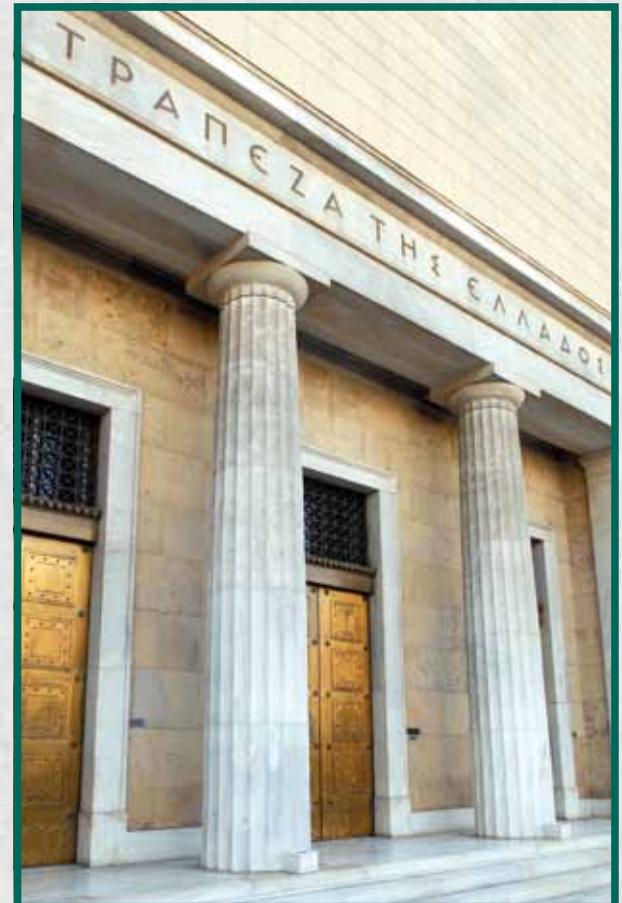


# ECONOMIC BULLETIN

## No 36



APRIL  
2012



BANK OF GREECE  
EUROSYSTEM





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# EMU SUSTAINABILITY AND THE PROSPECTS OF PERIPHERAL ECONOMIES

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## I INTRODUCTION

The sovereign debt crisis in Greece and in several other member countries of the eurozone have brought to centre stage the issue of the sustainability of the Economic and Monetary Union (EMU) at least under its present form. Specifically, the question is often raised whether it is possible for countries with high performance and a culture of monetary stability, such as Germany, to coexist in the euro area with economies such as Greece as well as several other peripheral economies, as they are widely known, which are experiencing severe difficulties, mainly low competitiveness and large macroeconomic imbalances, and some of which are under joint EU and IMF support programmes.

Although these questions seem somewhat “existential” and far from the present immediate priorities of stemming the crisis and ensuring financial stability in individual member countries and the euro area as a whole, they are nevertheless of utmost importance. If the view prevails that EMU is unsustainable and not to the benefit of all member states, the effort towards fiscal adjustment and structural reforms may not be as intense as necessary and may fail.

This article tries to give a first answer to the above questions by analysing EMU weaknesses, as they are identified by many economists, and by examining whether recent reforms in economic governance in the EU, and especially the euro area, provide the means to deal effectively with these weaknesses.

On 9.12.2011 and 30.1.2012 euro area member countries and almost the total of EU member states, with the exception of the UK and the Czech Republic, agreed to strengthen further the “architecture” of EMU by adopting the

Fiscal Compact and by better coordinating economic policies and the stability mechanisms (see Annex 3). Also, the European Council on 30.1 and 1-2.3.2012 placed more emphasis on growth as a necessary complement to stabilisation measures. These developments are consistent with the analysis and conclusions of the present study.

## 2 THE SOVEREIGN DEBT CRISIS AND ITS IMPLICATIONS FOR EMU

The sovereign debt crisis which, first, affected Greece and at varying intensity several other euro area countries and the functioning of the euro area itself, should be seen as a follow-up to the global crisis which emerged as a financial turmoil in August 2007 and dramatically deteriorated in October 2008, with the collapse of Lehman Brothers, to become a global financial and economic crisis and provoke the worst recession since 1929. The global crisis weakened most economies and exposed the fragilities of those with serious external and internal imbalances and structural weaknesses.

The sovereign debt crisis in the periphery of the eurozone was rapidly transformed into a systemic problem for the euro area, necessitating appropriate initiatives and action at national and EU level to contain the impact of the crisis.

A reason for the escalation of the uncertainty surrounding sovereign debt crisis was the widespread view among market participants that the fiscal problems in a number of euro area

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countries reflect unsustainable situations in several economies in Europe and around the world, as the fiscal response to the global crisis resulted in a shift of the burden from the financial to the public sector, in an environment of negative or significantly weakened GDP growth rates and reduced fiscal revenues. In the case of Greece, the aggravation of the government debt crisis was at the origin of the difficulties in the financial sector.

Moreover, some analysts have seen the sovereign debt crisis as a sign of underlying problems in the functioning of EMU which, after having accumulated over a number of years, became more acute because of the global crisis. According to this view, the Greek problem simply precipitated events that were destined to occur.

### 3 RECENT EVENTS AND THE EXPERIENCE FROM THE EMS CRISIS

It may be interesting to place recent events and their implications for economic governance and economic policy into an historical perspective. Speculative attacks on several euro area economies and the euro resemble those related to the European Monetary System (EMS) crisis in 1992-93. Although the institutional setting is different now, as we have moved from a simple monetary arrangement such as the EMS to a fully-fledged monetary union, recent developments showed that the present system is not immune to speculative attacks.

Of course, one should be cautious in using the term “speculative” in order to avoid implying that all was well and only speculation is to blame. It remains true, however, that historically speculators have exhibited a preference for attacking European monetary arrangements. But this should probably be expected, given that the stakes are high, as it is shown<sup>2</sup> by the huge gains made by speculators associated with the sterling’s exit from the EMS in 1992.

It may be interesting to note that some initiatives undertaken now by EU authorities to

cope with the crisis and improve economic governance, for example setting up a financial support mechanism for euro area member states in severe difficulties, are not new. Similar proposals had already been made at the time of the preparation of the Maastricht Treaty but were not accepted, as they were clearly outside the political agenda at that time.<sup>3</sup>

This should not come as a surprise, as it has been a constant fact in European affairs for things to advance through periodic crises, which make evident the need to move ahead gathering the necessary political support for such a move. The EMS crisis was the catalyst for moving to EMU. The present crisis may be the catalyst for better economic governance and for taking an important step towards further European economic integration.

### 4 IMMEDIATE MEASURES TO STEM THE CRISIS AND ACTION TO STRENGTHEN ECONOMIC GOVERNANCE

EU institutions and national governments have undertaken coordinated action in order to cope with and overcome the sovereign debt crisis. It has been argued that there were delays in mobilising the EU’s response, which the President of the European Council, H. Van Rompuy, denied in the report of the Council for 2010. Any delays are largely due to the lack of a legal basis: while a mechanism for financial support of EU member states outside the euro area did exist, no such mechanism existed, and thus had to be created, for euro area members.<sup>4</sup>

The EU initiatives undertaken went in three directions:

<sup>2</sup> Lorca-Susino (2010) and HM Treasury, “Sterling withdrawal from ERM, the cost of intervention”, 9.2.2005.

<sup>3</sup> Other proposals, such as the strengthening of the Community budget, were considered at that time, and are still now, as being outside the political agenda. It may be of interest to note that according to studies even a modest increase in the EU budget from its present level of 1% of GDP could have considerable stabilising effect.

<sup>4</sup> It could be possible to use article 122(2) of the Treaty (see Annex 1) but the range of situations under which it could be activated as well as the amount of available funds were – and still are – limited.

Firstly, immediate measures were taken to stem the impact of the crisis and ensure the stability of the euro area. In this category, we can include the creation of mechanisms for financial support to euro area countries and their activation for Greece, initially, and for Ireland and Portugal subsequently (Annex 1).

Secondly, a decision was taken to create a permanent crisis resolution mechanism, the European Stability Mechanism, which could be activated in the event of severe difficulties faced by euro area member countries, ensuring at the same time the smooth functioning of EMU through appropriate arrangements and incentives. This permanent mechanism is planned to be operational from mid-2013 – although, following tensions in the sovereign bond markets, it was decided to bring forward its starting date by one year – replacing the temporary mechanisms which will be in force until that date and partially in force for a transitional period (Annex 1).

A third set of initiatives included the strengthening of coordination and surveillance of economic and fiscal policy through a set of reforms which were described by the European Commission “as the most important since the start of EMU”. These proposals were adopted after some adaptations by the European Parliament and the EU Council – which rendered them more severe in some respects than the initial proposals – and are effective as from 1.1.2012. Already from 1.1.2011 the “European Semester” is in force, a mechanism focused on improving, operationally, the coordination of economic and fiscal policies of EU member states. To the above was added the “Euro Plus Pact”, an initiative which has as its main objective the strengthening of competitiveness and convergence in EMU (Annex 2).

Additionally, a number of EU decisions have been taken to cope with the effects of the global crisis on financial systems. These decisions refer to the enhancement of the institutional framework and of surveillance of financial markets through the setting-up of the

European Systemic Risk Board and the European Authorities for banks, securities markets and private insurance.<sup>5</sup>

The important contribution of the European Central Bank (ECB) should also be noted, both in coping with the global crisis and its impact on the European financial system but also in its response to the sovereign debt crisis. The ECB, the European institution having particular responsibility for the euro area, has taken crucial decisions in order to ensure the continued provision of liquidity to the banking system and the stability of the euro area as a whole and of individual member countries.<sup>6</sup>

## 5 EMU: ACHIEVEMENTS AND WEAKNESSES

The period since the formation of the euro area is certainly too short for the evaluation of such a major project as EMU. This is especially true, given that the period includes the worst global economic crisis since 1929.

With the above observation in mind, it may be useful to make a preliminary assessment of EMU’s path so far. It is reasonable, in a period dominated by the sovereign debt crisis and increased uncertainty about its effects, to focus our attention on EMU’s weaknesses and on the initiatives undertaken to overcome them. However, it is also necessary and useful to look briefly to EMU’s main achievements.

### Achievements

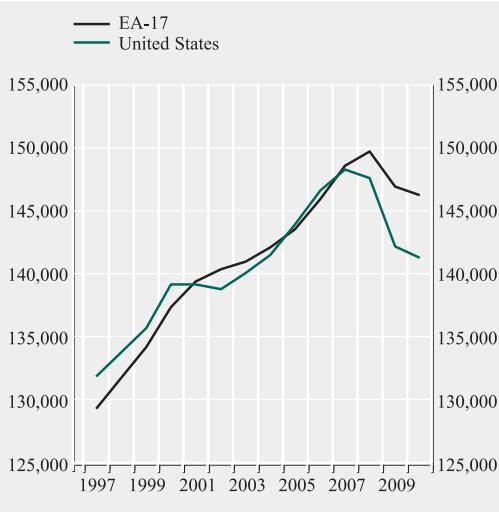
The most important achievements of the euro area have been the maintenance of monetary stability, the creation of 18 million jobs and the

<sup>5</sup> The reform of the supervision of the financial system was essentially based on proposals of the “de Larosière Report” (2009).

<sup>6</sup> Recent ECB interventions include the decision taken on 30.11.2011 for coordinated action together with the central banks of the US, Japan, Canada, the United Kingdom and Switzerland, aimed at facilitating the financing of European banks in US dollars, and the decision, on 8.12.2011, to conduct refinancing operations for banks of a three year duration at 1% fixed rate, aimed at enhancing liquidity in money markets and financing of the real economy. Also, the ECB reduced its main refinancing rate to 1%, after two reductions of 25 basis points each (1.11.2011 and 8.12.2011).

**Chart 1 Total employment**

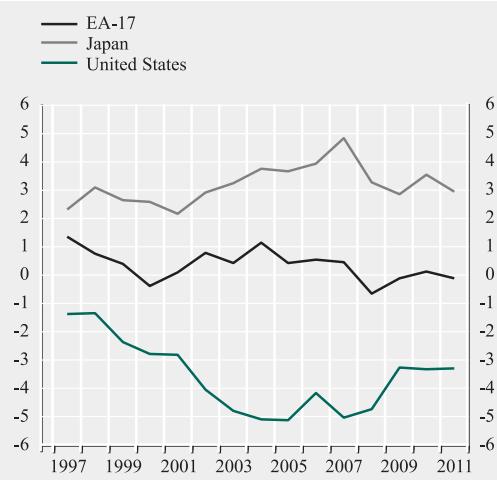
(annual averages; thousands of persons)



Source: Eurostat.

**Chart 2 Current account balance**

(% of GDP)



Source: European Commission, European Economic Forecast, Autumn 2011, November 2011.

convergence in per capita income among euro area countries, the significant increase in trade within the eurozone and the maintenance of equilibrium on its current account with the rest of the world, as well as the lower fiscal deficit and debt, as a percentage of GDP, compared with either the US or Japan. It should be noted that up to 2007, the last year before the sharp aggravation of the global crisis, and up to 2008 in some cases, there was improved performance in key indicators. The global crisis interrupted, and to some extent reversed, these trends. As a consequence, it is not appropriate to take account of developments after the emergence of the crisis and draw conclusions about the degree of convergence attained in EMU and its long-term sustainability.

Regarding specific indicators, it should be noted that average inflation in the euro area in the 12-year period since the start of EMU was 1.97%, i.e. meeting the official medium-term objective of below but close to 2%. Additionally, inflation expectations have remained close to the ECB's inflation objective.

Regarding international trade, according to a survey of empirical studies conducted by A.

Rose, EMU has raised intra-euro area trade by at least 8% and perhaps 23% (see ECB, 2009).<sup>7</sup>

Concerning fiscal adjustment, considerable progress had been made until the emergence of the crisis, as the fiscal deficit for the euro area as a whole was reduced to 0.7% of GDP in 2007; it rose again to 6.4% of GDP in 2009 as a consequence of the crisis.

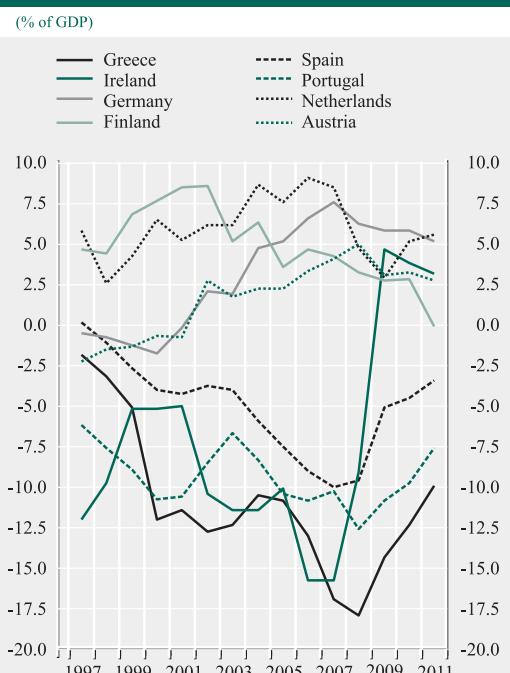
### Weaknesses

In the following paragraphs, the main weaknesses which have been identified during the operation of EMU are analysed and the question of whether recent reforms in economic governance and the other institutional changes provide the means to deal effectively with the said weaknesses is examined. A number of alleged weaknesses and some real challenges are also examined.

The main weaknesses, which have constituted the factors generating the present crisis, are

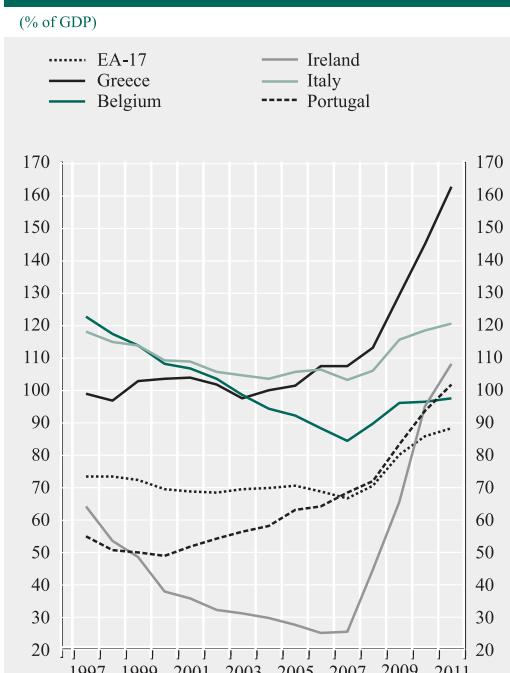
<sup>7</sup> Also, according to A. Rose, the growth of international trade among eurozone economies contributed to the rise in the synchronisation of the economic cycle and to enhanced effectiveness of the single monetary policy.

**Chart 3 Current account balance across euro area countries**



Source: European Commission, European Economic Forecast, Autumn 2011, November 2011.

**Chart 4 Gross public debt**



Source: European Commission, European Economic Forecast, Autumn 2011, November 2011.

the inappropriate economic and fiscal policies in a number of member countries which led to persistent divergences and imbalances in several basic indicators, the inadequate coordination of economic policies that exacerbated macroeconomic imbalances and the reform inertia which was identified in several cases and contributed to competitiveness losses and to an overall modest economic performance. The above should be examined in a context of very low real interest rates, in comparison with the past, in several member countries, which led to excessive borrowing of both public and private sectors. Finally, it was argued that EMU is vulnerable to tensions in financial markets.

Specifically:

- Whilst inflation was kept low in the euro area as a whole, it is clear that *persistent divergences and imbalances* were recorded in several key indicators of price and cost competi-

tiveness and the current account. Thus, persisting inflation differentials among member countries led to unsustainable loss of competitiveness. At the same time, progress towards fiscal adjustment was unequal among member countries and insufficient to reduce substantially the government debt ratio in a number of countries such as Greece and Italy. Thus accumulating macroeconomic imbalances have contributed to the present crisis and reflect also weaknesses in the functioning of EMU.

- A number of authors<sup>8</sup> argued that these imbalances and divergences are the consequence of the large heterogeneity of euro area economies, a fact that diminishes the effectiveness of the ECB's monetary policy and renders the whole EMU project unsustainable.

- Other analysts see as a main cause of the present difficulties the *asymmetry of eco-*

<sup>8</sup> Eijffinger & Mujagic (2010).

conomic policies of member countries and the lack of an economic adjustment mechanism. For example, according to M. Wolf<sup>9</sup> and to W. Munchau<sup>10</sup>, economic policies in Germany and, to some degree, in several other euro area countries – the main characteristics of which have been the real internal depreciation through a restrictive wage policy, the chronically weak internal demand and structural surpluses in the current account balance – have contributed to increased macroeconomic imbalances within EMU and entail the risk of condemning it to an extended economic stagnation.<sup>11</sup>

- A “*reform inertia*”<sup>12</sup> in the functioning of EMU has also been observed, due to the perception – which, finally, proved to be incorrect – that the euro provides protection against external disturbances and which exerted, in some way, a “tranquillising” effect on EMU’s peripheral countries and led them to the easy solution of borrowing and avoidance of structural reforms which could strengthen competitiveness.

- Moreover, concerns have been raised about the way EMU is structured which makes it *vulnerable to changes in financial markets’ sentiment*, while some of the elements of economic support mechanisms are likely to increase such vulnerability.<sup>13</sup> Recent developments in sovereign debt markets of euro area countries seem to give validity to such arguments.

One of the most obvious weaknesses of EMU, which we are currently experiencing, is the lack of appropriate means to deal effectively with the sovereign debt crisis. With the mechanisms created under the pressure of events it was possible to stem the immediate impact of the crisis but, apparently, not to overcome the crisis in an effective and lasting way. As a consequence, it is obvious that certain aspects of the institutional framework should be re-examined with a view to strengthening them. Recent decisions (see Annex 3) are a step towards this direction.

## 6 DOES EMU HAVE THE MEANS AT ITS DISPOSAL TO OVERCOME ITS WEAKNESSES?

The analysis of the weaknesses faced by countries hit by the sovereign debt crisis, in connection with the decisions taken by the EU and member states to improve economic governance, show that to a large degree these decisions strengthened decisively EU’s and member states’ “weaponry” to overcome the crisis. Looking forward, it is likely that, in some areas, existing mechanisms and measures must be further strengthened or new instruments created, as for example the Eurobond issue under certain conditions. Towards the end of this paper the problem of economic adjustment in EMU is analysed, to which the economic governance reform may not, by itself, be capable of answering; but it could, however, facilitate the action of economic agents to resolve it.

### Public finances: better surveillance and more strict rules

The inadequate fiscal adjustment in periods of high economic growth and some inherent weaknesses of EMU (see below), together with the effects of the severe economic recession, were the main reasons of the debt crisis in some euro area economies.

As a consequence, the strengthening of the surveillance and the coordination of budgetary policies was a central component of the economic governance reform in the EU and the eurozone in particular. This reform includes the strengthening of both the preventive and the corrective arm of the Stability and Growth Pact and also the fiscal framework in member

<sup>9</sup> Wolf (2010).

<sup>10</sup> Munchau (2010).

<sup>11</sup> See Demopoulos and Yannacopoulos (2011) for an analysis of issues related to the asymmetry of pressures for adjustment concerning economies with deficit or surplus in the current account of the balance of payments. In the euro area, recent reforms related to the prevention and the correction of excessive macroeconomic imbalances aim to address this asymmetry.

<sup>12</sup> Papapryrou (2007).

<sup>13</sup> De Grauwe (2011). The euro summit decision of 8-9.12.2011 for a strict implementation of the IMF practices regarding the private sector involvement in government debt restructuring answers, to a certain extent, to this criticism.

countries in order to ensure harmonisation with the common European rules and objectives in this area.

- The strengthening of fiscal surveillance through the recent economic governance reform is expected to contribute decisively to the consolidation of sound public finances in the EU and the euro area<sup>14</sup> in particular, as the procedure for the identification and the correction of high fiscal imbalances and the reduction of government debt has become more rigorous, involving the imposition of semi-automatic sanctions to member countries not respecting the agreed fiscal targets.<sup>15</sup>

### Is coexistence possible in EMU between a high performing Germany and economic laggards?

Several economic commentators<sup>16</sup> have argued that it is extremely difficult for EMU high performing economies with a culture of monetary stability, such as Germany, to coexist in EMU with peripheral economies exhibiting important weaknesses, notably low competitiveness and large macroeconomic imbalances.

However, other analysts have noted that the strong economic performance of Germany is not, in general, based on higher rates of productivity growth – with the exception of 2010, and albeit to a smaller extent 2011, when a large increase in productivity was recorded due to the large cyclical growth of German exports after the sharp recession of 2009 – but to an extended limitation of wage growth and accumulation of competitive advantage which are reflected in Germany's high export performance.<sup>17</sup> Indeed, the annual rate of productivity growth during the first decade of EMU was, on average, 0.9% in Germany compared with 1.0% for the eurozone.<sup>18</sup>

- As a consequence, and on the basis of the above data, the claim that economic coherence of EMU is threatened by a clearly higher economic performance of one large economy over the rest, which could hinder the design of the single monetary policy and the coordination of eco-

nomic policy, cannot be upheld. If there is an issue in this context, it rather concerns the asymmetry of national economic policies (see below).

Harmonious coexistence in EMU requires the examination of more data, such as the flexibility and the mobility in labour, product and services markets, but also the overall approach concerning monetary stability. Several of those issues are examined in the following paragraphs.

### Are South European economies prone to high inflation, deficits and low growth?

An intertemporal examination of economic developments shows that a combination of high rates of real GDP growth, relatively low inflation and very low external and fiscal deficits – even surpluses in some cases – is not something unknown in the South of Europe in the post-war period of fixed exchange rates. For example, in the period 1961-73, the annual average inflation rate (deflator of private consumption<sup>19</sup>) in Greece was 3.6% compared with 3.4% in Germany and 4.7% in France, while real GDP growth was 8.5% in Greece, 4.3% in Germany and 5.4% in France. The corresponding rates for Portugal in the above period were 3.9% for inflation and 6.9% for GDP growth.

<sup>14</sup> The objective of sound public finances contributes to the flexibility of fiscal policy by creating a margin for action to cope with economic recession through the activation of automatic fiscal stabilisers without putting at risk the stability of public finances. It is noted that the Fiscal Compact (see Annex 3) provides for a structural fiscal deficit not greater than 0.5% of GDP, i.e. it takes into account the impact of the economic cycle.

<sup>15</sup> On 23.11.2011 the European Commission made proposals for even tighter surveillance of euro area member countries subject to the Excessive Deficit Procedure, facing severe difficulties with respect to their financial stability and having received financial support under economic adjustment programmes. At the Ecofin meeting of 23.2.2012 a consensus was reached on the general approach of Commission proposals, opening the phase of negotiations with the European Parliament for a final agreement.

<sup>16</sup> Greenspan (2011).

<sup>17</sup> Munchau (2010) and Deutsche Bundesbank (2010).

<sup>18</sup> See European Commission, Economic Forecasts, Statistical Appendix, various editions. Of course, there should be an analysis on how the crisis affected productivity and potential GDP of individual economies. According to the IMF (Article IV Consultation, 9.6.2011), Germany's potential GDP was little damaged by the crisis but it remained rather low.

<sup>19</sup> The private consumption deflator is used due to the existence of comparative data. In Greece, the inflation rate measured by the consumer price index was 2.1% on average during the period 1960-70.

Although the comparisons between different time-periods should be made with caution, as important parameters may differ, they may nevertheless provide useful insights.

- The above indicators show that there is no unavoidable destiny of high inflation and low rates of GDP growth in some euro area member countries, currently faced with severe financial difficulties, which could determine their performance in the future. This, of course, does not imply that there is no need for deep structural changes and reforms in national economies which are currently facing severe difficulties and, also, in the economic governance of EMU.

#### **Asymmetry of economic policies in EMU**

For policy-makers it is evident, and the recent crisis supplied ample evidence supporting this, that most of the burden of external adjustment falls on countries with deficits and external debt. Indeed, large current account deficits, reflecting a loss of competitiveness and excess internal demand, have to be corrected in time, as their adverse impact on the economic and financial situation of the countries concerned can be very serious.

Several analysts point also to risks for the euro area from the accumulation of competitive advantage and surpluses in the current account of the balance of payments in Germany and some other member countries, resulting from the application of restrictive wage policy and inadequate internal demand for an extended period of time.

In a monetary union, the absence of the possibility for exchange rate adjustment requires the use of other economic policy instruments in order to reduce external imbalances.<sup>20</sup> The need for such an adjustment was not visible during the first years of EMU, because of the weak economic performance of Germany – its attempts to absorb the impact of the re-unification and, according to some authors, the high conversion rate at which it moved to the

euro – and the euphoria accompanying the low-interest-rate-induced growth in the south of Europe. But the accumulation of current account surpluses in Germany and some other member states in recent years as well as the growing current account deficits in several peripheral eurozone countries brought the problem of adjustment in EMU to centre stage.

Several policy measures have been proposed for the reduction of surpluses in the current account balance, operating mainly through structural reforms aimed to strengthen internal demand. Other, more controversial, proposals have as an objective the adoption of a common approach to wage policy in the eurozone, avoiding thus a counter-productive “war”, among member countries, to gain competitive advantage by reducing wage costs, which would be based on two elements:<sup>21</sup> a) the medium-term target of the ECB for price stability and b) the principle that real wage increases must be compatible with productivity growth.

- Recent reforms in economic governance concerning macroeconomic surveillance and the correction of macroeconomic imbalances, which were introduced for the first time in the economic governance “weaponry” of the EU and the euro area in such a systematic way – for instance, the introduction of the concept of “Excessive Imbalance Procedure” in analogy to the “Excessive Deficit Procedure” in the area of public finances – provide the right framework for the analysis of these issues and is expected to contribute decisively to the control and limitation of internal and external macroeconomic imbalances.

#### **Stability culture as a “public good” in EMU**

Arguments by several analysts on the need to strengthen domestic demand in Germany and in other countries with external surpluses, crit-

<sup>20</sup> Bank of Greece (2010).

<sup>21</sup> Bofinger (2010).

icism against the policy of strengthening competitiveness through an extended policy of wage restraint and the fact that Germany is profiting perhaps more than any other member country from EMU — this view has been expressed also by government officials in Germany — should not lead us to underestimate the important contribution of the “stability culture” in Germany to the creation of EMU and its successful path up to now.

Observers of the monetary history of Europe since World War II know well that Germany has been at the centre of all major monetary developments and institutional arrangements. At the centre of monetary and financial *developments* because in periods of crisis the DM was the natural reference to measure the strength of the rest of the currencies in Europe and, now, German government bonds are also the reference to measure the strength of the rest of the European economies and economic policies, at least as they are perceived by financial markets and reflected in interest rate spreads. Also, at the centre of monetary *arrangements* because it was perfectly understood by all that the German monetary credibility was an indispensable element of any monetary construction in Europe. That was the case in the European Monetary System and again in the construction of the economic and monetary union.

- An important lesson from the above is that the insistence of Germany, and of the Bundesbank, its central bank initially, and of the ECB subsequently, with stable money and sound public finances is a kind of “public good” that must be preserved because it is in the common interest of all euro area member countries. The ECB for its part has succeeded in preserving and enhancing this credibility in the monetary domain by ensuring price stability and a strong euro in the international scene.

In the light of the above, the right balance must be struck between the need for less asymmetry in economic policies in order to limit the creation of internal and external imbalances, whilst at the same time ensuring the “public

good” of monetary stability. Recent decisions aimed at strengthened macroeconomic coordination and surveillance, notably at the avoidance of excessive macroeconomic imbalances, are a step towards achieving functional solutions to these challenges.

#### **Reform inertia and how it can be overcome**

A serious “shortcoming” of EMU revealed by its operation is, perhaps paradoxically, linked to the protection the euro offers to its members against external monetary shocks and pressures, which had been a constant threat in the past for economies with weak currencies and balance of payments deficits. This protection exerted a “tranquillising” effect on member countries, which did not feel the need to act and introduce the necessary reforms in order to cope with a deteriorating economic situation.

Such tendencies may delay the necessary adjustment and aggravate external and internal imbalances. The very high deficits, as a percentage of GDP, on the current accounts of several member states — which could not reach and maintain such levels outside a monetary union — are indicative of a disequilibrium situation.

The persistence of such a situation may be surprising, as one could have reasonably expected that EMU would mobilise the reform zeal of member countries in order to cope with the intensifying competition of the internal market, following the loss of the exchange rate as an instrument of economic policy. However, research seems to confirm the tendency to postpone reforms (see, for example, Duval and Elmeskov, 2005). Although these authors identified reform inertia mainly in large member states, it seems that the perceived protection provided by the euro to large and small members alike against exchange rate and balance of payments pressures renders them less inclined to undertake reforms.

Moreover, the fact that the Lisbon Strategy, which was initiated firstly in 2000, was deemed

necessary to be re-launched in 2005 as the pace of reforms was judged inadequate, provides evidence that there was not enough natural momentum in the system to introduce structural reforms.

The low sensitivity of financial markets to high government debt, as reflected in the very low spreads between government securities of high debt and low debt euro area countries vis-à-vis German government debt seems to work in the same direction. This situation has now changed and the “pendulum” has gone to the other direction, implying an overreaction to perceived financial risks.<sup>22</sup>

The policy conclusion from the above is that mechanisms encouraging structural reforms must be put in place both at Community and national level.<sup>23</sup>

- The policy framework encouraging structural reforms in the EU and the euro area is the “Europe 2020” Strategy for growth and jobs, which replaced the Lisbon Strategy. Synergies with the rest of policies in the context of the European Semester are expected to have positive results, as is the idea of “ownership” of reforms by member countries. Of crucial importance is also the development of the potential of the Single European Market, notably in the area of services which account for 70% of the GDP but only for 20% of trade among the EU countries.<sup>24</sup>

### A fragile eurozone?

It has been argued by several analysts that the way EMU was constructed makes it vulnerable to changes in financial markets’ sentiment. Increased uncertainty about the effects of the sovereign debt crisis on the euro area and beyond adds weight to these views. The problem is described eloquently by De Grauwe (2011): “*Countries that join a monetary union lose more than an instrument of economic policy (interest rate or exchange rate). They lose their capacity to issue debt in a currency over which they have full control*”. In such a way

they become more vulnerable to changing trends in financial markets which “*can lead to ‘sudden stops’ in the funding of the government debt, setting in motion a devilish interaction between liquidity and solvency crises*”. The collective issue of government bonds, as part of a system with the right incentives and rules, could, according to the author, operate as a defensive system against situations of euphoria and panic which often govern financial markets.

As already noted, the EU has taken concrete measures to stem the sovereign debt crisis and ensure financial stability in the euro area. Moreover, with successive decisions the capacity of the European Financial Stability Facility (EFSF) to intervene has been broadened, initially on the primary market for government bonds and more recently also on the secondary market, while the total lending capacity of the EFSF was raised to €440 billion, from €250 billion initially. The EFSF will be also able to participate in the strengthening of the capital base of banks by granting loans to euro area member countries to this end.

- However, the continued crisis shows that probably a more drastic reform is necessary in this area. Many analysts but also some policymakers agree that the issuing of Eurobonds could be the most effective answer to the current crisis and could also prevent future crises.

<sup>22</sup> Gibson, Hall and Tavlas (2011).

<sup>23</sup> Structural reforms which ensure the smooth functioning of labour and product markets are essential elements of economic and monetary unions. According to researchers, in the 19th century the US had a common currency that worked satisfactorily, without any sizeable federal budget (as is the case of the EU today) mainly because of the flexibility of the labour market. See Darvas (2010).

<sup>24</sup> Globally, services account for a rising share of international trade of goods and services. Therefore, the growth of international trade in services in the EU and the euro area could contribute to the reduction of external macroeconomic imbalances, as several deficit countries, among them Greece, Portugal and Spain, have a comparatively better performance in the export of services than in the export of goods. As far as goods are concerned, the effort should be focused on the export of more “composite goods” that reflect productive knowledge, which predicts how fast a country would grow, according to Harvard professor R. Hausmann (*Financial Times*, 8.2.2012). Hausmann notes that Greece ranks only second to India, at global level, in this dimension, a heartening finding, adding however that “it needs to identify the missing knowledge and infrastructural inputs required by new industries and assure their provision, the way the Industrial Development Agency of Ireland does”.

## The Eurobonds issue

It should be noted from the start that Eurobonds are not a substitute for the necessary fiscal adjustment and the introduction of structural reforms in the economies of the euro area which are experiencing high fiscal deficits and debts and low competitiveness. Firstly, fiscal adjustment and reforms are necessary in order to ensure employment and welfare in any economy. Secondly, fiscal adjustment, or substantial progress towards that direction, constitutes a precondition, according to many European governments, for even discussing the issue of Eurobonds.

It should also be noted that the Eurobonds issue is not a technical issue as it is often presented but an eminently political issue as its adoption would imply a fiscal union of euro area economies. This would also imply a transfer of national rights in important issues of economic and fiscal policy to some central entity in Brussels.

Bearing in mind the above, it is clear that the adoption of Eurobonds could, under certain conditions, have a stabilising effect, as an important factor of uncertainty, the incapacity of several member states to have access to international capital markets under conditions which do not endanger debt sustainability, would disappear.

The preconditions are basically the correct design of the whole project in order to limit the risk of moral hazard, i.e. the absence of incentives for sound public finances, and to ensure that there will be an improvement or at least not a deterioration in the relative position of all member countries (e.g. to convince countries with high credit rating that their low borrowing cost would not be put at risk, or that effective ways may be found in order to compensate for such a risk). In addition, legal and political obstacles must be overcome, such as the Treaty's no-bail-out clause, constitutional restrictions in some member countries and other.

- The political, economic and legal conditions do not exist, at present, for the issue of Eurobonds at least as they are perceived by supporters of this idea. However, things may change more rapidly than is generally believed under the pressure of events. An example of such a trend was the broadening of the flexibility and the raising of the lending ceiling of the EFSF. As a consequence, although we are far away from a European fiscal union, the adoption of a Eurobond of some form, within the framework of the current treaty<sup>25</sup> and of the political reality in member countries of the euro area, cannot be excluded. This could probably imply, at a first stage, that a maximum amount of public debt be covered by the Eurobonds, e.g. 60% of GDP,<sup>26</sup> so that a link is established with the reference value for government debt as provided for in the Maastricht Treaty.<sup>27</sup>

## Economic adjustment and growth – the fundamental challenge

The focus of recent discussions on the sovereign debt crisis, financial support mechanisms and related issues should not conceal the fact that the fundamental challenge for EMU is not the financing of deficits and debts but economic adjustment. Even the most sophisticated and robust financing schemes cannot save EMU unless an efficient economic adjustment model is in place, capable of operating smoothly enough in order to generate economic growth and employment and absorb external imbalances without extreme frictions. Even a fiscal union, although it would be a superior state of economic integration compared with the present situation, would not suffice to make EMU workable: no system is sustainable if it depends permanently on large-scale financial assistance mechanisms.<sup>28</sup>

<sup>25</sup> Or following limited amendments as is currently proposed by a number of member states.

<sup>26</sup> Delpla and Weizsäcker (2010).

<sup>27</sup> On 23.11.2011, the European Commission presented a Green Paper on the rationale, preconditions and possible options of financing public debt through "Eurobonds" or "stability bonds". A precondition for such a move would be a tightening of fiscal surveillance, according to the Commission, which also presented draft Regulations to this end.

It should be noted that the issue of economic adjustment was somewhat neglected in the first decade of EMU, probably because it was neglected by the Maastricht Treaty itself! Although the degree of real convergence, factor mobility and the ability of economies to adjust had been at the core of the theory of “optimal currency areas” – widely considered as the theory underlying the movement towards EMU – the convergence criteria to join EMU were concentrated on nominal variables, such as the rate of inflation, interest rates, exchange rates and public finances and much less on the capacity of the economies to adjust.<sup>29</sup> Several explanations were given for such a choice, for example the focus of the Treaty on monetary stability and sound public finances, or the expectation that real convergence would occur gradually after joining EMU by the force of events (a kind of ex-post OCA theory).<sup>30</sup> Regardless of the reasons for such a choice, an effort to facilitate economic adjustment had to be undertaken following the crisis and its impact.

- In an effort to remedy such weaknesses, initiatives were undertaken – analysed briefly above and in more detail in annexes – to enhance economic governance, overcome “reform inertia” and facilitate structural adjustment with the objective to improve competitiveness, capacity to adjust and finally real convergence.

Of course EU rules cannot, and should not, dictate the adjustment path in the new uncharted territory of EMU. They provide the framework enabling action by economic agents to discover the optimal adjustment path. However, the intervention of EU and national authorities is necessary in order to remove obstacles, e.g. in the operation of the Single European Market, to liberate the growth potential in EMU and facilitate adjustment. The planned re-orientation<sup>31</sup> of expenditures of the EU budgets for the period 2014-2020 mainly towards investments enhancing economic growth and employment, linking them to the objectives of the “Europe 2020” strategy – such as investment in research and innova-

tion and in “connecting Europe infrastructure” in the areas of energy, transport and information technology – is expected to facilitate economic adjustment.

## 7 CONCLUSIONS

The present crisis has led many analysts to a negative evaluation of EMU’s history so far and to ominous projections for its future. However, this approach disregards some significant achievements of the euro area, since its inception, such as the maintenance of monetary stability, the creation of 18 million jobs, 4 millions more than in the US, the significant increase in intra-euro area trade and equilibrium in its current account with the rest of the world, as well as lower fiscal deficit and debt, as a percentage of GDP, compared with the US and Japan. Such an approach disregards also the vital role of the euro for the smooth functioning, and probably the mere existence, of the single European market.

Historical experience shows that the European integration advances through periodic crises which make evident the need for institutional reforms, thus ensuring the necessary social and political support for their realisation. This is also expected to be the case in the present crisis despite the significant difficulties. Economic governance reforms and the decisions about support mechanisms and supervision of the financial sector strengthened decisively EMU’s “weaponry” to overcome the crisis, while the strategy “Europe 2020” provides the framework for a dynamic policy of structural reforms and economic growth. In some areas it is likely that the existing mechanisms must be further strengthened or new instruments be created, such as the Eurobonds, under certain

<sup>28</sup> Wolf (2011).

<sup>29</sup> Sapir (2009).

<sup>30</sup> Also, the indicators to which the convergence criteria refer are more easily measurable and their evolution over time is more easily placed under the control of economic policy, compared with criteria such as flexibility and adaptability in labour and product markets.

<sup>31</sup> See “A Budget for Europe 2020”, Communication from the European Commission, 29.6.2011.

conditions. Indeed, the heads of state or government of the euro area have recently decided to strengthen further the architecture of EMU and announced that the process of integration of the economic and fiscal union will continue.

The analysis of the difficulties faced by the countries which are now at the centre of the sovereign debt crisis shows that the present adverse trend can be reversed, as it was due, on the one hand, to temporary factors in the first decade of EMU, such as the very low real interest rates in comparison with the past and, on the other, to inappropriate economic policies, such as inadequate fiscal adjustment and a reform inertia, which can be corrected. There is no inescapable trend towards high inflation, deficits and low growth rates in these countries, making problematic their coexistence in EMU with some other, high performing economies. Greece, and other countries in the South of Europe, experienced in the past high rates of economic growth with low inflation and very low fiscal and external deficits, even surpluses in some cases. Greece, for example, recorded budget surpluses during 1960-1970 and high primary surpluses in the drive to EMU.

Once the present crisis is over —with vision, method and determination— both at the euro area and at the member country level, and the countries of the South of Europe will have adopted a more sustainable growth model, they could very well be the winners of the economic growth game in the euro area during the next decades, as most of them are still “catching-up economies” with high growth potential and important comparative advantages. This prospect requires a constant procedure for adjustments and reforms —essentially, a more positive approach and a more effective method— through a more intensive “ownership” of collective decisions of European institutions and a more active participation in the European affairs in order to achieve a maximisation of synergies and benefits. It also requires a conscious and complete application of the “rules of the game” of the EU and the euro area, as experience shows that the maximum benefits —regarding stability, attraction of investments, development and more generally credibility and influence— go to those countries which adopt and fully apply such a policy, provided that this is their strategic choice.

# ANNEX I

## FINANCIAL SUPPORT MECHANISMS FOR EURO AREA COUNTRIES

### Temporary mechanisms

The mechanisms used by European institutions and euro area governments to provide financial support to euro area countries facing severe financial difficulties, following the adverse effects of the global economic crisis and the sovereign debt crisis, included initially bilateral loans from euro area governments to Greece, amounting to €110 billion in May 2010,<sup>32</sup> and subsequently loans to Ireland, amounting to €85 billion in November 2011 and to Portugal, amounting to €78 billion in April 2011 through the newly created European Financial Stability Facility (EFSF) and the European Financial Stabilisation Mechanism (EFSM). Financial support through the above mechanisms and bilateral loans were granted jointly with financial support from the IMF (in a two, EU, to one, IMF, proportion) on the basis of strict economic conditionality through adjustment and reform programmes agreed with the countries concerned and monitored by the European Commission, in consultation with the ECB, and the IMF.

The EFSF is the most important scheme, as the amount of funds that could be mobilised is much more important and the scope for their use much wider than under the EFSM. The EFSF is an intergovernmental scheme involving the creation of a “special purpose vehicle” established in Luxembourg which will borrow on capital markets under the guarantee of euro area countries and on-lend to euro area countries facing severe difficulties and requesting financial support. With successive EU Council decisions the capacity of the EFSF to intervene was broadened, initially to the primary government bonds market and subsequently also to the secondary market, while its total lending capacity was raised to €440 billion from €250 billion initially. The EFSF will also be able to participate in the strengthening of the capital base of banks by granting loans to member countries of the euro area to this end.

The EFSM is a more modest in size scheme created to enable the EU to grant loans under the guarantee of the EU budget. The amount which could be mobilised under this scheme is about €60 billion. The legal basis for the mechanism is Article 122(2) of the EU Treaty<sup>33</sup> which provides for the possibility to grant financial assistance to euro area countries “*where a member state is in difficulties or is seriously threatened with severe difficulties caused by natural disasters or exceptional occurrences beyond its control*”.

### A permanent “European Stability Mechanism”

In spite of strengthened fiscal and macroeconomic surveillance, unforeseen shocks can occur and the risk of crises can never be fully eliminated. For this reason, and in order to ensure the stability of the euro area as a whole, it was decided to establish a permanent crisis resolution mechanism.

On the basis of proposals made by the Task Force on Economic Governance, headed by H. Van Rompuy, and those advanced by the European Commission and the ECB, the European Council examined the issue in a number of

<sup>32</sup> A new economic programme for Greece, accompanied by financing of up to €130 billion from the EU, via the EFSF, and the IMF (in addition to €34.4 billion corresponding to the undisbursed part of the €110 billion loan) and with the contribution of private sector creditors, was agreed by the Eurogroup Finance Ministers, in principle, on 21.2.2012 and officially on 14.3.2012 and by the IMF on 15.3.2012. The programme is estimated to place the Greek government debt as a percentage of GDP to a declining path, aimed to reach 120.5% of GDP in 2020. The contribution of the private sector has been effected through a voluntary exchange of bonds (PSI – Private Sector Involvement) which includes a 53.5% decline in their nominal value. It is noted that on 21 July 2011 the European political leaders recognised the need to implement a comprehensive strategy for economic growth and investment in Greece and approved to this effect the setting-up by the European Commission of a special action force (Task Force) which will support the Greek authorities in channelling resources from EU Structural Funds to productive uses, while in the direction of supporting the Greek economy the European Investment Bank will also be mobilised. It was also envisaged to provide Greece with exceptional technical assistance for the implementation of reforms (see Bank of Greece, *Monetary Policy Interim Report 2011*, November 2011). Finally, following a proposal by the European Commission, the European Parliament and the Council endorsed the reduction of the national contribution to NSRF programmes to 5% (and correspondingly the raise of the EU contribution to 95%) for Greece and the other member countries which implement economic support programmes.

<sup>33</sup> By Regulation (EU) No 407/2010 of 11 May 2010 on “Establishing a European financial stabilisation mechanism”, Official Journal L 118/1, 12.5.2010.

meetings, and in the March 2011 European Summit it was decided to establish a permanent crisis resolution mechanism to safeguard the financial stability of the euro area as a whole. The Council also agreed on the text of a limited amendment of the Treaty. The amendment consists of the following paragraph to be added to Article 136 of the Treaty on the Functioning of the European Union:

*“3. The Member States whose currency is the euro may establish a stability mechanism to be activated if indispensable to safeguard the stability of the euro area as a whole. The granting of any required financial assistance under the mechanism will be made subject to strict conditionality”.*

The amendment will enter into force on 1 January 2013, after ratification by Member States, and the European Stability Mechanism is scheduled to start its operation in July 2013 (it was changed to July 2012, see Annex 3), assuming the role of the EFSFS and the EFSM in providing financial assistance to euro area member countries, under strict economic conditionality. The ESM:

- Will be established as an intergovernmental organisation under public international law, will be located in Luxembourg and will be governed by a Board of Governors consisting of the Ministers of Finance of the euro area member countries. The ESM will have also a Board of Directors, chaired by the Managing Director, for day-to-day management.
- Will have a total subscribed capital of €700 billion. Of this amount, €80 billion will be in form of paid-in capital provided by the euro area member states phased in from July 2012 in five equal instalments. ESM effective lending capacity will be €500 billion and the pricing of financial assistance will cover ESM funding costs plus an additional margin determined by the Board of Governors.
- ESM rules will provide for a case-by-case participation of private sector creditors, consistent with IMF policies (see also Annex 3). In order to facilitate this process, standardised and identical collective action clauses (CACs) will be included in the terms and conditions of all new euro area government bonds starting from 1.1.2013.

## ANNEX 2

### THE NEW ECONOMIC GOVERNANCE FRAMEWORK IN THE EU AND THE EURO AREA

The new EU and euro area economic governance framework, which is in force as from 13.12.2011, although some components thereof are already in force as from 1.1.2011, includes a) the “six-pack” of legislative acts<sup>34</sup> adopted by the Ecofin Council in October 2011, after agreement with the European Parliament, aimed at strengthening economic governance in the EU and more specifically in the euro area, b) the “European Semester”, which introduces a new architecture in economic and budgetary coordination in the EU and c) the “Euro Plus Pact” which aims at an enhanced cooperation of euro area countries, plus willing non-euro EU member countries, towards improving competitiveness and real convergence.

#### Reform of the Stability and Growth Pact

The reform concerns both the preventive arm of the pact, i.e. the procedures that are followed to ensure that excessive deficits are avoided, and the corrective arm, namely the procedures followed for the correction of excessive deficits. At the same time, the reform introduces new provisions with regard to the reduction of government debt.

*Preventive arm:* To promote attainment by the member states of their medium-term budgetary objectives (MTOs), the reform introduces an expenditure benchmark, which implies that annual expenditure growth should not exceed a reference medium-term rate of GDP growth. This is meant to ensure that revenue windfalls are not spent but instead allocated to debt reduction. If a euro area member state has not reached its MTO, a significant deviation in expenditure from its reference growth path could eventually lead to sanctions in the form of interest-bearing deposit of 0.2% of GDP.

*Corrective arm:* Greater emphasis is to be placed on the debt criterion, with member states whose debt exceeds 60% of GDP

required to take steps to reduce it at a pre-defined pace, even if their deficit is below 3% of GDP. To determine whether the debt ratio is sufficiently diminishing towards the 60% of GDP threshold, a numerical benchmark is introduced. A debt-to-GDP ratio above 60% will thus be considered to be sufficiently diminishing if its distance with respect to the 60% reference value has decreased over the previous three years at an annual rate of one twentieth. However, a decision to subject a country to the excessive deficit procedure will not only be based on the numerical benchmark, but will also take into account other relevant factors.

To strengthen the corrective arm of the SGP, a new set of financial sanctions are introduced for euro area member states. These will apply earlier on in the EDP and using a graduated approach. A non-interest bearing deposit of 0.2% of GDP will apply once a decision has been taken to subject a country to the EDP, if an interest-bearing deposit has already been imposed under the preventive arm of the pact or if serious non-compliance is identified. The deposit will be converted into a fine of 0.2% of GDP if the Council’s initial recommendation for correcting the deficit has not been followed. Further non-compliance will result in the sanction being stepped-up, in line with the existing provisions of Article 126(11) of the EU Treaty (maximum fine: 0.5% of GDP).

To trigger the sanctions more automatically than in the past, a so-called reverse majority voting rule is introduced, whereby the Commission’s proposal for imposing sanctions related to non-compliance with the Pact will be considered adopted unless the Council turns it down by qualified majority.

<sup>34</sup> The legislative package includes the following: Regulation (EU) 1175/2011 amending Regulation (EC) 1466/97 on the surveillance of member states budgetary and economic policies, Regulation (EU) 1177/2011 amending Regulation (EC) 1467/97 on the EU’s excessive deficit procedure, Regulation (EU) 1173/2011 on the effective enforcement of budgetary surveillance in the euro area, Regulation (EU) 1176/2011 on the prevention and correction of macroeconomic imbalances, Regulation (EU) 1174/2011 on enforcement measures to correct excessive macroeconomic imbalances in the euro area and Council Directive 2011/85 on requirements for budgetary framework of Member States.

## Budgetary framework at national level

Alongside the reform of the SGP, a directive sets out to ensure that the objectives of EU budgetary coordination are reflected in the member states' budgetary frameworks. Accounting, statistical and forecasting practices are brought into line with EU standards. Member states must adopt multi-annual fiscal planning to ensure that medium-term budgetary objectives set at the EU level are achieved. They must also introduce rules to promote compliance with the deficit and debt thresholds.

## Surveillance of economic policies

The legislative package establishes a mechanism for the prevention and correction of excessive macroeconomic imbalances, made up of two regulations which outline an "excessive imbalance procedure" and introduce the possibility of fines being imposed on member states found to be in an excessive imbalance position and repeatedly failing to comply with recommendations.

The starting point of the new framework is an alert mechanism for an early detection of imbalances which will be assessed using a "scoreboard" of economic indicators.<sup>35</sup> This will be followed by country-specific qualitative analysis.

If the imbalance is considered to be excessive, the member state concerned could be subject to an "excessive imbalance procedure", and would be called on to adopt a corrective action plan within a specific timeframe. The procedure gives the Council more flexibility in setting deadlines than the excessive deficit procedure in order to account for the less direct influence of government policies in addressing macroeconomic imbalances.

If the Council decides that the member state concerned has taken appropriate action, the procedure will be held in abeyance, and can be closed if the Council concludes that the imbal-

ance is no longer considered to be excessive. On the other hand, repeated non-compliance with the recommendation can in the case of euro area member states eventually lead to sanctions. Specifically, a decision to impose a yearly fine equal to 0.1% of the member state's GDP will be adopted through the "reverse majority" rule.

## The European Semester

In September 2010 the Ecofin Council endorsed the "European Semester", by which the different strands of economic policy coordination were integrated in a new surveillance cycle as from 1.1.2011.

Two are the basic objectives of the European Semester: a) better coordination of budgetary policies by discussing member countries' budgetary plans at the Ecofin Council before they are presented to national parliaments, and b) better synergies between budgetary and economic policies to be achieved by joint discussion of Stability Programmes and National Reform Programmes during the first half of the year (hence the term "European Semester").

The European Semester will apply to all the elements of economic surveillance, including policies to ensure fiscal discipline and macroeconomic stability and to foster growth. The processes under the SGP and the Europe 2020 strategy will thereby be aligned in timing, while remaining formally separate, helping thus to avoid policy inconsistencies.

## The "Euro Plus Pact"

On 11 March 2011, the Heads of State or Government of the euro area adopted the Pact for the Euro in order "to strengthen the economic pillar of the monetary union, achieve a new

<sup>35</sup> According to Commission proposals, the scoreboard will include the following ten indicators: current account balance, net investment position, export market shares, nominal unit labour cost, real effective exchange rate, development of unemployment rate, private sector debt, credit expansion to the private sector, real estate prices, and general government debt.

quality of economic policy coordination in the euro area, improve competitiveness, thereby leading to a higher degree of convergence". The Pact has the following principal objectives: to foster competitiveness and employment, to contribute further to the sustainability of public finances, and to reinforce financial stability.

The Pact focuses primarily on areas that fall under national competences and is open for participation to non-euro area member states. At the European Council of 24 and 25 March 2011 it was announced that Bulgaria, Denmark, Latvia, Lithuania, Poland and Romania accepted the invitation to participate in the pact, renamed thus to "Euro Plus Pact".

One of the most important aspects of the Euro Plus Pact is euro area member countries' com-

mitment to transpose EU fiscal rules, as set out in the Stability and Growth Pact, into national legislation. The commitment should be seen as reinforcing – for the adherents of the Pact – the legally binding minimum requirement for national budgetary frameworks established in the corresponding directive which forms part of the "governance package" analysed above. Member states will retain the choice of the specific national legal vehicle to be used, but will make sure that it has a sufficiently strong binding and durable nature (e.g. constitution or framework law).

In addition to the issues examined above, the Pact states that attention will be paid to tax policy coordination – starting from developing a common corporate tax base – although it is explicitly recognised that direct taxation remains a national competence.

## ANNEX 3

### **Decisions by the Heads of State or Government of the euro area, on 9.12.2011 and 30.1.2012, for a new fiscal compact and the development of stabilisation tools**

The EU and the euro area have done much over the past two years to improve economic governance and adopt new measures in response to the sovereign debt crisis. However, market tensions have increased and there was a need to step up efforts to address the current challenges and to move towards a stronger economic union through action in two directions: a) a new fiscal compact and strengthened economic policy coordination with the “Treaty on Stability, Coordination and Governance in EMU” (TSCG) and b) the development of stabilisation tools to face short-term challenges with the “Treaty on European Stability Mechanism” (TESM).

### **A reinforced architecture for Economic and Monetary Union**

In order to strengthen the stability and integrity of EMU as a whole, alongside the single currency, a strong economic pillar is indispensable. It will rest on enhanced governance to foster fiscal discipline and deeper integration in the internal market as well as stronger growth, enhanced competitiveness and social cohesion.

The effort to achieve this objective has to:

- build on and enhance what has been achieved in the past 18 months, i.e. the enhanced Stability and Growth Pact, the implementation of the European Semester, the new macroeconomic imbalances procedure, and the Euro Plus Pact,
- but also rely on the enhancement of progress made through a new “fiscal compact” and significantly stronger coordination of economic policies in areas of common interest. This will require a new deal between euro area member states to be enshrined in common ambitious rules and a new legal framework.

### **A new fiscal compact**

The establishment of a new fiscal rule was decided, containing the following elements:

- General government budgets shall be balanced or in surplus. This principle shall be deemed respected if, as a rule, the annual structural deficit does not exceed 0.5% of GDP.
- Such a rule will also be introduced in Member States’ national legal systems at constitutional or equivalent level. The rule will contain an automatic correction mechanism defined by each Member State on the basis of principles proposed by the European Commission and shall be triggered in the event of deviation. The jurisdiction of the European Court of Justice, to verify the transposition of this rule at national level, was recognised.
- Member States shall converge towards their specific reference level, according to a calendar proposed by the Commission.
- Member States in Excessive Deficit Procedure shall submit to the Commission and the Council for endorsement budgetary and economic partnership programmes detailing the necessary structural reforms to ensure an effectively durable correction of excessive deficits.
- A mechanism shall be put in place for the *ex ante* reporting by Member States of their national debt issuance plans.

The provisions of the TSCG do not affect economic policy terms on which financial assistance has been granted to euro area member countries in the context of EU/IMF stabilisation programmes, taking into account that these countries are subject to enhanced surveillance.

The rules governing the excessive deficit procedure (Article 126 of the TFEU) will be reinforced for euro area member states. As soon as a member state is recognised to be in breach of

the 3% ceiling, there will be automatic consequences unless a qualified majority of euro area member states is opposed. The same applies to measures and sanctions proposed by the Commission. The specification of the debt criterion in terms of a numerical benchmark for debt reduction (1/20 rule) for member states with a government debt in excess of 60% of GDP needs to be enshrined in the new provisions.

As there was no unanimity among the EU Member States, the Heads of State or Government decided to adopt the above measures through an international agreement which was signed on 2.3.2012. The Heads of State or Government of the EU Member States that do not participate in the euro area, with the exception of the United Kingdom and the Czech Republic, indicated the possibility to take part in this process after consulting their parliaments where appropriate.

For the longer term, the work on how to further deepen fiscal integration will continue. These issues will be part of the report of the President of the European Council, in cooperation with the President of the Commission and the President of the Eurogroup. Aimed at enhancing the drive towards a common economic policy, a procedure will be established to ensure that all major economic policy reforms planned by euro area member states will be discussed and coordinated at the level of the euro area, with a view to benchmarking best practices.

### **Strengthening the stabilisation tools**

The above longer-term reforms must be combined with immediate action to forcefully address current market tensions. To this effect, the following were decided:

- The European Financial Stability Facility (EFSF) leveraging will be rapidly deployed, through the two concrete options agreed upon by the Eurogroup on 29.11.2011. The readiness of the ECB to act as an agent for the EFSF in its market operations was welcomed.

- The entry into force of the permanent European Stability Mechanism (ESM) treaty will be accelerated. The Treaty will enter into force as soon as member states representing 90% of the capital commitments have ratified it. The common objective is for the ESM to enter into force in July 2012 (initial target: July 2013).

Regarding *financial resources*, it was agreed that the EFSF will remain active in financing programmes that have started until mid-2013, to reassess in March 2012 the adequacy of the overall ceiling of the EFSF/ESM of €500 billion and to stand ready to accelerate payments of capital to the EMS to ensure a combined effective lending capacity of €500 billion. Euro area and other Member States will consider and confirm the provision of additional resources for the IMF of up to €200 billion, in the form of bilateral loans, to ensure that the IMF has adequate resources to deal with the crisis.<sup>36</sup> Parallel contributions from the international community are also expected.

The following amendments to the ESM treaty were agreed to make it more effective:

- Concerning the involvement of the private sector, there will be strict adherence to the well established IMF principles and practices, while it was also clearly reaffirmed that the decisions taken on 21 July and 26/27 October concerning Greek debt are unique and exceptional.
- In order to ensure that the ESM is in a position to take the necessary decisions in all cir-

<sup>36</sup> In the Eurogroup meeting of 30.3.2012 an agreement was reached to raise the lending capacity of the financial support mechanisms of the euro area, the EFSF and the ESM, from the current overall ceiling of €500 billion to €700 billion. If account is taken of the bilateral loans to Greece and the loans which have already been paid out by the EFSF to support current programme countries, the euro area has mobilised an overall “firewall” of approximately €800 billion, i.e. more than USD 1 trillion. The ESM will be the main instrument for financing new programmes as of July 2012. The EFSF will remain active only for programmes which have started before the above date. For the transitional period until mid-2013, the EFSF could be mobilised for new programmes, so that the lending capacity of €500 billion to be ensured. Furthermore, the acceleration of the payment of capital subscription to the ESM was agreed. In addition, euro area countries have committed to provide €150 billion for additional bilateral contributions to the IMF.

cumstances, voting rules in the ESM will be changed to include an emergency procedure. The mutual agreement rule (i.e. practically unanimity) will be replaced by a qualified majority of 85%, in case the Commission and the ECB conclude that an urgent decision related to financial assistance is needed when the financial and economic sustainability of the euro area is threatened.

The granting of financial assistance through the European Stability Mechanism will be conditional, as of 1 March 2013, on the ratification by the member state concerned of the “Treaty on Stability, Coordination and Governance in EMU” and, upon expiration of the transposition period referred to in Article 3(2) of the TSCG, on compliance with the requirements of that article (i.e. fiscal position in balance or in surplus).

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# EMPLOYMENT AND WORKER FLOWS DURING THE FINANCIAL CRISIS

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## I INTRODUCTION

After peaking in the third quarter of 2008, Greek labour market main indicators have been systematically deteriorating. More specifically, the upward trend seen in employment for a number of years up to the third quarter of 2008, which created around 550,000 new jobs in a decade, was followed by a systematic and drastic decline: from nearly 4,590,000 people in the summer of 2008, total employment fell to 4,156,000 persons in the second quarter of 2011. These 433,500 lost jobs correspond to a 10.4% drop in employment, while widespread estimates suggest that the outlook remains poor, as unfortunately, in view of the ongoing economic recession, employment is expected to deteriorate further before starting to recover.

The decline in employment and the burden of the financial crisis are not evenly distributed across sectors of economic activity or social groups. Thus, while some sectors have lost a considerable part of their employment since the onset of the financial crisis, others appear resilient to the crisis or even seem to have gained new jobs. These changes in employment by sector, aside from the structural changes they entail, inevitably reflect corresponding changes in worker hirings and separations (including retirements and dismissals), given that every job created or destroyed corresponds to a hiring or separation of an employed person. Therefore, to analyse the above changes in employment, it is useful to examine hirings and separations, in other words worker flows by sector or branch; all the more so as the implication on policy making would be different if the observed decline in employment is associated either with limited hirings or with increased layoffs and separations in general (Pissarides 2000; Kanellopoulos 2011). Furthermore, it is useful to know how worker flows vary depending either

on their social attributes, such as gender, age, or education level, or on enterprise characteristics, such as size. If strong flow differentiations are identified, the prospects for absorbing and employing the unemployed are obviously quite different as well, and thus the planning of any proactive policy to mobilise and facilitate the movement of unemployed people towards vacant or new jobs should definitively take these flow variations into account.

Examination of such issues under the so-called labour market dynamics has progressed through the development of theoretical models that calculate the level and evolution of worker flows (Mortensen and Pissarides 1994; Pissarides 2000), as well as through many empirical studies that document the patterns of worker flows in many countries, in addition to their correlation with the business cycle. Specific aspects of these issues, however, still remain unclear, given that empirical results are not always in line with the predictions of theoretical models, thereby necessitating a more detailed documentation by country, time period and sector of economic activity.

The main aims of this study are: First, to examine the evolution of employment by sector of economic activity since the beginning of the current crisis, in order to identify sectors that (even if only potentially) show resilience or dynamism in terms of employment. Second, to examine worker flows by sector, i.e. the number and attributes of those hired and separated, as a contribution to shape policy priorities. Third, to explore possible correlations between sectoral changes in employment and the respective hirings or separations.

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The empirical examination of worker flows relies on the existence of appropriate statistical information, which is not always available. This study uses data from the Labour Force Survey (LFS) to document the size and the characteristics of worker flows during the recent financial crisis and the accompanying drastic decline observed in employment. The sample LFS records the hiring month of those employed, and thus allows hirings to be proxied as the number of those working at their current jobs for up to three months since the week of the survey. Separations on the other hand, as is explained further below, are proxied by subtracting from hirings the change in the respective employment. It is worth noting that, as the LFS is commonly used to estimate employment, our worker flows estimates are consistent with the published estimates regarding employment. Although the following descriptive examination is carried out at the level of sectors with a single-digit classification code, specific reference is also made to certain branches of manufacturing, deemed of potential special interest for state policy making or investment initiative taking.

In this context, we initially examine developments in employment in the period from the third quarter of 2008 (when, as was mentioned above, the upward trend of employment in the previous decades peaked, although the international financial crisis had already started to affect the country) up to the second quarter of 2011 (the last for which statistical data are available), by sector so as to identify sectors showing resilience to the financial crisis in terms of employment (section 2). We then examine sectoral worker flows over the same period, i.e. the number and the attributes of those hired and those separated in each sector (section 3). Subsequently, we document the correlations of recent sectoral changes in employment with the corresponding worker flows (section 4). Finally, the study concludes with a summary of its main findings (section 5).

The Greek economy is small and is heavily exposed to strong European and international competition. Specific sectors of the economy

that appear to have managed to navigate through the current deep crisis and show noticeable labour mobility – such as agriculture, the food industry, hotels, or the pharmaceutical industry – can only but be seen as promising signs of the economy's resilience to the crisis with a view to exiting it, as well as possible targets of a proactive employment policy. It should however be noted that the Greek economy is still in deep recession and estimates as to where it may lead are uncertain, to say the least. Against this background, this study's conclusions are tentative and could require revision due to future unforeseeable developments and structural changes.

## 2 CHANGES IN EMPLOYMENT BY SECTOR

The highest job losses between the third quarter of 2008 and the second quarter of 2011 are recorded in the construction sector, which is known to be more vulnerable in the prevailing economic conditions (loss of 136,600 jobs or one in three employment positions compared with the third quarter of 2008; see Table 1, column 3). Extensive job losses are also recorded in manufacturing, despite its already relatively low share in total employment. Overall, 125,600 jobs or 23% of employment in manufacturing were lost over the period. In fact, as a percentage, in certain manufacturing branches the decline in employment is much higher: textiles -52.1%; printing -51.4% (despite the reduced indirect taxation in this branch); wearing apparel -43.7%; and non-minerals production -42.7%. By contrast, there are also some manufacturing branches with a relatively lower level of job losses, such as food and beverages (-4%), the pharmaceutical industry (-14.5%), and the capital-intensive branch of refined petroleum products (-3.6%). Among the other sectors of the economy with a relatively high share in total employment, considerable job losses in absolute terms are recorded in – the rather oversized by international standards – trade (-57,300), in hotels and restaurants (-35,800), as well as in professional activities (-23,400).

Positive changes in employment, i.e. new jobs created in the period examined, are observed in health and social care (8,400), in administrative and support service activities (4,000), in information and communication (2,500), as well as in households as employers (2,700). It is also worth noting the low and relatively more recent job losses in education (-3,100) and agriculture (-4,100) – which, incidentally, produces a wide range of products: from traditional national products (lately vanishing from supermarket shelves) to modern-day biological and biotechnological exportable goods – as well as the estimated considerable decline in employment in public administration (-8,900).

Some of these declines in employment (e.g. in public administration) represent a declared explicit target of the policy pursued to achieve fiscal balance. Others are unavoidable if the economy is to be shifted from imported or domestically produced and consumed goods to internationally competitive products and services. Finally, other sectors (such as construction, industries producing for the construction sector such as mining) are largely affected by the current conditions of deep recession. It has now been widely accepted that the country's exit from the current financial crisis necessitates, among other things, a restructuring of production and employment by strengthening internationally competitive enterprises and sectors – i.e. those that produce exportable or import-substituting goods – which obviously include agriculture, manufacturing, tourism, and market services.

Using developments in employment as a criterion, we can identify specific sectors that produce internationally tradeable products and services which also show resilience to the crisis and relatively low employment losses, and thus could be seen as potential drivers of the economy's exit from the current crisis. These include agriculture (which for a large part of the period examined experienced an increase in employment), the food and beverages industry, the pharmaceutical industry, as well as hotels and restaurants, which are closely linked

to tourism. Although a number of reasons could be put forward to explain the observed sectoral changes in employment, it is worth noting that sectors showing increased employment do not seem to be characterised by strong institutional barriers to entry.

Targeted sectoral proactive employment policies (subsidising additional employment in dynamic sectors rather than in the public sector where the explicit target is to reduce it; sectoral training programmes), promotion of the use of generic medicines produced mainly by the domestic pharmaceutical industry, growth-fostering actions (through the adoption of well-developed investment plans), measures to expedite the definite approval of private investments, as well as real reforms that facilitate entry into specific professions of these sectors may prove to be effective in many ways. Indicatively, for a new farmer to register in the Farmers' Registry, Law 3874/2010 currently sets forth time-consuming procedures and requirements (such as attendance of training programmes, certificate from the local Tax Office that agricultural activities account for at least 35% of the person's annual income and absorb at least 30% of his/her annual working time, insurance under the Organisation for Agricultural Insurance (OGA), etc.).

Moreover, encouraging the development of efficient trade and supply networks for agricultural and industrial products, including through cooperation agreements among groups of producers, farmers, craftsmen, manufacturers and exporters or retail sale chains, may help accelerate the economy's exit from the current financial crisis.

### 3 HIRINGS AND SEPARATIONS BY SECTOR

A clearer picture as regards employment by sector emerges if we examine worker flows, i.e. the inflows of workers into individual sectors (mainly hirings of wage- or salary-earners and secondly inflows of self-employed), as well as the respective worker separations (including

voluntary quits and layoffs). It hardly needs to be said that worker flows, promoted through the labour market mechanism, redirect workers from unemployment or poorly-paid jobs to better-paid and hence more productive employment positions, and thus contribute to increased total production and productivity (Contini and Villostio 2007; Foster, Haltiwanger and Krizan 2006). Nevertheless, it is extremely hard to establish the optimum level of labour flows, since, on the one hand, excessive flows may entail high adaptation costs, discouragement of in-house training, and a possible slowdown in productivity. On the other hand, lack or scarcity of labour flows could indicate that the labour market does not operate effectively and that available human resources are not allocated to the most productive employment positions existing each time. Thus, any noticeable level of hirings observed in a sector – particularly during the recent period of the financial crisis and the accompanying drastic decline in employment – is a clear sign that the sector exhibits flexibility and dynamism in the face of changing economic conditions, as well as of the fact that workers respond to the emerging employment opportunities, acting either as replacements of quitting or laid-off employees, or in order to take up new jobs. Besides, any desired higher level of employment can only be reached through increased hirings of workers in the sectors examined. Similarly, separations, which include voluntary quits and layoffs, indicate an adaptation of employment to changing labour market conditions and workers' preferences, and typically increase during business cycle downturns when the rise in layoffs exceeds the fall in voluntary quits.

In connection with this, it should be noted that the European Union has adopted the 'flexicurity' (flexibility with security) model in the labour market, which at a practical level combines measures for economically supporting the unemployed, while giving them incentives to find jobs by relaxing legislation on layoffs, as a mechanism facilitating the flow of laid-off or redundant workers towards productive

employment, instead of institutionally protecting existing unproductive jobs. Consequently, monitoring and analysing the various dimensions of worker flows is deemed valuable for assessing the performance of the labour market.

The quarterly LFS, by collecting information on the month (and the year) each employed person embarked on his/her latest job, allows us to proxy the newly-hired as those who started on their latest job within the three previous months from the week of the interview. Their number is summed up on an annual basis and divided by the employment at the beginning of the period, thus giving the rate of hirings for the sector and the workers' group examined. It should be noted, however, that sectoral changes in hirings calculated based on the LFS can be quite wide from one year to the next, due to the small size of the sample, especially as the LFS is not designed to take the sector of employment into account when sampling. To eliminate such erratic changes, the present study, following common practices (OECD 2009; OECD 2010; European Commission 2009), calculates and presents average annual hirings in the period under review and deliberately avoids any more in-depth examination.

By analogy, separations record the retirement or dismissal of workers from their employment within the three previous months from the week of the survey and, according to common practices (Bassanini and Marianna 2009; OECD 2009 ch. 2; OECD 2010 ch. 3), are calculated using the following basic accounting identity:

$$\text{Separations} = \text{Hirings} - \text{Change in employment}$$

As in the case of hirings, separations are calculated as the annual average in the period examined. The rates of hirings and separations are considered to be reliable measures of the observed worker mobility (Davis and Haltiwanger 1992), while their sum is referred to in the relevant literature as the 'worker reallo-

cation rate', which obviously exceeds the (absolute) changes in employment in the same period.

It is worth noting that economic theory traditionally considers low labour (geographical, sectoral or professional) mobility as a main contributor to structural unemployment, low employment, as well as price increases, while empirical research has shown that labour reallocation tends to have a positive effect on productivity (see OECD 2009, section 2.3, and references found there). Moreover, any shift (change of job) of workers is seen as a self-investment (investment in human capital), since in this way workers get access to higher earnings and professional development opportunities, which usually more than offset any money and/or psychological cost entailed by the change of job (OECD 2010, p. 173 and references found there). In this sense, worker flows are associated with certain attributes of the workers, such as age and education level, as well as with the opportunities presented to them.

The LFS estimates that 350,000 hirings (346,400 to be precise) have taken place each year since the onset of the financial crisis (i.e. during the last three years), which account for roughly 7.8% of employment (see Table 1: absolute figures in column 5, percentages in column 6). Many of these hirings are concentrated in hotels and restaurants (71,000), the construction sector (53,800), and trade (47,000). Outside these sectors that are obviously strongly influenced by seasonal hirings, considerable hirings per year also appear in agriculture (31,000), food and beverages (10,200), and education (23,200). These developments in hirings that – in a period of drastic decline in employment – show some resilience, indicate that the labour market exhibits noticeable sectoral dynamism and adaptation of employment according to the needs of the enterprises, which – upon recovery of demand for the Greek products or (international) competitiveness – could lead to the creation of new jobs as well.

Much higher than the average hiring rate (7.8%) is the hiring rate in hotels and restaurants (23%) and in the rather closely related sector of entertainment and recreation (11.5%), as well as in construction (15.5%) and the associated sector of mining (8.8%). These sectors have many small enterprises, no regulated internal labour markets and show strong seasonality, and therefore record relatively high mobility. In contrast, the hiring rate is quite low in banks and insurance (2.6%), in electricity supply (5%), as well as in most manufacturing branches. A similar sectoral pattern of hirings is also recorded in other OECD countries (OECD 2009), a fact that can be attributed to the technological and other characteristics of specific sectors and individual product markets.

Total annual separations (i.e. workers moving from employment to unemployment or outside the labour market) in the period examined, based on the LFS and the above identity, are estimated at 487,500 per year, or 11% of employment, and represent – in the period examined which is characterised by a reduction in employment – a clearly higher level and rate than hirings (see Table 1, last columns). This finding is in line with the fact that this unprecedented rise in unemployment by 453,700 people in the period between the second quarter of 2008 and the second quarter of 2011 was accompanied by a rise of only 69,200 in the number of new unemployed persons (who had not worked in the past), while the rest were unemployed persons who had already been working (and hence have been laid off). In other words, during the current financial crisis the decline in employment came about mainly through increased separations, which is also evident in the fact that two in every three additional unemployed persons are 30 years old or over.

However, separations follow a sectoral pattern quite similar to that of hirings. Separations are also highly frequent in construction (101,900), hotels and restaurants (90,300) and trade (65,300), while relatively high separation rates

**Table 1 Employment, hirings and separations by sector**

<b>Economic activity sector</b>	<b>Employment 2011 Q2 (thousands)</b>	<b>Annual rate of change 2008 Q3 - 2011 Q2</b>	<b>Change in employment 2008 Q3 - 2011 Q2 (thousands)</b>	<b>Average annual hirings 2008 Q3 - 2011 Q1 (thousands)</b>	<b>Rate of hirings</b>	<b>Average annual separations 2008 Q3 - 2011 Q1 (thousands)</b>	<b>Rate of separations</b>
Agriculture, fishing	509.8	-0.29	-4.1	30.8	5.75	30.6	5.71
Mining	10.4	-17.56	-7.3	1.3	8.83	3.8	26.33
Food, beverages	116.5	-1.47	-4.8	10.2	8.21	7.6	6.12
Wearing apparel	25.3	-18.85	-19.6	2.8	7.36	8.9	23.72
Printing	19.6	-23.10	-20.8	1.3	4.56	8.6	29.36
Chemicals and chemical products	10.6	-8.28	-2.8	0.5	3.83	1.9	15.61
Pharmaceutical products	12.3	-5.59	-2.1	0.9	6.18	2.0	13.66
Manufacture of basic metals	16.5	-9.37	-5.1	0.3	1.50	1.4	7.43
Manufacture of furniture	28.0	-10.20	-9.6	1.0	2.82	2.7	8.01
Other manufacturing	188.2	-9.66	-60.6	8.5	3.79	27.8	12.45
Electricity, gas	22.7	-12.98	-10.6	1.4	5.03	5.6	19.97
Water supply, sewerage	28.1	-4.95	-4.2	4.0	12.81	5.0	15.91
Construction activities	262.2	-14.14	-136.6	53.9	15.53	101.9	29.37
Trade	772.9	-2.57	-57.3	46.9	5.81	65.3	8.08
Transport	205.5	-1.25	-7.2	13.6	6.41	18.0	8.50
Hotels, restaurants	303.8	-3.97	-35.8	71.0	22.99	90.3	29.26
Information, communication	79.5	1.18	2.5	3.3	3.95	0.0	0.05
Banks, insurance	111.9	-1.57	-5.0	2.9	2.59	5.6	4.93
Real estate management	4.5	-21.63	-4.3	0.3	4.15	1.9	26.27
Professional activities	212.4	-3.73	-23.4	11.5	5.12	12.5	5.55
Administrative, support service activities	81.7	1.84	4.0	8.5	11.43	8.1	10.83
Public administration	365.9	-0.87	-8.9	14.7	3.94	17.9	4.79
Education	313.0	-0.36	-3.1	23.2	7.22	28.6	8.90
Health, social care	238.7	1.32	8.4	13.4	5.66	8.5	3.60
Arts, entertainment, recreation	48.4	-7.51	-11.6	6.0	11.48	10.5	20.07
Other services	87.6	-2.65	-6.7	5.7	6.42	8.0	9.05
Activities of households	78.6	1.26	2.7	8.4	9.64	4.3	4.95
Activities of extraterritorial organisations	2.0	13.60	0.6	0.1	8.32	0.0	0.49
Total	4156.3	-3.54	-433.4	346.5	7.79	487.6	10.96

Source: Calculations based on data from Labour Force Surveys.

are recorded – aside from hotels and restaurants (29.3%) and the construction sector (29.4%) – in industries that are shrinking (wearing apparel 23.7%; printing 29.4%). Overall, in sectors where employment fell, the rate of separations exceeds that of hirings.

Small-sized enterprises, or more precisely local units employing up to 19 employees, show a much higher hiring rate (8.1% of employment; see Table 2) than large enterprises that employ more than 50 people (6.1%). Thus, considering that in terms of employment small enterprises

**Table 2 Worker flow characteristics**

	Hirings		Separations		
	Percentage of employment	Structure	Percentage of employment	Structure	
<b>Gender</b>					
Men	7.4	56.9	11.2	61.6	
Women	8.4	43.1	10.6	38.4	
Total	7.9	100.0	11.0	100.0	
Number (thousands)	346.5	346.5	487.5	487.6	
<b>Local unit size</b>					
Up to 19 employees	8.1	77.0	11.1	74.5	
20-50 employees	7.1	6.6	12.4	8.2	
50+ employees	6.1	8.3	7.7	7.4	
Other units	7.8	8.1	13.5	9.9	
<b>Age</b>					
Up to 30 years old	17.3	44.6	26.7	49.0	
30-50 years old	6.2	44.8	8.5	43.6	
50+ years old	3.3	10.6	3.4	7.3	
<b>Education</b>					
Tertiary	6.2	29.4	6.6	22.2	
Secondary	8.8	49.5	12.7	50.5	
Primary	8.4	21.1	15.5	27.7	
<b>Occupational status</b>					
Dependent employees	10.2	84.1	14.2	83.2	
Non-dependent employees	3.4	15.8	5.1	16.7	

Source: Calculations based on data from Labour Force Surveys.

prevail in the Greek economy, it is calculated that 77% of hirings concern units employing up to 19 persons. This negative correlation between enterprise size and hirings – documented in other countries as well – may be attributable to some extent to the relatively higher share of small enterprise start-ups, which inevitably implies corresponding hirings, whereas larger units with a long and steady presence show no worker flows for the same reason. Besides, worker flows are evidently limited as an enterprise operates for a longer period of time, as it converges on its optimum size.

Correspondingly, small enterprises are those that record more separations. It is estimated that 74% of separations took place in small

enterprises, or in other words 11.1% of the people employed by small enterprises quit or were dismissed in each year of the crisis period. This indicates that in terms of employment, the net contribution of small enterprises to employment during the current crisis failed to be positive. More separations than hirings are also observed in large production units of at least 50 employees, but this difference (both as an absolute figure and as a percentage) is clearly smaller than in small enterprises. This difference may be linked to the observed numbers of dependent employees, which recently increased in large production units (of more than 50 employees), while at the same time decreased in small units (Bank of Greece, 2011).

In addition to the sector and the size of the enterprises, it appears that workers' demographic traits, such as gender, age and education level, also affect labour flows; however (given the limited available data), the latter cannot be reliably examined by sector with respect to such characteristics as well. Examining the attributes of the hired, it appears that men show a relatively lower hiring rate (7.4%) than women (8.4%), although they account for 56.9% of the total number of hirings compared with 43.1% for women (see Table 2). There is, however, a sectoral separation of hirings by gender: women dominate the services sectors, while men dominate in agriculture and industry. By contrast, with regard to separations it is men who dominate – both as an absolute figure (300,000 men and 187,000 women) and as a percentage (11.2% and 10.6% respectively) – which indicates that the current crisis has hit men somewhat harder than women. The fact that the crisis had a greater impact on the construction and manufacturing sectors, which employ relatively more men, is in line with this finding.

Hirings are much more concentrated in younger ages. Around 45% of the hired are less than 30 years old, and a roughly equal share corresponds to the 31-50 age group. Given the relatively small number of the employed aged less than 30, the hiring rate for them rises to 17.3%, while it drops to 6.3% for the 30-50 age group and to 3.3% for people aged 50 or over. Considerable hirings of young people are recorded in all sectors, while noticeable hirings of relatively older workers are recorded in (seasonal) constructions and in households as employers (of domestic personnel). Correspondingly, separations from work show considerably higher relative rates for the young (26.7%) and for those in the most productive age group of 31-50 year-olds (8.4%). This negative correlation between age and mobility is to some extent unsurprising, given that it incorporates the integration of young people in the labour market. It also reflects the tendency of young workers to change jobs before settling down professionally, as well as their separation

upon expiry of the fixed-term employment contracts more typically offered to them.

Education level does not seem to increase the overall rate of hirings, since tertiary education graduates show a lower hiring rate (6.2%) than secondary education graduates (8.8%) or holders of primary education certificates (8.4%). This finding is linked to the relatively higher concentration of tertiary education degree-holders in sectors with low hiring rates and labour mobility, such as public administration, education, health, etc. It is worth noting that almost one in every two hirings involves secondary education graduates, who represent the largest group of employed persons by education level of those examined here. Consistent with the above is the correlation between separations and education level, as secondary education graduates also show relatively higher separations.

Hirings appear with a higher frequency in wage- and salary-earners (10.2%) than in non-wage-earners (3.4%) who are mainly self-employed persons. From a different perspective, although non-wage-earners represent 35.8% of employment, they only account for 15.8% of hirings. The level of employment is mainly adjusted through new entries of wage-earners and not the self-employed. Even in agriculture, which has high rates of self-employment, the inflows of wage-earners appear to exceed in number those of non-wage-earners. In separations as well, wage-earners show much higher rates (14.2%) than non-wage-earners (5.1%).

The annual rates of separations and hirings in Greece are clearly lower compared with the corresponding ones in other OECD countries in the period 2000-2005 (OECD 2009, Table 8). Relatively smaller annual labour flows in Greece are also recorded in the period 2002-2007 (European Commission 2009, Table 1). It is nevertheless worth noting that a relatively recent study by the European Commission (European Commission 2009, Charts 2-4), using data from the EU-SILC database, esti-

mates that the monthly (and annual) hiring and separation rates in Greece in the period 2005-2006 stand close to the medians of the 24 countries examined. Although the interpretation of labour flow differentials observed between Greece and the EU lies beyond the scope of the present study, to some extent the smaller labour flows observed in Greece can be explained by the higher share of self-employed persons working in the country, as well as by the relatively lower share of people working under fixed-term employment agreements. Moreover, the large number of social security funds still operating in the country, combined with the dissimilarity that characterises them as regards the requirements and the level of pensions and other benefits they grant, evidently deter workers from moving to another sector, or even another employer within a sector.

Despite these structural and institutional obstacles to worker flows, noticeable flows are indeed observed (not only in seasonal sectors), and on average almost 19 in 100 employed persons change their job each year. This indicates that labour markets in Greece are not all that rigid, and adapt to the conditions prevailing at the time. In addition, the relaxation of the legislation on employment protection in 2010 (the strictness of which has been empirically proven to discourage labour flows), as well as other institutional changes in the labour market (e.g. those facilitating fixed-term employment agreements, reduced minimum wages for the young) are expected to further encourage worker flows and particularly hirings in Greece (see also OECD 2010 for a relevant empirical research). Moreover, the legislative measures to facilitate the entry of interested workers in specific (regulated) professions, and mainly the deregulation of markets thus far controlled by the state (e.g. electricity supply, natural gas supply, railroads, etc.) are expected to similarly contribute in this same direction. The Greek experience has shown that the deregulation of product markets such as telecommunications, banks, or radio and television broadcasting, has led to higher employment and growth of the respective labour markets.

#### 4 HIRINGS, SEPARATIONS AND EMPLOYMENT

An interesting question that arises is whether the hirings estimated above for different sectors take place in order to boost production, and hence lead to higher employment, or in order to replace quitting or laid-off workers. In the first case, sectors with many hirings would be expected to have less separations, denoting a negative correlation between hirings and separations. In the second case, hirings would be expected to be positively correlated with separations, as both would then simply denote the extent of labour reallocation across the various sectors of production, and not necessarily changes in the size of the sectors examined. As in other countries as well, average annual hirings and separations by sector exhibit a positive correlation, which appears to be considerable (correlation coefficient = 0.46) and statistically significant ( $p$  value = 0.012). Thus, it seems that sectors that proceed to a relatively large number of hirings also record many separations of workers, a fact rather attributable to their specific production characteristics, e.g. seasonality, as well as to the enterprises' business opportunities, which entail a positive correlation between hirings and layoffs at sectoral level (OECD 2009, p. 131). However, the fact that this correlation between sectoral hirings and separations is not extremely high leaves room for an interpretation suggesting that individual sectors are going through a restructuring process, adapting their employment to the changing conditions.

In the period examined that has seen many job losses, the data reveal a strong negative correlation between the average annual sectoral rate of separations and the annual rate of change in the respective employment (correlation coefficient = -0.80,  $p$  value = 0.000). In other words, and in line with economic theory (Pissarides 2000), labour flows from employment to unemployment and outside the labour market are countercyclical and increase with declining employment. On the other hand, no evidence of a relationship appears in the same period between changes in sectoral employ-

ment and the respective hirings (correlation coefficient = 0.09, p value = 0.647). These last two findings indicate that the recent dramatic decline in employment is indeed closely associated with more separations (layoffs plus voluntary quits) of employed people, but not with less hirings as well. In other words, separations increased drastically in the three years of the crisis, but at the same time hirings do not appear to have decreased considerably.

## 5 SUMMARY AND CONCLUSIONS

The loss of 433,500 jobs from the onset of the financial crisis (in the third quarter of 2008) until spring 2011, or the 10.4% decline in employment in this period, is quite variably distributed across sectors of economic activity. The highest losses are observed in the construction sector (136,600) and in manufacturing as a whole (125,600). There are, however, some manufacturing branches with a relatively lower level of job losses, such as food and beverages (-4%) and the pharmaceutical industry (-14.5%). Agriculture, as well, did not record considerable losses in employment (-0.8%). Finally, the decline in employment in hotels and restaurants stands close to average.

The same period has seen around 350,000 hirings per year, corresponding to 8% of employment, as well as 487,000 separations; hence, almost 19 in 100 employed persons have changed their job each year. In addition to sectors exhibiting high seasonality (hotels and restaurants, construction, trade), noticeable hirings are recorded in agriculture, food and beverages, and education.

Although labour market indicators continue to deteriorate and prospects are rather bleak, the above examination allows us to draw the following initial conclusions.

There seems to be some sectoral dynamism in the labour market and an adaptation of employment to the needs of the enterprises.

Relatively higher flows in the labour market are recorded for young workers, wage-earners, and secondary education graduates, as well as for small production units.

The recent drastic decline in employment came about through a clear predominance of separations over hirings. Sectoral changes (losses) in employment are more closely associated with corresponding changes (increases) in separations rather with changes (decreases) in hirings.

Although the Greek hiring and separation rates appear lower than those in other EU countries, recent institutional changes (relaxation of the legislation on employment protection, facilitated conclusion of fixed-term employment contracts, etc.) are expected to further strengthen labour mobility in Greece.

The sectors identified above, which have shown higher employment resilience to the financial crisis, are exposed to international competition, produce internationally tradeable products or services and record noticeable labour mobility could be seen as potential drivers of the economy's exit from the current crisis. This would require strengthening them by carrying out well-developed investment plans, as well as implementing sectoral proactive employment policies (subsidising new hirings, respective training programmes). In parallel, sectoral research programmes should be prioritised, and the entry and integration of interested workers in these sectors should be facilitated further. Finally, there is a need to develop trade and supply networks for (agricultural and industrial) products, including through agreements among farmers, manufacturing companies and retail sale chains in Greece and abroad.

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# BANK CAPITAL ADEQUACY FRAMEWORK\*

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## I INTRODUCTION

Since the start of the current debt crisis, there have been recurrent concerns over the soundness of the Greek banking system and questions whether banks are adequately capitalised to absorb the negative effects of the crisis, whether the Hellenic Financial Stability Fund<sup>1</sup> should step in and contribute public funds, whether banks' capital is impaired by the findings of BlackRock<sup>2</sup> or whether banks are able to cope with the PSI<sup>3</sup>. A common denominator of all the above questions is bank capitalisation. But what is understood by "an adequately capitalised bank"? Obviously, a bank must have an "adequate" level of capital; which however is not always easy to define in quantitative terms. From a technical point of view, the answer is even more complicated, and considerable efforts have been made internationally to define the concepts and establish a regulatory framework, commonly known as the Basel framework, with a view to ensuring that banks are "adequately" capitalised. This paper discusses, in a comprehensive and non-technical manner, the relevant concepts and the answers to the above questions.

Banks play a significant intermediation role in the economy, where "confidence" is of paramount importance. The disruption of the effective provision of banking services leads to negative externalities,<sup>4</sup> as when a bank fails the cost incurred by its shareholders is much less than the total cost to society as a whole. Moreover, banks are very vulnerable to liquidity disruptions, as well as to potential spillovers of such disruptions as a result of interlinkages within the banking system. In order to address such problems, a financial safety net, which may envisage the use of public funds, has been designed and provides the rationale for introducing regulatory standards to avert any negative repercussions on economic activity. The regulatory standards aimed at ensuring banks' safety and soundness are included in micro-

prudential supervision, while those relating to the risks of the external environment of banks are part of macroprudential supervision. The main microprudential supervisory tool is capital adequacy requirements; their objective is to avert excessive risk-taking and protect depositors. In other words, supervisory authorities determine the minimum levels of leverage and expect banks to operate within additional capital buffers related to the risks they have to address. Banks are considered high-leverage enterprises and therefore can realise far higher gains (or far heavier losses) than what would have been the case if they invested only their own funds.

The determination of minimum capital requirements and capital buffers is at the core of this study. Section 2 explores the concept of leverage and Section 3 describes a detailed method of calculating regulatory capital and capital adequacy, i.e. it provides a discussion of the Basel framework. In Section 4, the concept of economic capital and its association with Pillar II are examined, while Sections 5, 6 and 7 analyse the methods for calculating capital requirements for credit risk, market risk and operational risk, respectively. Section 8

\* The views expressed in this paper are personal and do not necessarily reflect those of the Bank of Greece.

<sup>1</sup> The Hellenic Financial Stability Fund was established under Law 3864/2010, with the objective of safeguarding the stability of the Greek banking system through the strengthening of credit institutions' capital adequacy.

<sup>2</sup> The consulting firm BlackRock assessed Greek banks' loan portfolios and analysed the adequacy of their provisions.

<sup>3</sup> PSI stands for Private Sector Involvement and refers to the voluntary participation of Greek government bond holders in the exchange programme for new lower value bonds.

<sup>4</sup> There are at least five reasons for such negative externalities (see Brunnermeier et al., 2009): (1) informational contagion, as a problem in bank A may be perceived as a systemic problem and may affect robust bank B; (2) the loss of access to future funding for the failed bank's customers; (3) the interrelations among banks through the interbank and the derivative markets; (4) the liquidity spiral, whereby attempts to deal with liquidity problems through fire sales will lead to declines in prices, activating an internal amplifying process, which may create an overall solvency problem; and (5) the deleveraging via credit crunch, which weakens the economy and raises the probability of default. Banks can internalise such negative externalities by (1) holding higher level of capital, (2) taxing the transactions, and (3) implementing insurance policies. This study investigates only the first option.

focuses on Basel III and the major new arrangements concerning bank capital. To facilitate the reader and ensure an uninterrupted flow in the analysis, certain more technical issues are discussed in boxes or annexes.

## 2 LEVERAGE

In financial economic theory, the concept of leverage has various interpretations and aspects. Financial leverage is easier to identify, as it occurs when bank assets exceed equity capital.<sup>5</sup> A bank increases its leverage by borrowing funds, which when invested could improve its return-on-equity (ROE). From this perspective, leverage is measured using a simple debt-to-equity ratio, which reflects the capital structure. Leverage is closely linked with the economic cycle. During economic upturns, banks seek to maximise their gains by increasing borrowing and therefore leverage; during economic downturns, banks limit their exposure to borrowed funds. In both cases, the effects of the economic cycle are exacerbated.

The Miller-Modigliani theorem (MM) is the prominent theory behind financial leverage and examines a firm's capital structure, as well as the average cost of capital. According to the first proposition of the theorem (MM1), when a firm operates in the absence of distortions, its financing either with own funds or with borrowed funds does not affect its value: the value of a firm is unaffected by its capital structure (this is the so-called irrelevance theorem). However, the economic environment exhibits distortions, with the largest distortion arising from the system itself, as income from various forms of capital is used in a different way. Debt interest payments are tax deductible, whereas shareholder dividends are distributed after taxes, thus creating an incentive to take on debt in order to exploit the tax shield. The second proposition (MM2) states that the value of a levered firm (i.e. that is financed by debt only) is higher than that of an unlevered firm only by the present value of tax benefits. This creates an incentive for debt financing, which however is limited by the cost

of default. Beyond a given level of leverage, the cost of the probability of default is greater than tax benefits. An optimal capital structure exists at a level where the value of the firm is maximised and the cost of debt is minimised.

What is at stake here is whether the MM propositions also apply to banks. If this is the case, then the suggested higher capital requirements for banks (e.g. under Basel III) are not expected to yield any significant results. The MM irrelevance theorem implies that the use of higher equity reduces the risks to both equity and debt and, therefore, reduces the required rates of return, in such a way that the weighted average cost of capital remains constant.

Nevertheless, there is strong evidence that the MM propositions cannot be fully applied to banks, due to distortions which give banks incentives to hold a lower level of equity capital. The most important distortion is considered to be the existence of the financial safety net developed by the regulatory authorities to shield banks which, despite the protection offered to solvent banks and depositors, generates distorted incentives. For instance, the deposit insurance schemes provide a disincentive to depositors to monitor and discipline banks which, as a result, engage in riskier management practices. Therefore, it might be argued that the MM propositions cannot be fully applied to the banking sector. Banks have an incentive to hold a lower level of equity and therefore regulatory intervention is deemed necessary.

## 3 CAPITAL ADEQUACY – THE BASEL APPROACH

### 3.1 A BRIEF OVERVIEW

Sharp movements in the prices of financial instruments in the 1980s had a strong effect on

<sup>5</sup> Other forms of leverage arise from: (a) off-balance sheet financing (off-balance sheet leverage), whereby a bank creates financing vehicles, e.g. SPVs or SIVs, to which it provides credit and/or liquidity facilities with recourse, which however may imply higher loss; (b) an investment in financial derivatives, where the margin is much lower than the entailed risk. Moreover, the term operating leverage refers to the relationship between fixed and variable expenses in a firm's cost structure and is part of operational risk.

the market value of banks' capital; this led to calls for the development of an internationally accepted capital adequacy framework, with a view to strengthening the capital base of banks and to ensuring cross-country comparability and ultimately financial stability. This task was entrusted to the Basel Committee on Banking Supervision (BCBS), a body which has no legal status and operates under the umbrella of the Bank of International Settlements. It is not a supranational intergovernmental organisation or a supervisory authority, as it is not empowered to supervise the banks of its member countries. Its recommendations are not legally enforceable, but rather aim to develop broad supervisory standards, guidelines and best practices.

In 1988 the Basel Committee issued the Basel Capital Accord (July 1988), commonly known as "Basel I", which determined the minimum level of capital that banks are required to hold relative to credit risk. The capital adequacy ratio has been used ever since as a main tool of prudential supervision, with a view to creating a capital base capable of absorbing unexpected losses. The new framework introduced the concept of risk weighting for on-balance sheet and off-balance sheet items as a basis for the calculation of capital requirements. It also established rules for the measurement of risk-weighted assets and, at the same time, the minimum capital ratio of 8% of risk-weighted assets was introduced.<sup>6</sup> The initial Basel Accord was later supplemented in 1996 with the inclusion of market risk. Under this amendment, banks were required to hold adequate capital to cover both credit and market risk.

The introduction of the Basel I framework had a direct impact on banks' behaviour. According to international studies, the capital base of banks was significantly expanded, which contributed to the robustness of the system as a whole. Nevertheless, many banks took advantage of loopholes in the framework, which often led to mismatches between capital and assumed risks or to inadequate capital for certain activities, e.g. securitisations. As a result

of these weaknesses, financial innovations (e.g. credit derivatives) emerged, seeking to exploit regulatory arbitrage. A review of the rules was inevitable. Supervisory authorities worldwide focused on an analytical calculation of capital requirements in an effort to better capture the entailed risks. Against this background, in June 1999 the Basel Committee issued a consultative paper entitled "A New Capital Adequacy Framework" (Basel II), which, after repeated rounds of consultations, was finalised in 2004 with effect from 2008.

In contrast to Basel I, whose main objective was to create a level playing field for banks, introducing a "one-size-fits-all" framework, Basel II encourages banks to develop risk management systems and to calculate capital requirements on the basis of these systems' outcomes. This approach changed once again in view of the financial turmoil which broke out in 2007-2008.

At the onset of the global financial turmoil in 2007, the new Basel II framework had been implemented in only a few countries and therefore it is misleading to judge the Basel II framework in terms of its ability to mitigate the effects of the crisis. Nevertheless, this shed light on some amendments that were deemed necessary. Under Basel II, regulatory authorities tried to develop the framework vertically, i.e. by suggesting analytical rules for specified risks, and not horizontally, i.e. by covering as many risks as possible. As a result, they disregarded important developments in the banking sector, namely the growth of the shadow banking system in terms of size, leverage and intermediation. The shadow banking system, which refers to the banking system not subject to regulatory oversight, did not trigger the crisis in and of itself, but rather magnified its effects. Furthermore, the regulatory authorities overlooked the implications from accumulated risks within the system, the interlinkages

<sup>6</sup> The 8% minimum was derived from past experiences of adequately capitalised banks. It was introduced for the first time under the Basel I framework and has been a benchmark for bank capitalisation ever since.

between banks, the repercussions of a financial turmoil, as well as the procyclicality of the framework. In addition to the above, weaknesses were detected as regards risk coverage, and primarily the coverage of liquidity risk. The view that abundant liquidity does not create any problems proved to be erroneous, as it led to an easing of credit standards. Moreover, financial innovations added new parameters to liquidity risk, but their implications were neither fully appreciated nor captured.

Efforts at improvement focused on three main directions: an enhancement of the existing framework, the introduction of the macro-prudential dimension and the establishment of stress testing and capital planning as complementary tools of prudential supervision.

As regards the first direction, the method for calculating capital for market risk was enhanced, the approaches to both securitisation and liquidity risk were significantly modified, minimum capital requirements were raised through the establishment of capital buffers, rules were introduced to enhance the quality of capital in terms of loss-absorbing capacity, and capital adequacy ratios were supplemented with a simple leverage ratio.

The second direction rested upon the view that problems in systemically important banks have broader implications and banks are not motivated enough to internalise the potential for such negative externalities. Therefore, the establishment of special arrangements for the monitoring of systemic risk and system-wide risks was envisaged (the ESRB in the euro area and the Dodd-Frank Act in the US), while the supervisory framework was reinforced and higher capital requirements for systemically important banks were determined.

Turning to the third direction, stress testing and capital planning added a dynamic aspect to banking supervision, as they assess capital adequacy against a background of adverse macroeconomic developments. Furthermore, the evaluation of required capital helps deter-

mine the amount of capital that a bank should hold above the regulatory minimum. Additional capital buffers attach a dynamic aspect and regulatory ratios cease to act as lagging indicators.

On the basis of the above, from July 2009 onwards the Basel Committee issued a set of additional recommendations, rules, etc. that are commonly known as “Basel III”. This framework is the regulatory response to the financial crisis and is expected to have been phased in by 2019. In the meantime, certain arrangements are very likely to be reconsidered in the light of the lessons learnt from the current euro area debt crisis.

### 3.2 BANKS' CAPITAL BASE

In general, we can distinguish between three different types of capital:

- Equity capital: own funds reported in the balance sheet and calculated according to international accounting rules.
- Regulatory capital: own funds required by regulatory standards.
- Risk capital or economic capital: the amount of capital required to absorb any unexpected losses arising from the risks facing a bank.

This diversity in the concept of capital in the banking sector is due to the heterogeneity of banks' stakeholders. Stakeholders can be categorised in five groups: debt holders, depositors, shareholders, rating agencies and regulatory authorities. Each group places emphasis on different points of analysis, as its unique motives, preferences and goals differentiate its behaviour in relation to the other groups, as well as its influence over the bank's decision making.

Debt holders and rating agencies, which in theory represent potential debt holders, are mainly interested in the bank's probability of default and therefore tend to assess each piece

of information from this perspective. Depositors are barely motivated to differentiate their behaviour, to the extent that their deposits are protected by deposit guarantee schemes, and as a rule their actions are driven by liquidity motives. On the other hand, shareholders focus primarily on wealth creation and secondarily on the bank's probability of default. They are willing to undertake higher risks as long as they are rewarded. Their behaviour is driven by the potential for profit creation, i.e. the maximisation of the bank's cash flows subject to non-default. Lastly, the regulatory authorities act with a view to maximising social welfare. Regulators have the possibility to draw information through on-site audits and prudential reports that banks are required to submit, as well as to impose disciplinary sanctions. The most important risk factor underlying their decisions is the probability of default that could cause a systemic problem. Preemptive action aims at reducing the probability of default, while corrective action aims at preventing the crisis from spreading to sound banks. Therefore, the main objectives of regulatory authorities are more compatible with the aspirations of debt holders and depositors than those of shareholders.

### 3.3 EQUITY CAPITAL

Equity capital is important for bank management, since it signals bank soundness, as well as the degree of protection that a bank offers its depositors. Equity capital is calculated according to the International Financial Reporting Standards (IFRS) and comprises three main items: share capital, reserves and retained earnings. Reserves are created from a bank's profit in order to address any impairment losses in assets, mainly loans and investment in securities. From an accounting point of view, the treatment of reserves depends on the classification of balance sheet items, which must be included in one of the following categories:

- a) held to maturity – HTM;
- b) loans and receivables – L&R;

- c) fair value through profit and loss – FVTPL;
- and
- d) available for sale – AFS.

Balance sheet items in each category are held for different purposes, thus resulting in different valuation methods for each category.

Held-to-maturity assets are classified under the HTM portfolio, while loans, deposits, etc. are classified under the L&R portfolio. Both portfolios are valued at amortised cost, i.e. the acquisition cost minus accumulated depreciation minus any possible impairment losses. Impairment losses (provisions) mostly refer to the loan portfolio.<sup>7</sup>

The category "fair value through profit and loss" (FVTPL) has two subcategories, namely held-for-trading (HFT) securities, purchased with the intent of trade within a short period of time taking advantage of short-term price fluctuations, and the assets that the bank has chosen to report at fair value upon initial recognition.<sup>8</sup> In both cases any revaluation outcomes affect directly bank financial results.

Lastly, the "available for sale" (AFS) portfolio comprises assets which are designated in advance as available for sale at fair value, but any revaluation is directly recorded in equity

<sup>7</sup> Under the IFRS, banks are required to record in a special provisions account the value of loans which is not expected to be recovered, after conducting an impairment test using the incurred loss method. On an annual basis, this account reduces earnings and probably capital, since, if earnings are not adequate to absorb provisions, reserves (retained earnings) and therefore capital are bound to be adversely affected. Accumulated provisions reduce bank asset value, as they are recognised as deductions from loans. In the event of loan write-offs, bank earnings or capital will not be affected, as the stock of provisions, if adequate, will be used.

In many cases, this approach is different from the estimates of supervisory authorities on adequate provisions. Supervisory authorities either apply a special system for calculating adequate provisions (e.g. Bank of Greece Governor's Act 2442/1998, as applicable) or are based on banks' estimates about credit risk parameters (see Annex 1). In the latter case, provisions reflect the expected loss (see Section 4.1). It is obvious that there is a discrepancy in the calculation methods for provisions between accounting and supervisory authorities. This discrepancy has been a constant debate between the authorities which however have not yet managed to bridge the gap.

<sup>8</sup> Fair value is the amount for which an asset or liability can be exchanged between two informed parties in an arm's length transaction. This price may correspond to the market value or the model value. The latter method is used when the market value is not representative.

capital, i.e. AFS securities reserves are subject to change, unless the asset is sold and thus accumulated gains or losses are transferred to a Profit and Loss account.<sup>9</sup>

### 3.4 REGULATORY CAPITAL ADEQUACY

In order to fully understand the regulatory aspect of capital, a distinction should be made between available capital and required capital. Available capital refers to the capital held by a bank in line with supervisory standards, while required capital refers to the capital that a bank should hold on the basis of its risk profile and business plan. If available capital exceeds required capital, then the bank is considered to be adequately capitalised. The difference between available and required capital also determines how a bank will manage its capital. Let us examine each type of capital separately.

#### A) AVAILABLE CAPITAL

For a financial asset to be included in available regulatory capital, it must meet the following criteria:

- **Permanence and availability**, i.e. the funds provided by the underlying financial asset must be permanent and available when needed. This means that the issuer should not have any (contractual or not) obligation to buy back prior to due date (e.g. early redemption clause), but even in this case, the clause should not provide a strong incentive for early redemption. According to the above, shareholders' equity, which has no maturity, is of a higher quality than subordinated debt with a defined maturity.<sup>10</sup>

- **Flexibility**, i.e. the issuer of the financial instrument must have the possibility to cancel payments (interest or dividend payments) depending on the financial conditions. This is typically possible as regards dividends from common stock or preference shares, as the distribution of dividends is at the bank's discretion, but flexibility is reduced in the case of

cumulative preference shares. By contrast, the possibility to suspend coupon payments on subordinated bonds is much more limited.

- **Loss absorption capacity**, i.e. the ability to absorb any unexpected losses, so that a bank continues to operate (on a going concern basis) or depositors are protected in case of bankruptcy (on a gone concern basis). According to the loss absorption criterion, shareholders' equity ranks first in terms of quality, since it can absorb losses immediately without any restrictions. Conversely, subordinated bonds have a lower priority than other debts, since their loss absorption capacity is not high on a going concern basis. However, this capacity is enhanced on a gone concern basis, as subordinated bondholders rank just before common stockholders.

On the basis of the three criteria mentioned above, regulatory capital is classified into three categories in terms of quality, namely Tier 1, Tier 2 and Tier 3 capital. Each category is further divided into upper and lower capital. Table 1 provides a brief breakdown of each category.

#### a) Tier 1 capital

Upper Tier 1 capital (sometimes referred to as Core Tier 1) is equivalent to the IFRS definition and comprises equity capital, disclosed

<sup>9</sup> The above portfolio distinction can help to better understand the losses that Greek banks incurred due to the haircut applied on Greek government bonds. Most of the securities had been classified as available for sale and recorded in the AFS portfolio; therefore, they were valued at fair value. Following the onset of the debt crisis and the sharp decline in prices, securities were transferred from the AFS portfolio to the HTM portfolio, which is allowed under certain conditions. Thus, the adjustment to fair value was not required and bank equity capital was protected. However, under the voluntary Greek bond exchange (known as the PSI), their value declined by an amount equal to the differential between the value of the existing bonds and the value of the new bonds. The loss is deducted from equity capital having a commensurate impact on regulatory capital (for the accounting treatment of Greek sovereign debt see ESMA, Public Statement, "Sovereign Debt in IFRS Financial Statements", 25 November 2011, ESMA/211/397).

<sup>10</sup> The concept of subordination refers to the hierarchical treatment of creditors in case of bankruptcy. Subordination means lower priority vis-à-vis other debt holders. If a bank has issued subordinated bonds, in the event of bankruptcy these bondholders have lower priority among other bondholders and they are ranked just before common stockholders. In other words, subordinated debt holders "support" all other creditors with their funds.

**Table 1 Breakdown of capital<sup>1</sup>**

		<b>Deductions from core Tier 1 capital</b>	<b>Deductions from Tier 1 and Tier 2 capital</b>	<b>Deductions from total capital</b>
(Tier 1)	Core	- Equity capital	- Goodwill and intangible assets	
		- Disclosed reserves	- Revaluation reserves	- 50% of the negative differential between provisions and expected loss
		- Minority interests	- Own shares	- 50% of the share of bank A in bank B, if this share is higher than 10% of B's capital.
	Non-core	- Innovative instruments		
		- Non-innovative instruments		
	(Tier 2)	Upper	- Perpetual cumulative preference shares	- 50% of the negative differential between provisions and expected loss
			- Perpetual subordinated debt	- 50% of the share of bank A in bank B, if this share is higher than 10% of B's capital.
			- Positive differential between provisions and expected loss	
		Lower	- Cumulative preference shares with a defined maturity	
			- Subordinated debt with a defined maturity	
(Tier 3)		- Short-term subordinated debt		

1 This breakdown is not exhaustive but refers to a number of illustrative examples for a better understanding of the concepts. A detailed breakdown is provided in Bank of Greece Governor's Act 2610/29.10.2010.

reserves and minority interests.<sup>11</sup> All of the above types of capital are identifiable in the banking system, are clearly reflected in published financial statements, have a strong impact on profitability and best meet the three criteria of regulatory capital. Therefore, Upper Tier 1 capital is considered to have the highest quality among all types of capital.

Upper Tier 1 capital can in many cases be difficult or costly to raise, and the regulatory authorities have decided to expand the scope of Tier 1 capital with the inclusion of hybrid securities, comprising Lower Tier 1 capital. Hybrid securities combine elements of equity (e.g. they have no maturity) and debt (e.g. fixed coupon payment). Hybrid security holders actually trade their claims on capital for fixed payments from

the bank's earnings. The most important hybrid instruments are innovative instruments, non-innovative instruments and preference shares.<sup>12</sup>

<sup>11</sup> Minority interest is an accounting concept to reflect the value of the minority shareholders' holdings in a bank's subsidiary. These holdings are in essence claims from the bank and must therefore be reported on the consolidated balance sheet. It is part of Tier 1 capital as it can absorb losses immediately. However, minority interest can only absorb the losses suffered by the specific subsidiary and thus it may be argued that it does not fully meet the loss absorption criterion.

<sup>12</sup> Innovative instruments provide an incentive for early redemption. If the contract contains a step-up clause, after a certain period of time the issuer has a call option, which must be exercised, otherwise the issuer will pay a higher interest rate. Thus the issuer has an incentive to redeem the funds and the permanence criterion is not fulfilled. However, if this incentive is provided after a relatively long period of time (usually 10 years), these instruments can be viewed as Lower Tier 1 capital. Preference shares do not have a defined maturity, they pay a fixed-rate coupon and if the bank has the discretion not to pay a cumulative coupon, they can be included in Upper Tier 1 capital. Under Law 3723/2008 aimed at supporting liquidity in the Greek economy, non-cumulative preference shares were acquired by the Greek government (so as to be included in Upper Tier 1 capital) at a coupon rate of 10%.

Hybrid securities are often issued by a special purpose vehicle and are used as a capital enhancement instrument, but the framework sets a number of quantitative limitations, e.g. they should not exceed 15% of Tier 1 capital. During the financial crisis of 2007-08 several hybrid securities were downgraded by credit rating agencies and significantly lost their loss absorption capacity.

#### **b) Tier 2 capital**

Tier 2 capital consists of cumulative preference shares, subordinated debt and the positive differential between loan-loss provisions and expected loss. With regard to the latter, it should be noted that, if the level of provisions is higher than expected loss, then the differential must be viewed as available capital and is classified as Tier 2 capital, provided that it does not exceed 0.6% of risk-weighted assets. In fact, this possibility is provided only to banks which apply the internal ratings-based (IRB) approach under the Basel II framework (see Annex 1), as these banks are considered to follow a reliable method for estimating expected loss.

#### **c) Deductions from capital**

For the measurement of total available capital, certain assets which do not meet the inclusion criteria are deducted. For instance, goodwill and intangible assets are deducted from Tier 1 capital, as they cannot be converted into tangible assets to absorb losses. Own shares are also subject to deduction, since by buying back its own stock a bank transfers the loss absorption capacity from the initial buyer to itself. Furthermore, revaluation reserves at fair value do not include any positive or negative differentials in the valuation of non-interest-bearing instruments (e.g. shares). This is attributable to the fact that, in the case of non-interest bearing instruments with no maturity, valuation losses must be realised and therefore deducted from Tier 1 capital. This is also the case for valuation gains, which however are included, at a rate of 45%, in Tier 2 capital.

Interest-bearing instruments (e.g. bonds) have a defined maturity and valuation losses are not a reliable approximation of the potential loss and therefore, remain in the reserves.<sup>13</sup> Only in the event of the issuer's default, must the loss be realised and deducted.

Furthermore, total capital is subject to a number of necessary adjustments, aimed at deducting those items that are not characterised by an adequate loss absorption capacity. Again, analysis is not exhaustive but is limited in some typical cases:

- The negative differential between provisions and expected loss is deducted by 50% from Tier 1 capital and by 50% from Tier 2 capital.
- The share (in the form of stock or hybrid securities) of bank A in bank B is deducted by 50% from Tier 1 capital and by 50% from Tier 2 capital, if this share exceeds 10% of B's capital. The rationale behind the deduction is the avoidance of double gearing, since otherwise banks A and B could help each other to raise their capital base without any actual capital inflow.
- The participation of a bank in an insurance company is deducted from the bank's total capital, if it is higher than 20% of the insurance company's capital.

#### **d) Restrictions**

The classification of capital in quality categories is important for the restrictions which are set in the form of limits.<sup>14</sup> For instance, Upper Tier 1 capital must account for at least 50% of total Tier 1 capital. This restriction might lead to cliff effects, as, in the event that Lower Tier 1 capital exceeds 50%, excess cap-

<sup>13</sup> A different treatment of revaluation reserves is observed under IFRS, as these are not recognised in regulatory capital, that is prudential filters apply on unrealised losses for interest-bearing financial instruments.

<sup>14</sup> As already discussed, certain items are deducted from Tier 1 capital, whereas some other items are deducted from total capital. This distinction is important, since the latter are not subject to any restrictions applicable in all capital categories.

ital is classified (or plunges) into Tier 2 capital. Another important restriction is that the total level of Tier 2 capital should not be higher than the total level of core Tier 1 capital.

The net sum of the abovementioned forms of capital makes up the available capital. However, the question is whether available capital is adequate or not; its adequacy depends on its comparison with required capital.

## B) REQUIRED CAPITAL

For total available capital the Capital Adequacy Ratio (CAR) can be measured as follows:

$$CAR = \frac{AC}{Credit\ risk + Market\ risk + Operational\ risk} \geq 8\%$$

where:

*CAR*: capital adequacy ratio;

*AC*: total (available) regulatory capital (Available Capital);

*Credit risk*: proxy for credit risk;

*Market risk*: proxy for market risk;

*Operational risk*: proxy for operational risk.

If  $CAR \geq 8\%$ , a bank is considered to be adequately capitalised,<sup>15</sup> in the sense that its available capital covers any losses that may arise from the credit, market and operational risks the bank has assumed.

Nevertheless, in some cases, and especially in times of distress, Tier 2 capital does not behave well, as its loss absorption capacity is not satisfactory. As a result, the analysis focuses only on Tier 1 capital and the Tier 1 ratio is measured as follows:

$$Tier\ 1\ ratio = \frac{Tier\ 1\ capital}{Credit\ risk + Market\ risk + Operational\ risk} \geq 4\%$$

Under the current regulatory framework, the Tier 1 ratio must be greater or equal to 4%.

Basel III revisits both the definition of capital and minimum ratios, as discussed in Section 8. Sections 5, 6 and 7 present an analysis of the method for calculating capital requirements for each category of risk.

In general, as regards the denominator of both ratios, the method of risk weighting is used, whereby risk weights (RW) and risk-weighted assets (RWA)<sup>16</sup> are calculated as follows:

$$RWA = RWA_{credit} + RWA_{market} + RWA_{operational}$$

$$RWA = RWA_{credit} + 12,5 \times (AC_{market} + AC_{operational})$$

$$RWA_{credit} = A \times RW$$

where:

*AC*: available regulatory capital,

*RWA*: risk-weighted assets,

*A*: value of assets,

*RW*: credit risk weights.

And thus:

$$CAR = \frac{AC}{Credit\ risk + Market\ risk + Operational\ risk} = \frac{AC}{RWA_{credit} + RWA_{market} + RWA_{operational}} = \frac{AC}{RWA} \geq 8\%$$

**Equally**, the analysis can focus on required capital, in which case, capital adequacy can be measured by comparing available to required capital. Instead of actually determining whether  $CAR \geq 8\%$ , one can compare whether available capital is greater or equal to required capital. Needless to say, the result is always the same.

<sup>15</sup> This view must be treated with caution, as the method for calculating the CAR is marked by weaknesses which are discussed below. It is indicative that a month before the implementation of the €94 billion rescue package agreed by France, Belgium and Luxembourg, Dexia Bank's capital adequacy ratio was significantly higher than the required minimum (see De Groot, W.P., "A closer look at Dexia: The case of misleading capital ratios", 19 October 2011, CEPS Commentary).

<sup>16</sup> To be precise, risk-weighted assets are calculated for credit risk, whereas for all other risks the required capital is calculated and is converted into notional risk-weighted assets, by multiplying the capital by 12.5. The multiplier applies for a CAR of 8% (i.e. 1/0.08=12.5).

$$\frac{RC}{RWA} = 8\% \Rightarrow RC = A \times RW \times 8\%$$

Required capital (RC) is measured as follows:

For instance, if a bank provides €100 million worth of financing to a creditor with RW=50%, then:

Required capital =  $100 \times 50\% \times 8\% = €4$  million.

In order for the bank to provide credit, its available capital must amount to €4 million; otherwise, this means that the bank is not adequately capitalised to assume the risk entailed in such financing. In this case, it has three options: raise its capital base, reduce the amount of credit (lower A) or make a safer investment (lower RW). In any case, it is obvious that the capital adequacy framework sets a number of limitations on the growth of a bank, which can be achieved only with adequate own funds. Generally, the system of capital requirements is not based on incentives, but reflects a desirable behaviour and imposes restrictions and a “cost” on the expected return-on-equity (ROE).<sup>17</sup>

## 4 ECONOMIC CAPITAL

### 4.1 THE CONCEPT OF EXPECTED AND UNEXPECTED LOSSES

Meeting regulatory requirements is undeniably a key parameter for a bank's capital management policy. However, several other market participants – primarily shareholders and international rating agencies – must also be satisfied. Regulatory capital comprises the minimum capital base that a bank must maintain in order to operate, covers three major risks (credit, market and operational risk) and is calculated using specified methodologies. The actual risk profile of a bank may differ from the profile that is outlined in regulatory instructions. Consequently, each bank must map the risks it has already undertaken or is planning to

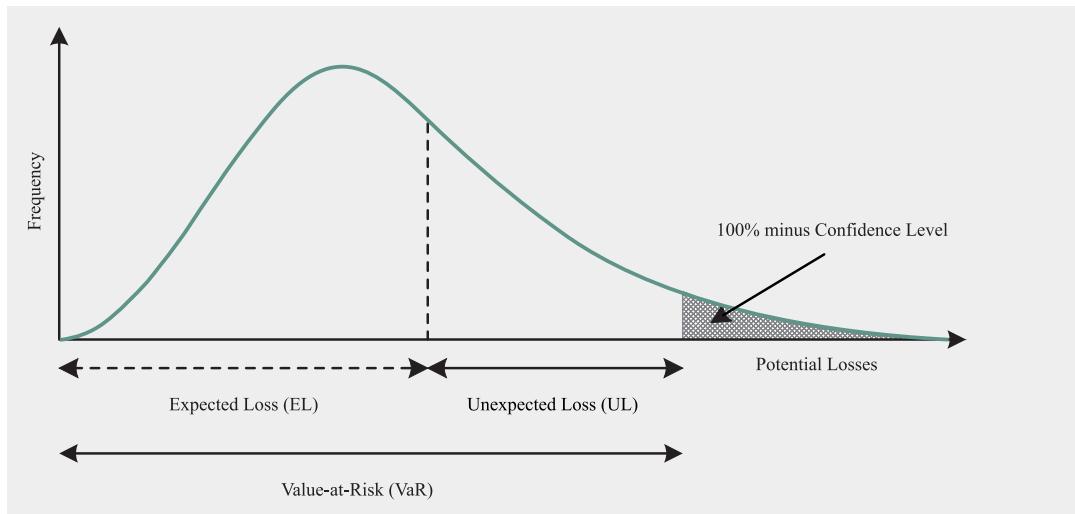
undertake, establish reliable measurement methods, determine the degree of risk tolerance, as well as the time horizon of measurement, calculate the required capital per risk and finally estimate total required capital. In other words, each bank must calculate its economic capital. Thus the heterogeneity of risk sources is transformed into a common denominator, which makes risk management an easier and simpler process. This common denominator (economic capital) is estimated on the basis of loss distribution for all risks facing a bank.

Portfolio loss distribution comprises two main components, a) loss frequency, i.e. the frequency of a risk event that may result in losses, and b) loss severity, i.e. the magnitude of the losses that must be absorbed in the occurrence of a risk event. These two features combined lead to the loss distribution per type of risk. This distribution captures all future losses and estimated probabilities and can be illustrated as a probability density function (PDF), the shape of which depends on the characteristics of each risk. For instance, the distribution for market risk displays the features of a normal distribution, the distribution for credit and operational risks has the properties of an asymmetric distribution, the distribution for retail exposures is less fat-tailed compared with the distribution for corporate exposures, etc. After specifying different risk distributions and simulating them using a theoretical distribution (a process which involves many difficulties), the analysis focuses on two critical statistical characteristics of a distribution, namely the mean and the variance. The distribution mean determines the concept of expected loss, whereas the concepts of unexpected loss and stressed loss are determined on the basis of the variance and the confidence interval.

Typically, the expected loss arises from a bank's exposure to its daily operation under normal financial conditions. Conversely, an unexpected loss stems from rare but probable

<sup>17</sup> The literature is currently beginning to explore the effectiveness of the capital requirement framework in the event of tail risk; see Perotti et al. (2011).

Chart I Total loss distribution



events that occur in the financial environment in which the bank holds open positions. The stressed loss comes from adverse events which cannot be foreseen by typical risk calculation models due to the well known problem of fat tails. The implementation of alternative solutions, such as stress testing based on adverse but plausible crisis scenarios,<sup>18</sup> is indispensable.

One of the challenges for the implementation of the economic capital framework is the combination of individual risks into a single risk distribution for the bank as a whole, as two different problems must be overcome:

- The method of combining two or more distributions with different forms and different time horizons.
- The calculation of the impact of diversification within and across risks.

Several approaches have been proposed in the international literature to address the aforementioned problems, but so far none has been established as a benchmark. As a result, the economic capital framework is only used as a decision-making tool by very few large banks which have both the resources and the expert-

ise to invest in the framework's demanding requirements.

After the completion of all the steps necessary to calculate economic capital, the loss distribution can be extracted, as shown in Chart 1. The expected loss is determined on the basis of the mean of the distribution, while the unexpected loss is determined by the variance and the confidence interval. Economic capital is defined as the difference between unexpected and expected loss. Regulatory capital is differentiated from economic capital to the extent that the regulatory rules for capital measurement differ from the economic capital framework discussed above.

## 4.2 ECONOMIC CAPITAL AND PILLAR II

The Basel II accord consists of three pillars:

- The first pillar refers to the determination of minimum capital requirements to cover of credit, market and operational risks.
- The second pillar deals with the process of assessing banks' capital adequacy, as well as

<sup>18</sup> See Kalfaoglu (2011).

the introduction of the general principles and criteria which will govern this process.

**III.** The third pillar refers to the enhancement of market discipline through the disclosure of certain qualitative and quantitative details.

The “three pillars” concept was an innovation introduced by Basel II, which shifts, up to a certain extent, the responsibility for the calculation of required capital onto banks themselves. Specifically, the aim of Pillar II is to ensure that each bank has adequate internal procedures and adequate internal capital based on an effective risk assessment system. Internal capital can be defined as the capital that a bank deems adequate to cover, on a constant basis, all undertaken or future risks, assisted by effective risk management procedures. It should be noted that the Basel framework uses the term “internal capital” rather than “economic capital” in an effort to make clear that there are both a quality component, i.e. effective procedures, and a quantity component, i.e. the calculation of required capital. Although the demanding conditions for the calculation of economic capital need not be fulfilled, the Basel framework encourages the exploration of alternative processes.

In this vein, Pillar II can be broken down into four levels:

- Level 1: Pillar II complements Pillar I

The internal capital adequacy assessment process aims to take into account all risks that are not fully covered by the process under Pillar I. Such risks are, for example, concentration risk, country risk, residual risk and securitisation risk.

- Level 2: Pillar II strengthens Pillar I

The internal capital adequacy assessment process seeks to deal with risks which are not considered under the Pillar I process, such as interest rate risk on the banking book, liquidity risk, business risk and strategic risk.

- Level 3: External environment effects

The objective of the internal capital adequacy assessment process is to take into consideration risks ensuing from external factors. A typical example of this case is business cycle effects, concentration of risks in the system and systemic risk.

- Level 4: Capital planning

A key element of Pillar II is the planning of banks’ capital needs both on a solo and on a consolidated basis. Capital planning refers to the treatment of the differential between available and required capital (see Section 3).

Pillar II introduces the concept of Supervisory Review Process (SRP), under which the regulatory authorities review on a constant basis the adequacy of banks’ capital and internal procedures by applying the Internal Capital Adequacy Assessment Process (ICAAP) and the Supervisory Review and Evaluation Process (SREP). Nevertheless, the dialogue between an institution and its regulator constitutes the most important part of the supervisory review. The dialogue should ensure a mutual understanding of the implemented methodologies and procedures that generated the relevant outcomes, as well as an eventual adjustment of those outcomes to the specific risk profile and systemic importance of each bank.

Pillar II rests upon the following basic principles:

- Internal capital adequacy assessment process.

Banks should develop a process for assessing their overall capital adequacy in relation to the risks they assume depending on their strategies and risk profiles.

- Supervisory review of banks’ internal capital adequacy assessments and of their compliance with regulatory capital ratios.

Supervisors should review banks' internal capital adequacy assessments and strategies, as well as their ability to monitor and comply with capital ratio regulations.

- Capital requirements above the basic minimum.

Supervisors should expect banks to operate above the minimum regulatory capital ratios.

- Supervisory controls and audits.

Supervisors should seek to intervene at an early stage to prevent capital from falling below the minimum levels required and should require rapid remedial action if capital is not maintained or restored.

## 5 CREDIT RISK

### 5.1 CREDIT RISK PARAMETERS

Credit risk can be defined as the risk of loss due to default by bank borrowers. Although all bank assets are exposed to credit risk, analysis mainly centres on the loan portfolio, as the primary risk for bond, stock etc. portfolios is market risk. Moreover, a bank also faces different variations of credit risk, e.g. country risk, which refers to the risk of a bank defaulting on its obligations due to worsened economic conditions in the host country and a subsequent suspension of payments.

Credit risk can be considered as the combined result of three distinctive risks, i.e. default, exposure and recovery risks. Default risk refers to the risk of a bank's borrowers defaulting on their contractual obligations, which normally brings about loan restructuring. Exposure risk is associated with the total amount that is subject to credit risk. As regards loan portfolios, the total amount is represented by the nominal value of credit. The measurement becomes more complex in the case of off-balance sheet items, with the most common practice consisting in calculating credit equivalent values. Recovery risk refers to the percentage of the

total amount exposed to risk that a bank would collect on a defaulted credit. This rate is related to the liquidation value of the collateral, as well as the seniority of the bank's debt.

Therefore, on the basis of the above components, credit risk can be described using an estimation of the following three parameters:

- Probability of Default (PD), which refers to the probability of a borrower or group of borrowers defaulting on their contractual obligations vis-à-vis the bank. It is expressed in percentage terms.
- Loss Given Default (LGD), referring to the loss incurred by a bank due to a debtor's default following the subsequent realisation of collateral. It is expressed as a percentage of total exposure.
- Exposure At Default (EAD), referring to the total value that the bank is exposed to at the time of default, expressed as a sum denominated in the portfolio currency.

The main assumption for the measurement of credit risk parameters rests upon the definition of credit event, i.e. the event that has caused a loss to the bank. There are alternative definitions of the credit event which in turn determine the type of the credit model. Under default models, the credit event is defined as the default on agreed obligations and the loss is solely attributed to this event. Under migration models, the credit event is defined as the deterioration in the borrower's financial position, as reflected in a downgrading of its credit worthiness.

Having estimated all of the above three parameters, banks establish provisions to cover any expected losses due to debtors' default and withhold capital reflecting the unexpected loss from the risk assumed. Expected loss is calculated as follows:

$$EL_p = \sum_i EL = \sum_i (EAD_i \times PD_i \times LGD_i)$$

Unexpected loss, due to the variance of LGD, is computed as follows:

$$UL_p = \left[ \sum_i \sum_j \rho_{ij} UL_i UL_j \right]^{1/2} \quad \text{where } UL = \sqrt{EL(LGD - EL)}$$

## 5.2 RATING AS A MEASURE OF CREDIT WORTHINESS

As already mentioned, the Basel capital adequacy framework uses the method of risk weighting of all on-balance sheet and off-balance sheet items for the calculation of capital requirements, and therefore the risk weight (RW) must be determined or estimated beforehand. The higher the borrower's credit rating, the lower the risk weight and the lower the level of required regulatory capital. Nevertheless, in complete markets the *ex ante* determination of risk weights leads to changes in risk behaviour and distorts the basis for the calculation of capital requirements. In the market for credit products a short position became possible after the launch and diffusion of credit derivatives, which among other things created strong incentives for the use of capital requirement minimisation techniques. Banks engaged in risk-shifting to their own benefit, by undermining the concept of risk-sensitive capital. A salient example is securitisation, which was developed in an effort to reduce capital requirements and resort to new

sources of liquidity. The inadequate regulatory framework, compounded by the existence of non-measurable risks (e.g. liquidity risk), led to risk taking that was incompatible with capital requirements.

Despite the above criticism, the system of mapping credit worthiness into risk weights has remained unchanged. But how should credit worthiness be measured? The Basel I framework had determined *ex ante* four risk categories, as well as their corresponding risk weights. The Basel II framework brought about a major innovation by adopting the use of credit ratings as a measure of credit worthiness for the calculation of capital requirements, while at the same time it recognised guarantees and collateral as credit risk mitigation elements. As regards ratings, two alternative methods can be applied. Under the first approach (standardised approach), banks can take the external ratings issued by international credit rating agencies (e.g. Moody's, S&P, etc.) to estimate their risk level. The second approach enables banks to develop and use their own internal rating systems for the various portfolios (internal ratings-based approach – IRB). The Basel III framework has left the approach to credit risk unchanged. Both approaches are detailed in Box 1 and Box 2 respectively.

### Box 1

#### THE STANDARDISED APPROACH

The standardised approach allows banks to use external ratings, i.e. ratings issued by major international rating agencies (e.g. Moody's, S&P, etc.). Moreover, it divides the bank portfolio into separate asset classes and determines the risk weight for each class on the basis of the external rating. Thus, under the standardised approach the risk weight (RW) is determined *ex ante* and specified in the Basel framework. The table illustrates some asset classes with their respective risk weights.

As shown in the table, a six-grade credit quality scale is applied. This constitutes a differentiation of the framework for capital requirements, as applicable in the European Union (CRD), from the broader Basel framework, which uses the ratings released by one specific rating agency. At the European level, the scales of all major credit rating agencies must be

### Examples of risk weights under the standardised approach

Credit rating	1	2	3	4	5	6	Unrated
Sovereign	0%	20%	50%	100%	100%	150%	100%
Corporations	20%	50%	100%	100%	150%	150%	100%
Retail banking							75%
Housing credit							35%

mapped into the aforementioned six-grade scale, with a view to obtaining the final classification. Regulatory authorities are entrusted with this task.

Therefore, according to risk weights under the standardised approach, the financing of a firm with an AA rating has lower capital requirements than the financing of a firm with a BB rating. Furthermore, it can be observed that for retail banking exposures no external ratings are envisaged, but a weight of 35% and a weight of 75% have been determined for mortgages and consumer credit, respectively.

In addition, three forms of collateral are recognised under the standardised approach: financial collateral, guarantees and credit derivatives. It should be noted that no physical collateral (e.g. real estate) is recognised, as it is considered to have been factored-in by risk weights. In the case of financial collateral, the principle of exposure adjustment is applied, the value of collateral (after applying a haircut) is deducted from the initial exposure and their differential is weighted using the corresponding risk weight. In the case of guarantees and credit derivatives, the substitution principle is used and the primary debtor's risk weight is substituted with the guarantor's risk weight. It should also be noted that the framework sets several quality requirements for the eligibility of credit risk mitigation tools.

An important drawback of the standardised approach is its failure to distinguish between expected and unexpected loss. The total amount arising from the weighting of exposures with the appropriate risk weights is considered an unexpected loss and determines the level of required capital. Therefore, the standardised approach cannot be used to determine the adequacy of provisions.

### Box 2

#### INTERNAL RATINGS-BASED (IRB) APPROACH

The internal ratings-based approach allows banks to develop internal rating systems for their portfolios and evaluate capital requirements on the basis of internally estimated risk parameters. This requires complicated modelling, as well as appropriate skills, knowledge and experience. For this reason, regulatory approval is warranted before the implementation.

The implementation of the IRB approach requires three distinct steps:

- the development and implementation of a robust internal rating system,
- the estimation of risk parameters, and
- the validation of the results.

Each step has specific requirements and challenges which are detailed in Annex 1. However, before those three steps are implemented, a bank should take certain strategic decisions. These decisions concern the portfolios that will be subject to the IRB approach, as well as the internal procedures that must be adopted to assist in the successful implementation of the approach.

The framework allows for a combination of both approaches or a partial implementation of the internal ratings-based approach, as some portfolios may be excluded. After taking into account a number of restrictions, each bank can choose which portfolios to include under the IRB approach on the basis of a cost-benefit analysis. Furthermore, as regards the selected portfolios, the bank has two options. First, the foundation (F-IRB) approach, under which the bank must estimate the parameter PD for the corporate portfolio on the basis of its own systems, while it can also use the regulatory approximation of  $LGD=45\%$ .<sup>1</sup> Turning to retail banking portfolios, all risk parameters must be estimated by the bank. Second, the advanced (A-IRB) approach, under which all risk parameters for all portfolios must be estimated on the basis of the bank's internal systems. In most countries regulatory authorities encourage large and international banks to apply the IRB approach.

With respect to internal procedures, the framework calls for a set of internal control measures, with a view to ensuring the system's integrity. Among other things, banks should have at least one year of experience in the implementation of rating systems (experience test). This implies that the issue of customers' credit rating reflects the overall credit risk culture and should involve all decision-making bodies as well as staff at all levels. Besides, the bank should also use the results of the rating system in its decision-making process and not only for the calculation of capital requirements (use test). This suggests that, if a bank is confident with the robustness of its system and uses it in decision-making, among other things, for establishing limits, provisioning, price setting, etc., then this system can also be applied in the calculation of capital requirements.

<sup>1</sup> The regulatory determination of LGD might act in favour of some banks and to the detriment of others. Generally speaking, if a bank pursues a cash flow lending policy, then  $LGD=45\%$  is probably deemed favourable, whereas if a collateral lending policy is pursued,  $LGD=45\%$  is rather unfavourable. Furthermore, empirical studies prior to the crisis have evaluated the parameter LGD at lower percentages than the regulatory 45% (see S&P, 2004).

The use of credit ratings has clearly improved the sensitivity of capital requirements to risk, but also raised some concerns. In more detail:

#### a) The use of credit ratings

Credit ratings rely on the historical behaviour of obligors under scrutiny and are therefore considered to be lagging indicators. Although the framework requires forward-looking rat-

ings, the development of a system that takes account of the economic cycle (see Annex 1) cannot be easily implemented. Moreover, either for technical or non-technical reasons, ratings are only reviewed after the occurrence of credit events and, as a result, they lag in the recording of the financial situation.<sup>19</sup>

<sup>19</sup>This was the case with Enron, whose rating remained investment grade even four days prior to its default, despite the fact that credit rating agencies were fully aware of the firm's problems several months previously.

### **b) The use of external credit ratings**

There is an implied consensus that international rating agencies have a quasi-regulatory role, despite the fact that they had been unregulated organisations until recently.<sup>20</sup> They lost considerable credibility due to the 2007-08 crisis, as several securities with the highest possible (AAA) rating defaulted. They have been accused of using an incomplete methodology, especially with regard to structured products, which resulted in a non-optimal allocation of risk. Moreover, they have been criticised that published credit ratings are the result of conflict of interests which leads to positively biased assessments. This, compounded by a lack of international credit rating standards, raises doubts concerning the transparency of criteria and ratings. Nevertheless, investors and fund managers continue to design their investment policies based on the agencies' ratings, while international investment indicators rest upon these ratings as well. Therefore, agencies must strike a balance between the short-term profit from the issuer's satisfaction and their long-term reputation in the market. Markets so far seem to trust credit rating agencies, since they tend to forgive false estimations, but not bias. For this reason, any alternative efforts towards this end have blatantly failed.

### **c) Lack of credit ratings**

Although large banking institutions are expected to use the IRB approach, smaller banks will use the standardised approach, which is simpler and less costly to implement. However, the lack of ratings for a great number of firms, even though a risk weight is envisaged in the case of unrated counterparties, weakens the framework's sensitivity to risk. Several empirical studies<sup>21</sup> on the default of unrated firms suggest a risk weight closer to 150% than the 100% weight that is being currently used (see the table in Box 1).

### **d) Delegated monitoring**

One strand of the theoretical literature on banking views banks as delegated monitors, in

the sense that depositors invest their cash assets and at the same time "delegate" the monitoring of borrowers to the bank. The existence and uniqueness of a bank are due to its competitive advantage as regards the risk monitoring of its portfolio. By adopting external ratings, it actually concedes the monitoring for capital adequacy purposes to the credit rating agencies. This lowers the incentive to collect the necessary information, as well as the incentive to initiate a monitoring process. Besides, one of the main causes of the current crisis proved to be banks' failure to implement the functions of monitoring and understanding of risks in an effective manner. The possibility to use internal ratings resolves the problem posed by delegated monitoring and provides banks with a strong incentive to develop their own credit risk monitoring systems, as well as to improve risk management systems.

### **e) The Dodd-Frank Act in the United States**

One of the challenges facing the implementation of the Basel framework in the US is its coupling with the Dodd-Frank Act,<sup>22</sup> which provides, among other things, for the removal of any reference to external credit ratings from the regulatory framework (Sec-

<sup>20</sup> In 2008 the IOSCO's Code of Conduct Fundamentals for Credit Rating Agencies was published. The Code Fundamentals establish rules to ensure the quality and integrity of the rating process, including the monitoring of ratings. They also contribute to the introduction of internal procedures and mechanisms and to the independence of analysts, in order to eliminate any conflicts of interests. They promote the transparency of rating methods and ensure that the credit rating is updated on a timely basis, as appropriate. They oversee the treatment of confidential information and disclose the degree to which rating agencies comply with the fundamentals. These fundamentals offer a set of general principles without indicating preference to a specific methodology, such as indices, models or rating categories. In the United States, rating agencies have been officially registered as Nationally Recognized Statistical Rating Organizations (NRSROs), insofar as they meet the requirements set by the US Securities and Exchange Commission (SEC) and are subject to an extensive control. SEC's requirements incorporate several elements of the IOSCO's code fundamentals. In the EU, following the European Commission's proposal, the European Parliament and the Council adopted on 16 September 2009 a regulation on credit rating agencies (Regulation 1060/2009), with a view to enhancing the integrity, transparency, responsibility, good governance and reliability of credit rating activities. A key element of the regulation is that the European Securities and Markets Authority (ESMA) has been directly supervising credit rating agencies since July 2011.

<sup>21</sup> See Saunders and Allen (2010).

<sup>22</sup> See Tobias, A. (2011), "Dodd-Frank One Year On: Implications for Shadow Banking", Federal Reserve Bank of New York Staff reports 533.

tion 939A). This is in stark contrast with the Basel approach, particularly as regards the banks that have opted for the standardised approach. The supervisory authorities are currently seeking alternatives to the credit rating approach<sup>23</sup> and there is no doubt that whatever the outcome might be, it will certainly affect the capital adequacy framework at the international level.

#### f) Credit ratings and sovereign risk

The current euro area debt crisis triggered several debates concerning the treatment of sovereign risk under the regulatory framework. In financial markets, sovereign risk had long been underestimated, and modern financial theory rests upon the assumption that government bonds entail zero risk. The Basel framework moves along this path, although recently some sovereign default or quasi default cases have appeared. The financial market does not consider these securities as zero-risk investments, but the Basel regulatory framework has not adjusted to this development and, although different risk weights depending on external credit ratings are used, a preferential treatment of 0% risk weight is still retained for exposures to government securities which are financed in the same currency.<sup>24</sup> Amid the current debt crisis, this arrangement has proved to be problematic, since all sovereign exposures have a zero risk weight for all euro area countries. However, deteriorating public finances, due to growing deficits in an effort to both mitigate for the repercussions of the recession and rescue the financial sector, entail the risk of contagion in the banking sector and/or the financial sector as a whole. In all countries the banking sector is to a great extent exposed to sovereign risk, and particularly to home country bias,<sup>25</sup> and therefore the spillovers from the crisis have a strong impact. The framework for capital requirements fails to capture the above risks at a satisfactory level,<sup>26</sup> as sovereign debt among euro area countries is considered to be covered to a great extent by the principle of mutuality and therefore free of country risk.

### 5.3 CALCULATION OF REGULATORY CAPITAL

Section 4.1 discussed the concepts of expected and unexpected loss, which were illustrated in Chart 1, and it was determined that expected loss must be covered with provisions whereas unexpected loss should be covered with capital. The calculation of unexpected loss could be based on credit risk models that banks have developed internally. However, a second best solution was adopted, since credit risk modelling has not yet reached a satisfactory level. Specifically, a direct calculation of capital is not allowed, but credit risk parameters are estimated instead and are later inserted in a pre-defined formula for the calculation of required capital. This however does not eliminate model risk, i.e. the estimation of false parameters as a result of a wrong specification of the models, erroneous mathematical hypotheses or problems arising from data availability and adequacy.

For specifying the regulatory formula, the Basel Committee used a credit model which is called Asymptotic Single Risk Factor (ASRF),

<sup>23</sup> The US regulatory authorities issued a joint press release (Advance Notice of Proposed Rulemaking – ANPR) regarding alternatives to the use of credit ratings (see [www.occ.gov/news-issuances/bulletins/2010/bulletin-2010-32.html](http://www.occ.gov/news-issuances/bulletins/2010/bulletin-2010-32.html)). The initial consultation paper referred to the following alternative proposals: (1) participation in international organisations or supranational entities, such as the G-20, the Basel Committee or IMF programmes; (2) point (1) combined with risk premia available in the market or debt restructuring history; (3) sovereign credit ratings produced by the OECD or the World Bank, and (4) distinction on the basis of specified indicators and measures.

<sup>24</sup> The preferential treatment in the EU came both as a result of political compromise and for lack of a satisfactory alternative solution. The banks that apply the IRB approach have the possibility to estimate their own risk parameters, but this is quite challenging, since portfolios are deemed as low default portfolios and additional modelling is warranted. Therefore, it is equally possible for banks applying the IRB approach to permanently exclude the government securities portfolio and to use the standardised approach with a 0% risk weight. Yet, this has broader implications. The zero risk weight is also used on all other portfolios guaranteed by the government, while portfolios with zero risk weight are excluded from the 25% ceiling on large exposures.

<sup>25</sup> See CGFS Papers (2011). It should also be noted that in the analysis of banks' credit worthiness potential government support is considered as well as the "too-big-to-fail" policy, which evolved into "too-important-to-fail" and further to "too-connected-to-fail" policies.

<sup>26</sup> The new Basel III framework does not affect the regime for government securities held by banks but imposes an incremental risk charge on securities held in trading books, with a view to covering the credit component of market risk. Furthermore, the establishment of a leverage ratio (see Section 8.4) constitutes a first step away from the zero risk weight, as the government securities portfolio as a whole is calculated on the denominator of the ratio.

a variation of Value-at-Risk (VaR) models adjusted for credit risk. It is a univariate model which assumes that apart from idiosyncratic factors, the value of an item is correlated to a single systematic risk factor, i.e. the condition of the global economy, which has a similar effect on all banks, without taking into account any country-specific disparities. In other words, it is assumed that the economic condition of the Greek State does not contribute to a deterioration in the probability of default of Greek businesses. In theory, this assumption is problematic, as it is contrary to the banking practice, which identifies far more risk factors such as sovereign risk, as well as to the assumptions of credit risk models for commercial purposes (e.g. CreditMetrix).<sup>27</sup> Furthermore, the model rests upon a second assumption that each loan accounts for a small percentage of the total portfolio. This means that neither the differences between obligors nor concentration risk, which is left in Pillar II, are taken into account.

Notwithstanding the criticism, the model was selected since the calculation of capital requirements is independent of the structure of the loan portfolio. This implies that the capital required to cover a loan is portfolio invariant.<sup>28</sup> This attribute is convenient for the calculation of total capital by simple summing the individual capital requirements, without the need for specifying a variance-covariance matrix. Moreover, the estimation of the three credit risk parameters (PD, LGD and EAD) is sufficient for the calculation of ratings-based capital. Finally, this approach meets the regulatory preference for implementing a single common framework in different banking systems and jurisdictions.

Under the assumption that the systematic risk factor is normally distributed<sup>29</sup>, and after a confidence level of 99.9% was determined, the calculation of capital is based on the following equation:

$$\begin{aligned} CaR &= VaR(99.9\%) - PD \times LGD + M_{adj} \\ \Rightarrow CaR &= PD_A \times LGD - PD \times LGD + M_{adj} \end{aligned}$$

where  $CaR$ : Capital at Risk (required capital),

$VaR(99.9\%)$ : unexpected loss at a confidence level of 99.9%,

$PD_A$ : conditional probability of default,

$M_{adj}$ : maturity adjustment.<sup>30</sup>

The parameters PD and LGD must be estimated by the bank itself, while the challenge posed is the estimated PDA, that is the probability of default in times of strain and crisis.<sup>31</sup> For the estimation of PDA the Basel Committee used the Vasicek model (Box 3 provides a more detailed description of the model), under which:

$$PD_A = N \left[ \sqrt{\frac{1}{1-R}} * G(PD) + \sqrt{\frac{R}{1-R}} * G(0.999) \right]$$

where  $PD$ : the probability of default according to the bank's estimates,

$N$ : normal distribution,

$G$ : inverse of normal distribution,

$R$ : default correlation coefficient,

PDA: conditional probability of default.

The default correlation coefficient  $R$  measures the systematic risk of loans in relation with one

<sup>27</sup> The ASRF model is comparable to the capital asset pricing model (CAPM) which is univariate. Both in theory and in practice, multivariate models deliver better results.

<sup>28</sup> See BCBS (2005) and Gordy (2003).

<sup>29</sup> This is another assumption that is subject to criticism. If, for instance, it is assumed that the systematic factor is proxied by GDP growth, several empirical studies have challenged the normality of the distribution.

<sup>30</sup> The Vasicek model (see Box 3) calculates the conditional probability of default over a time horizon of one year. However, long-term loans have a higher probability of default than short-term loans. In order to take this into account, specifically for the corporate portfolio, a maturity adjustment was added, which is specified as follows:

$$\begin{aligned} M_{adj} &= \frac{1}{1-1.5b} * (1 + (M - 2.5) * b) \\ b &= (0.11852 - 0.05478 * \log PD)^2 \end{aligned}$$

<sup>31</sup> It is not required to estimate LGD in periods of economic distress but the estimation of LGD must factor-in periods of economic downturn (downturn LGD).

single risk factor (the condition of the global economy) and thus it corresponds to the beta coefficient of CAPM models rather than the correlation coefficient between loans. The Basel framework acknowledges that the R coefficient cannot be estimated by banks in a reliable way and therefore moves onto the determination of its functional relation with PD and introduces a limit of between 12% and 14%. The exact relation is the following:

$$R = 1,25 \times \left[ 0,12 \times \left[ \frac{1 - e^{-50PD}}{1 - e^{-50}} \right] + 0,24 \left[ 1 - \frac{1 - e^{-50PD}}{1 - e^{-50}} \right] \right] + SME_{adj}$$

The inverse of the function between R and PD, as well as the restrictions that have been set rest upon the assumption that a default is mainly due to idiosyncratic risk and not so much to systematic risk, which however remains to be empirically proven.

### Box 3

#### THE VASICEK MODEL

The Vasicek model is an extension of Merton's model. Merton's model is based on the general idea that a loan is similar to a call option on borrowers' debt and on the basis of a call option valuation model (e.g. Black-Scholes) the so-called "distance to default" can be calculated. For instance, if the total assets of a firm amount to 100, debt is 80 and asset variance is 20, distance to default (DD) is  $DD = (100-80)/10 = 2$  standard deviations, which corresponds to a confidence interval of 2.5%. If the probability of default is known, it is possible to calculate DD using the inverse of normal distribution (N-1 or G). For further details see Saunders and Allen (2010), Chapter 4.

Based on the abovementioned property, the Vasicek model is developed (see Vasicek, 2002), where loss  $y$  for any financial instrument over a period of one year is a function of a systematic factor  $e$  and an idiosyncratic factor  $\omega$ . If  $w_1, w_2$  are the weights of both factors, loss can take the following form:

$$y = w_1 \times e + w_2 \times \omega$$

The probability that loss  $y$  should not fall below a critical level  $a$ , at which the obligor is considered to have defaulted, is explored. Therefore

$$P(y < a) = P(w_1 \times e + w_2 \times \omega < a) = P\left(\omega < \frac{a - w_1 \times e}{w_2}\right)$$

Under the assumption of a normal distribution of idiosyncratic risk,

$$P(y < a) = N\left(\frac{a - w_1 \times e}{w_2}\right) = N\left(\frac{1}{w_2} \times a + \frac{w_1}{w_2} \times (-e)\right)$$

If the bank's DD is known, the critical level  $a$  can be determined as follows:

$$a = N^{-1}(PD) = G(PD)$$

Regarding the systematic risk, it is assumed to be normally distributed and at a confidence interval of 99.9%,

$$N^{-1}(99,9\%) = -3,09 = -e$$

Finally, if the weights are defined using the correlation coefficient R as and , the conditional probability of default PDA is expressed with the following formula:

$$PD_A = N \left[ \sqrt{\frac{1}{1-R}} * G(PD) + \sqrt{\frac{R}{1-R}} * G(0.999) \right]$$

## 6 MARKET RISK

### 6.1 MARKET RISK COMPONENTS

Market risk is the risk of losses in a bank's trading book arising from movements in market prices, namely in interest rates, foreign exchange rates, stock (or index) prices and commodity prices. For capital adequacy purposes, market risk applies to the trading book that includes trading positions and hedging positions. The financial instruments included in a trading book are usually bonds and other securities, foreign exchange positions, shares, positions in commodities, mutual funds and derivatives using any of the above as an underlying instrument.

Market risk for capital requirement purposes has the following components:

- Position risk

Specific position risk arises from changes in the value of a financial instrument as a result of variations in the risk of the issuer.

General position risk arises from changes in the value of a financial instrument as a result of market price movements.

- Foreign exchange risk

Foreign exchange risk is the risk of unanticipated changes in exchange rates which has consequences for both trading book and non-trading book assets denominated in foreign currency.

- Counterparty risk

Counterparty risk refers to the probability of loss if the counterparty to a transaction

defaults before the final settlement of the transaction's cash flows.

- Settlement risk/incomplete transactions risk

Settlement risk refers to the probability of loss due to unfavourable changes in the price of a financial instrument for a transaction that has not been settled within market convention dates. This refers to DVP transactions, while incomplete transactions risk refers to the probability of loss due to unfavourable changes in the price of a financial instrument for non-DVP transactions.

- Large exposure risk

Large exposure risk from trading positions arises when the large exposure limits to a specific counterparty are exceeded due to trading book positions.

### 6.2 CALCULATION OF REGULATORY CAPITAL

Regulatory capital for market risk is set out as follows, according to Basel II :

Regulatory Capital = VaR + SR,

and according to Basel III:

Regulatory Capital = VaR + SR + sVaR + IRC.

Terms and symbols are explained further on.

#### a) General position risk

The risk assessment criterion used for general position risk is the fluctuation in the value of financial instruments in the trading book. Price

movements and the required capital are approached either indirectly on the basis of the instruments' maturity (standardised approach), or directly through their direct estimation (internal model approach).

The standardised approach involves detailed rules for calculating the required capital for every asset in the trading book. Conversely, if the bank has developed a model to measure the maximum potential loss (VaR model, see Annex 2), the required capital is a multiple  $k$  (where  $\min k=3$  and which increases depending on the number of failures at the backtesting process) of the estimated loss:

$$C_t = \max \left( VaR_t^{(10)}, k \frac{1}{60} \sum_{i=1}^{60} VaR_{t-i}^{(10)} \right)$$

Value at risk (VaR) refers to the maximum potential loss that the holder of a portfolio of positions in financial products may suffer within a given time period at a given level of probability. The time period and the probability depend on the planning horizon and the degree of risk tolerance. For supervisory purposes the time horizon is set at 10 days and the level of confidence at 99% whereas historical data covering at least 250 days should be used.

Since the beginning of the crisis it has become clear that some of the trading book risks have been underestimated, such as the risks from positions in structured financial products and the risks from positions in instruments that are traded in illiquid and thin markets. VaR models, though in ever increasing complexity, have failed to adequately capture the above risks. Thus, under the new Basel III framework, a new complementary Stressed Value-at-Risk (sVaR) model should be added to the existing VaR model, in cases of disturbances in the risk factors. For the sVaR model the same parameters (10 days, 99.9%) are used, with a time horizon of 12 months of consecutive disturbance. The required capital for the overall risk will be calculated as follows:

$$C_t = \max \left( VaR_t^{(10)}, k_1 \frac{1}{60} \sum_{i=1}^{60} VaR_{t-i}^{(10)} \right) + \max \left( sVaR_t^{(10)}, k_2 \frac{1}{60} \sum_{i=1}^{60} sVaR_{t-i}^{(10)} \right)$$

$$k_1, k_2 \geq 3$$

The calculation of regulatory capital with the VaR methodology is a statistical estimate which facilitated the illustration of complex relations. Therefore, at some point it no longer constitutes a risk management method but becomes a risk management culture. The line is blurred and depends on the experience of decision makers, tolerance to risk, and most importantly, the decision-making philosophy. In no circumstances should the results of the model give the illusion of safety. Like all models, it rests upon certain assumptions, which, plausible as they may be, are often thwarted by reality. In other words, it entails significant model risk.

### b) Specific position risk

The risk criterion used for specific position risk is the external rating of the issuer of the financial instruments in the trading book. The required capital (SR) is approximated indirectly on the basis of ratings (standardised approach) or directly calculated using a VaR model (internal model approach). It turned out, however, that VaR models cover only partially or do not cover at all the specific position risk. For this reason, Basel III has set new qualitative criteria and imposed an additional level of capital (Incremental Risk Charge, IRC) for non-securitised positions to cover for both default risk and migration risk. The IRC must represent a default and migration estimate within one year and at a confidence level of 99.9%, using data on the basis of the realisation horizon.

### c) Counterparty risk

The risk criterion used for counterparty risk is the counterparty's rating. Practically, this is a credit risk component inherent in financial instruments with a settlement date other than the date of the agreement, namely in OTC derivatives and securities financing transac-

tions (SFTs). Counterparty risk has two dimensions, the time dimension, as the exposure depends upon the event of the counterparty's default, and the potential dimension, as the loss is time-varying, depending on whether the transaction has positive or negative value. Therefore, the exposure is calculated as the sum of the current exposure and the potential future exposure. The current exposure is approximated by the replacement cost, while the challenge is to estimate the potential future exposure. The Basel framework provides for alternative methods and gives the possibility to develop a corresponding model.

Counterparty risk has deteriorated substantially due to the 2007-08 financial crisis and the current debt crisis. The models are embryonic and usually fail to take into account significant risk components. Three main additional measures were introduced by the Basel III framework.

- Wrong-way risk

Wrong-way risk exists when the value of an exposure to a counterparty is negatively correlated with the counterparty's creditworthiness (PD and EAD are related). For example, credit risk and foreign exchange risk, which can affect the overall exposure, are inherent in currency swap agreements.

- Credit Valuation Adjustment (CVA)

The CVA represents the potential loss from market valuation, which is associated with a deterioration in the counterparties' creditworthiness (spread risk). It has particularly worsened due to the debt crisis in the euro area.

- OTC derivatives

Incentives were given for clearing through a central counterparty, while higher capital requirements for bilaterally cleared contracts are envisaged in the framework.

### 6.3 NON-TRADING BOOK

Assets not included in the trading book are not assessed in terms of capital requirements for market risk. This does not mean that they do not actually entail market risk or interest rate risk, in particular. Interest rate risk is the risk to which a bank is exposed due to unexpected changes in interest rates. There are four sources of interest rate risk:

- Assets and liabilities' maturity mismatches for fixed rate instruments – or mismatches in the repricing date for floating rate instruments (repricing risk).
- The imperfect correlation between interest rates of assets and liabilities with different bases (basis risk).
- Changes in the slope or the shape of the yield curve (yield curve risk).
- Movements in the value of the trading portfolio (trading risk).

Changes in interest rates affect a bank's net profit through changes in net interest income or the value of equity. The impact can be quantified by measuring the repricing gap or the duration gap.

The repricing gap (RGAP) is the difference between the rate sensitivity of assets (RSA) and the rate sensitivity of liabilities (RSL). The impact on net interest income (NII) is calculated as follows:

$$RGAP = RSA - RSL$$

$$NII = RGAP \times \Delta r$$

$\Delta r$  = interest rate change.

The duration gap (DGAP) is the difference between the average duration of assets (DA) and the average duration of liabilities (DL). The impact on the net asset value ( $\Delta E$ ) is calculated as follows:

$$DGAP = D_A - \lambda D_L$$

$$\Delta E = DGAP \times A \times \frac{\Delta r}{1+r}$$

$\lambda$ : leverage ratio,

$A$ : asset value.

which tend to become benchmarks in the market. The categories are: (1) external fraud, (2) internal fraud, (3) employment practices and workplace safety, (4) clients, products and business practice, (5) damage to physical assets, (6) business disruption and systems failures, and (7) execution, delivery and process management.

Based on the analysis of their characteristics, there are two types of operational risk events:

- high frequency, low impact events; and
- low frequency, high impact events.

Awareness of these two features helps banks to optimise their operational risk management, provided that they make the necessary organisational arrangements and develop the proper tools. For the first type of events, banks have proceeded to establish centralised units focusing on specific operational risk segments – such as operating procedures, prevention of money laundering, business continuity, managing suppliers and outsourcing as well as addressing external fraud – thus raising awareness about operational risk. At the same time, databases were developed for the collection, assessment and reporting of operational risk events, and the related losses; self-assessment systems for each activity were initiated, examining the framework of internal controls in order to identify, monitor and manage any weaknesses and finally, the Key Risk Indicators (KRIs) per activity were selected, in an effort to determine potential exposure to operational risk and to signal the necessary corrective actions when they exceed the pre-determined levels.

## 7.2 CALCULATION OF REGULATORY CAPITAL

The framework suggests three alternative methods for the calculation of minimum capital requirements to cover for operational risk. These methods are:

- the Basic Indicator Approach,

- the Standardised Approach,
- the Advanced Measurement Approach.

According to the first two simple methodologies, operational risk is a function of gross

income, either for the bank as a whole or for individual business activities. The issue of gross income as an operational risk indicator has received significant criticism as it is considered a problematic proxy of risk. The analysis of the two methods is provided in Box 4.

#### Box 4

##### THE BASIC INDICATOR APPROACH AND THE STANDARDIZED APPROACH FOR OPERATIONAL RISK

According to the Basic Indicator Approach, the capital requirement against operational risk is a pre-fixed percentage (15%) (denoted “alpha factor”) of Gross Income. Gross Income is the average of gross operating income in the last three years prior to the reporting date, and it is considered as an approach of the bank’s exposure to risk.

The Standardised Approach entails the separation of the bank’s business lines into eight pre-defined categories. The capital requirement against operational risk in each business line is calculated as a fixed percentage (denoted “beta factor”) of the Gross Income from this business line. The business lines with the corresponding beta factors are:

Corporate Finance	18%
Trading and Sales	18%
Retail Banking	12%
Commercial Banking	15%
Payment & Settlement	18%
Agency Services	15%
Asset Management	12%
Retail Brokerage	12%

Under the advanced measurement approach, the capital requirement is equal to the magnitude of risk as estimated by the internal system for quantifying operational risk losses. The operational risk measurement system should include the following main elements (AMA 4 key elements):

- internal loss data,
- external loss data,
- scenario analysis,
- business environment and internal control factors.

In the international literature, models are based on actual loss data and operational risk scenarios or on a combination of the above. The first is a parametric method similar to the VaR model, focusing on the assessment of the loss curve (Loss Distribution Approach – LDA). Based on the principles of actuarial models, the frequency distribution of operational risk events and the loss severity distribution are estimated separately. Then the two distributions are combined into a loss distribution, through complex mathematical approaches (Monte Carlo simulations or Copulas). The LDA approach raises many methodological problems associated with the

availability of data as well as with the lack of operational risk events and “special” operational risk events that are not always directly related to the bank’s operation.

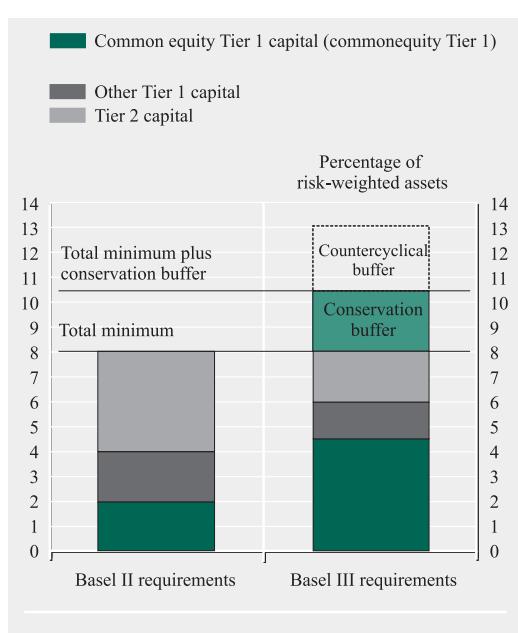
The issue of data availability is partly solved in two ways. First, by using external data of operational risk events and losses, although in this case it is difficult to convince the bank’s management to hold adequate capital buffers for an event that occurred in another bank. Second, by associating real loss with scenarios deriving from managers’ expertise, which exacerbates the issue of subjectivity. Whichever method is used, complex Bayesian techniques are required that make the sophisticated approach hardly feasible, especially for smaller banks. Moreover, this approach provides room for mathematical manipulations.

## 8 BASEL III: A NEW APPROACH TO CAPITAL ADEQUACY

### 8.1 FROM BASEL II TO BASEL III

The capital adequacy framework is under revision with Basel III. The financial crisis of 2007-08 coincided with the beginning of the effort to adopt the new supervisory framework of Basel II for capital requirements. In this sense, the Basel II framework was not tested as a mitigating influence in the crisis. At the same time, however, the lessons learnt from the crisis highlighted certain obvious weaknesses of the framework, and changes are currently being implemented as regards banking supervision in general and the Basel II framework in particular. It is clear that Basel II underestimated some significant risks and generally overestimated the ability of banks to manage risks effectively. Moreover, certain forms of capital have proved incapable of absorbing losses and supervisory authorities have begun to revise the definitions of capital. In addition, the Basel II effort focused on required capital and the most appropriate estimation of risk-weighted assets, i.e. the denominator of the Capital Adequacy Ratio. Instead, Basel III

Chart 2 Basel III versus Basel II



focuses on available capital, i.e. the numerator of the ratio. It should be noted that the impact of adjustments on available capital is much higher (about 12.5 times) than the impact of adjustments on required capital. Risk-weighted assets are so high in absolute terms that any change has relatively little impact, whereas a change in the definition of capital has a much stronger impact.

Table 2 shows the framework under development, as announced by the Basel Committee on 12.9.2010.<sup>32</sup>

Under the new framework, the minimum requirement for common equity and other high forms of loss absorbing capital (core Tier 1) will be raised to 4.5%. Moreover, the Tier 1 ratio will increase to 6%, while the Capital Adequacy Ratio (CAR) will remain at 8%. Furthermore, it was agreed that banks will hold a conservation buffer of 2.5% above the threshold, as well as a counter-cyclical buffer

<sup>32</sup> See BSBC, “Group of Governors and Head of Supervision announces higher global minimum standards”, Press release, 12/9/2010.

of 0%-2.5%, determined by the supervisory authority. The sum of the two buffers may reach up to 5% of the risk-weighted assets<sup>33</sup> and must be covered by common equity. Finally, it should be noted that there will be a phasing-in period and the above recommendations are expected to be fully implemented by 1.1.2019. The differences between the new framework and the current one are illustrated in Chart 2.

## 8.2 QUALITY OF CAPITAL

One of the main conclusions drawn in relation to the crisis is that many forms of capital, particularly Tier 2 capital, failed to sufficiently absorb losses; as a result, the issue of changing the definition and the composition of financial instruments that could be classified as available capital was raised, with a view to strengthening the capital with the greatest loss-absorption capacity. In other words, the quality of capital should be enhanced and banks' reliance to non-equity securities should be reduced. Most empirical studies conclude that the Tier 1/RWA ratio is a better predictor of a crisis situation than the (Tier 1 + Tier 2)/RWA ratio. In this perspective, the definition of Tier 1 capital is more narrow, with common equity, (i.e. common shares with voting rights and disclosed reserves) being the most important, while requirements are raised for the inclusion of non-equity securities to own funds.

According to the new classification, there are three categories:

- Common equity Tier 1;
- Additional Tier 1; and
- Tier 2.

Further differentiations as well as Tier 3 capital are eliminated, so that market risk is covered by the same forms of capital for credit risk and operational risk. The above classification certifies the “superiority” of common equity Tier 1 capital. Although the proposed amend-

ments do not specify a measure of superiority (percentage or otherwise), they enhance superiority through:

- (i) the introduction of a Minimum Common Equity Tier 1 ratio in relation to risk-weighted assets (see Table 2);
- (ii) the tightening of necessary adjustments (deductions),<sup>34</sup> which must be made in common equity Tier 1 capital and not to total Tier 1 or total own funds;

- (iii) the elimination of minority interests from Tier 1 capital.

Another important distinction with respect to regulatory capital under the new framework is the distinction between the capital needed for a bank to continue to operate (going concern) and the capital required to protect depositors in the event of bankruptcy (gone concern). The former includes Tier 1 and the latter Tier 2 capital. Under this perspective, innovative hybrid securities are not recognised in regulatory capital and non-innovative securities are classified as Tier 2 capital up to 15%. Moreover, the non-cumulative preference shares are classified as Tier 2 capital, since their loss absorption capacity is limited to coupons and not to the principal.

An additional limitation for the classification of hybrid capital as Tier 1 is the existence of a clause for their conversion into own funds, should a specified risk event occur that trig-

<sup>33</sup> In order to determine this percentage, the Basel Committee conducted an analysis based on the actual losses suffered by banks from crises. For example, for the period 2007:Q3–2009:Q4 the average loss was 5.4% of risk-weighted assets, with a median of 3.2% of risk-weighted assets. As suggested by the examination of other crises (i.e. Japan 2000–2002, Sweden and Norway 1988–1993, etc.), losses from systemic crises range between 4%–5% of risk-weighted assets, whereas losses from less systemic crises between 1%–2%. Given that there are differences in the calculation of risk-weighted assets, as well as survivorship bias in the results since banks with heavy losses were excluded, the buffer set at 2.5%–5% is consistent with the actual losses that have occasionally occurred in times of crisis (see BCBS, 2010).

<sup>34</sup> Revaluation reserves at fair value are an exception, as the practice of non-recognition and implementation of supervisory filters to certain categories of unrealised losses has lowered the market's confidence in Tier 1 capital. Therefore, revaluation reserves are not included in deductions.

gers the conversion. This requirement has led to a new generation of financial instruments, the Contingent Convertible Bonds (CoCos),<sup>35</sup> which are converted directly into shares following the occurrence of the trigger event.<sup>36</sup> The advantage of such a conversion is that it directly increases the bank's capital and reduces its leverage. But the terms of conversion may affect both the risk and the incentives to assume risk. More specifically, the design of CoCos as to their conversion time, rate and ratio and as to the decision triggering their conversion is of utmost importance. Low triggering frequency means postponing capital restructuring. At low capital levels, shareholders are not the most suitable agents for maintaining capital value, as low risk exposure gives an incentive to raise debt capital, which will probably entail greater risk than the existing debt capital and will lead to soaring yields. Thus, the conversion time, i.e. slightly before the full depreciation of own funds or proactively at an earlier stage, affects the incentives to assume risk. Moreover, the conversion rate is crucial, as it will affect the value transfer from CoCos holders to shareholders. The conversion rate will in turn affect the conversion ratio, which may lead shareholders to higher risk-taking, as at low levels of capital the conversion will cause the value to surge.

Finally, one of the main issues is the decision that will trigger the conversion. There are three possibilities: a) an accounting event, b) a market event or c) a decision by the supervisory authorities. The accounting event (i.e. negative own funds) is problematic, as a lagging indicator of risk is used, which usually requires the consent of the supervisory authority and is therefore treated as a supervisory decision. The market event (i.e. share price) entails the risk of market abuse practices and price manipulation. Moreover, as the trigger point approaches, there might be a sharp drop in the share price. The supervisory decision is critical and plays a significant signalling role, especially when the bank is on a going concern basis.

### 8.3 CAPITAL BUFFER

As shown in Chart 2, the Basel III framework specifies two components of capital: the first component consists of minimum capital requirements and the second component consists of the capital buffer required for each bank (see Box 5). The second component is used to ensure the broader macroprudential goal of the protection from the accumulation of risks at a systemic level, as well as to address the issue of procyclicality, which had been identified since the first implementation of Basel II, and reflects the requirement of adjusting the minimum capital to the economic cycle.

The concept of procyclicality<sup>37</sup> for bank capital refers to the practice of maintaining lower levels of capital during economic upturns and higher levels of capital in downturns. As regards risk, there is a tendency to underestimate it in periods of favourable economic conditions and to overestimate it in times of adverse conditions. In both cases the cycle effects are exacerbated, while a rational policy of prudential supervision should design the regulatory framework in such a way to mitigate the effects of the cycle. This can be achieved in three ways: through the adoption of a dynamic provisioning system, the cyclical adjustment of risk parameters and the cyclical adjustment of the final result. Under the dynamic provisioning system banks would have to make increased provisions in periods of economic upturns so that they can be used in times

<sup>35</sup> The first bank to issue such a bond was Lloyds Bank in November 2009, with a nominal value of GBP 7.5 billion, which was oversubscribed and the trigger event set was the bank's Tier 1 capital falling below 5%. Rabobank followed, with a bond amounting to USD 2 billion which was oversubscribed by 300% and the trigger event set was the bank's Tier 1 capital falling below 8%. The first Greek bank to issue such a bond was the Bank of Cyprus, amounting to €1,300 million; the trigger event set was the bank's Tier 1 capital falling below 5% or the Central Bank of Cyprus seeking their conversion in order to enhance the bank's capital adequacy.

<sup>36</sup> CoCos are often likened to the catastrophe bonds (cat bonds) that exist in the US market. If the catastrophic event (e.g. earthquake, flood) does not occur, the issuer pays the coupons and the principal to the investor, whereas if the catastrophic event occurs, then the coupons and the principal are not paid and the issuer uses the capital to compensate the victims of the catastrophe.

<sup>37</sup> For a full analysis, see Bank of Greece, *Interim Financial Stability Report*, December 2009, Special Feature II.

of economic downturns. Suggestions have been made in this direction, which, however, have not so far been institutionalised. As regards the adjustment of risk parameters, it depends on the characteristics of the rating system. The more countercyclical the characteristics of the rating system are, the more countercyclical the estimated capital is. But the implementation of a system which takes into account the phases of the economic cycle is difficult and most models have the characteristics of point-in-time classification (see Annex 1).

An alternative would be to estimate the parameters from the banks' internal models and then to calibrate them upwards with an adjustment factor deriving from the analysis of historical data. This approach was considered by the European Banking Authority,<sup>38</sup> but has not been implemented. The Basel Committee has chosen to adjust the final result, namely the estimated capital, using the "bottom of the cycle" calibration, according to which the level of capital determined corresponds to the level at the peak of a full cycle, regardless of the actual phase of the economic cycle.

Based on the above rationale, a conservation buffer of 2.5% of the risk-weighted assets was determined to ensure that banks hold additional capital that can be used to absorb losses during periods of distress. This capital will be held by banks in periods of favourable market conditions and will be used, if necessary, during periods of large fluctuations in the markets. This capital will be able to absorb any losses in the event of a crisis, in order for the minimum regulatory capital to remain intact. Moreover, a countercyclical buffer equal to 0%-2.5% of the risk-weighted assets is provided for. This rate, applicable at the national level, will be determined by the supervisory authority, the main criterion being excess credit growth<sup>39</sup> and, possibly, measures of risk concentration.

The policy of building capital buffers received widespread publicity as it was associated with restrictions on the discretion of banks as to profit distribution. During the financial crisis,

many banks continued to pay dividends to shareholders and/or benefits to their staff (i.e. bonuses), while they had reported losses in their credit portfolios. These benefits were in favour of shareholders and to the detriment of depositors and bondholders, thereby violating the priority of creditors over shareholders. They also increase the risk of assets, since they lead to lower capital levels.

The discretion exercised by banks with respect to the distribution of profits is crucial, especially in times of crisis, as it may help the bank to cope with the problems and continue its operation. Discretionary elements include, inter alia, the distribution of dividends, the repurchase of shares, extraordinary staff benefits, additional insurance benefits or the exercise of the hybrid securities repayment option. For banks whose capital adequacy ratio falls within the buffer percentages, strict restrictions are imposed on discretionary profit distribution.<sup>40</sup> It should be noted that restrictions do not apply to banks' activities, but only to activities that might affect capital. The bank will continue to operate and perform all banking operations normally.

Establishing and determining the additional capital buffer is an innovation of Basel III. In the Basel II framework, this was left to the discretion of banks, with the consent of supervisory authorities, under Pillar II. In line with the experience gained during the financial crisis and based on the widespread consensus

<sup>38</sup> See CEBS (2009).

<sup>39</sup> The GAP ratio has been suggested  $GAP = (CREDIT/GDP) \times 100 - TREND$ , for which the Hodrick-Prescott filter is used to establish the TREND. If  $GAP < 2$ , no capital buffer is required, whereas if  $GAP > 10$ , a capital buffer of 2.5% is required. For intermediate GAP values a buffer equal to  $[0.25 \times GAP - 0.5]/100 \times RWA$  is proposed.

<sup>40</sup> It should be noted that a bank with a common equity Tier 1 capital ratio of 4.5%-5.125% is required to capitalise 100% of its earnings (see Basel III, <http://www.bis.org/publ/bcbs189.pdf>). The idea of automatic buffer replenishment by limiting discretionary profit distributions and therefore the mandatory capitalisation of profits illustrates the experience gained during the crisis when some banks appeared reluctant to cut dividends or to raise equity capital, probably to avoid signalling to the market that their capital position is weak. The automatic mechanism provided for in Basel III reduces the capability of banks to maintain their capital base, while it eliminates the risk for this to be perceived by the market as a sign of weakness. Instead, the aim is for this to be perceived by the market as a positive sign for maintaining capital base.

that banks failed to understand and manage risk, it was decided that part of their discretion would be institutionalised and clearly determined. Of course, capital buffers do not

fully substitute Pillar II, but only in terms of covering systemic risks. Idiosyncratic risks, which are not part of Pillar I, continue to be covered under Pillar II.

#### Box 5

##### THEORETICAL BACKGROUND

In order to analyse the theoretical background of the minimum capital requirements and the capital buffer, we consider banks as rational investors who decide to invest in assets. The introduction of minimum capital is practically the imposition of restrictions on the structure of investments in relation to bank own funds. The risk-weighted assets  $x_i$  should be a minimum percentage  $\alpha$  of capital  $K$ .

$$\sum_{i=1}^n \omega_i x_i \geq \alpha K$$

For the calculation of weights  $\omega_i$ , the supervisory authorities focus on the likelihood of bankruptcy of banks. The objective is to maintain the possibility of bankruptcy at acceptable levels, and not to let it fall below a crucial level. In this case bank behaviour is guided by the safety-first criterion, according to which risk is not measured by the fluctuation of equity, but by its probability to fall below the tolerable threshold  $h$ . In other words  $\Pr(K < h) < c$ , in which the probability of the equity  $K$  being below  $h$  is less than  $c$ . For the calculation of the probability  $\Pr(K < h) < c$ , we apply the Tchebyshev inequality. If  $K \rightarrow N(\mu, \sigma^2)$ , then  $\Pr(K < h) < c$

$$\Rightarrow \Pr(|K - \mu| > k\sigma) < \frac{1}{k^2}, \text{ where } k = \text{constant.}$$

$$\text{If } h = \mu - k\sigma \Rightarrow \Pr(K < h) < \frac{\sigma^2}{(K - h)^2}$$

In other words, the probability of capital  $K$  being less than  $h$  is proportional to the fluctuation in capital value and inversely proportional to the distance from the minimum capital required.

#### 8.4 LEVERAGE RATIO

In a very interesting article entitled “How the banks played the leverage game”,<sup>41</sup> the authors analyse how many banks created a high leverage ratio in their on- balance sheet and off-balance sheet assets and wonder how that happened in the sector with the most widespread surveillance. At the onset of the financial crisis of 2007-08, banks were forced to implement deleveraging policies, which exerted pressure on the prices of financial instruments and created incentives for further deleveraging, which in turn led to heightened risk, further capital reduction, etc. Meanwhile, bank-

ing supervision was based on the Capital Adequacy Ratio, a measure sensitive to changes in risk, which however does not adequately capture the deleveraging process. Supervisory authorities have decided to adopt a simple supplementary leverage ratio not adjusted for risk, which is calculated as follows:

$$\text{Leverage ratio} = \frac{\text{Core Tier 1 Capital}}{\text{Total Assets}} \geq 3\%$$

This ratio is calculated as the Core Tier 1 ratio to total assets, including off-balance sheet

<sup>41</sup> See Acharya and Richardson (2009), Chapter 2.

exposures and positions in derivatives, and must not be lower than a floor, originally suggested at 3%. The calculation of the ratio and the floor will be determined after a transition period on 1.1.2018 as part of Pillar I.

The main advantage of the above ratio is simplicity, low monitoring cost and minimisation of the model risk inherent in the estimation of the capital adequacy ratio. It also discourages regulatory arbitrage, since banks will not have the “option” of risk shifting. Finally, the adoption of the leverage ratio is a measure of countercyclical policy and the statutory ceiling ensures that banks will not excessively increase their lending during economic upturns or excessively constrain it during downturns.

One of the disadvantages of the ratio is the lack of empirical studies suggesting that the leverage ratio satisfactorily forecasts an eventual crisis. Moreover, the ratio may provide the wrong incentives, especially if examined separately, since a bank may increase the balance sheet risk and still satisfy the minimum rate. For this reason, the Basel III framework stresses that it is a complementary supervisory ratio. Nevertheless, the biggest issue is to ensure a method of calculation which is harmonised worldwide. Differences in supervisory and accounting frameworks could lead to significant discrepancies.<sup>42</sup> Unless the concepts of capital and total assets are aligned, comparability at the international level will not be feasible.

## 9 CONCLUSIONS

In the introduction to this paper, the question was raised as to the meaning of an “adequately capitalised bank”. Although intuitively the answer is that banks must have “adequate” own funds, the technical answer is much more

complex. The aim of this paper was to present a non-complex but comprehensive answer. The framework of this analysis is the framework of the Basel capital requirements, which has followed an evolutionary path depending on events in markets, especially after the financial crisis of 2007-08. This path had two main features: a) the revised definition of capital, which was initially extended, i.e. by the acceptance of hybrid instruments, and then became more restrictive by including only those assets that have a presumed large loss-absorbing capacity (i.e. common equity), and b) the expansion of risks to be covered by regulatory capital as well as an improvement in risk measurement methodologies. The framework kept abreast with the revolutionary developments of the last fifteen years in the disciplines of banking and finance regarding the quantification of financial decisions. It requires banks to use sophisticated risk models, which calls for specialised know-how and experience.

Finally, as is always the case, the current euro area debt crisis is expected to lead to changes in some of the framework’s features and rules. Meanwhile, both academic research and the banking sector are constantly developing methodologies for measuring risk that could lead to a first best solution in the future, according to which capital will be calculated on the basis of a bank’s internal models. For the time being, it does not seem likely that bank capital adequacy as a key tool of microprudential policy will be abandoned.

<sup>42</sup> Three countries with large international banking systems either already use the leverage ratio or have announced that they will use it in the future. The United States and Canada have maintained the leverage ratio along with the capital adequacy ratio, while Switzerland has announced the use of the ratio as of 2013. In the US Tier 1 capital is taken into account, while off-balance sheet items are ignored. In Canada both Tier 1 and Tier 2 capital are taken into account (and the regulatory minimum is determined at 20%), while in Switzerland several other significant adjustments are introduced, the most important being the exclusion of the loan portfolio from the calculations.

# ANNEX I

## IMPLEMENTATION OF THE IRB APPROACH

As analysed in Box 2, the IRB approach requires three distinct steps:

- development and implementation of a robust internal rating system;
- estimation of risk parameters; and
- validation of results.

### Internal rating-based system

The “internal rating-based system” consists of a set of methodologies, procedures, tests and IT systems supporting the assessment of credit risk, the classification into risk grades and the quantification of risk parameters. The internal rating-based system is a technique implemented by many banks in the context of credit risk identification, measurement and monitoring. The first step in developing an internal rating-based system is to determine the rating philosophy, i.e. the range of economic conditions taken into account in the rating procedure. These systems can be distinguished into point-in-time (PIT) systems, which rely on the economic condition of the borrowers at the time of rating and through-the-cycle (TTC) systems, which rely on the economic behaviour of borrowers over a full economic cycle. PIT systems use more dynamic elements and are more influenced by current information and current market conditions, which results in more frequent rating adjustments. By contrast, in TTC systems, rating adjustments are not so frequent and risk parameters approach their long-term expected values.

The second step in developing an internal rating-based system is to decide on the methodological approaches to modelling credit risk. Usually, banks use credit rating systems for the corporate portfolio and credit scoring systems for the retail portfolio. Credit scoring systems fall into two main categories: application scoring models, which take into account data collected when an application for a credit product

is made, and behavioural scoring models, which rely on existing customers and take into account information on their credit behaviour.

Credit rating techniques mainly include the expert system and the modelling techniques or a combination of these.\* The selection of the appropriate technique depends on the bank philosophy to the management of credit risk, as well as on the availability of data. Expert rating systems reflect the judgment of bank experts involved in the credit procedure and are based on the accumulated knowledge, training and experience of these persons in counterparties’ credit rating. Modelling techniques fall into two categories: those where the causal relationship results from the application of statistical techniques and those where the causal relationship results from economic theory. The most well-known models in the first category are (1) discriminant analysis, by which banks divide borrowers into high and low default-risk classes, with the cut-off point being an important variable of risk tolerance, and (2) a logistic regression, through which borrowers are divided into more than two classes of credit ratings based on the score resulting from the regression equation. The second category includes structural models, which try to draw data inherent in stock prices, taking advantage of the theoretical link established by Merton between the valuation of options and the valuation of stock, as well as intensity-based models, which consider default as a random exogenous event and try to model the time of default and the intensity of default events.

### Quantification of parameters

The second step in applying the IRB approach is to quantify the parameters of

\* The de Larosiere report (see The de Larosiere Group, 25.2.2009, High level group on financial supervision in the EU) on the causes of the 2007/08 financial crisis states that banks should not take decisions based exclusively on the results of a model, but should rely more on judgment. Furthermore, the former Fed Governor, Alan Greenspan, has warned that a perfect risk model is infeasible, mainly due to the rational behaviour assumption. And even if such a model existed, it could not be used in periods of crisis, when behaviour is highly non-rational (see Alan Greenspan, We will never have a perfect model of risk, *Financial Times*, 16.3.2008).

credit risk by assessing the Probability of Default (PD), the Loss Given Default (LGD) and the Exposure at Default (EAD).

### (a) Probability of Default

Three techniques can be used to assess the probability of default:

- the Expected Default Frequency (EDF);
- mapping to external data; and
- statistical models of credit risk.

The first technique reflects the internal experience of a bank, as it draws data from its own experience with defaults. The Probability of Default (PD) can be proxied by the Expected Default Frequency (EDF) and is defined as the ratio of defaulted debtors compared to the total number of debtors in a portfolio over a year. In particular, the Probability of Default can be calculated as follows:

$$PD_t = \frac{\text{Defaulting debtors between (t-1) and (t)}}{\text{Total debtors over (t-1)}}$$

where:

Defaulted debtors between (t-1) and (t): total number of defaulted debtors within a year.

Total debtors over (t-1): total number of debtors.

The second technique is based on mapping to external data and is recommended for low default portfolios. A bank can map its internal ratings to an external scale used by an external rating agency, and then assign the default rates of the scale used by the agency to its internal ratings. When applying this method, a bank is deemed to use a shadow rating system, which can be implemented either by obligor mapping or by grade mapping. In the second case, the characteristics shared by the obligors within a grade are used to construct a “representative obligor” for each grade. Then, the representative obligor is mapped to the reference data

and the default probability associated with this obligor will serve as the grade PD.

Finally, the third technique allows a bank to use statistical models in order to calculate directly the default probability. For example, in the logit model, if factors X1, X2, ...XN, are determined and the linear relationship

$$Z = a_0 + a_1 X_1 + a_2 X_2 + \dots + a_n X_n$$

is calculated, then the transformation

$$F(z) = \frac{1}{1 + e^{-Z}}$$

represents the Probability of Default.

### (b) Loss Given Default

In the calculation of Loss Given Default (LGD) “economic loss” is considered, which is broader than the loss for accounting purposes. It includes the amount that cannot be recovered, once recourse to the law against the debtor has been exhausted and the liquidation of collateral has been completed. Therefore, LGD can be defined as:

$$LGD = 1 - d$$

where d=recovery rate.

However, recovery in case of default takes place over time. Therefore, LGD has a time dimension and includes both the direct and the indirect cost of recovery, as well as discount rates. Hence:

where

$$LGD = 1 - \frac{\sum \frac{P_t - C_t}{(1+r)^t}}{EAD}$$

P: payments made (amounts recovered after the default relating to principal, interests and any suspended interest)

C: other expenses of a credit institution, and

r: discount rate.

It should be noted that it is very important to use a common definition of default in estimating both LGD and the Probability of Default (PD), as these two parameters can be inversely related. A high PD can be associated with a low LGD (bad borrower with good collateral) and a low PD can be associated with a high LGD (good borrower without collateral). However, the development of LGD models lags significantly that of PD models. The difficulty resides in the fact that risk factors change over time, since it has been proven empirically that LGD is influenced by factors related to credit (debt seniority), the sector, the market and the economic cycle.

### (c) Exposure At Default (EAD)

For on-balance sheet items, Exposure At Default (EAD) is the nominal value of the claim and in no case can it be lower than the outstanding debt at the time of default. The off-balance sheet items must be converted to an equivalent credit risk through the application of credit conversion factors, which are determined by regulation, and then the counterparty's risk weight must be applied.

For derivatives, the procedure is more complicated. The credit equivalent derives from the replacement cost plus an add-on for potential future exposure. The replacement cost reflects the current value of the derivative as if it were to be hedged in the market. The potential future exposure reflects the potential loss that a bank may incur if the value of the derivative increases. If the value of the derivative declines, the bank will "gain" from the counterparty's default and, therefore, the potential future exposure is relevant only when it is positive.

For the purpose of assessing the potential future exposure, the Basel framework offers the possibility of using either predefined factors or an internal model. In this case:

$$\text{EAD} = \alpha \times \text{effective EPE}$$

where EPE = expected positive exposure, which derives from simulation exercises on the price of the derivative with variation of the basic risk factor. For example, for an interest rate derivative a simulation exercise will be carried out on the change in interest rates, and the average price of the derivative (EPE) will be calculated, assuming that once it reaches its highest price, it will remain to that level (effective EPE). Factor  $\alpha$  has been predefined as  $\alpha=1.4$ .

### (d) Calibration:

The final stage of quantifying the parameters of credit risk takes place once the banks have assessed the PD, the LGD and the EAD, as analysed above. In this stage, some calibration of the preliminary results is necessary. The results of a rating system are calibrated so that the estimated risk parameters reflect their expected behaviour. If this is not the case, a mathematical model is introduced to eliminate noise and normalise results. For example, the final estimates of results should be calibrated, if a grade PD is higher than the PD of a worse grade. Indicatively, an L1-optimisation model can be used, where constraints are put on the monotony and convexity of results, to achieve their normalisation.

### Validation

The third step in the implementation of the advanced method is the validation of parameter estimates. The validation is an internal procedure for the evaluation of a rating system and is an integral part of any rating system procedures. The main validation criterion is the ability to distinguish borrowers into high and low default-risk classes. This is achieved through statistical measures, backtesting and benchmarking. It is noted that that there is no single "optimal" value for the above statistics, but a range of values depends on the type and composition of the portfolio as well as on adequate performance in and out of sample tests.

Among statistical measures, the most widely used is the Gini coefficient, which measures

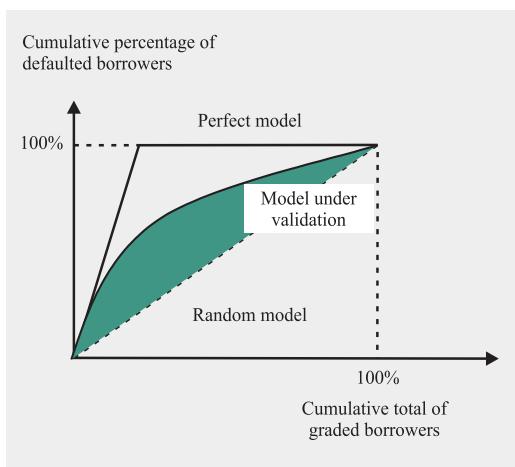
the discriminatory power of a model, i.e. its ability to discriminate between defaulting and non-defaulting borrowers. In technical terms, this requires the CAP curve (Cumulative Accuracy Profile – solid line in Chart 3) to be constructed and then the coefficient is measured on the basis of the area below the curve of the model under validation (shaded area in Chart 3). A perfect model selects only defaulting borrowers (solid line in Chart 3), while a random model selects only a part of them (dashed line). The accuracy ratio or Gini coefficient is calculated as

$$AR = \frac{\alpha_Y}{\alpha_T},$$

where  $\alpha_T$  = the area under the perfect model and  $\alpha_Y$  = the area under the model under validation. The closer the accuracy ratio is to one, the better the predictive ability of the model.

Backtesting refers to the comparison of predictions ( $\hat{\theta}$ ) with actual values ( $\theta$ ). Several measures of this discrepancy can be calculated, the most popular being the mean squared error,

Chart 3 Validation of credit risk models



$MSE = E(\hat{\theta} - \theta)$ . In addition to estimates, deviation thresholds must be established, which should trigger corrective actions when exceeded. Similarly, the results of the model are compared with the results of external rating agencies and widely recognised models (benchmarking).

## ANNEX 2

### VALUE AT RISK (VAR)

Value at Risk (VaR) is defined as the maximum potential loss that the holder of a portfolio with positions in financial products can incur over a given period and with a given probability. The time period and the probability depend on the planning horizon and the degree of risk tolerance. By way of illustration with a random number example, a daily potential loss (VaR) of €60,000 with a probability of 95% means that holding positions for an additional day can entail, with a probability of 95%, a maximum potential loss of €60,000. Certainly, there is a 5% probability that the loss will exceed €60,000. Holding positions in the portfolio for 10 days can entail a potential loss  $x 60,000 = €189,736.66$  with a probability of 95%. If a larger confidence interval (99%) is chosen, then the amount of the potential daily loss derives from the coefficients of normal distribution and is calculated as  $2.33/1.65 \times 60,000 = €84,727.27$ . For a holding period of 10 days, the corresponding calculations are  $\sqrt{10} \times 84,727.27 = €267,931.15$ .

All the above calculations are based on the assumption that the likelihood of change in the values of risk factors influencing the portfolio positions has a normal distribution. Generally, one can distinguish two cases: the non-parametric method, where the distribution does not have to be defined, and the parametric method, where the distribution can be defined and the estimation of the loss is based on the parameters of the distribution (mean, standard deviation).

#### Non-parametric method of measurement

We assume that a portfolio consists of  $n$  positions, which at time  $t$  (initial investment) have a value  $p_{i,t}$   $i=1, \dots, n$ . The value of the portfolio is:

$$W_t = \sum_{i=1}^n A_i p_{i,t}$$

where  $A_i$  is the weight of each portfolio position. If at time  $t+1$  (end of the planning horizon) the structure of the portfolio remains unchanged, then its value is equal to:

$$W_{t+1} = \sum_{i=1}^n A_i p_{i,t+1} \Rightarrow \Delta W = \sum_{i=1}^n A_i \Delta p_i$$

Equally, if  $R$  is the portfolio return, with expected price  $\mu$  and standard deviation  $\sigma$ , its value will be:

$$W_{t+1} = W_t (1+R).$$

Assuming that  $W^*$  denotes the minimum acceptable portfolio value at the end of the planning horizon  $t+1$ , then:

$$W^* = W_t (1+R^*).$$

The potential loss (VaR) can be defined in relation to the mean  $\mu$ , as

$$VaR_{\text{mean}} = E(W_{t+1}) - W^* = -W_t (R^* - \mu)$$

or in relation to zero, i.e. assuming that  $\mu=0$ , as

$$VaR_{\text{zero}} = E(W_{t+1}) - W^* = -W_t R^*$$

Finding the potential loss (VaR) is equivalent to determining the minimum acceptable  $W^*$  depending on the selected confidence level. If  $f(w)$  denotes the distribution of returns,  $c$  denotes the specified confidence level and  $\pi$  denotes the probability of  $w < W^*$  occurring, then  $W^*$  is:

$$\Pr(w > W^*) = c \Rightarrow 1 - p = \int_{W^*}^{+\infty} f(w) dw$$

$$\Pr(w > W^*) = 1 - c \Rightarrow p = \int_{-\infty}^{W^*} f(w) dw$$

The number  $W^*$  is the percentile of the distribution of the sample and can be calculated for any distribution  $f(w)$ .

#### Parametric method of measurement

In the parametric method, we assume that the distribution  $f(w)$  is the standard normal distribution  $\Phi(\omega)$  with  $\omega \sim N(0,1)$ . In the non-parametric

metric method, the analysis focused on  $W^*$ , while in the parametric method it will focus on  $R^*$ . Usually,  $R^*$  is negative and can be written as  $-R^*$ . Standardising return rates leads to the variable  $\alpha > 0$ , which equals:

$$-\alpha = (-|R^*| - \mu)/\sigma$$

Calculating the potential loss is equivalent to finding  $\alpha$  such that the area to the left of  $\alpha$  is equal to  $1-c$ .

$$1-c = \int_{-\infty}^{w^*} f(w)dw = \int_{-\infty}^{-|R^*|} f(r)dr = \int_{-\infty}^{-a} \Phi(\omega)d\omega$$

This can be found easily with a one-sided test of the standardised normal distribution.

To calculate the VaR, we solve the equation for  $R^*$ .

$$R^* = -\alpha\sigma + \mu$$

Substituting into the equation, we have:

$$VaR_{\text{mean}} = E(W_{t+1}) - W^* = -Wt(R^* - \mu) = W_t\alpha \sigma\sqrt{\Delta t}$$

$$VaR_{\text{zero}} = E(W_{t+1}) - W^* = -W_t R^* = W_t(\alpha \sigma\sqrt{\Delta t} - \mu\Delta t)$$

It should be noted that in the parametric method the variable of time is also considered, as in order to calculate the parameters it is necessary to adjust them according to the time horizon used. The change in the expected rate of return  $\mu$  is linear in time, while the standard

deviation  $\sigma$  changes in relation to the square root of time. The expected rate of return  $\mu$  and the standard deviation  $\sigma$  of the distribution of the portfolio returns are calculated as follows:

$$\mu = \sum_{i=1}^n A_i R_i$$

and in table format  $\mu = [A_1, A_2, \dots, A_n] \begin{bmatrix} R_1 \\ R_2 \\ \dots \\ R_n \end{bmatrix}$

$$\sigma^2 = \sum_{i=1}^n \sum_{\substack{j=1 \\ j \neq i}}^n A_i A_j \sigma_i \sigma_j \rho_{i,j}$$

or  $\sigma^2 = [A_1, A_2, \dots, A_n] \begin{bmatrix} \sigma_{11}, \sigma_{12}, \dots, \sigma_{1n} \\ \sigma_{21}, \sigma_{22}, \dots, \sigma_{2n} \\ \dots \\ \sigma_{n1}, \sigma_{n2}, \dots, \sigma_{nn} \end{bmatrix} \begin{bmatrix} A_1 \\ A_2 \\ \dots \\ A_n \end{bmatrix}$

$$\text{or } \sigma^2 = A^T \sum A$$

where  $A_i$ : the weighting of each position in the portfolio

$R_i$ : the expected rate of return of each position

$\sigma_i$ : the standard deviation of the return of each position

$\rho_{i,j}$ : the correlation coefficient between the returns of positions  $i$  and  $j$ .

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# WORKING PAPERS (APRIL - DECEMBER 2011)

This section contains the abstracts of Working Papers authored by Bank of Greece staff and/or external authors and published by the Bank of Greece. The unabridged version of these publications is available in print or electronic format on the Bank of Greece's website ([www.bankofgreece.gr](http://www.bankofgreece.gr)).

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## Assessing the impact of terrorism on travel activity in Greece

Working Paper No. 127

*Helen Gazopoulou*

Tourism receipts have always been vital for supporting the Greek current account, given that receipts from travel activity added to the proceeds from sea transportation amount to more than 10% of the country's GDP and finance 80% of its annual trade deficit. This study considers the volatility of travel receipts and, therefore, the possibility of adverse repercussions concerning the possibilities of financing the Greek current account by focusing on the extent to which terrorist strikes may bring about serious unexpected disturbances to travel activity in Greece.

The empirical findings of the paper point to the conclusion that the impact of terrorist attacks at an international level is not expected to bring about a considerable decline in the number of tourist arrivals to Greece. The findings rule out, in addition, the possibility that certain parallel adverse consequences resulting from the impact of a terrorist attack on the incomes of the sending countries may add to the limited adverse effect of such terrorist attacks on the Greek travel industry.

## The role of product variety and quality and of domestic supply in foreign trade

Working Paper No. 128

*Panayiotis P. Athanasoglou*

Large imbalances in the external balance of Greece are anything but rare. In fact, at times, high external balance deficits have been a factor restricting the country's economic growth and the pursuit of a stabilisation and growth policy. Almost permanently, Greek balance of payments deficits stem mainly from the high deficit of the trade balance, given that this reflects not only cyclical factors but also structural weaknesses of the production base.

This study aims at analysing the behaviour of imports of goods and estimating the effect of their main determinants. The empirical analysis relies on quarterly statistical data for the period 1962-2007, i.e. covers a long period (45 years) of economic developments. The study introduces some major innovations, most prominent of which are the following: First, it expands the traditional model of imports, so as to include product diversification in line with the New Trade Theory. Second, it enhances the theoretical analysis of the imports function, so as to incorporate the inadequacy of domestic supply, as well as to express the relationship

that links actual imports with the demand for imports at the equilibrium level and also with the effective demand for imports. Third, it specifies the density function for actual imports.

The analysis suggests a number of solutions: First, two thirds of Greek imports originate from the EU-15. Second, imports of high-tech goods, despite having increased, fall short of those of the other countries of Southern Europe. Third, import penetration into the domestic market for manufactured goods has been rising fast in the last decade, crowding out domestic industrial products. Fourth, the competitiveness of domestic production displays a permanent deterioration from 1988 onwards and worsens after the country's entry into the euro area.

The most important findings of the econometric analysis are the following: First, in the long run, Greek imports are affected by competitiveness (relative prices), disposable income and particularly the "variety and quality" of the

imported goods, as well as the demand for the domestic good to the extent that this is not satisfied. The elasticities of these factors are equal to or slightly higher than one, save for the relative price elasticity. Second, in the short run, imports are affected by “variety and quality”,

capacity utilisation and, to a lesser extent, competitiveness, while they seem to be unaffected by income. Third, although in the long run domestic and imported goods are substitutes, in the short run their relationship appears to be complementary.

### **The determination of wages of newly hired employees: survey evidence on internal versus external factors**

Working Paper No. 129

*Kamil Galuščák, Mary Keeney, Daphne Nicolitsas, Frank Smets, Paweł Strzelecki and Matija Vodopivec*

This paper uses information from a rich firm-level survey on wage and price-setting procedures, in around 15,000 firms in 15 European Union countries, to investigate the relative importance of internal versus external factors in the setting of wages of newly hired workers. The evidence suggests that external labour market conditions are less important than internal pay structures in determining hiring pay, with internal pay structures binding even more often when there is labour market slack. When explaining their choice, firms allude to fairness considerations and the need to pre-

vent a potential negative impact on effort. Cross-country differences, that do exist, are found to depend on institutional factors (bargaining structures); countries in which collective agreements are more prevalent and collective agreement coverage is higher report to a greater extent internal pay structures as the main determinant of hiring pay. Within-country differences are found to depend on firm and workforce characteristics; strong association between the use of external factors in hiring pay, on the one hand, and skills (positive) and tenure (negative), on the other.

### **Unveiling the monetary policy rule in euro-area**

Working Paper No. 130

*Thanassis Kazanas and Elias Tzavalis*

This paper provides evidence that, since the signing of the Maastricht Treaty, euro-area monetary authorities mainly follow a strong anti-inflationary policy. This policy can be described by a threshold monetary policy rule model which allows for distinct inflation policy regimes: a low and high. The model's policy parameters capturing the effects of deviation of inflation and output from their target levels on the central bank interest rate are subject to regime-switching depending on the level of current inflation rate. The paper finds that these authorities react more strongly to positive deviations of inflation and/or output from their target levels rather than

to the negative. They do not seem to react at all to negative output deviations in the low-inflation regime. We argue that this behaviour can be attributed to the attitude of the monetary authorities to build up credibility on stabilizing inflationary expectations. To evaluate the policy implications of the above euro-area monetary policy rule behaviour, the paper simulates a small New Keynesian model. This exercise clearly indicates that the absence of reaction of the euro-area monetary authorities to negative output gap when inflation is very low reduces their efficiency on dampening the effects of negative demand shocks on the economy.

## A conditional CAPM; implications for the estimation of systematic risk

Working Paper No. 131

*Alexandros E. Milionis and Dimitra K. Patsouri*

There is little doubt that thus far the so-called Capital Asset Pricing Model (CAPM) of Sharp, Lintner and Black has played a very important role in the relation between risk and return, as it describes how investors react to risk and value risky assets. According to the CAPM, the expected return of an asset is a linear function of its corresponding risk coefficient (beta) and presumably this one-dimensional expression for risk suffices to describe the cross section of expected returns.

There is a voluminous literature on the ability of the CAPM to explain observed asset returns and there are serious specification issues that have been raised regarding its ability to explain much. Numerous attempts have been made to explore the nature of the anomalies associated with the standard CAPM and correct them. Several scholars have developed conditional versions of the CAPM in which it is assumed that the CAPM holds in a conditional sense allowing beta and the market risk premium to vary over time. A main problem with the conditional CAPMs in general is the choice of conditioning variables and the lack of theory about how to form the relationship between the betas and the conditioning variables.

The present work using the standard static CAPM as a starting point tries to look at the context of a conditional CAPM for a specific

simple conditional type of CAPM where the conditioning is data-driven, derived by an examination of the residuals of the so-called Market Model. More specifically, the purpose of this paper is to examine: (i) whether or not the residuals of the Market Model are conditionally heteroscedastic; (ii) whether or not there exists an interralling effect in conditional heteroscedasticity in the residuals of the Market Model; (iii) the effect of conditional heteroscedasticity on the estimation of systematic risk; as well as to propose a simple data-driven conditional CAPM.

To this end, daily closing prices of stocks traded at the Athens Stock Exchange are used, covering the period from 1.10.1999 to 30.9.2004. Empirical evidence is provided for the existence of: (a) conditional heteroscedasticity in MM residuals; (b) a pronounced interralling effect on ARCH in MM residuals; (c) GARCH in mean type of conditional heteroscedasticity for the majority of cases where ARCH was present in MM residuals.

These findings in terms of theory are conducive to a conditional CAPM, which takes into account the effect of conditional variance on expected returns, rather than the standard CAPM. Furthermore, in terms of practical implications, these findings may lead to better estimates of systematic risk.

## External asymmetries in the euro area and the role of foreign direct investment

Working Paper No. 132

*Nicos Christodoulakis and Vassilis Sarantides*

A few years after the establishment of the European Economic and Monetary Union (EMU), large asymmetries emerged in the trade balances and the current accounts of the member states. A divide seems to separate two

groups in the euro area, one with the northern countries achieving external surpluses and the other including the southern countries with large external deficits. We argue that a crucial factor in shaping productivity, and conse-

quently affecting competitiveness and the external position of the economy, is the size and composition of Foreign Direct Investment (FDI). It seems that the northern countries received more total FDI than the southern group, while the southern countries attracted more investment in real estate rather than the productive sector. Focusing on ten euro area economies over the period 1980-2009, we establish a positive relationship between FDI

flows and trade balances in the northern countries, in contrast to a negative one for the southern group. The crucial factor that seems to shape this relationship is the composition of FDI at the industry level. More specifically, using industry-level data, we also establish a positive (negative) relationship between FDI and the trade balance in the manufacturing (non-manufacturing) sector for the northern (southern) countries.

### **Asset price volatility and government revenue**

Working Paper No. 133

*Athanasiос Tagkalakis*

Taking on board the increased policy focus on the interactions between asset price developments and fiscal policy outcomes, this paper examines whether asset price volatility amplifies the volatility of cyclically adjusted government revenue. Increased revenue volatility could amplify the variability of the (discretionary) fiscal policy stance, which according to Fatas and Mihov (2003) increases output volatility and harms economic growth.

We find significant evidence that both asset price and output growth volatility increase the variability of government revenue. A 1 percent increase in equity price volatility increases government revenue variability by 0.37-0.44 percent. An increase in residential property price volatility increases revenue volatility by about 0.15-0.22 percent, whereas this effect dimin-

ishes to 0.11 percent in case of commercial property prices. This evidence reflects the automatic increase of government revenue variability due to asset price movements and supports arguments in favour of adjusting fiscal variables for both business cycle and asset price changes. However, we also report evidence that equity price variability increases revenue variability even when government revenue is adjusted for both economic and asset price cycles, indicating the presence of more complicated dynamics between fiscal variables and asset price changes. This could reflect discretionary fiscal policy actions to stabilize asset prices and/or economic activity, as well as political economy motives, i.e. in case of asset price booms revenue windfalls might be passed on to consumers and businesses in the form of tax cuts.

### **Decomposing the predictive performance of the moving average trading rule of technical analysis: the contribution of linear and non linear dependencies in stock returns**

Working Paper No. 134

*Alexandros E. Milionis and Evangelia Papanagiotou*

Although the theory of efficient markets states that in a weak-form efficient market stock returns are not predictable and, hence, studying the time series of past stock prices to predict future price movements is useless, on sev-

eral occasions technical analysis rules have been shown to have predictive power. Some of these rules lack strict mathematical foundation, but some others, like the moving average trading rule, are mathematically well defined.

It is generally believed that the predictive power of such rules is due to non-linearities in asset returns which are exploited by such rules in an empirical way.

This study aims to contribute to the literature on the predictive ability of moving average trading rule of technical analysis in several ways. More specifically: (i) a sensitivity analysis of trading rule cumulative returns is performed, using not only original prices, but also simulated “prices” that may be derived by filtering the original prices using linear filters; (ii) a new innovative methodological approach for statistical inference regarding the predictive power of the moving average trading rule of technical analysis, based on sensitivity analysis, is proposed and applied; (iii) the predictive performance of the MA trading rule is broken down into that part that can be attributed to linear interdependencies in asset returns and that part that is attributed to non-linearities; (iv) the possible existence of a functional relationship between the attenuation of the trading rule performance due to linear filtering and the length of the longer moving average is investigated. The rule is applied to daily closing prices of the General Index of the Athens

Stock Exchange covering a period of 12 years from 27 April 1993 to 27 April 2005.

The results indicate that for both the original and the simulated indices, the cumulative trading rule returns are very sensitive to the choice of the length of the moving averages. Further, using an innovative significance testing approach which takes into consideration this variability in the performance of the trading rule depending on the specific combination of moving average lengths, it is shown that the predictive power of the MA trading rule is clearly reduced once linear dependencies in the returns of the stock index are removed. To some extent, this conclusion contradicts the prevailing belief that the predictive power of the trading rules of technical analysis is to be attributed mainly to the existence of non-linearities in stock returns. Finally, it is found that the attenuation of the trading rule’s performance after filtering out linear dependencies in stock returns is not the same for all the lengths. Indeed, there exists a systematic decrease in the differential performance of the trading rule as the length of the longer MA increases. That means that the contribution of linear dependencies is maximized at the shorter moving averages.

### **Exchange rates and prices in the Netherlands and Britain over the past four centuries**

Working Paper No. 135  
*James R. Lothian and John Devereux*

This paper examines exchange-rate and price-level data for the long period 1590-2009 for the Netherlands and the United Kingdom (earlier the Dutch Republic and England), countries that at various times over this near four century span have differed substantially in terms of the pace at which their economies were developing, have operated under a variety of exchange rate regimes, and have been subjected to an extremely wide variety of real shocks. The principal conclusion of this study

is the resiliency of the simple purchasing-power-parity model and of the law of one price at the microeconomic level. Both take some heavy blows during this close to four-century long sample period. In the end, however, they emerge surprisingly unscathed. Real factors at times appear to have had substantial effects on real exchange rates and hence PPP, but such effects ultimately dissipate. As a long-run equilibrium condition, PPP holds up remarkably well.

## **In the neighbourhood: the trade effects of the euro in a spatial framework**

Working paper No. 136

*Harry Kelejian, Pavlos Petroulas and George S. Tavlas*

During the past decade, a rapidly expanding empirical literature has emerged assessing the effects of a common currency on trade. This literature has, by-and-large, been a reaction to findings that a currency union, on average, triples the size of trade flows among the members of the union.

However, even though trade is spatial in nature when trade regressions are specified spatial issues are typically not accounted for in a satisfactory way.

Trade regressions are typically estimated by ordinary least squares and bilateral trade between two countries, say (i) and (j), is usually assumed to depend only on the attributes of the two countries considered. These standard features of the gravity model and its estimation seem to be at odds with a multi-country framework for trade for several reasons. Moreover, the 'standard' approaches tend to omit considerations of the persistence of trade as well as possible endogeneity issues of explanatory variables.

In this paper, we specify and estimate a generalization of the typical gravity model which includes country pair, fixed effects, third country effects, endogenous regressors, and error terms that are both spatially and time autocorrelated. These error terms are specified in such a way that the extent of spatial and time autocorrelation are country specific, as are their variances.

We find that the estimated results are substantially affected when one accounts for statistical complications. Specifically, euro effects on exports are significantly reduced and are only "borderline" significant. Also, dummy variables measuring the effects of EU-membership on exports become insignificant. The results relating to other variables do not seem to be substantially affected.

All of this suggests that, perhaps, the effects of currency unions on trade as described in the previous literature has been severely overstated.

## **Bank capital and risk in the South Eastern European region**

Working Paper No. 137

*Panayiotis P. Athanasoglou*

In the present study we investigate the relationship between bank capital (regulatory and equity) and risk in SEE countries. We want to examine the behaviour of SEE banks in terms of choices about capital and risk over the last decade and mainly after the financial crisis of 2008. Due to this crisis almost all the banks in the SEE countries suffered heavy losses on their loan portfolios or their trading activities, in particular the non-traditional ones. Therefore it might be expected that they would be attempting either to lower

their exposures to relatively high-risk assets or to increase their capital in order to ensure compliance with requirements.

More precisely, this paper uses a modified version of the simultaneous equations model developed by Shrieves and Dahl (1992) to analyze banks' choice of capital (both regulatory and equity) and risk in seven SEE countries (Albania, Bulgaria, Bosnia-Herzegovina, FYROM, Serbia, Croatia and Romania) spanning the period 2001-2009.

The paper focuses on the following issues: Firstly, while a number of studies have examined the above relationship in the US and other European countries besides SE ones, this is, to the best of our knowledge, the first attempt to estimate the relationship between bank capital and risk in the SEE region. Secondly, we investigate the relationship between both equity and regulatory capital with risk, assuming that banks differentiate in their decisions between equity capital and risk and between regulatory capital and risk. Thirdly, we estimate our model for the full sample of banks and for sub-samples according to the size of the equity capital-to-assets and regulatory capital-to-risk-weighted-assets ratios respectively. Fourthly, we consider as a control variable the index of bank

liquidity, which is rarely used in empirical research. We also account for the effect of the banking reform process in the SEE countries on bank capital and risk.

The empirical results suggest that the relationship between regulatory capital and risk is positive. Moreover, the significance and causation of this relation depends on the degree of capitalization. In less-than-adequately capitalized banks there is a two-way relationship between bank regulatory capital and risk, while in well-capitalized banks this relation is not significant. The evidence confirms the assumption that banks differentiate in their decisions between equity capital and risk and regulatory capital and risk, since the former relation is negative.

### **The theoretical framework of monetary policy revisited**

Working Paper No. 138

*Hiona Balfoussia, Sophocles N. Brissimis and Manthos D. Delis*

The three-equation New-Keynesian model advocated by Woodford (2003) as a self-contained system on which to base monetary policy analysis is shown to be inconsistent in the sense that its long-run static equilibrium solution implies that the interest rate is determined from two of the system's equations, while the price level is left undetermined. The inconsistency is remedied by replacing the Taylor rule with a standard money demand equation. The modified system is seen to possess the key

properties of monetarist theory for the long run, i.e. monetary neutrality with respect to real output and the real interest rate and proportionality between money and prices. Both the modified and the original New-Keynesian models are estimated on US data and their dynamic properties are examined by impulse response analysis. Our research suggests that the economic and monetary analysis of the European Central Bank could be unified into a single framework.

### **Procyclicality in the banking industry: causes, consequences and response**

Working Paper No. 139

*Panayiotis P. Athanasoglou and Ioannis Daniilidis*

Procyclicality is an inherent feature of the real and especially the financial sector of an economy, which has been highlighted by the recent crisis. Due to procyclicality, banks are transformed from mitigation mechanisms to amplifiers of changes in economic activity potentially

affecting financial stability. The causes of procyclicality can be attributed to market imperfections and deviations from the efficient market hypothesis, while other factors – including Basel II and accounting standards – may have exacerbated it. To attenuate procyclicality, a

number of suggestions have been made in the form of rules and discretion and are presented according to the factors they aim to alleviate. Some of the suggestions have been adopted under the Basel III framework, including the countercyclical capital buffer. Although these Basel III proposals seem able to address the procyclicality issue, they will lead to higher minimum capital adequacy ratios, which are expected to increase lending costs and the provision of loans by banks, and reduce economic activity. However, the cost of the new proposals is expected to be lower than the estimated cost of financial crisis.

This paper aims at a comprehensive, exploratory and possibly concise, although not exhaustive, overview of the existing literature on procyclicality, exploring some aspects of the procyclicality that have not been addressed until recently in the relevant literature. The paper focuses on the following main directions:

Firstly, it classifies and presents comprehensively existing knowledge on several aspects of procyclicality, especially those concerning its causes, its consequences and the proposals to mitigate it. Secondly, it clarifies the relevant concepts, which are referred to in the literature, but are not adequately explained and therefore may not be used by all researchers in the same way. Thirdly, it critically examines the propositions concerning the banking sector's procyclicality issue.

However, some issues are deliberately not elaborated in this paper. For example, the findings presented are based on studies concerning a variety of countries, but the differences across countries are not always explained. Likewise, the role of public debt markets and credit default swaps are not dealt with, while the effect of corporate governance on compensation schemes is only narrowly explained.

### **Financial crises and financial market regulation: the long record of an “emergent”**

Working Paper No. 140  
*Sophia Lazaretou*

The main goal of this paper is to trace the long record of financial crises and financial market regulation from the perspective of an emerging economy. Two questions are addressed: first, what explains the incidence and severity of financial crises in an emerging market economy? And, second, what is the role of learning: how does the country learn from its past experience in financial crises to improve institutions and develop better techniques so as to successfully manage successive crisis events? To answer the above questions, I first present evidence on financial crises in Greece over a long time span. Greece has been chosen as an

appropriate case-study since it is a country with a rich history in financial crises. I try to identify a variety of crisis events, thus providing a chronology. Moreover, I present a number of facts about the incidence, frequency and severity of crises events. Second, I discuss the key determinants of the crises, which are closely related to country-specific factors, such as credit expansion, fiscal imbalances, and the limited reserve coverage of the monetary base. And third, I deal with the evolution of the regulation. I place emphasis on the post-crisis regulatory responses that changed the country's institutional developments.

## **Housing credit and female labour supply: assessing the evidence from Greece**

Working Paper No. 141

*Sarantis E. G. Lolas and Evangelia Papapetrou*

This study investigates the possible interrelationship between housing credit and female labour supply decisions in the case of Greece. This relationship is analysed through the estimation of two probit models with endogenous regressors using household data. In the mortgage loans equation the female participation in the labour force is an endogenous variable, while in the female labour supply equation mortgages are endogenous. Financial and socioeconomic factors affect the household's decision to obtain a mortgage (wife's age, husband's income and education level, couple's familiarity with banking transactions, presence of small children) and the wife's decision to seek for a job (wife's education level and age, husband's income, presence of small children).

The analysis is based on household data from the EU Survey on Income and Living Conditions (EU-SILC) of 2008 and was enriched with unpublished data on housing credit collected by ELSTAT. The empirical results show that mortgage and female labour participation decisions are interrelated. Since borrowing constraints induce women to enter the labour market and vice versa, housing credit policies could have a significant positive impact on employment and real economic activity. In a broader perspective, the evidence provided in our analysis supports the existence of a finance (housing credit) and real economy activity (female labour supply) nexus.

## **Time-consistent fiscal policy under heterogeneity: conflicting or common interests?**

Working Paper No. 142

*Konstantinos Angelopoulos, James Malley and Apostolis Philippopoulos*

This paper studies the aggregate and distributional implications of Markov-perfect tax-spending policy in a neoclassical growth model with capitalists and workers. Focusing on the long run, our main findings are: (i) it is optimal for a benevolent government, which cares equally about its citizens, to tax capital heavily and to

subsidize labour; (ii) a Pareto improving means to reduce inefficiently high capital taxation under discretion is for the government to place greater weight on the welfare of capitalists; (iii) capitalists and workers preferences, regarding the optimal amount of "capitalist bias", are not aligned implying a conflict of interests.

## ARTICLES PUBLISHED IN PREVIOUS ISSUES OF THE ECONOMIC BULLETIN

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