4 - Weighted PC																													
	1	**0.93**	1	s	*	**0.93**	1	s	*	1.08	1	t	*	1.06	1	t	*	1.05	1	t	*	**0.80**	1	s	*	1.05	1	t	*
	2	**0.94**	1	t	*	**0.85**	1	s	*	1.02	1	t	*	1.06	1	s		1.00	1	t	*	**0.62**	1	s	*	1.10	1	t	*
	3	1.01	1	s	*	**0.87**	1	s	*	1.22	1	s		1.30	1	t		1.05	1	t	*	**0.57**	1	s	*	1.07	1	s	*
	4	1.11	1	t		**0.78**	1	s	*	1.38	1	t	*	1.33	1	t		1.20	1	t	*	**0.49**	1	t	*	**0.99**	1	s	
	Mean	1.01	1	t	*	**0.80**	1	s	*	1.17	1	t	*	1.26	1	t		1.07	1	t	*	**0.62**	1	s	*	1.06	1	s	*
Method 5 - Correlation Oriented PC																													
	1	**0.92**	1	t	*	**0.90**	5	s	*	1.06	1	t	*	1.02	1	t	*	1.11	1	s	*	**0.83**	1	s	*	**0.93**	2	t	*
	2	**0.64**	2	s	*	**0.84**	1	s	*	**0.62**	2	s	*	**0.87**	2	s	*	**0.70**	2	s		**0.62**	1	s	*	**0.65**	2	s	
	3	**0.60**	2	s	*	**0.84**	1	s	*	**0.60**	2	s	*	1.07	2	t		**0.67**	2	s	*	**0.56**	1	s	*	**0.74**	2	t	*
	4	**0.70**	2	s	*	**0.70**	3	t	*	**0.72**	2	s	*	**0.97**	2	t		**0.67**	2	s	*	**0.50**	1	t	*	**0.66**	1	s	*
	Mean	**0.69**	2	s	*	**0.78**	1	s	*	**0.73**	2	s	*	1.03	3	s	*	**0.75**	2	s	*	**0.62**	1	s	*	**0.80**	2	t	*
Method 6 - PLS																													
	1	1.61	4	t		1.77	1	t		1.29	2	s	*	1.26	2	t	*	1.33	2	t	*	1.71	1	t		**0.98**	4	t	
	2	1.17	2	t	*	1.85	1	t		**0.78**	2	t	*	**0.89**	2	t		**0.78**	4	t	*	1.27	1	t		**0.75**	2	t	*
	3	**0.98**	2	s	*	1.27	1	t	*	**0.82**	2	s		1.07	2	t	*	**0.76**	2	t		1.12	1	s		**0.77**	2	s	
	4	1.09	2	s	*	1.21	1	t		**0.94**	2	s		1.11	2	s	*	**0.89**	2	s		1.14	1	s		**0.69**	1	s	*
	Mean	1.19	2	s	*	1.38	1	t		**0.95**	2	s		1.10	2	t	*	**0.94**	2	t		1.27	1	t		**0.85**	4	t	

Source: Authors' calculations.

Table 3 (to be continued)

OUT-OF-SAMPLE RMSE FOR GFCF QUARTER-ON-QUARTER FORECASTS

		Overall							Public						Private						Private Residential						Private Productive						Construction						Overall excl. construction					
		Specification							Specification						Specification						Specification						Specification						Specification						Specification					
		Initial		Final					Initial		Final				Initial		Final				Initial		Final				Initial		Final				Initial		Final				Initial		Final			
		RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind
	h		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)
Method 0	1	0.021	1					0.069	1					0.018	1					0.034	2					0.018	1					0.033	1					0.030	1				
- AR Model	2	0.022	3					0.069	1					0.020	4					0.034	1					0.023	2					0.033	1					0.032	3				
	3	0.021	1					0.061	4					0.019	1					0.034	2					0.019	1					0.033	2					0.029	1				
	4	0.021	4					0.060	4					0.019	4					0.034	1					0.019	1					0.033	1					0.028	1				
	Mean	0.022	4					0.070	1					0.020	1					0.034	1					0.020	1					0.033	1					0.030	1				
Method 1	1	**1.03**	4	s		*		**0.79**	3	s		*		**1.14**	1	t	*	*		**0.91**	1	s	*	*		**1.02**	1	s	*	*		**0.57**	4	s	*	*		**0.80**	2	s		*	
- Just surveys	2	**0.57**	3	s		*		**0.82**	5	s		*		**0.79**	2	s		*		**0.61**	5	s		*		**0.51**	1	s		*		**0.68**	2	s		*		**0.72**	4	s		*	
	3	**0.73**	5	s		*		**0.69**	3	s	*	*		**0.44**	1	t		*		**0.88**	1	t		*		**0.67**	5	s		*		**0.70**	2	s		*		**0.88**	3	t		*	
	4	**0.59**	1	t	*	*		**0.72**	1	s	*	*		**0.38**	1	t	*	*		**0.80**	3	t		*		**0.73**	3	s	*	*		**0.71**	5	s		*		**0.78**	1	s	*	*	
	Mean	**0.79**	2	s				**0.78**	5	s				**0.71**	1	t				**0.87**	5	s				**0.79**	1	s				**0.73**	4	s				**0.81**	1	s			
Indicator 1	1	1.01	4	s		*		**0.77**	4	s		*		1.14	1	t	*	*		**0.91**	1	s	*	*		1.02	1	s	*	*		**0.57**	4	s	*	*		**0.77**	2	s		*	
- Sales of heavy	2	**0.56**	3	s		*		**0.73**	4	s		*		**0.66**	2	s		*	*	**0.52**	4	s	*	*	*	**0.51**	1	s		*		**0.66**	2	s		*		**0.75**	1	s		*	*
commercial	3	**0.73**	5	s		*		**0.72**	3	s	*	*		**0.44**	1	t		*		**0.68**	5	s	*	*	*	**0.67**	5	s		*		**0.65**	5	s	*	*		**0.90**	1	s		*	
vehicles	4	**0.65**	1	t	*	*	*	**0.80**	2	t	*	*		**0.41**	1	t	*	*	*	**0.80**	3	t		*		**0.66**	3	s	*	*	*	**0.71**	4	s		*		**0.77**	1	s	*	*	
	Mean	**0.80**	4	s				**0.78**	2	s				**0.72**	1	t				**0.80**	5	s				**0.79**	1	s				**0.69**	4	s				**0.80**	1	s			
Indicator 2	1	1.05	2	t		*	*	**0.78**	3	s		*		1.07	2	t	*	*	*	**0.91**	1	s	*	*		**0.95**	1	s	*	*	*	**0.62**	4	s	*	*		**0.80**	2	s		*	
- IPI	2	**0.57**	3	s		*		**0.82**	5	s		*		**0.79**	2	s		*		**0.61**	5	s		*		**0.53**	1	s		*		**0.71**	1	s	*	*	*	**0.69**	3	s		*	
	3	**0.73**	2	t		*		**0.72**	3	s	*	*		**0.44**	1	t		*		**0.88**	1	t		*		**0.67**	5	s		*		**0.70**	2	s		*		**0.87**	3	t		*	*
	4	**0.60**	1	t	*	*	*	**0.72**	1	s	*	*		**0.40**	1	t	*	*	*	**0.69**	2	t	*	*	*	**0.73**	3	s	*	*		**0.64**	5	s	*	*	*	**0.78**	1	s	*	*	
	Mean	**0.79**	2	s				**0.75**	5	s				**0.71**	1	t				**0.84**	5	s				**0.78**	1	s				**0.74**	4	s				**0.80**	1	s			
Indicator 3	1	1.01	2	t		*	*	**0.79**	3	s		*		1.10	2	t		*	*	**0.89**	1	s	*	*	*	1.08	1	s		*	*	**0.75**	4	s	*	*	*	**0.81**	2	s		*	
- IPI -	2	**0.56**	2	s		*		**0.78**	5	s		*		**0.81**	2	s		*		**0.61**	5	s		*		**0.51**	1	s		*		**0.68**	2	s		*		**0.72**	4	s		*	
Investment	3	**0.78**	5	s		*	*	**0.72**	1	s	*	*		**0.54**	1	t		*		**0.93**	5	s		*		**0.74**	5	s		*	*	**0.73**	5	s	*	*		**0.84**	3	t		*	
goods	4	**0.79**	2	t	*	*		**0.71**	1	s	*	*		**0.56**	1	t	*	*	*	**0.90**	1	s		*	*	**0.73**	3	s	*	*		**0.74**	4	s		*		**0.78**	1	s	*	*	
	Mean	**0.79**	2	s				**0.77**	1	s				**0.80**	1	t				**0.89**	5	s				**0.82**	1	s				**0.75**	4	s				**0.82**	1	s			
Indicator 4	1	**0.85**	2	t		*	*	**0.79**	3	s		*		**0.99**	2	t		*	*	**0.91**	1	s	*	*		1.00	1	s	*	*	*	**0.57**	4	s	*	*		**0.86**	2	s	*	*	*
- IPI	2	**0.50**	4	s	*	*	*	**0.76**	5	s		*		**0.69**	3	s		*	*	**0.61**	5	s		*		**0.66**	1	s	*	*	*	**0.62**	5	s	*	*		**0.71**	4	s		*	*
Transportation	3	**0.61**	5	s	*	*	*	**0.70**	3	s	*	*		**0.44**	1	t		*	*	**0.95**	5	s	*	*	*	**0.64**	5	s		*	*	**0.66**	2	s		*	*	**0.82**	3	t		*	*
equipment	4	**0.62**	1	t	*	*	*	**0.63**	1	s	*	*		**0.43**	1	t	*	*	*	**0.85**	2	t		*	*	**0.73**	3	s	*	*		**0.71**	5	s		*		**0.76**	1	s	*	*	
manufacture	Mean	**0.72**	2	s				**0.75**	1	s				**0.71**	1	t				**0.90**	5	s				**0.83**	1	s				**0.71**	5	s				**0.81**	1	s			

Table 3 (continued)

OUT-OF-SAMPLE RMSE FOR GFCF QUARTER-ON-QUARTER FORECASTS

		Overall							Public							Private							Private Residential							Private Productive							Construction							Overall excl. construction						
		Specification							Specification							Specification							Specification							Specification							Specification							Specification						
		Initial		Final					Initial		Final					Initial		Final					Initial		Final					Initial		Final					Initial		Final					Initial		Final				
		RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind
	h		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)
Indicator 5	1	1.14	1	t		*		**0.76**	3	s		*	*	1.20	2	t		*	*	**0.91**	1	s	*	*		1.33	1	s		*	*	**0.86**	4	s	*	*	*	**0.95**	2	s		*	*
- IPI Investment	2	**0.57**	3	s		*		**0.87**	5	s		*		**0.79**	2	s		*		**0.61**	5	s		*	*	**0.49**	1	s		*		**0.67**	2	s		*		**0.76**	4	s		*	*
goods	3	**0.65**	2	s		*		**0.64**	5	t	*	*	*	**0.47**	1	t		*		**0.87**	2	s		*		**0.64**	5	s		*		**0.70**	2	s		*		**0.91**	1	s		*	
excluding	4	**0.59**	1	t	*	*		**0.72**	1	s	*	*		**0.46**	1	s	*	*		**0.73**	2	t		*		**0.67**	2	s	*	*		**0.75**	1	s	*	*		**0.79**	1	t	*	*	
transportation equipment	Mean	**0.83**	2	s				**0.79**	2	t				**0.83**	2	s				**0.90**	5	s				**0.85**	1	s				**0.83**	2	s				**0.88**	1	s			
Indicator 6	1	**0.85**	1	t	*	*	*	**0.81**	2	s	*	*	*	1.01	2	t	*	*	*	**0.57**	1	s		*	*	1.13	2	s		*	*	**0.52**	2	s	*	*	*	**0.97**	2	s		*	*
- Cement sales	2	**0.57**	3	s		*		**0.77**	4	s		*		**0.79**	2	s		*		**0.63**	5	s		*		**0.61**	1	s		*		**0.70**	5	s	*	*	*	**0.72**	4	s		*	
	3	**0.73**	3	s		*		**0.65**	2	s	*	*	*	**0.74**	1	t	*	*	*	**0.88**	1	t		*		**0.67**	1	s		*		**0.47**	5	s	*	*		**0.89**	4	s		*	
	4	**0.59**	1	t	*	*		**0.75**	1	t	*		*	**0.38**	1	t	*	*		**0.80**	3	t		*		**0.73**	3	s	*	*		**0.73**	1	s	*	*	*	**0.79**	1	t	*	*	*
	Mean	**0.75**	2	s				**0.75**	1	t				**0.75**	1	t				**0.79**	5	s				**0.82**	2	s				**0.64**	5	s				**0.88**	1	s			
Indicator 7	1	1.03	2	t		*		**0.75**	3	s		*	*	1.14	1	t	*	*		1.08	1	s	*	*		1.02	1	s	*	*		**0.54**	4	s	*	*		**0.82**	1	s		*	
- Imports of	2	**0.57**	3	s		*		**0.79**	1	t	*	*	*	**0.79**	2	s		*		**0.61**	5	s		*		**0.57**	1	s		*		**0.67**	5	s	*	*	*	**0.76**	4	s		*	
cement	3	**0.73**	5	s		*		**0.70**	3	s	*	*		**0.44**	1	t		*		**0.90**	5	s		*		**0.75**	3	s		*		**0.70**	2	s		*		**0.88**	3	t		*	
	4	**0.59**	1	t	*	*		**0.77**	1	s	*	*		**0.38**	1	t	*	*		**0.74**	1	t		*		**0.73**	3	s	*	*		**0.67**	5	s	*	*	*	**0.80**	1	s	*	*	
	Mean	**0.79**	2	s				**0.71**	3	s				**0.71**	1	t				**0.91**	5	s				**0.87**	1	s				**0.70**	5	s				**0.84**	1	s			
Chosen Indicators:	1	**0.74**	2	t	*	*	*	**0.79**	2	s	*		*	**0.98**	2	t	*	*	*	**0.57**	1	s		*	*	1.14	2	s		*	*	**0.51**	2	s		*	*	**0.87**	2	s	*	*	*
(1) IPI transp.	2	**0.52**	2	s		*	*	**0.76**	1	t	*	*	*	**0.73**	2	s		*	*	1.12	2	s	*	*	*	**0.98**	1	t	*		*	**0.70**	1	s	*	*	*	**0.81**	2	s		*	*
equipment, (2)	3	**0.69**	2	s	*	*	*	**0.65**	1	s	*	*	*	**0.65**	1	t	*	*	*	1.02	1	t		*	*	**0.68**	1	s	*	*	*	**0.68**	2	s		*	*	**0.81**	1	s		*	*
Cement sales	4	**0.62**	1	t	*	*	*	**0.63**	1	s	*		*	**0.43**	1	t	*	*	*	**0.90**	1	s		*	*	**0.75**	2	s	*	*		**0.76**	1	s	*	*	*	**0.81**	2	t	*	*	*
and (3) Cement imports	Mean	**0.69**	2	s				**0.68**	1	s				**0.75**	1	t				**0.96**	1	t				**0.91**	2	s				**0.70**	1	s				**0.85**	2	s			

Source: Authors' calculations.

Table 4 (to be continued)

OUT-OF-SAMPLE RMSE FOR GFCF YEAR-ON-YEAR FORECASTS

		Overall						Public						Private						Private Residential						Private Productive						Construction						Overall excl. construction					
		Specification						Specification						Specification						Specification						Specification						Specification						Specification					
		Initial		Final				Initial		Final				Initial		Final				Initial		Final				Initial		Final				Initial		Final				Initial		Final			
		RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind
	h		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)
Method 0	1	0.026	2					0.094	3					0.022	1					0.030	4					0.022	1					0.033	4					0.029	1				
- AR Model	2	0.035	4					0.091	3					0.033	4					0.040	2					0.034	4					0.045	3					0.041	1				
	3	0.041	2					0.131	2					0.035	1					0.036	1					0.036	1					0.054	4					0.043	1				
	4	0.040	2					0.143	4					0.032	2					0.034	1					0.034	2					0.055	4					0.044	1				
	Mean	0.036	3					0.122	3					0.031	2					0.036	1					0.032	2					0.048	4					0.039	1				
Method 1	1	**0.85**	1	t	*	*		**0.78**	5	s	*	*		**0.88**	2	t	*	*		**0.82**	2	t	*	*		**0.98**	1	t	*	*		**0.79**	5	t	*	*		1.04	1	t	*	*	
- Just surveys	2	**0.79**	3	s	*	*		**0.63**	5	s	*	*		**0.87**	4	s	*	*		**0.88**	1	t	*	*		1.12	1	t	*	*		**0.52**	5	s	*	*		**0.89**	4	s	*	*	
	3	**0.65**	2	t	*	*		**0.53**	4	s	*	*		**0.43**	2	t	*	*		**0.95**	3	t	*	*		**0.63**	1	s	*	*		**0.59**	3	t	*	*		**0.47**	5	t	*	*	
	4	**0.77**	4	t	*	*		**0.60**	4	t	*	*		**0.49**	1	s	*	*		1.12	5	t	*	*		**0.57**	1	t	*	*		**0.59**	5	t	*	*		**0.62**	5	s	*	*	
	Mean	**0.89**	5	s				**0.62**	4	s				**0.83**	4	s				1.06	3	t				**0.86**	1	t				**0.66**	5	t				**0.80**	3	s			
Indicator 1	1	**0.85**	1	t	*	*		**0.78**	5	s	*	*		1.01	2	t	*	*		1.24	2	t	*	*	*	**0.99**	3	s	*	*		**0.89**	2	t	*	*		1.04	1	t	*	*	
- Sales of heavy	2	**0.76**	3	s	*	*		**0.79**	5	s	*	*		**0.80**	4	t	*	*		**0.81**	1	t	*	*	*	**0.96**	5	s	*	*		**0.47**	5	s	*	*		**0.95**	5	t	*	*	
commercial	3	**0.65**	2	t	*	*		**0.57**	4	s	*	*		**0.43**	2	t	*	*		**0.95**	2	t	*	*	*	**0.54**	1	s	*	*	*	**0.52**	3	t	*	*	*	**0.53**	5	t	*	*	
vehicles	4	**0.77**	4	t	*	*		**0.62**	4	t	*	*		**0.54**	1	s	*	*		1.04	5	t	*	*	*	**0.68**	2	s	*	*		**0.59**	5	t	*	*		**0.65**	2	s		*	
	Mean	**0.86**	3	s				**0.69**	4	s				**0.83**	5	t				1.07	5	t				**0.83**	2	s				**0.70**	5	s				**0.81**	2	s			
Indicador 2	1	**0.79**	1	t	*	*	*	**0.71**	4	s	*	*	*	**0.88**	2	t	*	*		**0.79**	2	t	*	*	*	**0.98**	1	t	*	*		**0.90**	5	t	*	*		1.04	1	t	*	*	
- IPI -	2	**0.78**	3	s	*	*	*	**0.66**	5	s	*	*	*	**0.87**	4	s	*	*	*	**0.85**	1	t	*	*	*	1.05	1	t	*	*	*	**0.50**	5	s	*	*		**0.77**	4	s	*	*	*
Investment	3	**0.65**	5	s	*	*		**0.49**	4	s	*	*		**0.43**	2	t	*	*		1.00	3	t	*	*	*	**0.63**	1	s	*	*		**0.58**	3	t	*	*		**0.47**	4	t	*	*	*
goods	4	**0.77**	1	s	*	*	*	**0.59**	5	t	*	*		**0.44**	1	s	*	*	*	1.11	5	t	*	*	*	**0.52**	2	t	*	*	*	**0.59**	5	t	*	*		**0.64**	2	s		*	
	Mean	**0.82**	5	s				**0.57**	4	s				**0.80**	2	t				**0.98**	3	t				**0.84**	1	t				**0.69**	4	t				**0.77**	5	s			
Indicator 3	1	**0.67**	5	t	*	*	*	**0.91**	5	s	*	*		**0.71**	1	t	*	*	*	**0.69**	2	t	*	*	*	**0.67**	4	s	*	*	*	**0.87**	2	s	*	*	*	1.10	1	t	*	*	
- IPI -	2	**0.94**	5	s	*	*	*	**0.73**	4	s	*	*		1.14	3	s	*	*		**0.84**	1	t	*	*	*	1.12	1	t	*	*		**0.52**	5	s	*	*		**0.88**	4	s	*	*	
Investment	3	**0.54**	2	t	*	*	*	**0.53**	4	s	*	*	*	**0.43**	2	t	*	*		**0.99**	2	t	*	*		**0.63**	1	s	*	*		**0.63**	5	s	*	*		**0.47**	5	t	*	*	
goods	4	**0.77**	4	t	*	*		**0.63**	4	t	*	*		**0.49**	1	s	*	*		1.01	5	t	*	*		**0.57**	1	t	*	*		**0.71**	5	t	*	*		**0.64**	2	s		*	
	Mean	**0.80**	2	t				**0.66**	4	s				**0.79**	2	t				**0.97**	5	t				**0.84**	4	s				**0.72**	4	t				**0.79**	3	s			
Indicador 4	1	**0.31**	5	t	*	*	*	**0.75**	3	s	*	*		**0.57**	1	t	*	*	*	**0.63**	3	t	*	*	*	**0.49**	4	s	*	*	*	**0.73**	2	s	*	*	*	**0.98**	1	t	*	*	*
- IPI	2	**0.83**	5	t	*	*	*	**0.64**	5	s	*	*		**0.79**	4	s	*	*	*	**0.80**	5	t	*	*	*	**0.97**	5	s	*	*	*	**0.40**	4	t	*	*		**0.70**	5	s	*	*	*
Transportation	3	**0.53**	2	t	*	*	*	**0.62**	4	s	*	*		**0.43**	2	t	*	*		**0.90**	2	t	*	*	*	**0.63**	1	s	*	*		**0.55**	3	t	*	*		**0.37**	5	t	*	*	*
equipment	4	**0.77**	4	t	*	*		**0.58**	4	t	*	*		**0.58**	4	s	*	*	*	1.12	5	t	*	*		**0.55**	2	t	*	*		**0.79**	4	t	*	*		**0.64**	2	s		*	
manufacture	Mean	**0.71**	2	t				**0.64**	4	s				**0.75**	4	s				**0.95**	5	t				**0.77**	4	s				**0.63**	4	t				**0.77**	5	s			

Table 4 (continued)

OUT-OF-SAMPLE RMSE FOR GFCF YEAR-ON-YEAR FORECASTS

		Overall							Public						Private						Private Residential						Private Productive						Construction						Overall excl. construction					
		Specification							Specification						Specification						Specification						Specification						Specification						Specification					
		Initial		Final					Initial		Final				Initial		Final				Initial		Final				Initial		Final				Initial		Final				Initial		Final			
		RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind	RMSE	k	Dat	AR	Sur	Ind
	h		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)
Indicator 5	1	**0.84**	1	s	*	*	*	**0.85**	3	s	*	*		1.00	3	s	*	*	*	**0.94**	4	s	*	*		1.02	1	t	*	*	*	**0.88**	3	s	*	*	*	1.04	3	t	*	*	
- IPI Investment	2	**0.97**	5	s	*	*		**0.76**	3	s	*	*	*	**0.94**	3	s	*	*	*	**0.85**	1	t	*	*	*	1.12	1	t	*	*		**0.49**	5	s	*	*	*	**0.89**	4	s	*	*	
goods	3	**0.63**	5	s	*	*	*	**0.58**	4	s	*	*		**0.43**	2	t	*	*		**0.90**	3	t	*	*		**0.54**	2	s	*	*	*	**0.69**	4	t	*	*		**0.47**	5	t	*	*	
excluding	4	**0.70**	5	t	*	*		**0.58**	4	s	*	*	*	**0.60**	1	s	*	*	*	1.12	5	t	*	*		**0.59**	1	t	*	*		**0.78**	5	t	*	*	*	**0.48**	5	s	*	*	*
transportation equipment	Mean	**0.91**	2	t				**0.64**	4	s				**0.82**	4	s				1.06	5	t				**0.85**	1	t				**0.74**	5	s				**0.74**	5	s			
Indicator 6	1	**0.49**	1	t	*	*	*	**0.81**	3	s	*	*		**0.56**	1	t	*	*	*	**0.39**	2	s	*		*	**0.69**	1	t	*	*	*	**0.51**	4	t		*	*	1.02	1	t	*	*	*
- Cement sales	2	**0.86**	3	s	*	*		**0.69**	4	s	*	*		**0.87**	4	s	*	*		**0.86**	1	t	*	*	*	1.08	5	t	*	*	*	**0.59**	5	s	*	*		**0.88**	5	s	*	*	*
	3	**0.77**	2	t	*	*	*	**0.50**	4	s	*	*		**0.46**	2	t	*	*		**0.97**	2	t	*	*		**0.70**	1	s	*	*		**0.59**	3	t	*	*		**0.51**	2	s	*	*	*
	4	**0.77**	4	t	*	*		**0.56**	4	t	*	*		**0.49**	1	s	*	*		1.11	5	s	*	*	*	**0.57**	1	t	*	*		**0.58**	5	t	*	*	*	**0.58**	3	s	*	*	*
	Mean	**0.83**	2	t				**0.63**	4	s				**0.76**	4	s				1.01	5	t				**0.82**	1	t				**0.60**	5	t				**0.78**	3	s			
Indicator 7	1	**0.85**	1	t	*	*		**0.73**	1	t	*	*	*	**0.88**	2	t	*	*		**0.82**	2	t	*	*		**0.98**	1	t	*	*		**0.78**	5	t	*	*		**0.98**	1	t	*	*	*
- Imports of	2	**0.79**	3	s	*	*		**0.75**	5	s	*	*		**0.80**	5	s	*	*		**0.88**	1	t	*	*		**0.93**	1	t	*	*	*	**0.64**	5	s	*	*	*	**0.71**	5	s	*	*	*
cement	3	**0.65**	2	t	*	*		**0.60**	5	t	*	*		**0.43**	2	t	*	*		**0.96**	1	t	*	*		**0.42**	2	t	*	*	*	**0.59**	3	t	*	*		**0.42**	5	t	*	*	*
	4	**0.76**	5	t	*	*		**0.61**	3	t	*	*	*	**0.49**	1	s	*	*		1.12	5	t	*	*		**0.37**	1	t	*	*	*	**0.47**	5	t	*	*	*	**0.49**	1	s	*	*	*
	Mean	**0.87**	2	t				**0.68**	4	s				**0.85**	4	s				1.09	5	t				**0.68**	1	t				**0.64**	5	t				**0.68**	1	s			
Chosen Indicators:	1	**0.35**	1	s	*	*	*	**0.75**	1	t	*	*	*	**0.55**	1	t	*	*	*	**0.57**	1	t	*	*	*	**0.67**	1	t	*	*	*	**0.46**	1	s	*	*	*	**0.90**	1	t	*	*	*
(1) IPI transp.	2	**0.96**	1	t	*	*	*	**0.79**	2	s	*	*		1.13	2	s	*	*	*	**0.80**	1	t	*	*	*	1.04	1	t	*	*	*	**0.70**	1	s	*	*	*	1.11	1	t	*	*	*
equipment, (2)	3	**0.77**	2	t	*	*	*	**0.70**	2	s	*	*		**0.44**	2	t	*	*		**0.48**	2	t	*	*	*	**0.47**	2	t	*	*	*	**0.76**	2	t	*	*	*	**0.44**	2	s	*	*	*
Cement sales	4	**0.79**	1	s	*	*		**0.71**	2	t	*	*	*	**0.61**	1	s	*	*		1.71	1	s	*	*	*	**0.34**	1	t	*	*	*	**0.63**	1	t		*	*	**0.53**	1	s	*	*	*
and (3) Cement Imports	Mean	**0.76**	2	t				**0.69**	2	s				**0.80**	2	t				1.03	2	t				**0.65**	1	t				**0.73**	1	t				**0.75**	2	s			

Source: Authors' calculations.

CHRONOLOGY OF MAJOR FINANCIAL MEASURES

January to December 2008

January

- 3 January (Decree-Law No 1/2008, Official Gazette No 2, Series I, Ministry of Finance and Public Administration)

Introduces changes to the Legal Framework of Credit Institutions and Financial Companies, approved by Decree-Law No 298/92 of 31 December and amended by Decree-Laws No 246/95 of 14 September 1995, No 232/96 of 5 December 1996, No 222/99 of 22 June 1999, No 250/2000 of 13 October, No 285/2001 of 3 November, No 201/2002 of 26 September, No 319/2002 of 28 December, No 252/2003 of 17 October, No 145/2006 of 31 July, No 104/2007 of 3 April and No 357-A/2007of 31 October. It amends a number of articles, adds a few others and revokes Articles 89 and 90 of the said Decree-Law, re-published in full in an annex (consolidated version). This Decree-Law establishes the market conduct supervision of credit institutions and financial companies, within the framework of the tasks of Banco de Portugal, thus reinforcing its supervisory powers. This Decree-Law shall enter into force on the day following its publication.

- 4 January (Circular Letter of Banco de Portugal No 3/2008/DET, Treasury and Issue Department)

Informs, within the scope of the framework for implementation of Decree-Law No 195/2007 of 15 May, with regard to the conclusion of contracts on euro banknote recycling, that in December 2007 Banco de Portugal signed a contract with the cash-in-transit company LOOMIS, S.A.

- 9 January (Circular Letter of Banco de Portugal No 1/08/DSBDR, Banking Supervision Department)

Conveys the understanding of Banco de Portugal as to the interpretation of Article 3 of Decree-Law No 240/2006 of 22 December with regard to the periodicity of revision of the benchmark used in variable-rate credit operations.

- 15 January (Notice of Banco de Portugal No 1/2008, Official Gazette No 15, Series II)

Under the terms and for the purposes of the provisions of Article 13(1) of Decree-Law No 221/2000 of 9 September, it determines which payment systems will benefit from the irrevocability of transfer orders and the enforceability of collateral set up on behalf of a participant or a bank integrating the European System of Central Banks (ESCB). This notice enters into force on 18 February 2008, or on the date of the actual migration of TARGET2-PT to the Single Shared Platform of TARGET2, if this migration can only occur on a later date.

- 15 January (Instruction of Banco de Portugal No 33/2007, BNBP 01/2008)

Regulates the operation of the Target 2 national system.

- 15 January (Instruction of Banco de Portugal No 34/2007, BNBP 01/2008)

Regulates the participation in the Large-Value Payment System (RTGS2).

- 15 January (Instruction of Banco de Portugal No 35/2007, BNBP 01/2008)

Creates the Intraday Credit Market.

- 15 January (Instruction of Banco de Portugal No 36/2007, BNBP 01/2008)

Amends Instruction No 25/2003, published in the Official Bulletin No 10 of 15 October 2003, with regard to the close of Financial Clearing and Settlement in the EFT System for the processing of operations sent and received within the scope of SEPA.

- 16 January 2008 (Circular Letter of Banco de Portugal No 5/2008/DET. Treasury and Issue Department)

Informs that Banco de Portugal will disseminate to the banking system requests for information submitted to it by individual persons, relating to the identification of bank accounts and/or other financial assets of deceased relatives. For that purpose, Banco de Portugal will make available, on the Bank Customer-oriented website, a form named "Request for the location of financial assets in case of death of the respective holders", which will allow for the filling-in and electronic sending of the request, as well as its printing and later forwarding by mail.

- 18 January (Circular Letter No 6/2008/DET Banco de Portugal. Treasury and Issue Department)

Informs, within the scope of the implementation framework set forth in Decree-Law No 195/2007 of 15 May on the contractual obligations relating to the recycling of euro banknotes, that Banco de Portugal has signed a contract with the cash-in-transit company *GRUPO 8 - Vigilância e Prevenção Electrónica, Lda*.

- 23 January (Circular Letter No 8/2008/DET Banco de Portugal. Treasury and Issue Department)

Publishes the procedures to be met in contracts to be signed with Banco de Portugal, arising from the new legal framework governing euro coin recycling, pursuant to Decree-Law No 184/2007 of 10 May. It provides clarification on the contract model to be adopted and informs on the procedures for handling euro coins unfit for circulation and for removing counterfeit coins from circulation. It establishes that the entities shall adjust to the transition period laid down therein, and informs that Banco de Portugal offers its availability in terms of cooperation, training and clarification regarding any issue.

- 24 January (Circular Letter No 6/2008/DSBDR Banco de Portugal. Banking Supervision Department)

Provides information, in the wake of the entry into force of Decree-Law No 371/2007 of 6 November, on the changes to the procedures relating to the Complaints Book to which Credit Institutions and Financial Companies should pay particular attention, with a view to a faster and more efficient treatment of the respective complaints. It also informs that a new service on claims is expected to be available soon, within the scope of BPnet, to be used for the electronic circulation of information flows between credit institutions and Banco de Portugal.

- 30 January (Circular Letter No 8/2008/DSB of 30 January 2008 Banco de Portugal. Banking Supervision Department)

Reminds credit institutions that they shall fully comply with the enforcement of attachments of bank accounts and securities, namely those stemming from the Directorate General of Taxation, with special attention to the applicable provisions of the Code of Civil Procedure. This reminder is provided in the wake of a number of complaints to the Ombudsman's Office. The Ombudsman addressed to the Governor of Banco de Portugal a recommendation pointing to the elimination of procedures adopted by some banking institutions that were deemed to be irregular.

February

- 4 February (Decision No 2727/2008 of 21 December 2007 Ministry of Finance - General Government. Minister's Office Official Gazette No 24 - Series 2

Approves, pursuant to Article 63 (1) of the Organic Law of Banco de Portugal (Law No 5/98 of 31 January), the new Chart of Accounts of Banco de Portugal, to enter into force as of 1 January 2008.

- 6 February Instruction of Banco de Portugal No 1/2008, BNBP 03/2008 (date of entry into force: 8 February 2008)

Introduces changes in Instruction No 4/2002, published in the Official Bulletin No 1 of 15 February 2002, which defines the informa-

tion elements relating to liabilities on account of retirement and survivorship pensions to be supplied to Banco de Portugal.

- 18 February 2008 (Notice of Banco de Portugal No 2/2008, Official Gazette No 38, Series II)

Introduces changes in Notice No 12/91 of 31 December, in compliance with the amendments to the Companies Register, as a result of Simplified Business Information.

March

- 7 March (Parliament Decision No 6/2008, Official Gazette No 51, Series I)

Determines the setting up of a parliamentary committee of inquiry into the exercise of banking, insurance and capital market supervision.

- 17 March (Instruction of Banco de Portugal No 2/2008, BNBP 3/2008)

Revokes Instruction No 27/2000, published in the BNBP No 12 of 15 December 2000.

- 17 March (Instruction of Banco de Portugal No 3/2008, BNBP 3/2008)

Informs that credit institutions adopting the minimum banking services system laid down in Decree-Law No 27-C/2000 of 10 March shall fill in and send to Banco de Portugal, up to 15 January each year, the table in attachment to the present Instruction.

- 17 March (Instruction of Banco de Portugal No 4/2008, BNBP 3/2008)

Lays down the procedures to be followed in the application to the utilisation of internal models by institutions, as regards the calculation of own fund requirements to cover market risks.

- 17 March 2008 (Circular Letter of Banco de Portugal No 27/2008/DET, Treasury and Issue Department)

Makes known that within the framework for the implementation of Decree-Law No 195/2007 of 15 May, Banco de Portugal has entered into a contract with Prosegur - Companhia de Segurança, Lda. (a cash-in-transit company) regarding the euro banknote recycling activity.

- 18 March 2008 (Notice of Banco de Portugal No 3/2008, Official Gazette, Series II)

Lays down that credit institutions must provide clear and accurate information on the balance of demand deposit accounts and defines the concept of “available balance”. This Notice shall apply to all information that mentions the available balance, irrespective of it being provided over-the-counter, by ATMs, banking portals or call centres. This Notice shall enter into force on the 90th day following its publication.

- 26 March 2008 (Circular Letter of Banco de Portugal No 25/2008/DSB, Banking Supervision Department)

Pursuant to the provisions laid down in paragraph 2 of Article 77-A of the Legal Framework of Credit Institutions and Financial Companies, approved by Decree-Law No 298/92 of 31 December, as amended by Decree-Law No 1/2008 of 3 January, defines a set of procedures to be complied with by credit institutions and financial companies when complaints are directly submitted to the Bank against those institutions, and where the Bank considers that the said institutions must be involved in the assessment process.

- 26 March 2008 (Decree-Law No 57/2008, Ministry of Economy and Innovation, Official Gazette No 60, Series I)

Lays down the legal framework applicable to unfair business-to-consumer commercial practices, occurred before, during or after a commercial transaction in relation to a product or service. This Decree-Law transposes into Portuguese law Directive 2005/29/EC of the European Parliament and of the Council of 11 May.

April

- 7 April 2008 (Notice of Banco de Portugal No 4/2008, Official Gazette No 4, Series II)

Makes known that the Board of Directors of Banco de Portugal has decided to close down its agency located in Vila Real, effective from 31 May 2008.

- 17 April (Circular Letter No 30/08/DSBDR Banco de Portugal. Banking Supervision Department)

With a view to clarifying a number of doubts, it explains the provisions of paragraph 5 of Article 15 (implementation of the IRB approach) of Decree-Law No 104/2007 of 3 April.

- 28 April (Circular Letter No 36/2008/DET Banco de Portugal. Treasury and Issue Department)

In the wake of public complaints on practices involving the refusal to exchange cash and the charging of fees for the mere conduct of such operations, it informs that credit institutions must ensure the carrying out of exchange operations free of charge at their branches, so as not to undermine the trust of the public and other traders in currency circulation.

May

- 15 May (Instruction of Banco de Portugal No 5/2008, BNBP 05/2008)

Amends Instruction No 25/2003 published in the Official Bulletin No 10 of 15 October 2003, as regards the clearing of cheques and of interbank electronic transfers, as well as the closing times of financial clearing and settlement.

- 15 May (Instruction of Banco de Portugal No 6/2008, BNBP 5/2008)

Amends Instruction No 23/2007 published in the Official Bulletin No 8 of 16 August 2007, which laid down the prudential reporting requirements applicable to credit institutions and certain financial companies.

- 15 May (Instruction of Banco de Portugal No 7/2008, BNBP 5/2008)

Revokes Instruction No 18/2004 published in the Official Bulletin No 9 of 15 September 2004, laying down a new framework for the notification and regular reporting of securitisations.

- 15 May (Circular Letter of Banco de Portugal No 30/2008/DSB, Banking Supervision Department)

For the purposes of clarification of some doubts, makes clearer the provisions laid down in Article 15 (5) (implementation of the IRB Approach) of Decree-Law No 104/2007 of 3 April.

- 15 May (Circular Letter of Banco de Portugal No 38/2008/DSB, Banking Supervision Department)

Informs that for the purposes of compliance with the requirement laid down in Circular Letter of Banco de Portugal No 17/2002/DSB regarding the preparation of a report quantifying the economic provisions required to cover the risk implicit in a credit portfolio, Banco de Portugal will thenceforth accept the replacement of the said report with an imparity report, provided that the methods used are consistent and consistency is certified by the external auditors of the respective institutions.

- 29 May (Decree-Law No 88/2008, Official Gazette No 103, Series I, Ministry of Finance and Public Administration)

Harmonizes the criteria to be used in the calculation of the interest rate and respective indexing rate in the situations covered by Decree-Law No 51/2007 of 7 March, adopts the general 360-day count convention for the euro market, regarding the calculation of the interest rates of deposits, within the scope of the provisions laid down in Decree-Law No 430/91 of 2 November, and clarifies the treatment of reference indices for the calculation of interest in terms of the monthly average, set out in credit and financing contracts and

foreseen in Article 3 of Decree-Law No 240/2006 of 22 December. This Decree-Law shall enter into force on the 30th day after its publication.

June

- 5 June (Law No 25/2008 of 5 June, Official Gazette No 108, Series I, Assembly of the Republic)

Lays down measures of a preventive and repressive nature to combat money laundering of illicit origin and terrorist financing, transposing into Portuguese law Directives No 2005/60/EC of the European Parliament and of the Council of 26 October and No 2006/70/EC of the Commission of 1 August on the prevention of the use of the financial system for the purpose of money laundering and terrorist financing.

- 9 June (Deliberation No 1890/2008, Official Gazette No 134, Series II, Banco de Portugal)

Makes public the delegation of powers decided at a meeting of the Board of Directors of Banco de Portugal, held on 9 June 2008.

- 19 June (Regulation of the Securities Market Commission No 3/2008, Official Gazette No 127, Series II)

Amends Regulation of the Securities Market Commission No 2/2007 of 5 November, with a view to achieve convergence between the Securities Market Commission and Banco de Portugal in matters relating to the internal control of financial intermediaries. This Regulation shall enter into force on the 1st day following its publication.

- 24 June (Circular Letter of Banco de Portugal No 47/DET, Treasury and Issue Department)

Makes known that credit institutions can have access to an e-learning training course on "Euro banknote knowledge" developed by Banco de Portugal, through the platform of Instituto de Formação Bancária – WebBANCA.

- 25 June (Notice of Banco de Portugal No 5/2008, Official Gazette No 125, Series II, Part E)

Updates the internal control requirements to be applied to institutions subject to supervision by Banco de Portugal. Enables full harmonisation of the internal control reports required by Banco de Portugal and the Securities Market Commission, by introducing a simplification. Report contents shall be focused on weaknesses, understood as all existing real or potential shortcomings, or the opportunities to introduce improvements that will strengthen the internal control system, replacing the description of procedures. Considering that a minimum period of adaptation has been envisaged, the deadline for submitting the first internal control report has been extended to 31 December 2008. This Notice shall enter into force on the 1st day following its publication.

July

- 15 July (Circular Letter of Banco de Portugal No 46/08/DSBDR, Banking Supervision Department)

Makes known that the recommendations of the Financial Stability Forum (FSF) laid down in its Report of 11 April should be adopted, as well as the recommendations of the Committee of European Banking Supervisors (CEBS) published in the report of 18 June, regarding the transparency of information and the valuation of assets; institutions subject to the bi-annual publication of accounts shall send to Banco de Portugal, through the BPnet system, the annexed questionnaire duly filled in.

- 15 July (Instruction of Banco de Portugal No 8/2008, BNBP 7/2008)

Amends Instruction of Banco de Portugal No 30/2002, published in the Official Bulletin No 10 of 15 October 2002 relating to BPnet.

- 21 July (Decree-Law No 125/2008, Official Gazette No 139, Series I, Ministry of Finance and Public Administration)

Lays down the national measures required for the implementation of Regulation (EC) No 1781/2006 of the European Parliament and of the Council of 15 November 2006 on information on the payer accompanying transfers of funds.

- 21 July (Decree-Law No 126/2008, Official Gazette No 139, Series l, Ministry of Finance and Public Administration)

Introduces changes in the Legal Framework of Credit Institutions and Financial Companies, approved by Decree-Law No 298/92, of 31 December. Within the framework of adoption of "better regulation" principles, these changes are intended, inter alia, to promote convergence of criteria and procedures for assessing the fitness and properness of the members of management and auditing boards of the institutions subject to the supervision of the competent authorities regulating the financial sector.

August

- 18 August (Instruction of Banco de Portugal No 9/2008, BNBP 8/2008)

Defines information to be reported by institutions to Banco de Portugal during the transition period agreed for adjustment to the common policy for the re-circulation of euro banknotes, its frequency and respective reporting period.

- 18 August (Instruction of Banco de Portugal No 10/2008, BNBP 8/2008)

Introduces changes in Instruction No 31/99 of 17 October 2000, as reworded by Instruction No 34/2000 of 15 December 2000.

- 18 August (Instruction of Banco de Portugal No 11/2008, BNBP 8/2008).

Introduces changes in Instruction No 26/2003 (Legal system governing the cheque and its technical specifications) of 15 October 2003.

- 26 August (Decree-Law No 171/2008, Official Gazette No 164, Series I, Ministry of Finance and Public Administration)

Approves borrower protection measures in housing credit regarding the renegotiation of loan conditions and their mobility. This Decree-Law shall enter into force on the 30th day after its publication. At the end of the first year after the date of its entry into force, Banco de Portugal shall prepare and disclose an evaluation report on the impact of its implementation.

September

- 3 September (Instruction of Banco de Portugal No 12/2008, BNBP10/2008)

  Amends Instruction of Banco de Portugal No 19/2006, published in the Official Bulletin No 1 of 17 January 2007, as regards the release on the Website of Banco de Portugal of the accounting documents of branches in Portugal of credit and financial institutions.

- 19 September (Instruction of Banco de Portugal No 13/2008, BNBP10/2008)

  With a view to having available more systematised information on compliance with the provisions laid down in Articles 85 and 109 of the Legal Framework of Credit Institutions and Financial Companies (granting of credit to members of the management or auditing boards), provides for the sending of specific information items to Banco de Portugal.

- 30 September (Circular Letter of Banco de Portugal No 61/08/DSBDR, Banking Supervision Department)

  Conveys the understanding of Banco de Portugal regarding the provisions laid down in paragraph 1 of Article 3 of Decree-Law No 171/2008 of 26 August on the renegotiation of housing credit conditions.

October

- 14 October (Notice of Banco de Portugal No 6/2008, Official Gazette No 202, Series II)

  Amends Notice of Banco de Portugal No 12/92 of 29 December, following the recommendations issued by the Committee of European Banking Supervisors (CEBS), as regards the treatment of unrealised gains and losses in debt securities classified as available-for-sale assets in the calculation of own funds. This Notice shall enter into force one day following its publication.

- 14 October (Notice of Banco de Portugal No 7/2008, Official Gazette No 202, Series II)

  Amends Notice of Banco de Portugal No 12/2001 of 23 November, taking into account the adjustments resulting from the transition to the International Accounting Standards/Adjusted Accounting Standards and, in particular, those resulting from the full adoption of IAS 19. This Notice shall enter into force one day following its publication.

- 14 October (Notice of Banco de Portugal No 8/2008, Official Gazette No 211, Series II)

  Updates the legal framework of the own funds and the solvency ratio of the institutions subject to the supervision of Banco de Portugal, following the publication of Decree-Law No 103/2007 of 3 April, which transposed into Portuguese law Directive 2006/49/EC of the European Parliament and of the Council of 14 June on the capital adequacy of investment firms and credit institutions, and Decree-Law No 104/2007 of 3 April, which transposed into Portuguese law Directive 2006/48/EC of the European Parliament and of the Council of 14 June relating to the taking up and pursuit of the business of credit institutions. This Notice shall enter into force on the day of its publication.

- 14 October (Decree-Law No 204/2008, Official Gazette No 199, Series I, Ministry of Finance and Public Administration)

  Approves, making use of the legislative authorisation granted by Law No 15/2008 of 18 March, the legal framework of the Central Credit Register (*Central de Responsabilidades de Crédito* - CRC).

- 15 October (Instruction of Banco de Portugal No 14/2008, BNBP 10/200)

  Sets at 0.03% the base contributory rate applicable to the calculation of the contribution of each member institution to the Deposit Guarantee Fund in 2009.

• 15 October (Instruction of Banco de Portugal No.15/2008, BNBP 10/200)	Sets at 10% the limit for the irrevocable payment commitment applicable to annual contributions in 2009.
• 17 October (Circular Letter of Banco de Portugal No 2/2008/DMR, Market and Reserve Management Department)	Provides information on the conditions under which resident credit institutions in Portugal may participate in the liquidity-providing operations conducted in USD and CHF through foreign exchange swaps against euro, following the arrangement entered into between the European Central Bank and several central banks.
• 20 October (Law No 60-A/2008, Official Gazette No 203, Series I, Assembly of the Republic)	Announces that the State may offer extraordinary guarantees, in order to reinforce financial stability, and provide liquidity to financial markets. Approves an exceptional regime of guarantees by means of which, the limit set out in Article 105 (1) of Law No 67-A/2007 of 31 December, approving the State Budget for 2008, shall be increased by 20 billion euros, for the guarantees to be granted under the terms of this Law. This Law shall enter into force one day following its publication. Regulated by Executive Order No 1219-A/2008 of 23 October.
• 23 October (Executive Order No 1219-A/2008, Official Gazette No 206, Series I, Ministry of Finance and Public Administration)	Regulates the extraordinary granting of guarantees by the State, in order to reinforce financial stability, and the provision of liquidity to financial markets, set forth in Law No 60-A/2008 of 20 October.
• 28 October (Notice of Banco de Portugal No 9/2008, Official Gazette No 213, Series II)	Amends Notice No 12/92 of 22 December, in order to allow for the full inclusion of active deferred taxes in the calculation of own funds. This Notice shall enter into force one day following its publication.
• 31 October (Circular Letter of Banco de Portugal No 4/2008/DMR, Market and Reserve Management Department)	Makes known, in accordance with the provisions laid down in Article 5 (4) of the Regulation of the European Central Bank on the application of minimum reserves (ECB/2003/9) of 12 September, the time limit for the notification of minimum reserves and the calendar of the maintenance periods in 2009 (quarterly basis reporting).
• 31 October (Circular Letter of Banco de Portugal No 5/2008/DMR, Market and Reserve Management Department)	Makes known, in accordance with the provisions laid down in Article 5 (4) of the Regulation of the European Central Bank on the application of minimum reserves (ECB/2003/9) of 12 September, the time limit for the notification of minimum reserves and the calendar of the maintenance periods in 2009 (quarterly basis reporting).

November

• 3 November (Decree-Law No 211-A/2008 Official Gazette No 213, Series I, Ministry of Finance and Public Administration)	Approves measures to increase the limit of the guarantees of the Deposit Guarantee Fund and Mutual Agricultural Credit Fund, as well as the reporting and transparency obligations within the scope of the financial activity and the coordination powers of the National Council of Financial Supervisors. Up to 31 December 2011, the limit of the guarantee set out in Article 166 (1) of the Legal Framework of Credit Institutions and Financial Companies and in Executive Order No 1340/98 (Series II) of 12 December shall increase from 25,000 euros to 100,000 euros. This Decree-Law is effective as from 12 October 2008.

- 11 November (Law No 62/2008, Official Gazette No 219, Series I, Assembly of the Republic)

Nationalises all shares representing the capital stock of Banco Português de Negócios, S.A. (BPN) and approves the legal framework governing the take over of ownership through nationalisation, pursuant to the provisions of Article 83 of the Constitution of the Portuguese Republic. Through this nationalisation, BPN becomes a sociedade anónima de capitais exclusivamente públicos (public limited company fully owned by the State), and shall continue to be governed by the legal provisions regulating its activity, as well as by its statute, except as otherwise provided for in the legal framework of the State corporate sector and in this Law. The management of BPN is entrusted to Caixa Geral de Depósitos, S.A., which shall appoint the members of the corporate bodies and define within 60 days the respective management objectives. This Law shall enter into force one day following its publication.

- 11 November (Law No 62-A/2008, Official Gazette No.219, Series I, Supplement, Assembly of the Republic)

Nationalises all equity capital of Banco Português de Negócios, S.A., (BPN) and approves the legal system governing public ownership through nationalisation, in compliance with the provisions laid down in Article 83 of the Constitution of the Portuguese Republic. Following this nationalisation, the BPN will hence be a limited company with exclusively public capital, and will continue to be governed by the legal provisions regulating its activity and by its statutes, insofar as these do not run counter to the provisions of the legal system of the public enterprise sector and of the present Law. BPN management shall be the responsibility of Caixa Geral de Depósitos, S.A. that shall appoint the members of the management bodies and shall define, within 60 days, the respective management goals. The present Law enters into force on the day following its publication.

- 17 November (Circular Letter of Banco de Portugal No 72/2008/DET, Treasury and Issue Department)

Establishes the conditions for the exchange of banknotes denominated in Slovak koruna for banknotes and coins in euro, taking into account the tasks of the Eurosystem's national central banks within the scope of ECB/2006/10 Guideline of 24 July on the exchange of banknotes after the irrevocable fixing of exchange rates in connection with the introduction of the euro, as regards the introduction of the euro in Slovakia as at 1 January 2009.

- 20 November (Decree-Law No 225/2008, Official Gazette No 226, Series I, Ministry of Finance and Public Administration)

In use of the legal powers vested in it by Law No 36/2008 of 4 August, it creates the Conselho Nacional de Supervisão de Auditoria (National Council of Audit Supervision) and approves the respective Statutes, transposing into national law part of Directive No 2006/43/EC of the European Parliament and of the Council of 17 May on statutory audits of annual accounts and consolidated accounts. The present Decree-Law enters into force of the day following its publication.

- 24 November (Law No 63-A/2008 Official Gazette No 228, Series I, Supplement, Assembly of the Republic)

Establishes measures intended to strengthen the financial soundness of credit institutions within the scope of the initiative to enhance financial stability and liquidity availability in financial markets. Access to public investment under the present Law is independent of recourse by credit institutions to a state personal guarantee, pursuant to Law No 60-A/2008 of 20 October. The present Law enters into force on the day following its publication.

- 24 November 2008 (Decision No 30830-A/2008, Official Gazette No 231, Series II, Supplement, Ministry of Finance and Public Administration, Office of the Secretary of State for the Treasury and Finance)

  Authorises the State to grant a personal guarantee allowing for the fulfilment of obligations in terms of principal and interest within the scope of the debenture loan to be issued by Caixa Geral de Depósitos, S.A., to an amount of up to €2,000,000,000 and a nominal value of €50,000, with a view to reinforcing liquidity levels and to rebalancing the balance-sheet maturity structure, in order to maintain the levels of lending to households and corporations, in particular to small and medium sized enterprises.

- 25 November (Decision No 31179/2008, Official Gazette No 235, Series II, Part C, Ministry of Finance and Public Administration, Office of the Secretary of State for the Treasury and Finance)

  Authorises the State to grant a personal guarantee allowing for the fulfilment of obligations in terms of principal and interest within the scope of the debenture loan to be issued by Banco Espírito Santo, S.A., to an amount of up to €1,500,000,000 and a nominal value of €50,000, with a view to allowing for compliance with the 2008 financial programme, maintaining a balanced financing structure and adequate liquidity levels, and ensuring the development of lending to households and corporations, in particular to small and medium sized enterprises.

- 27 November (Instruction of Banco de Portugal No 19/2008, BNBP 12/2008)

  Determines the temporary widening of the legal framework governing eligible assets as collateral in Eurosystem operations.

December

- 1 December (Decision No 31268-A/2008, Official Gazette No 235, Series II, 1st Supplement, Part C, Ministry of Finance and Public Administration, Office of the Secretary of State for the Treasury and Finance)

  Authorises the State to grant a personal guarantee allowing for the fulfilment of obligations in terms of principal and interest within the scope of a financing operation under the form of a loan granted to Banco Privado Português, S.A., by a group of credit institutions to the amount of €450,000,000, with a view to meeting liabilities in the bank's balance-sheet as at 24 November 2008, the date when the above institution notified Banco de Portugal, under the terms of Article 140, 1) of the Legal System of Credit Institutions and Financial Companies.

- 2 December (Instruction of Banco de Portugal No 20/2008, BNBP 12/2008)

  Determines that internal control reports shall be sent to Banco de Portugal, pursuant to articles 25 and 26 of Notice No 5/2008 of 1 July, through the BPnet system.

- 5 December (Parliament Resolution No 65/2008, Official Gazette, Series I)

  Establishes an ad-hoc committee of parliamentary inquiry on the situation that led to the nationalisation of BPN - Banco Português de Negócios and on the inherent banking supervision.