INTRODUCTORY STATEMENT OF THE GOVERNOR OF BANCO DE PORTUGAL

PUBLICATION OF PROJECTIONS AND THE PORTUGUESE ECONOMIC POLICY

1. As from December 2000 the ECB *Monthly Bulletin* started to publish staff economic projections for the euro area main economic variables, including inflation. These projections, which result from the involvement of all national central banks, will be released twice a year, in June and December, and will always cover a two-year horizon.

As it is known, the Banco de Portugal used to publish economic forecasts in March and September, for the same year, although it did not include inflation in the variables shown. The new stance adopted at the Eurosystem's level implies, however, a change in this procedure. The Banco de Portugal has thus decided that the *Economic Bulletin*, to be published immediately after the ECB *Monthly Bulletin* containing the staff economic projections, will release the projections for the Portuguese economy produced by the Banco de Portugal within the framework of the preparation of euro area projections – now also including inflation. In the December issue of the *Economic Bulletin* of each year the projections for the following year will be presented and only in the June issue of the *Economic Bulletin* will the projections for the subsequent year be disclosed. The reason for this difference vis-à-vis the procedure adopted in the euro area is due to the fact that it is more difficult to make forecasts for a longer horizon, with an acceptable degree of reliability, for a small economy, which is more open and volatile than the euro area as a whole. In June there is a larger amount of information available and hence there is an increased possibility of making more reliable projections for the next year.

2. Our concern to ensure the credibility of the projections stems from the rationale behind the decision to publish, from now on, the economic projections that the Eurosystem has always produced internally. In fact, any modern monetary policy strategy must take into account the effect of economic agents' expectations on the process of transmission of monetary impulses to the economy. The publication of economic projections, namely those for inflation, is an attempt to stabilise expectations around the values considered by the Eurosystem itself, when preparing monetary policy decisions. In this case, transparency helps to enhance the credibility of monetary policy. The increased credibility, in turn, renders the conduct of this policy more flexible, enabling for example a better response to recessive shocks, without jeopardising the confidence in the ability to control inflation, or making possible more abrupt changes in interest rates if the need arises, without introducing too much noise in the information provided to economic agents.

The projections released are an exercise of conditional forecasts, based on the assumption that monetary policy will remain unchanged, i.e. that during the whole period both interest rates and the exchange rate remain unchanged. This procedure aims to maintain the information content of the existing rates, which are necessarily considered by authorities as the most adequate to the economic situation of a particular moment. To make forecasts on the future trend of interest rates *inter alia* would render less flexible the future policy decisions determined by the actual conditions of a specific moment in time. Central banks that publish projections normally use this method, although a few complement it with projections based on future interest rates implied in money market and financial market rates. The conduct of this exercise tends to be more comprehensive in the countries which follow a monetary policy strategy of so-called «inflation targets», which is

not the case of the Eurosystem. As it is well known, we adopt a more flexible hybrid strategy, which uses parts of different approaches to the design of monetary policy. This flexibility allowed monetary policy to properly adjust to the needs of the European economy. Following the cut in interest rates in early 1999, in response to the recessive risks existing at that time, the rise in the rates decided by the Governing Council in the course of last year kept in check the inflationary process, without jeopardising economic growth and the decrease in unemployment. Given that the creation of the euro allowed for the implementation of a single monetary policy, it provided European countries with a powerful instrument to largely decouple their own short-term economic situation from developments in other parts of the world. This autonomy, which can only be provided by a single monetary policy, is quite evident in recent developments, which particularly show the difference between the American and the European economic situations. Europe has now better conditions to withstand the consequences of the deceleration of the US economy.

3. The most recent developments mentioned above are a good example of the speed with which nowadays projections become outdated, at least partially. Indeed, the figures disclosed at end-December were computed from assumptions set out in early November. Since that date there was a recovery in the euro exchange rate, the oil price is now lower and growth prospects in the economy of the rest of the world are more pessimistic. The projections published assumed an unchanged euro-US dollar rate of 0.85 and recent values range around 0.94, while the oil price considered at the time was USD 29, compared with prospects of an average value of around USD 25 this year. In turn, growth prospects, which are now more consensual for the US economy, stand at around 1 percentage point below the forecasts made three months ago. According to many forecasters, all these developments are likely to influence euro area growth and to reduce it by approximately 0.25 percentage points vis-à-vis the projections of last December, which pointed to a range centred on 3.1%. The effects on inflation can also be quite significant, bringing its average value to below 2% in 2001, if assumptions currently made by forecasters for the euro exchange rate or the oil price turn out to be true.

As I mentioned above, the projections that the Banco de Portugal is releasing in this *Economic Bulletin* are the ones produced in the context of the preparation of those disclosed for the euro area in the December 2000 issue of the ECB *Monthly Bulletin*. No attempt was made to update data, which must be interpreted against the background in which they were prepared. The principles underlying the changes referred to for the euro area would lead to the conclusion that, with the new assumptions, inflation and growth forecast for Portugal would be slightly lower than those calculated in the December publication. The figures referred to above show that the differences would be rather small and that — given the uncertainty which necessarily surrounds the forecasts of variables, such as investment or wages — the forecast ranges presented in this *Bulletin* would certainly accommodate them.

4. The **growth scenario** shown reflects a slight deceleration which is in line with a smooth adjustment of the Portuguese economy towards a moderation of the growth of domestic expenditure, which has been financed by growing indebtedness. The economy cannot maintain indefinitely expenditure levels which are far above production levels. The indebtedness of economic agents associated with domestic demand above GDP gives rise to an external deficit. However, for a country with no national currency of its own, as is currently the case of Portugal, the limits of the external deficit result chiefly from the aggregation of the borrowing capacity of each agent, including banks. These have been acting as intermediaries between domestic agents and abroad, borrowing from euro area interbank markets in order to finance credit expansion. Financial markets and foreign banks have provided these resources because of their positive assessment of the soundness of Portuguese banks.

Such a process obviously has limits, and there will be a time in which, a natural process of moderation of expenditure growth will start. What is important for a country integrated into a monetary union is precisely the existence of self-correcting mechanisms of an excessive external imbalance, and the Portuguese reached almost 10% of GDP in 2000. Indeed, either agents start to moderate expenditure and increase their saving levels or banks must tighten their risk assessment criteria and

consequently reduce credit supply. The later this deceleration process begins, the more abruptly the economy may come to an halt and the higher the risks of a true recession. Thus, the economy should continue to decelerate, a process which is in fact already visible in consumption and industrial production.

This in general implies a slight fall in the growth of the economy, also partially checked by our situation of full employment. As I mentioned last July: «The Portuguese economy is in a situation of full employment, whereas the euro area still has room to grow before it reaches potential output, given its higher unemployment. In order to grow at higher rates, Portugal would need a surge in productivity, which is difficult to achieve in the short run, or to resort to labour import on a larger scale.»

Thus, it is not surprising that other European countries such as Spain or Greece, the latter now being subject to the effect of a cut in interest rates, are growing more strongly than Portugal. We need productivity increases which imply structural transformations on the supply side with an improvement in the quality of inputs and in the efficiency of their use. This is a medium and long-term process which depends on some public policies which create new external economies in production, but which above all depends on entrepreneurial initiative.

The predominance of supply policies is *one of the rules* to be respected by an economy integrated into a monetary union. With no fundamental instruments to control overall demand and short term instability, economic policy must concentrate on other aspects. Factors such as the infrastructures, the quality of human capital, the incentives to labour supply, a favourable climate for productive investment and technological modernisation are the cornerstones of competitiveness and of the possibility to improve the standard of living. A monetary union is an area of globalisation of economic relationships, which inevitably requires increased competition.

As a consequence, *a second rule* should be followed by all member countries: the acceptance of the openness to foreign countries and to corporate internationalisation, in line with the basic principles of a single, highly competitive market, subject to the discipline of an integrated capital market. These and other operational rules have not yet been completely understood among us. There are still some signs of the old ways of thinking dependent on the environment prevailing when there was still a national currency and the control of capital movements.

5. The behaviour regarding **inflation** largely reflects the fact that the new operational framework of the Portuguese economy has not been fully interiorized. The projection made in the context of the Eurosystem can be now revised downwards due to the latest developments in the euro exchange rate and in the oil price. However, the fact that inflation was higher than forecasted in the last two months of 2000 and the uncertainty about the wage policy warrant caution in the revision of the value expected for 2001.

The fact that fuel prices were raised at the end of March 2000 leads inflation measured early this year to record a one-off acceleration, probably above 4%, since the comparison will be made with the first months of 2000, i.e. prior to fuel price rises. As mentioned in the text on the economic policy situation, the average inflation projected for this year is likely to range between 2.9% and 3.3%, albeit recording an intra-annual pattern of strong deceleration throughout the year. It is thus estimated that at end-2001 inflation is likely to stand slightly below 2.5%. The risk associated with the much higher inflation recorded at the beginning of the year results from the fact that it is usually in this period that the major wage negotiations occur, and these can be erroneously influenced by the most recent levels of recorded inflation.

In fact, and more importantly, the increase in average wages in Portugal cannot continue to ignore developments in the remaining euro area countries. This is another operating *rule* of a monetary union which we cannot ignore: with no national currency of its own and thus without the possibility of making devaluations, wage increases above the growth rates recorded in the rest of the monetary union in the long run will chiefly affect competitiveness and unemployment. This means that the decisions which influence costs and prices should take as a reference the average values of the euro area, so that there is, *inter alia,* an increase in unit labour costs (ULC) which does not steadily differ from that in the rest of the euro area. It should be noted that this variable is already taking

into consideration the development of relative productivity. Indeed, a usual indicator of competitiveness vis-à-vis our trading partners is an index which results from the correction of the nominal exchange rate with the ratio of developments in ULC in Portugal and in its trading partners. The change in ULC is given by the difference between the growth rate of *nominal* wages and the growth rate of productivity measured in *real* terms. On the other hand, as regards the other euro area countries, the «exchange rate» now equals 1 (we share the same currency) and its change equals zero. Thus, in order for the real exchange rate to be kept unchanged (measured by relative ULC), it is necessary that the difference in the growth of ***nominal*** wages between Portugal and the euro area equals the difference in the growth of ***real*** productivity. Only in this way can ULC grow equally and competitiveness be maintained (see annex 1). However, this has not been the case in the past few years (see Table 1).

Table 1

ULC GROWTH

Per cent

	1998	1999	2000
Portugal	**4.2**	**4.0**	**3.9**
Euro Area	**0.3**	**1.1**	**0.8**
Spain	2.3	2.3	2.4
Ireland	3.4	2.3	2.4
Italy	-2.3	1.4	1.0

In the past five years ULC in Portugal have always grown above those in the remaining euro area countries (therefore excluding Greece, which only joined the euro area this year). This trend cannot continue indefinitely. Price competitiveness can be maintained for a few years through the shrinkage in profit margins and / or the above-the-average growth in some producers of tradable goods, but both solutions have obvious limits. It is true that this indicator is usually assessed in relation to all our trading partners and competitors and not just the euro area, which nevertheless receives more than 80% of our exports and from which we import more than 70% of the total, and is therefore the most relevant group.

On the one hand, wage developments in Portugal, which have been increasing more than productivity in recent years, have been narrowing corporate profit margins. In the long run, wage growth eventually move close to the increase in productivity, although there can be limited periods when the functional distribution of income is changed. However, developments in recent years have been particularly marked (see Table 2).

On the other hand, when making a comparative analysis of real wages and productivity, terms of trade cannot be ignored. Indeed, when there are gains in terms of trade (relative development in export and import prices) the maintenance of the functional distribution of income implies that real wages have to grow above productivity. Similarly, when there are losses in terms of trade, as in 1999 and 2000, real wages should increase below productivity, in order not to affect the profitability of other production factors. A decline in terms of trade (other things being equal) means a reduction in the real income of the economy in which all economic agents must participate (see annex 2).

6. All the basic principles that I have just recalled are valid for developments in total average

Table 2

WAGES AND PRODUCTIVITY

Per cent

	1997	1998	1999	2000
Portugal				
Growth of nominal wages (whole economy)	**5.8**	**6.0**	**5.3**	**5.7**
Productivity growth	1.8	1.9	1.3	1.7
Euro area				
Growth of nominal wages (whole economy)	**2.1**	**1.4**	**1.9**	**2.4**
Productivity growth	1.5	1.1	0.7	1.6

Table 3

PORTUGAL
ACTUAL AND NEGOTIATED WAGES

Per cent

	1997	1998	1999	2000
Corporate sector:				
Growth of actual wages	5.3	5.1	4.8	5.0
Growth of negotiated wages	3.6	3.1	3.3	3.5
«Wage drift»	1.7	2.0	1.5	1.5
Public sector:				
Growth of actual wages	6.6	6.5	6.7	5.9
Growth of negotiated wages	3.0	2.8	3.0	2.5
«Wage drift»	3.6	3.7	3.7	3.4

wages. In practice, though, there is always a wage drift equal to the difference between actually paid wages and negotiated wages. The wage drift above wage settlements is justified by factors such as promotions, restructuring of careers, or simply because some corporations pay above wage settlements. The difference between negotiated wages and actually paid wages has therefore to be taken into account. In Portugal, this difference has been very significant (see Table 3).

The table above illustrates the importance of the wage drift phenomenon in Portugal. An analysis of a longer period evinces that the size of this drift changes significantly according to the economic cycle. In a full employment situation, as the one we are experiencing, it is expected to be at least as high as in recent years. This implies that particular caution should be observed in wage settlements. In the euro area *total actual wages* rose only by 2.4% in 2000 and in 2001 they are expected to rise by 2.75%. Taking this into account, as well as developments in recent years, it is straightforward that average wage settlements should clearly rise by less than 3% in 2001. Thus, the 3.71% increases in the wage settlements of government employees, which may turn out to be effective increases of more than 6% as in recent years, are a bad example, hardly reconcilable with the situation of public finances, and should not be followed by the remaining sectors of the economy.

In fact, with a significant wage drift, the increase in staff costs will hamper the execution of the budget, considering that Portugal, due to its development level, is already in an extraordinary position as the euro area country with the highest General Government staff costs as a percentage of GDP. On the other hand, in the past few years the increase in government employees' wages was higher than that in the remaining sectors of the economy, and average net wages of government employees are around one third higher than those in the corporate sector. This situation is only partly explained by the higher average education level in the Public Administration.

In Portugal the wage settlement procedures need a structural reform, so as to comply with the following principles:

1) Cost increases in the euro area and real productivity differentials from which we may benefit should be a relevant benchmark.
2) Negotiated wages for two years (instead of only one) should be introduced to provide stability and reduce uncertainty and the costs of economic conflict. This happens in several European countries and it will tend to become broadly based, since it is possible to rely on a system of stable inflation around 2% across the euro area.
3) Overall wage benchmarks should not jeopardise the taking into account of specific sectoral, regional and corporate conditions, guaranteeing some room for negotiation at the microeconomic level.

These principles may seem the expression of an orthodox thinking, but they simply correspond to the recognition of a fundamental reality, which is

currently the Portuguese one. The workers' representatives, who have the illusion that recent years developments may continue indefinitely, must understand that such a situation would only add to future unemployment. From now on, unemployment is the variable that adjusts and, if the developments of recent years persist, the consequences on unemployment will also reflect the power of the social oligopoly of those who are currently employed.

The sustainable improvement of the living standards and the convergence to European average levels can only occur on the basis of a real productivity growth above that of our partners. We need a consensual national policy to reduce cost inflation to values close to those of the European average, with a view to contributing to the competitiveness of Portuguese companies, which are expected to make a greater effort of investment and technological modernisation.

7. The increase in wage costs in recent years has created difficult conditions to fiscal policy, contributing to a rise in government current expenditure. The increase in government consumption has fostered domestic demand and contributed to a pro-cyclical fiscal policy as from 1997. Only the budget for the current year, when adjusted for the effects of the economic cycle, shows a restrictive autonomous impulse. However, the excessive growth of expenditure in recent years reduced the flexibility of the fiscal policy to face a deceleration of the increase in tax revenue over the coming years, which implies, as recently stated by the Minister of Finance, the need of deeper reforms to curb the growth of expenditure. The provisions of the mandate given by the Minister of Finance to the Co-ordination Group for the Reform of Government Expenditure *(Ecordep)*, which has recently taken office, are worthy of support. We expect the development in Public Finances to benefit – beyond current expectations – from those principles and from the measures proposed by the *Ecordep*.

This is essential for the compliance with another *rule*, the fourth I mention, which countries in a monetary union have to adopt. In fact, fiscal policy remains the only instrument at the countries' disposal to fine-tune the economic situation. Thus, fiscal policy has to become more flexible and create room for manoeuvre in periods of prosperity, in order to have a significant anti-cyclical effect and to absorb adverse economic shocks. These are the principles underlying the Stability and Growth Pact which, although restrictive, have their ultimate rationale in the idea of achieving a balanced budget in the course of an economic cycle, allowing for higher deficits in periods of recession, provided that they are offset by surpluses in periods of strong economic growth.

8. The new operating rules that I have mentioned as imperative for countries participating in a monetary union may be summarised as follows:

a) Predominance of supply policies. Those depending on public policies, such as infrastructures, training of human resources, incentives to labour supply or to a favourable investment climate, as well as those resulting from the behaviour of companies from which technological modernisation and increase in productivity is required.
b) Acceptance of full openness to foreign countries and to corporate internationalisation, in line with the basic principles of a single market in which frontiers disappeared and where there is higher competition and the discipline of an integrated capital market.
c) Higher relevance to the relationship between wages, competitiveness and unemployment. Without being possible to resort to the depreciation of the national currency, wages, more than domestic inflation, determine, in the long run, competitiveness and unemployment.
d) Need to use the fiscal policy more in an anti-cyclical manner in order to absorb economic shocks and recessive periods, which implies the creation of room for manoeuvre, and even budget surpluses, in periods of prosperity.

The two latter rules mean that, in order to be successful, participation in a monetary union implies the interiorization of new operating rules regarding wage and budget policies. It means to operate according to a sound principle of reality and to withdraw all the consequences of participating in a monetary union from which there is no going back. We made an irreversible historical choice and we have to fully assume it. Otherwise we can-

not ripe the fruits of our participation. Without it we would not have been benefiting from a low interest rate system for some years now. The fall in interest rates during the second half of the 1990s implied an increase in the wealth and in the borrowing capacity of private economic agents. Many households and corporations suddenly became solvent to borrow and, in view of the new inflation and low interest rate regime, rationally decided to use their borrowing capacity to increase their expenditure. Corporations seized the opportunity to expand and modernise their capacity utilisation, their indebtedness being estimated to have increased to 71.4% of GDP in 1999. In 1990 households had an estimated indebtedness of 18.5% in relation to disposable income and the interest payments accounted for 4.8%. In 1999, the debt ratio had increased to 76%, but the interest payments were only 3.5% of disposable income. This increase in indebtedness has as its counterpart the access to goods and services, which increased significantly the living standards. In other words, it was not only the increase in real income, but also the access to durable goods (housing, cars, etc…) which made of these years a unique period in Portuguese economic history.

This process had natural limits associated with the borrowing capacity of each economic agent. We are about entering a phase of adjustment and moderation of income growth. As the proverb runs “hood does not make the monk”. It will not suffice to have the wealthy outfits of monetary union, it is also necessary to assume its demanding virtues and rules of life. However, as classical wisdom assures, «all excellent things are as difficult as rare».

23 January 2001

Vitor Constâncio

Annex 1

UNIT LABOUR COSTS, WAGES AND COMPETITIVENESS

The definition of Unit Labour Costs (ULC) is given by the following expression:

$$ULC^n = \frac{W^n . L}{Y_q} = \frac{W^n}{\left(Y_q / L\right)} = \frac{W^n}{\pi^r}$$

where

ULC^n – Labour costs per unit produced;

W^n – Nominal wages; L – Volume of employment;

Y_q – Real GDP; π^r – Real productivity.

In terms of growth rates we have,

$\dot{ULC}^n = \dot{W}^n - \dot{\pi}^r$ (variation of nominal costs per unit produced)

What matters for international comparisons are the nominal unit labour costs translated in the same currency.

$$ULC\,relative = \frac{ULC_{es}}{ULC_p} . S$$

where:

ULC_{es}, ULC_p – ULC foreign and domestic;

S – Nominal exchange rate

In growth rates,

$$\dot{ULC}\,relative = \left(\dot{W}^n_{es} - \dot{\pi}^r_{es} \right) + \dot{S} - \left(\dot{W}^n_p - \dot{\pi}^r_p \right)$$

where,

$\dot{W}^n_{es}, \dot{W}^n_p$ – wages growth rates abroad and domestic

$\dot{\pi}^r_{es}, \dot{\pi}^r_p$ – real productivity growth rates abroad and domestic

$\dot{S}$ – growth rate of the exchange rate, which in the case of the euro area is zero

In order to maintain relative ULC constant, we must have

$$\dot{W}^n_p - \dot{\pi}^r_p = \dot{W}^n_{es} - \dot{\pi}^r_{es}$$

which implies that,

$$\dot{W}^n_p - \dot{W}^n_{es} = \dot{\pi}^r_p - \dot{\pi}^r_{es}$$

This means that in order to maintain competitiveness, the growth differential with our partners of ***nominal*** wages must be equal to the growth differential of ***real*** productivities.

Annex 2

TERMS OF TRADE EFFECTS ON THE FUNCTIONAL DISTRIBUTION OF INCOME

Consider the following two equations:

1) $\dot{P}_c = a\dot{P}_d + (1-a)\dot{P}_f$ where $\dot{P}_c$ represents the growth rate of a general consumer price index determined as a weighted average of an index of domestic prices $\dot{P}_d$ (v.g. a GDP deflator) and an index of import prices $\dot{P}_f$.

2) $\dot{T} = \dot{P}_d - \dot{P}_f$ $\dot{T}$ is the growth rate of the terms of trade with domestic price used as a proxy of export prices

From 2) we may write 3) $\dot{P}_f = \dot{P}_d - \dot{T}$
Substituting in 1), we have

$\dot{P}_c = a\dot{P}_d + (1-a)\dot{P}_d - (1-a)\dot{T} = \dot{P}_d - (1-a)\dot{T}$ and

4) $\dot{P}_c - \dot{P}_d = -(1-a)\dot{T}$ This implies that if $\dot{T} > 0$ (a terms of trade gain) then $\dot{P}_c < \dot{P}_d$ and if $\dot{T} < 0$ (terms of trade loss) results $\dot{P}_c > \dot{P}_d$.

Let's analyse now what are the necessary conditions for the functional distribution of income to remain constant. We start with the labour share in GDP:

$\frac{W.L}{Y}$ where W is the nominal wage, L the volume of employment and Y the nominal GDP.

We may write the same expression but with real wages and real GDP, taking into account that, when the terms of trade vary, the general price index has variations different from the ones shown by a deflator of GDP. The later is relevant to deflate GDP and the former is appropriate to deflate wages. We have then:

$$\frac{w^r.P_c.L}{y^r.P_d} = \frac{w^r.P_c}{(y^r/L).P_d} = \frac{w^r.P_c}{\pi^r.P_d}$$

In terms of growth rates and in order to maintain constant the labour share in GDP, it is necessary that:

$$\dot{w}_r - \dot{\pi}_r + \left(\dot{P}_c - \dot{P}_d\right) = 0$$

From equation 4) we have $\dot{P}_c - \dot{P}_d = -(1-a)\dot{T}$. Substituting, we obtain

$$\dot{w}_r - \dot{\pi}_r - (1-a)\dot{T} = 0$$

or,

$$\dot{w} = \dot{\pi}_r + (1-a)\dot{T}$$

This implies that for the labour share to remain constant:

a) If $\dot{T} > 0$ (*terms of trade gain*) real wages have to grow more than productivity.
b) If $\dot{T} < 0$ (terms of trade loss) real wages have to grow less that productivity.

OUTLOOK FOR THE PORTUGUESE ECONOMY IN 2001

1. INTRODUCTION

This issue of the *Economic Bulletin* discloses projections for Gross Domestic Product (GDP) growth, inflation and the current and capital account in Portugal in 2001 (see Table 1), prepared within the scope of the Eurosystem autumn staff economic projection exercise (published for the euro area as a whole in the December 2000 issue of the *Monthly Bulletin* of the European Central Bank).

The economic projections arising from the Eurosystem staff economic projection exercise are conditional on a relatively comprehensive set of assumptions on the behaviour of the world economy in the projection horizon, including for example developments of overall activity, world trade and various international prices. In addition, projections are based on the technical assumption that short-tem interest rates and bilateral exchange rates remain unchanged throughout the projection horizon, at the levels recorded when the assumptions were made (generally in mid-October). As a result, and in contrast with the forecasts made by international organisations, such as the European Commission, the OCDE and the IMF, this exercise does not consider monetary policy changes throughout the projection horizon, understood as changes in the Eurosystem's intervention rates.

The assessment of overall developments in the Portuguese economy in 2000 — which is a very important element in the current macroeconomic projection exercise — corresponds to the analysis recently disclosed by the Banco de Portugal in the September 2000 issue of the *Economic Bulletin* (see the section entitled "Portuguese Economy in 2000"). GDP seems to have recorded a real growth of approximately 3 per cent, as in 1999. In the course of 2000 there were significant shifts in the growth pattern, with a deceleration of private consumption and an acceleration of exports.

In 2001, the Portuguese economy is foreseen to decelerate, although not very sharply, to a growth rate of real GDP within the range of 2½ to 3 per cent. The deceleration of growth will reflect the gradual slowdown in domestic demand (private consumption, public consumption and gross fixed capital formation), which will more than offset the moderation in the negative contribution from net external demand. As a percentage of GDP, the deficit of the goods and services account is likely to

Table 1

PORTUGAL
PROJECTIONS OF THE *BANCO DE PORTUGAL*
Percentage rates of change

	2000[(a)]	2001
Private consumption	[2¾ ; 3¼]	[2½ ; 3]
Public consumption	3.2	1.7
Gross Fixed Capital Formation	[5¼ ; 5¾]	[2½ ; 4½]
Domestic demand	[3¼ ; 3¾]	[2½ ; 3]
Exports	[8¼ ; 8¾]	[7½ ; 8½]
Overall demand	[4¼ ; 4¾]	[3¾ ; 4¼]
Imports	[8 ; 8½]	[6¼ ; 7¼]
GDP	[2¾ ; 3¼]	[2½ ; 3]
Current + capital account (% GDP)	[-10 ; -9]	[-9½ ; -8½]
Harmonised Index of Consumer Prices	2.8	[2.9 ; 3.3]

(a) Estimates / projections disclosed in the September 2000 issue of the *Economic Bulletin*, with the exception of the annual average rate of change in the HICP.

stabilise or to widen only marginally. However, the aggregate current and capital account deficit, which reflects external borrowing requirements of the resident sectors, is likely to narrow somewhat. This is associated with the upturn in public capital transfers to levels similar to those recorded in recent years, after the reduction observed in 2000, which was due to the transition to the Third Community Support Framework. With regard to inflation, the annual average change in the Harmonised Index of Consumer Prices (HICP) is projected to range between 2.9 and 3.3 per cent in 2001.

2. ASSUMPTIONS UNDERLYING THE PROJECTIONS FOR THE PORTUGUESE ECONOMY

The projections for Portugal are based on the same set of assumptions as used in the euro area projections published by the European Central Bank (ECB). These assumptions refer to developments in the world economy — world activity, international trade and international prices —, in the exchange rate and in short-term interest rates. It should be noted that the consistency of the Eurosystem's macroeconomic projection exercise ensures that the forecast made for each national economy participating in the euro area is taken into account in the preparation of the projection for the Portuguese economy.

The Eurosystem's projections assume that the external framework of the euro area will remain favourable for the next two years, in line with the forecasts presented by the main international organisations. In particular, the growth of economic activity outside the euro area is expected to reach 5 per cent in 2000 and to slow subsequently to slightly above 4 per cent in 2001. Projections assume that the US economy will slow down, after the very high growth in 2000, and that the current recovery in Japan will continue, albeit at a modest pace. Most emerging markets are likely to record continued robust growth, in particular, the Asian economies.

Also according to the Eurosystem's projections, and after the acceleration recorded in 2000, the euro area activity is likely to remain strong in the next two years, though slowing down slightly. The buoyancy of domestic demand is forecast to remain relatively subdued in the projection horizon, although the contribution from net external demand, after a sizeable improvement in 2000, is expected to be less significant.

In this context, considering the geographical structure of Portuguese exports, the external demand directed to the Portuguese economy is likely to decelerate progressively from around 10 per cent in 2000 to around 8 per cent in annual average terms in 2001.

As to international oil price developments, the assumption made is based on the implied trend in the futures markets of this commodity. Thus, the oil price is expected to decline somewhat in the course of 2001, which implies that, in annual average terms, it will remain at approximately the same level as in 2000. The prices of non-energy commodities are expected to increase modestly in 2001.

Projections for Portugal took also into account the available information on the developments in general government accounts, namely the State Budget for 2001, and information on the excessive deficit procedure of the end of last August. More specifically, this projection exercise assumes that real growth of public consumption will be at 1.7 per cent in 2001.

Finally, given the price-setting system of consumer fuel in Portugal, it was also necessary to make an assumption on developments in these prices in 2001, which naturally conditions, to a large extent, the projection for the inflation rate. Consumer fuel prices are assumed to increase by approximately 3 per cent in January 2001, and to be unchanged until the end of the year[1].

3. OUTLOOK FOR THE PORTUGUESE ECONOMY IN 2001

3.1 Economic activity

In 2001 the Portuguese economy is expected to decelerate moderately (Table 1). This evolution reflects the deceleration trend of domestic demand already seen in 2000, which is not likely to be fully offset by the projected improvement in net exter-

(1) After the conclusion of this projection , the updating of fuel and diesel prices was announced, as from early January 2001, to an amount rather close to that assumed in this exercise.

nal demand. The forecast presented assumes a gradual correction of some imbalances which have been more pronounced in the recent past, mainly reflecting the composition of growth of the Portuguese economy.

The deceleration projected for the Portuguese economy will chiefly result from three factors: the deceleration of external demand and hence of Portuguese exports; the moderation of public consumption, contrasting with the very high increases recorded in the previous years; and finally, the effects of the significant rise in most interest rates throughout 2000, which are magnified by the high indebtedness levels of both households and non-financial corporations.

Private consumption is likely to decelerate in 2001 and to grow in line with output, similarly to 2000, in the wake of the strong expansion of this aggregate in the late 1990s, which was clearly above the growth of output and of household disposable income. The significant cut in interest rates in the late 1990s, together with the significant growth of public consumption, led to a strong expansion of private consumption, in parallel with a considerable reduction in the household saving rate. Despite the moderation in private consumption growth, the rate of change in real household disposable income is expected to remain close to 3 per cent. It should be noted that the developments projected for disposable income already include the main changes in the Personal Income Tax contemplated in the State Budget for 2001. The present high indebtedness position of households (around 85 per cent of disposable income at end-2000), in parallel with the rise in interest rates (the rate on the main refinancing operations of the Eurosystem was raised from 2.5 to 4.75 per cent between November 1999 and October 2000), are two factors that may bring about a slight recovery in the levels of the households saving rate.

Gross fixed capital formation (GFCF) is estimated to have kept considerable buoyancy in 2000, relatively broadly based across all its components. In 2001 this aggregate is expected to decelerate, albeit maintaining a stronger growth than that of output (Table 1). This deceleration will be chiefly due to investment in construction, reflecting a fall in household investment in housing. The rise in interest rates in 2000, the high indebtedness position reached and the extremely marked growth of GFCF in housing in the recent past are some of the factors behind the projected fall, which is likewise suggested by forward-looking indicators, such as the issue of new house building permits. In contrast, public investment is expected to accelerate slightly in 2001 with the implementation of the Third Community Support Framework. The State Budget report for 2001 points along the same line and forecasts a significant increase in transfers of structural fund. The highest margin of uncertainty is foreseen in corporate investment. The strong growth of corporate indebtedness and the less favourable conditions of access to capital markets will translate into increased financial restrictions, which will limit corporate investment capacity. However, high capacity utilisation rates will continue to prevail in some sectors of the economy, which together with the significant growth expected for exports in 2001, will likely give a significant boost to corporate investment. The projection for developments in GFCF as a whole includes a slight slowdown in corporate investment.

Exports of goods and services are likely to decelerate slightly in 2001, albeit continuing to grow at a high rate, in line with the projected developments of external demand directed to Portuguese producers. The deceleration expected for imports of goods and services will be more pronounced, as a reflection of the lower growth of overall demand. With regard to the developments in the relative prices of international trade, the change in terms of trade is expected to have a neutral or slightly positive impact on the goods deficit in the projection horizon, following the strong negative impact recorded in 2000, as a result of the oil price increase. Overall, and in contrast with the strong widening of the Portuguese goods and services account deficit in recent years, the above mentioned developments may allow for the maintenance of or for a marginal rise in this deficit as a percentage of GDP in 2001.

However, the external borrowing requirements of the Portuguese economy, i.e. the aggregate current and capital account deficit, are expected to decline slightly in 2001. This will result from the upturn in public capital transfers to levels similar to those recorded in recent years, after the reduction observed in 2000, which was due to the transition to the Third Community Support Framework.

3.2 Inflation

The current inflation projection points to an inflation rate in 2001, measured by the annual change in the HICP, between 2.9 and 3.3 per cent, thus presenting an increase from 2000. On the basis of information of the HICP for September, the projection of the Banco de Portugal for the annual average change in the HICP in 2000 was 2.8 per cent[2].

Despite the foreseeable rise in the annual inflation rate in 2001, the current forecast scenario points to a deceleration path of consumer prices in the course of 2001, particularly from March onwards. Although inflation may increase in the early months of 2001 compared with the last months of 2000, consumer prices will tend to decelerate from the second quarter onwards. The annual projection is consistent with a year-on-year change between 2.3 and 2.9 per cent in the last quarter of 2001. The adjustment for the effects associated with the fuel price increases at end-March 2000 and for the abnormally high increases in the prices of some foodstuffs in the second half of 2000, as well as the gradual unwinding of the effects of the depreciation of the euro, explains this downward trend in the year-on-year price change in the course of 2001.

The inflation projection for 2001 and the pattern observed throughout the year depend crucially on the assumption considered for the behaviour of consumer fuel prices: a one-off adjustment of around 3 per cent in January 2001. On the other hand, the projection also depends decisively on the developments forecast for compensation per employee. It should be noted that, conversely to Portugal, most other euro area countries have generally experienced a relatively moderate increase in wages, which is expected to continue in 2001, notwithstanding the fact that the spillover from the increase in international oil prices to consumer fuel prices was higher in these countries than in Portugal.

2 According to data for November 2000, the annual average rate of change in the HICP stood at 2.6 per cent.

4. ASSESSMENT OF RISK FACTORS AND CONCLUSION

As highlighted in the first two sections of this text, the projections disclosed in this *Bulletin* are conditional on a set of assumptions, such as developments in world activity and in the oil price and technical assumptions of unchanged interest and exchange rates throughout the projection horizon. There is however a large number of risks associated with the fact that these projections may fail to materialise, bringing about developments other than those assumed.

At the external level, the main risk factor is that the international economy may present a smaller growth than that assumed in the forecasting exercise, leading to a less buoyant Portuguese economy via lower export growth, which will have a reflection on the other private expenditure components. In particular, a sharper deceleration of the US economy is a possibility which cannot be ruled out, given that both its direct effect on the US economy and its indirect effect, through the slowdown of economic growth in the euro area (where Portugal's major trading partners are concentrated), would have a negative impact on economic growth in Portugal and would hamper the reduction of the external borrowing requirement. A scenario of simultaneous sharper slowdown in the world economy and a strong appreciation of the euro would deepen the effects of moderating growth in the euro area economies, including the Portuguese economy.

The scenario would be even more unfavourable if the international price of oil were not reduced, as assumed in this exercise. The protracted maintenance of the oil prices at very high levels would add to an even stronger deceleration of economic growth at the global scale and could, in addition, trigger inflationary pressures. However, considering the recent reduction of the international price of oil, there is less likelihood of a more unfavourable trend than forecast. Indeed, it seems more likely that the reductions in oil prices will be greater than those assumed in the exercise.

At the domestic level, there is some risk that the expansion of domestic demand will be higher than projected, with public consumption growth exceeding the rate assumed — similarly to developments in recent years. This factor, especially

Table 2

UNIT LABOUR COSTS PER UNIT OF PRODUCED OUTPUT WHOLE ECONOMY

Percentage rates of change

	1998	1999	2000
Portugal	**4.2**	**4.0**	**3.9**
Belgium	0.8	0.9	0.6
Germany	0.0	0.6	0.0
Greece	6.4	0.6	1.6
Spain	2.3	2.3	2.4
France	0.5	0.6	0.2
Ireland	3.4	2.3	2.4
Italy	-2.3	1.4	1.0
Luxembourg	0.3	0.7	2.7
Netherlands	1.7	2.0	2.6
Austria	0.4	0.5	-0.5
Finland	0.8	0.5	1.2
Euro area	**0.3**	**1.1**	**0.8**

Sources: *Banco de Portugal* and European Commission (autumn 2000 Economic Forecasts).

when coupled with a more moderate deceleration of investment, would translate into a postponement of the correction of the growth of domestic demand and of external borrowing requirements. Such a postponement would imply in the future a more significant and abrupt adjustment, which would be reflected in a sharper deceleration of output growth and in a rise in the unemployment rate.

As regards the risks to the inflation projection, amongst the favourable aspects, mention should be made of the recent developments in the euro exchange rate, which appreciated against the US dollar by around 10 per cent, when comparing the figure for end-2000 with that considered in the assumptions made in the projection exercise. Should the euro appreciation be maintained or increased, the outlook for price developments would improve in the euro area countries, and obviously in Portugal.

The reduction of the international price of oil is also a favourable aspect, although its direct effect on consumer fuel prices in Portugal depends largely on the transmission resulting from the price-setting policy. In any case, the reduction of the oil price will nevertheless be reflected in a decrease in inflationary pressures on the Portuguese economy, both via lower corporate energy costs and lower inflation in other countries (and hence, by the lower growth of import prices).

With regard to the adverse aspect, it should be highlighted that the year-on-year inflation recorded in the last quarter of 2000 stood 0.1 p.p. above the assumptions implicit in the exercise. Thus, as a result of this base effect, inflation in 2001 — other things being equal — would be slightly higher than projected, partly counterbalancing the above-mentioned positive effects.

The main adverse risk to inflation projections is, however, linked to the wage settlement behaviour. In a context of inflation increases throughout 2000 and of prospects of moderation in the growth of activity, it would be extremely negative for the Portuguese economy if wages accelerated in 2001. In this respect, the wage increases settled for the government employees, of around 3.7 per cent, i.e. 1.2 p.p. higher than in the previous year, are a risk due to their signalling effect.

As referred to in section 3.2, despite the recent inflation increases in Portugal's major trading partners, wages in these countries have followed a rather moderate pattern, with modest increases in unit labour costs (see Table 2), which are expected to prevail throughout the projection horizon. On the contrary, in Portugal real compensation per employee has been growing clearly above productivity; thus it is essential to correct this trend without delay in 2001. Should this happen, a vital condition will be created to prevent the deterioration of Portuguese corporate competitiveness. In this case, the unavoidable and desirable adjustment of the Portuguese economy may be achieved with no significant costs in terms of activity growth and without a significant rise in the unemployment rate.

Completed in December 2000 on the basis of a projection exercise using data available up to the cut-off date of 10 November.

INFORMATION ON INFLATION EXPECTATIONS CONTAINED IN THE PRICES OF FINANCIAL ASSETS*

*Fátima Silva***
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The techniques to extract information on market expectations about future developments in variables relevant to the monetary policy, obtained from financial asset prices, have been studied and used by central banks in the past few years. In this article we try to summarise the techniques available to extract inflation expectations and the uncertainty associated with them, from information contained in the prices of financial assets. In particular, we focus our attention on the estimation of probability density functions of break-even inflation expectations.

1. INTRODUCTION

Financial asset prices reflect market participants' expectations as they are forward looking in nature. As is known, the current price of a financial asset equals the present value of the future expected asset payoff. Thus, when setting the price of a financial asset, investors create expectations about the future value of that asset and fix the discount rates — including the risk premia inherent in that investment — to be applied. In a liquid and efficient market, the price of an asset should reflect, in principle, both the market opinion and the discount rates determining that price. In turn, discount rates used for the setting of prices of financial assets are driven by two factors: the compensation for the decision to postpone consumption and for the uncertainty linked to the future stream payoffs.

As the prices of financial assets are permanently updated they reflect continuously revised expectations, including the most recent information available in the market. In addition to giving information on market expectations, prices of some financial assets, namely derivatives, may also provide relevant information on the degree of uncertainty attached by the market to future developments. For example, options on long-term government bonds may indicate the degree of uncertainty associated with future developments of the yield on those bonds. Assuming certain hypotheses, these assets may also provide information on the uncertainty associated with break-even inflation expectations.

Therefore, financial asset prices constitute a large source of information for central banks. The information given by them is important for monetary policy as it provides a means of confirming the assessment by the central bank itself of risks for price stability, thus contributing to determine the monetary policy response which is appropriate to offset those risks. Moreover, for the above mentioned reasons, obtaining inflation expectations in financial markets is a fundamental strategic central banking area, as the expectations about future developments of some macroeconomic variables affect economic agents' response to monetary policy decisions in the present.

* The views expressed in this article are those of the authors and not necessarily those of the *Banco de Portugal*.

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This article is organised as follows: section 2 analyses the methods to extract indicators of inflation expectations and section 3 focuses on the methods to extract the existing uncertainty indicators.

2. INDICATORS OF INFLATION EXPECTATIONS

The term structure of interest rates (or yield curve) is the relationship between the yield to maturity of default-free zero-coupon bonds(1) and their maturity.

A nominal interest rate or spot interest rate implied in a government bond may be decomposed into three components: (i) real interest rate expected, required by investors for holding the bond up to its maturity date; (ii) compensation for the inflation rate expected over the life of the bond; and (iii) compensation for the several risk premia involved (namely the liquidity risk premium and the inflation risk premium). Algebraically, for a zero-coupon security, which matures at moment $t+m$, this relationship, also called Fischer identity, may be written:

$$i_{t,m} = r_{t,m} + E_t(\pi_{t,m}) + \lambda_{t,m}, \qquad (2.1)$$

being $i_{t,m}$, the spot interest rate at moment t with maturity m, $r_{t,m}$ the real interest rate expected at t with a maturity m, $E_t(\pi_{t,m})$ the average inflation rate expected at t for the period from t to $t+m$ and $\lambda_{t,m}$ a measure of the premia inherent in the several risks involved in this investment for the same period.

Thus, the changes in the term structure have implicit changes in one or several of these components. In particular, the extraction of information on inflation expectations from the yield curve is a delicate exercise, given the several explanatory factors involved. Besides, the very-short-term end of the yield curve (up to two years) is very sensitive to changes or to expectations of a change in the central bank intervention rates and therefore this additional explanatory factor should be taken into consideration, together with other factors. The normal practice of extracting inflation expectations from yield curves has thus been to restrict the analysis to the longest end of the yield curve (over two years), assuming that, in these maturities, both real interest rates and risk premia involved are relatively stable.

2.1 Mishkin's approach

Since the term structure of interest rates contains information about future inflation, there must be therefore a way of quantifying the relationship between interest rates and inflation expectations. Mishkin (1990a and b, 1991), proposed a simple approach of estimating from an econometric perspective the relationship between interest rates and inflation expectations. In this analysis we assume that economic agents have rational expectations. Mishkin starts from Fischer identity without risk premium:

$$E_t(\pi_{t,m}) = i_{t,m} - r_{t,m}, \qquad (2.2)$$

And also:

$$\pi_{t,m} = E_t(\pi_{t,m}) + e_{t,m}, \qquad (2.3)$$

where $e_{t,m}$ are the prediction errors of the inflation rate. Given the fact that rational expectations are assumed, we have $E_t(e_{t,m}) = 0$.

From (2.2) and (2.3) we get, by substitution:

$$\pi_{t,m} = i_{t,m} - r_{t,m} + e_{t,m}. \qquad (2.4)$$

Considering two different maturities, m and n, we may analyse the information contained in the term structure of interest rates about the path of future inflation. From the equation (2.4) applied to each maturity we get, calculating the respective difference:

$$\pi_{t,m} - \pi_{t,n} = i_{t,m} - i_{t,n} - (r_{t,m} - r_{t,n}) + e_{t,m} - e_{t,n}, \qquad (2.5)$$

decomposing the average real interest rate into sample average plus deviation from the average, for both maturities, m and n, we get:

$$r_{t,m} = \bar{r}_m + u_{t,m}, \qquad (2.6)$$

$$r_{t,n} = \bar{r}_n + u_{t,n}. \qquad (2.7)$$

(1) A zero-coupon bond is an asset, which generates at maturity a previously fixed single financial flow.

Hence, we may rewrite equation (2.5) as an equation to predict the change in:

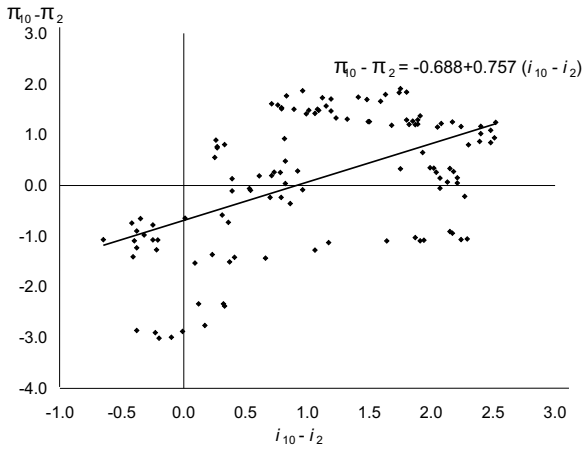
$$\pi_{t,m} - \pi_{t,n} = \alpha + \beta\left(i_{t,m} - i_{t,n}\right) + \eta_{t,m}, \qquad (2.8)$$

with $\alpha = \bar{r}_m - \bar{r}_n$ e $\eta_{t,m} = \left(e_{t,m} - e_{t,n}\right) - \left(u_{t,m} - u_{t,n}\right)$. Equation (2.8) may be estimated consistently through the method of the ordinary least square (OLS), provided that the hypothesis of rational expectations and a constant term structure of real interest rates occur. In this context hypothesis $\beta = 1$ may be tested.

The acceptance of hypothesis $\beta = 1$ indicates that the change in the spread of the nominal interest rate is a non-biased estimator for the change in the future inflation rate.

Chart 2.1 illustrates the relationship between the 10-2 year inflation differential(2) and the spread between 10-2 year interest rates in Germany for the period from January 1980 to December 1999 (monthly data). The relationship between the inflation spread and the interest rate spread is positive, which makes it possible to confirm that the term structure of interest rates contains information on future inflation expectations, albeit being skewed(3).

Chart 2.1
RELATIONSHIP BETWEEN THE SPREAD OF INTEREST RATES AND THE INFLATION RATE DIFFERENTIAL
10-2 years



2.2 Calculation of inflation expectations with index-linked bonds

A more robust method to extract inflation expectations from financial assets arose with the launching of the issuance of index-linked bonds in several countries. An index-linked bond is an asset whose coupon and/or principal payments are linked to a price index, providing its holder with a guaranteed real yield. This type of bonds differs from conventional bonds, which guarantee to their holders a previously defined nominal yield. However, similarly to conventional bonds and considering that in developed countries the risk of government bankruptcy is negligible, the value of this asset in practice does not depend on the credibility of the issuer.

Several countries issued inflation-indexed bonds(4). In the euro area, only the French Treasury issues index-linked government bonds. The first issue of inflation-indexed bonds in France (Obligation Assimilable du Trésor Indexée (OATI)) took place in September 1998. Currently, index-linked bonds mature in 2009 and 2029, with an annual coupon of 3 and 3.4 per cent respectively. The payment of the coupons and of the redemption of the OATI is linked to the French Consumer Price Index, excluding tobacco. The indexation lag is of 3 months at the most, therefore being considered negligible.

Suppose that $PR_{t,m}$ is the price of an OATI with maturity *m*. We admit that this index-linked bond pays in real terms a fixed coupon *CR* in each moment $\left(t + s_j, j = 1, \ldots, J\right)$ and with $s_J = m$(5) . At the maturity date, the holder of the bond will be paid by the amount, also in real terms, of MR.

The payment at moment $\left(t + s_j\right)$, in real terms, of the coupon *CR* means that the holder of the bond will receive $\left(1 + \pi_{t,t+s_j}\right)^{s_j}$ where $CR\ \pi_{t,t+s_j}$ is the average annual inflation rate at period *t* to $t + s_j$.

(2) The inflation differential $\pi_{10} - \pi_2$ was calculated by the difference between the average inflation rate recorded in the ten subsequent years and the average inflation in the two subsequent years. For example, for December 1989 the inflation differential corresponds to the average inflation recorded between December 1989 and December 1999 less the average inflation recorded between December 1989 and December 1991.

(3) One-off estimate of 0.757 with standard deviation of 0.12.

(4) For a more detailed analysis, see Deacon and Derry (1998).

(5) Given the fact that we are considering the year as a time unit, we have $s_j = s_{j-1} + 1 \left(j = 1,2,\ldots,J\right)$.

Similarly, a real redemption of MR at the maturity date of the bond means that the holder will receive by that time $\left(1+\pi_{t,t+m}\right)^{m} MR$. The Yield-To-Maturity Real (YTMR) rate is the rate which makes it possible to equalise the market price of the index-linked bond to the expected future cash-flows, in real terms, generated by it:

$$PR_{t,m} = \sum_{j=1}^{J} \frac{CR}{(1+YTMR)^{s_j}} + \frac{MR}{(1+YTMR)^{m}} \quad (2.9)$$

or, equivalently in terms of nominal cash-flows:

$$PR_{t,m} = \sum_{j=1}^{J} \frac{\left(1+\pi_{t,t+s_j}\right)^{s_j} CR}{\left(1+\pi_{t,t+s_j}\right)^{s_j} (1+YTMR)^{s_j}} + \quad (1.10)$$

$$+ \frac{\left(1+\pi_{t,t+m}\right)^{m} MR}{\left(1+\pi_{t,t+m}\right)^{m} (1+YTMR)^{m}}$$

Thus, the appreciation of OATIs does not need any hypothesis on inflation expectations at the maturity date of the bond.

The non-existence of a similar type of instrument in the euro area led to the frequent use of inflation expectations derived from OATIs as a proxy for inflation expectations in the long run for the euro area as a whole[6].

2.2.1 Methodologies for the calculation of the break-even inflation rate[7] for the euro area

The simultaneous issue of inflation-indexed securities, guaranteeing to their holders a defined real yield, and of securities guaranteeing a defined nominal yield, for the same maturity, enabled the development of methodologies for extracting inflation expectations from the prices of these instruments.

In the French case, a simple method of extracting inflation expectations from index-linked bonds consists in the direct application of the Fischer identity without risk premium. The average inflation expectation in the period is thus calculated as the difference between the nominal Yield-To-Maturity (YTM) of a conventional bond and the real YTM implied in an index-linked bond, issued for the same maturity and by the same issuer, in this case the French government. Implicitly we assume that investors are risk neutral, i.e., for investors it is indifferent to hold in their portfolios index-linked bonds or conventional bonds. This implies that, in the absence of arbitrage opportunities, the nominal yield guaranteed by an index-linked bond equals the nominal yield of a conventional bond. This equality enables the substitution of the nominal YTM of the index-linked bond by the YTM of a conventional bond. It should be stressed that the inflation expectation thus obtained is an average inflation expectation in the period from the present to the maturity date of the securities taken into consideration.

For example, subtracting the real YTM of an index-linked bond with the same residual maturity from the nominal YTM of a conventional bond with a five-year residual maturity, we get an average inflation expectation in the 5-year period up to the maturity date of both bonds.

2.2.2 Limitations to the use of index-linked bonds

The difference between the real and the nominal YTM may reveal the change in inflation expectations over time. However, this is a skewed indicator of the average level of inflation expected in a given period. This results basically from two sets of factors: first, the two types of bonds (index-linked and conventional) do not have the same type of characteristics, viz. time to maturity, structure of cash flows and degree of liquidity. Second, an inflation risk premium is inherent in nominal bonds; in principle, this type of risk premium does not exist in index-linked bonds.

With regard to the first set of factors, the problem arises from the fact that the average inflation expectation in a given period — being derived from only two securities — is very sensitive to the securities taken into consideration in this calculation. On the one hand, it is difficult to find two bonds, one of them index-linked to inflation and the other one nominal, with the same residual maturity. On the other hand, even if the two bonds have the same residual maturity, they can give rise

(6) It should be noted that the break-even inflation rate implied in these bonds is derived from the French CPI and not from the Harmonised Index of Consumer Prices (HICP), which is used by the Eurosystem in its definition of price stability. However, the difference is not relevant in practical terms.

(7) Break-even inflation is a measure of inflation expectations extracted from index-linked bonds.

to a different cash flow structure[8]. An alternative way would be to calculate the average inflation expectation in the period from two securities with the same "duration"[9]. However, according to Deacon *et al.* (1994), this alternative would create difficulties, due to the fact that average inflation expectations thus obtained mask the residual maturities of the securities used for their calculation.

In addition to these factors, it should also be noted that index-linked bonds show a lower degree of liquidity than conventional bonds. This leads investors to demand a higher liquidity premium in order to hold index-linked bonds in their portfolios. As a result, real YTM is probably overestimated while the break-even inflation expectation is underestimated.

With regard to the second set of factors, the problem results from the fact that the conventional bond is still subject to inflation risk. Hence, the Fischer identity should include a measure of the inflation risk premium. We conclude that when the liquidity premium is not taken into consideration, break-even inflation rates may be underestimated, while they may be overestimated when the inflation premium is not taken into consideration.

The fact that the inflation premium is not considered in the calculation of expectations regarding break-even inflation is probably the major limitation of the methodology described above. For example, Remolona *et al.* (1998) — combining information on the real and the nominal yield curve — estimated for the United Kingdom from July 1982 to July 1997 inflation expectations, inflation risk premium, real interest rate and risk premium related to real factors. In this work, the real discount factor (price kernel) is a linear function of a real factor, while the nominal discount factor is a linear function of two factors, one of them identified with inflation and the other one identified with the real factor. For that period, the average inflation risk premium for the 2-year maturity was around 100 basis points, having declined to 70 basis points after the pound sterling left the European Monetary System. In sum, this work showed that, for the English case, the break-even inflation rate obtained by the direct application of the Fischer identity without risk premium overestimates average inflation expectations for the period. This type of research cannot be applied to the French case, due to the fact that only 10 and 30-year maturity bonds were issued.

2.2.3 An indicator of inflation expectations for the euro area

Given the difficulty in estimating adequately liquidity and inflation risk premia, average inflation expectations for the euro area implied in the prices of index-linked and conventional government bonds will be estimated below, assuming that the balance of these premia is relatively low in the euro area. This exercise is obviously interesting for the monetary policy, as it makes it possible for monetary authorities to calculate, at a very high frequency (daily), an indicator of economic agents' expectations about the future inflation rate[10].

Chart 2.2 illustrates the daily evolution of the 10-year nominal YTM[11] in France, as well as the evolution of its two components: the real YTM and the break-even inflation rate, for the period from January 1999 to August 2000. As mentioned above, since index-linked government bonds exist only in France, the average inflation expectation obtained from OATIs is frequently used as a proxy for inflation in the long run for the euro area as a whole.

Considering the period as a whole, the upward trend of the nominal YTM in the euro area becomes apparent. However, the contribution of each component to this upward trend is not symmetrical. The growth of the nominal YTM in the first half of 1999 was mainly due to the increase in

(8) For example, a nominal bond with a 10-year maturity, which has a semi-annual coupon payment of 6.5 per cent and a principal payment of 100 m.u., will give rise to a semi-annual coupon payment of 3.25 m.u. In the case of an index-linked bond with a real interest rate of 4.25 per cent and assuming an inflation rate of 3 per cent, the coupon received varies between 2.13 and 2.82 m.u. and the equivalent payment will be of 134 m.u. In real terms, the value of the coupons of an index-linked bond will be constant (equal to 2.13 m.u.), while a conventional bond will give rise to settlements, which decline due to the erosion effect caused by inflation.

(9) "Duration" of a bond is defined as the average time the investor must wait to obtain the redemption of the principal invested, in which the average is calculated weighting the periods by the amounts to be received in those periods.

(10) It should be recalled that surveys on consumer prices are an alternative method of extracting inflation expectations.

(11) Nominal and real interest rates used as from this point correspond to YTMs implied in the prices of the respective bonds.

Chart 2.2
NOMINAL AND REAL YTM AND 10-YEAR BREAK-EVEN INFLATION RATE IN FRANCE
Proxy for the euro area

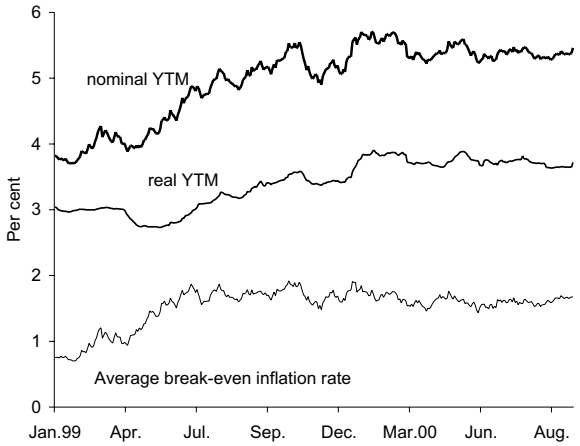
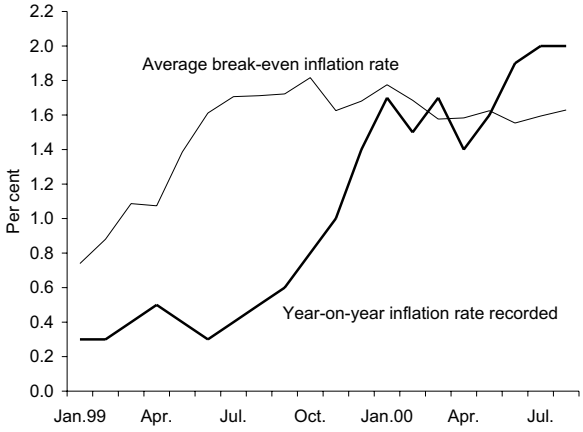


Chart 2.3
INFLATION RATE RECORDED AND BREAK-EVEN INFLATION RATE
Proxy for the euro area



the break-even inflation rate, the real YTM having declined slightly. In the second half of 1999 the trend was reversed. The real YTM started an upward trend up to the first quarter of 2000, while the break-even inflation rate remained relatively stable, or even with a slightly downward trend. In the past few months (approximately since early 2000), the nominal YTM has not evinced a clear trend, due to the fact that neither the real interest rate expectation nor the break-even inflation rate have recorded significant changes.

Despite the short sample period available, the break-even inflation rate implied in index-linked bonds, which represents an average expectation for a ten-year period, seems to have the properties of a "leading indicator" for the current year-on-year inflation rate. Chart 2.3 compares the evolution in the past two years of the year-on-year inflation rate in France with inflation expectations implied in French index-linked bonds. Indeed, it can be seen that the latter anticipated relatively in advance the recent rise in the inflation rate.

3. INDICATORS OF UNCERTAINTY

As referred to in section 2, the prices of financial assets provide information on the future path expected by investors for certain macroeconomic variables, namely the levels of economic activity and inflation. In particular, the analysis over time of nominal interest rates evinces how economic agents revise their expectations about future levels for these variables. However, prices of financial assets only make it possible to infer the average level expected for the level of macroeconomic variables and do not provide information on the degree of uncertainty attached to these expectations by the market. In mathematical terms, the degree of uncertainty associated with a random variable is measured by the moments of order above one, namely the second, the third and the fourth moments[12]. Since economic conditions change over time, the uncertainty assessed by the market regarding future inflation and economic activity is also likely to change. Besides, investors are expected, under certain circumstances, to attach to different scenarios different probabilities, which may give rise to multimodal or asymmetric distribution of probabilities implied for the different prices in the future. Under these circumstances, the calculation of uncertainty indicators is particularly indicative of the overall market sentiment. Due to their prospective characteristics in relation to the price of the underlying asset, derivatives prices intrinsically contain information related to different

(12) The second centred moment of a random variable defines the degree of dispersion of the observations around the average, the third moment defines the skewness and the fourth moment the kurtosis.

aspects of uncertainty. For example, options on long-term government bonds may be useful to gauge the degree of uncertainty associated with future developments in the yields of these bonds.

If the yield of a long-term bond may be decomposed in ex ante real interest rate, average inflation expectations up to the maturity date and a component related to several risk premia, any measure of uncertainty extracted from the option prices on bonds must also reflect the uncertainty attached to these components. However, there is no consensus on the way in which uncertainty related to inflation expectations can be separated from uncertainty associated with the path of the real interest rate or the risk premia. The fact that expectations about these components affect the pricing of derivatives of long-term bonds therefore requires the assumption of certain simplifying hypotheses in relation to these factors, with a view to extracting and interpreting prospective information.

3.1 Main concepts

Financial derivatives prices (forward, futures and options contracts) reflect economic agents' expectations about future price developments in underlying assets. However, while forward and futures contracts only provide information on the expected value of the prices of underlying assets, options premia allow for the estimation of the probability attached by the market to the various possible prices of underlying assets.

Thus, options prices contain relevant information for financial institutions and the private sector in general. This information is also potentially useful for monetary authorities, namely for constructing uncertainty indicators, assessing the impact of monetary policy measures and to help to identify anomalies in the operation of financial markets. All these issues have been increasingly focused in the literature.

In order to derivate an uncertainty indicator associated with a financial asset, account is taken of the valuation in period t of a European call option[13] with exercise date T. In a world of risk-neutral agents, the price of an option (premium) is obtained by calculating its expected return, discounted at the risk-free interest rate, in relation to the risk-neutral probability measure. If S_T is the price of the underlying asset at time T, and X the strike price of the European option, the price of a call option at t is given by:

$$C(X) = e^{-i_{t,\tau}\tau} \int_0^{\infty} \max[S_T - X, 0] q_t(S_T) dS_T, \quad (3.1)$$

where $\tau = T - t$ and $q(S_T)$ is the risk-neutral probability density function (PDF) of the price of asset S_T, conditional on the current asset price. Differentiating (3.1) with respect to the strike price gives:

$$\frac{\partial C}{\partial X} = -e^{-i_{t,\tau}\tau} \left(1 - \int_{-\infty}^{X} q(S_T) dS_T \right), \quad (3.2)$$

that is:

$$1 + \frac{\partial C}{\partial X} e^{i_{t,\tau}\tau} = P_Q[S_T \leq X]. \quad (3.3)$$

Thus, the distribution function of the future price of the underlying asset is obtained. The risk-neutral probability density function is derived through the differentiation of (3.2) with respect to the strike price:

$$q(X) = e^{i_{t,\tau}\tau} \frac{\partial^2 C(X)}{\partial X^2}. \quad (3.4)$$

This PDF is the uncertainty measure associated with a given future average expectation. The various estimation methods for this function are explained below.

(13) An option gives the holder the right, but not the obligation, to conduct a specific financial transaction at a certain future date, at a predetermined price, against the payment of a premium to the seller of an option (a call option gives the right to buy, while a put option gives the right to sell). The predetermined price for the future transaction is known as the exercise price or strike price and the date at which or up to which an option can be exercised is known as the maturity date or exercise date. European options can only be exercised at expiration, while American options can be exercised at any time up to and including the maturity date. An option has a number of designations according to its results. Thus, it is said to be in-the-money when after being immediately exercised a profit is implied for its holder. Conversely, when after being immediately exercised a loss is implied for its holder, this option is said to be out-of-the-money. If the exercise of an option contract does not imply a gain or a loss to the holder, this option is said to be at-the-money.

3.2 Techniques to extract PDFs through prices of options on interest rates

The methods to extract PDFs from the premia of options on financial assets can be grouped into four approaches. In the first approach, the PDF is nonparametrically estimated, that is with no functional restrictions on the stochastic process that governs the underlying financial asset, the call pricing function, the implied volatility or the PDF.

In the second approach, a functional form of the PDF or of the stochastic process followed by the underlying asset is specified. Should the latter be chosen, it is necessary to derive the PDF implied in this stochastic process. The parameters of the PDF, whether it has been derived or directly specified, are estimated by minimising the distance between the observed premia and the theoretical premia that are generated by the functional form assumed.

In the third approach, a specific density considered liable of being a PDF is estimated in a first phase, usually starting by a simple density function. The PDF is subsequently re-estimated as the density, which fulfils two conditions simultaneously: (i) it minimises the distance between the density estimated in the first phase and (ii) it minimises the distance from the observed premia.

In the fourth approach the PDF is derived directly from some parametric specification of the call pricing function (or the put pricing function) or of the volatility implied in options.

Following the proposals of academic literature, the empirical studies developed have frequently chosen the second approach, specifying the stochastic process followed by the underlying asset and inducing the respective PDF implied in this stochastic process. The PDF parameters are estimated by minimising the distance between the observed options premia and the theoretical premia (directly or indirectly) generated by the functional form specified for the PDF.

The most commonly used functional form for the PDF is the mixture of several lognormal distributions[14]. In the case of a European option and of a mixture of two distributions, we have the following optimisation problem:

$$\underset{\mu_1,\mu_2,\sigma_1,\sigma_2,\theta}{Min} \sum_{j=1}^{N}\left[\hat{C}\left(X_j,\tau\right)-C_j^0\right]^2+\sum_{j=1}^{N}\left[\hat{P}\left(X_j,\tau\right)-P_j^0\right]^2+$$

$$+\lambda\left[\theta e^{\mu_1+\frac{1}{2}\sigma_1}+(1-\theta)e^{\mu_2+\frac{1}{2}\sigma_2}-e^{-i_{t,\tau}\tau}S_T\right]^2 \tag{3.5}$$

where:

- $$\hat{C}\left(X_j,\tau\right)=e^{-i_{t,\tau}\tau}\int_{X_j}^{\infty}\left(\theta q(\mu_1,\sigma_1;S_T)+(1-\theta)q(\mu_2,\sigma_2;S_T)\right)\left(S_T-X_j\right)dS_T,\qquad (j=1,2), \tag{3.6}$$

- $$\hat{P}\left(X_j,\tau\right)=e^{-i_{t,\tau}\tau}\int_{X_j}^{\infty}\left(\theta q(\mu_1,\sigma_1;S_T)+(1-\theta)q(\mu_2,\sigma_2;S_T)\right)\left(X_j-S_T\right)dS_T, \tag{3.7}$$

  - λ is a penalty coefficient,
  - N is the number of premia observed for call and put options,
  - $\hat{C}\left(X_j,\tau\right)$ and $\hat{P}\left(X_j,\tau\right)$ are the theoretical premia of call and put options for the different strike prices X_j and a given maturity τ,
  - C_j^0 and P_j^0 are the premia observed for these strike prices of the call and put options,
  - $$q\left(\mu_j,\sigma_j,S_T\right)=\frac{1}{S_T\sqrt{\sigma_j 2\pi}}.e^{-\frac{\left(\ln S_T-\mu_j\right)^2}{2\sigma_j}}, \tag{3.8}$$

that is, $q\left(\mu_j,\sigma_j,S_T\right)$ is the lognormal density function for call and put options premia, where the parameters μ_1 and μ_2 are the means of the normal corresponding distributions and σ_1 and σ_2 the respective variances and finally,

- θ and $(1-\theta)$ are the weight attached to each distribution.

The first two segments of the objective function are the sum of the squared deviations between the observed premia and the estimated premia of call options and put options. The last segment of the objective function reflects the squared difference between the estimated mean of the distribution and the future price. From the theoretical point of view, the distribution mean should equal the future price, whereby $\lambda>0$ reflects the penalty coefficient for the distance between the two measures. Where $\lambda=0$ the penalty is nil, while where λ is

(14) See, for instance, Bahra (1997), Melick and Thomas (1997) and Söderlind and Svensson (1997).

very large ($\lambda \to \infty$) this will be equivalent to considering a conditioned optimisation problem with an equality restriction between the distribution mean and the future price.

When fixing a value for λ, whenever there is a sufficiently large number of call and put prices with the same time-to-maturity, simultaneously observed but with different strike prices, the parameters of equation (3.8), as well as θ (where $\lambda > 0$), can be determined by the minimisation of expression (3.5). In line with the current practice in other central banks, namely the Bank of England and Banca d'Italia, the specification considered by *Banco de Portugal* is a mixture of two lognormal distributions(15) and the penalty parameter was fixed at 1.

An American-style option gives the holder the right to exercise it at any time up to and including the maturity date. Thus, the theoretical premia of call and put options are functions consisting of two bounds: a lower and an upper bound. The lower bound is equal to the value of the European-style option, i.e. in case the American-style option is only exercised at the maturity date. The upper bound is equal to the value of the European-style option if the maturity corresponds to the present moment, i.e. the sum that its holder receives for having exercised his option immediately. Equations (3.6) and (3.7) are substituted by:

$$\hat{C}\left(X_j,\tau\right) = w_h C^S\left(X_j,\tau\right) + \left(1-w_h\right)C^i\left(X_j,\tau\right)$$

$$C^S\left(X_j,\tau\right) = \max\left(e^{-i_{t,\tau}\tau}S_T - X_j, \int_{X_j}^{\infty}\left(\theta q\left(\mu_1,\sigma_1;S_T\right) + \right.\right.$$
$$\left.\left. + (1-\theta)q\left(\mu_2,\sigma_2;S_T\right)\right)\left(S_T - X_j\right)dS_T\right) \qquad (3.9)$$

$$C^i\left(X_j,\tau\right) = \max\left(e^{-i_{t,\tau}\tau}S_T - X_j, e^{-i_{t,\tau}\tau}\int_{X_j}^{\infty}\left(\theta q\left(\mu_1,\sigma_1;S_T\right) + \right.\right.$$
$$\left.\left. + (1-\theta)q\left(\mu_2,\sigma_2;S_T\right)\right)\left(S_T - X_j\right)dS_T\right)$$

$$\hat{P}\left(X_j,\tau\right) = w_h P^s\left(X_j,\tau\right) + \left(1-w_h\right)P^i\left(X_j,\tau\right)$$

$$P^s\left(X_j,\tau\right) = \max\left(X_t - e^{-i_{t,\tau}\tau}S_T, \int_{X_j}^{\infty}\left(\theta q\left(\mu_1,\sigma_1;S_T\right) + \right.\right.$$
$$\left.\left. + (1-\theta)q\left(\mu_2,\sigma_2;S_T\right)\right)\left(X_j - S_T\right)dS_T\right)$$
$$P^i\left(X_j,\tau\right) = \max\left(X_j - e^{-i_{t,\tau}\tau}S_T, e^{-i_{t,\tau}\tau}\int_{X_j}^{\infty}\left(\theta q\left(\mu_1,\sigma_1;S_T\right) + \right.\right. \qquad (3.10)$$
$$\left.\left. + (1-\theta)q\left(\mu_2,\sigma_2;S_T\right)\right)\left(X_j - S_T\right)ds_T\right)$$

$$h = \begin{cases} 1 \text{ if the option is} \quad \text{in-the-money} \\ 2 \text{ if the option is out-of-the-money} \end{cases}$$

In the next section PDFs are derived for the euro area long-term bond yields. Since options on euro area forward interest rates are of the American style, the expressions used were (3.9) and (3.10).

3.3 Derivation of PDFs for the euro area long-term bond yields

Chart 3.1 shows two PDFs of the euro area long-term bond yields. The proxy for this rate is the 10-year German government bond yields. Given that the options and futures contracts with the highest degree of liquidity in the euro area are the German Bund contracts(16), these should, in principle, reflect investors' expectations about the level of the euro area long-term bond yields.(17) The sample dates are 19 June and 22 June 2000.

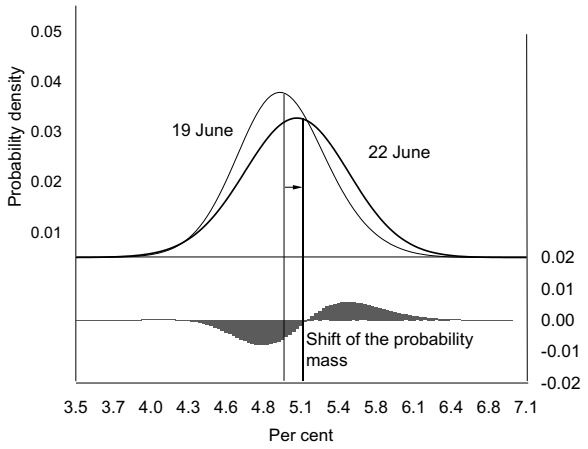
(15) In Adão, Cassola and Luís (1998) it was concluded that the estimation of the density functions through the combination of two lognormal distributions has several advantages compared to the alternative methods, given that it allows for PDFs that are simultaneously flexible — asymmetric density functions, exhibiting skewness and/or multimodal functions — and consistent with the empirical data observed.

(16) Derivatives contracts on German (Bund) government bonds are traded on the EUREX derivatives exchange. The underlying asset of the options is a futures contract traded on this market. In turn, the underlying asset of the futures contract is a long-term public debt instrument issued by the German Federal Government, with a residual maturity of between 8.5 and 10.5 years and an annual coupon of 6 per cent. Options on Bund futures are of the American style, and can be exercised at any time up to and including the maturity date. Maturities coincide with the months when the underlying futures contract matures, which include the March, June, September and December cycle. The last trading day of the contract is the 10th business day of the month in which the contract matures.

(17) PDFs were originally estimated for the German long-term bond prices and not for interest rates. The bond prices thus obtained were converted into interest rates by using the bond with the cheapest delivery on the estimation day (i.e. when the options prices are observed). The PDF associated with the bond prices was transformed into the PDF associated with interest rates by using the first derivative of the price with respect to the interest rate, according to the normal formula of the change of the variable.

Chart 3.1

PDF FOR DECEMBER 2000 OF THE EURO AREA 10-YEAR INTEREST RATE ON 19 AND 22 JUNE 2000



The aim is to analyse the impact of the decision of the Organisation of Petroleum Exporting Countries (OPEC) of 21 June to increase crude oil production, in order to contain the rise of the oil price recorded in the previous months.

The probability density functions estimated for 19 June and 22 June show that the investors' reaction to the shock was significant, albeit contrary to expectations. In fact, the probability mass shifted strongly to the right, mirroring an upward (not downward) revision by investors of their expectations regarding the level of 10-year interest rate which will prevail in the euro area in December. The most probable value for the 10-year interest rate at the end of the year (measured by the distribution mode) increased by around 14 b.p., moving from 4.97 per cent on 19 June to 5.11 per cent on 22 June (Table 3.1). The upward revision of expectations was accompanied by an increased uncertainty, confirmed by a longer PDF on 29 June. PDFs are positively skewed on both 19 and 22 of June, i.e. investors attached a higher probability to the forward interest rate in December 2000, being higher than the distribution mode and not the opposite.

3.4 Extracting PDFs for inflation expectations

The measure of the degree of uncertainty associated with the 10-year interest rate will be, however, more elucidative, if it can be broken down into its various components, viz. the uncertainty about the real interest rate, the inflation rate expectations and the risk premium. This paper builds on the possibility of extracting uncertainty indicators associated with inflation expectations through a methodology similar to that suggested in Söderlind and Svensson (1997).

Table 3.1

STATISTICS ON EXPECTATIONS ABOUT THE 10-YEAR INTEREST RATE

December 2000 horizon

Per cent

	19 June 2000	22 June 2000
Mean	5.01	5.11
Mode	4.97	5.11
Median	5.00	5.11
Standard deviation	0.37	0.42

If there were n prices of options on real and nominal interest rates, with maturity T, these prices could be used, under certain assumptions, to extract the implied risk-neutral probability density functions for the future inflation expectations. If there are no derivatives on future inflation expectations or on real interest rates, assumptions can nevertheless be made on the manner in which investors would define their expectations, should they exist.

Consider the Fisher identity, with reference not to the present time t, but to the maturity time of the options, T:

$$i_{T,m} = r_{T,m} + E_T\left(\pi_{T,m}\right) + \lambda_{T,m}, \qquad (3.11)$$

where $i_{T,m}$ is the nominal interest rate at T for the maturity m (the maturity of the bond implied in the option, which will be $T+m$), $r_{T,m}$ the real interest rate at T expected in the period between T and $T+m$, $E_T\left(\pi_{T,m}\right)$ the inflation rate expected at T for the same period and $\lambda_{T,m}$ a measure of the premia associated with the various risks involved in this investment.

The extent of the risk premium $\lambda_{T,m}$ (which represents the consolidated effect of the liquidity and inflation premium) is assumed to be minor. Even if it is not, it is not admitted to have significant

variability over time $(\Delta\lambda_{T,m} \approx 0)$, whereby the compared analysis for different moments in time remains valid. Under this hypothesis, the nominal interest rate is decomposed in two components: the real interest rate and the future inflation expectation, i.e.: $i_{T,m} = r_{T,m} + E_T(\pi_{T,m})$.

If the real interest rate and the inflation expectations were two independent variables, then inflation expectations could be extracted from information on nominal and real interest rates. The hypothesis of a nil conditional covariance between the two variables is equivalent to considering that the conditional variance of *r* and the conditional covariance between *i* and *r* are statistically equal. Both variables had a similar behaviour in the sample considered (the last 100 observations), and the difference between them does not seem to be significant.

Admitting that:

$$r_{T,m} \sim N(r_{t,m}, \sigma_{t,\tau}), \qquad (3.12)$$

where $r_{t,m}$ is the real rate recorded at the present moment *t* and $\sigma_{t,\tau}$ the variance of $r_{T,m}$, conditional on the information available in *t*. Considering also that the PDF of the nominal interest rate is the result of the combination of two normal distributions:

$$i \sim \theta . N(\mu_{1i}, \sigma_{1i}) + (1-\theta) . N(\mu_{2i}, \sigma_{2i}). \qquad (3.13)$$

Then, under the hypothesis that the real interest rate and inflation expectations are independent from each other, the PDF of inflation expectations is also the result of the linear combination of two normal distributions:

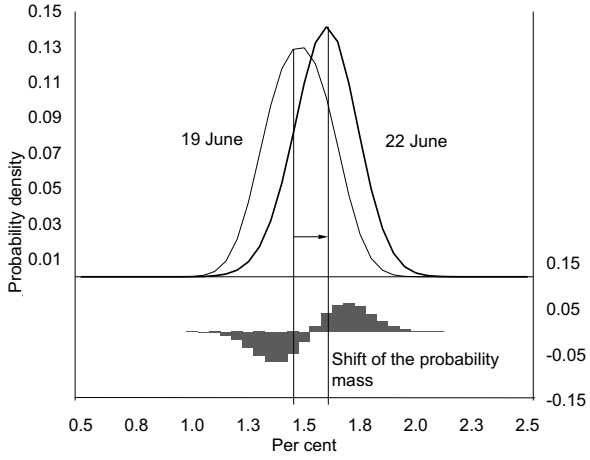
$$E_T(\pi_{T,m}) \sim \theta . N(\mu_{1i} - r_{t,m}, \sigma_{1i} - \sigma_{t,\tau}) + \\ +(1-\theta) . N(\mu_{2i} - r_{t,m}, \sigma_{2i} - \sigma_{t,\tau}). \qquad (3.14)$$

Note that (3.14) sets up a model for the first moment of the probability distribution of the future inflation $E_T(\pi_{T,m})$ implied in the behaviour of financial markets. It is not therefore a model for the distribution of the inflation rate $\pi_{T,m}$ itself. The equation (3.14) is relevant since it is reasonable to admit that there is a close relationship between the PDF of the inflation expectation and the PDF of inflation in the full sense.

Chart 3.2

ESTIMATES ON 19 AND 22 JUNE 2000 OF THE PDF OF INFLATION EXPECTATIONS IN 2000

Probability density



In practice, the construction of the PDF of euro area inflation expectations assumes that the Bund bond yield is a proxy for the euro area nominal interest rate and that the French index-linked bond yield is a proxy for the euro area real interest rate. Thus, the probability distribution of the nominal interest rate was obtained through Bund options, according to the explanations of the previous section. In turn, the parameters of the distribution of the real interest rate were obtained from historical data on the real interest rate implied in French index-linked bonds. In order to avoid comparability problems arising from changes in the spread between French and German long rates, the observed values of real rates were previously adjusted by adding to them the spread between French and German nominal rates.

Chart 3.2 shows the forecasts made before (19 June) and after (22 June) the OPEC meeting with regard to the PDF of the expectations in December 2000 about the average euro area inflation rate for the period from 2001 to 2010. Currently, the aim is to analyse to what extent the change in the uncertainty linked with the expectations for the 10-year nominal interest rate was due to a change in the uncertainty linked with inflation expectations in that period.

The change in the estimates of the PDF of inflation expectations shows that the investors' response to the shock was significant, albeit contrary

Table 3.2

STATISTICS ON INFLATION EXPECTATIONS

December 2000 horizon

Per cent

	19 June 2000	22 June 2000
Mean	1.48	1.59
Mode	1.50	1.60
Median	1.50	1.60
Standard deviation	0.14	0.14

to expectations. The probability mass of the PDFs of inflation expectations shifted to the right, i.e. investors revised their inflation expectations upwards. The most probable value for the average inflation rate expected for the ten-year period starting in January 2001 (measured by the distribution mode) increased by around 10 b.p., moving from 1.50 per cent on 19 June to 1.60 per cent on 22 June (Table 3.2).

When comparing the data from Table 3.1 with those from Table 3.2, the 14 b.p. revision of the most probable value for the euro area 10-year nominal interest rate in December 2000 can be explained by the 10 b.p. revision of inflation expectations. In sum, the analysis of the PDF of inflation expectations confirms the analysis made in the previous section, i.e. the OPEC countries' decision on 21 June was not considered to be sufficient to reverse the upward trend of the oil price, and therefore it did not have the desired impact on financial markets.

4. CONCLUSION

This paper summarises the most recent theoretical and applied research on the manner in which government bond prices and their derivatives can be used to extract information on the market expectations regarding future inflation. The contribution from index-linked bonds to the construction of inflation expectation indicators was noticeable. In the second part of this paper probability density functions of "implied inflation expectations" were derived. The preliminary results obtained, despite the fragility of their simplifying hypotheses, are encouraging.

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IS SELF-EMPLOYMENT A RESPONSE TO LABOUR MARKET RIGIDITY?*

*Mário Centeno***

1. INTRODUCTION

Over recent years self-employment has received a great deal of attention, both from academic researchers and policy makers. This is in part explained by the growth of the proportion of workers who are self-employed observed in several countries in the last decade, notably Germany, Canada, New Zealand, Netherlands, Portugal, and Sweden (see Tables 1 and 2).

A set of overlapping reasons has been put forward for this recent growth in the self-employment share. Traditionally, economists relate self-employment growth with the deterioration of labour market conditions. However, more recently, researchers have been stressing out other reasons such as: the market reaction to overly rigid labour and product markets and the high level of taxation; changes in industrial organisation; the availability of new employment opportunities in OECD economies; and special policies directed to foster self-employment entry (see Manser and Picot (1999) and OECD (2000) for a detailed analysis of recent self-employment growth)(1).

This paper explores the role of non-agricultural self-employment as a close alternative to paid-employment, and as the response to labour market policies that affect the opportunity cost of entering and remaining self-employed, such as employment protection legislation and compulsory contributions to the social security system made by the self-employed(2).

This paper is the first attempt to shed some light on the interaction of labour market rigidity with variables capturing the cost of being self-employed, when evaluating the role of self-employment in highly regulated labour markets. Using panel data evidence from a set of OECD countries, I inquire whether different policy variables affecting both demand and supply for self-employment matches can explain the recent evolution of the employment structure in these countries.

My results indicate that the finding of a positive relationship between labour market rigidity and the share of self-employment is sensitive to the inclusion of more variables capturing the costs of entering (and remaining in) self-employment. Proxying these costs with the ratio of social security contributions per self-employed to the nominal GDP *per capita*, I find a non-linear relationship between flexibility and self-employment share.

The main result is that higher social security contributions by the self-employed reduce the ability of labour market rigidity to explain self-employment. Therefore, the role of self-employ-

* The views expressed in this article are those of the author and not necessarily those of the *Banco de Portugal*.

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(1) Previous studies on self-employment have stressed the sociological and psychological characteristics of the self-employed and investigated its role in providing jobs for the unemployed, most papers analysing the relationship between unemployment and self-employment rates. These studies include both micro and aggregate level analyses such as those by Evans and Leighton (1989), Blanchflower and Meyer (1992), Meager (1992), and, more recently, Borjas (1999), Carrasco (1999), and Blanchflower (2000).

(2) In some countries there has been the concern that taxation systems and other labour market policies might have encouraged the development of ''false'' self-employment. This kind of employment arrangement is characterised by working conditions very similar to those in paid-employment, but workers declare themselves as self-employed simply to reduce tax liabilities or employers responsibilities.

Table 1

SHARE OF NON-AGRICULTURAL SELF-EMPLOYMENT ON CIVILIAN EMPLOYMENT

1984 -1998

Per cent

	1984	1989	1994	1996	1997	1998
Germany	7.55	7.77	8.46	8.99	9.25	9.36
Australia	12.45	12.87	12.54	11.82	12.87	11.79
Austria	7.92	6.57	6.63	6.89	7.05	7.37
Belgium	12.46	12.89	13.90	14.12	14.12	13.90
Canada	7.39	7.19	9.05	9.54	10.13	n.a.
Denmark	7.64	6.90	6.76	7.11	6.71	6.95
Spain	17.95	17.58	18.69	18.49	18.12	17.61
United States	7.63	7.51	7.50	7.25	7.16	6.97
Finland	6.87	8.65	9.90	10.26	10.00	10.00
France	10.50	10.47	8.80	8.51	8.58	8.17
Greece	27.26	27.18	28.03	27.48	27.00	n.a.
Ireland	11.45	12.92	13.57	12.82	12.93	13.40
Italy	21.38	22.39	22.29	22.97	22.74	22.74
Japan	13.00	12.04	10.08	9.69	9.69	9.66
Norway	6.79	6.38	6.12	5.46	5.39	5.35
New Zealand	13.89	14.65	15.81	15.72	15.70	16.86
Netherlands	8.68	7.75	9.36	9.77	9.99	9.68
Portugal	16.90	16.43	19.18	19.84	19.13	n.a.
United Kingdom	10.22	12.37	11.99	11.75	11.71	11.40
Sweden	4.66	7.06	8.97	9.12	9.05	9.00
Switzerland	10.18	10.02	9.72	9.65	9.66	9.65

Source: OECD Employment Outlook (2000).
n.a.: Data not available.

Table 2

CONTRIBUTION OF NON-AGRICULTURAL SELF-EMPLOYMENT TO TOTAL JOB GROWTH IN THE UNITED STATES, CANADA, PORTUGAL AND SPAIN

	Period	Growth (in thousands)		Self-employment as a percentage of total job growth
		Self-employment	Total employment	
Portugal:				
Boom	1978-82	114	344	33.14
Recession	1983-85	-27	-83	32.53
Boom	1985-91	164	692	23.70
Recession	1992-93	-176	-214	82.42
Boom	1993-97	58	69	84.06
Spain:				
Recession	1977-85	110	-1039	-10.59
Boom	1985-91	384	2576	14.91
Recession	1991-94	27	-569	-4.10
Boom	1994-97	136	1042	13.05
United States:				
Recession	1981-82	163	-871	-18.71
Boom	1982-90	1199	19266	6.22
Recession	1990-91	177	-1075	-16.47
Boom	1989-96	239	11839	2.02
Canada:				
Recession	1981-82	18	-289	-6.12
Boom	1982-90	231	2144	10.77
Recession	1990-92	42	-290	-14.48
Boom	1992-97	367	1089	33.70

Source: OECD, Quarterly Labour Force Statistics (several issues).

ment in making those rigidities less severe it's only present in countries in which these contributions do not act as a barrier to self-employment entry.

These results illustrate a key drawback of previous research on self-employment and market rigidities, which is the failure to identify the broad effect of labour market policies on the structure of employment. In fact, to analyse the total effect of different labour market policies and/or outcomes (for example, firing costs, compulsory contributions, unemployment, and inequality), researchers need to think carefully about how self-employment (and other labour market variables) is going to respond to these policies and/or outcomes. Too often, people just think of self-employment as another form of underemployment (a close substitute to unemployment), rather than self-employment being a close substitute to dependent employment.

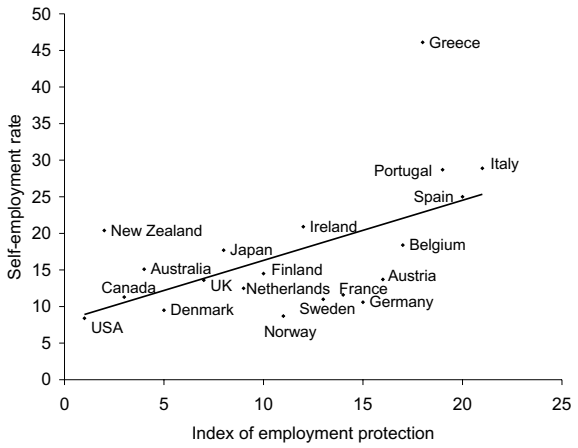
The policy implications of these results are quite important. Since different policies affect self-employment in different ways, they can undo the effect of each other in such a way that omitting one of them leads us wrongly to conclude that they have no effect. Policies that act as a barrier to self-employment entry might prevent those who potentially foster self-employment to have perceivable effects. Thus if somehow one makes more expensive to enter and operate a business, this is expected to crowd out the effect of labour market rigidities on self-employment entry, and thus, to magnify their impact on different labour market outcomes, such as, for example, the unemployment rate.

The rest of the paper is organised as follows. Section 2 reviews the literature on labour market flexibility and the determinants of self-employment. Section 3 presents the empirical strategy and the evidence obtained using a panel of 18 OECD countries and section 4 concludes.

2. SELF-EMPLOYMENT AND EMPLOYMENT PROTECTION

The argument that relates self-employment and employment protection is not a new one. Some findings of this kind are reported in Grubb and Wells (1993), OECD (1999), and, more recently, in Robson (2000).

Chart 1
SELF-EMPLOYMENT RATE AND INDEX OF EMPLOYMENT PROTECTION



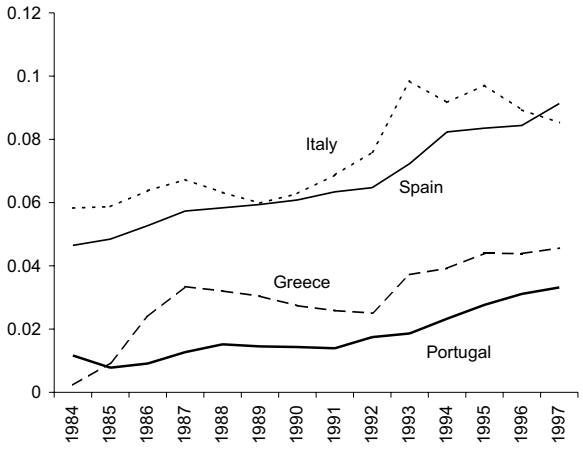
The first study presents simple correlation coefficients between an index of employment protection and the structure of employment. It identifies some tendency for self-employment to be higher in countries which have stricter regulations while employment/population ratios are negatively correlated with employment protection[3]. This positive association (possibly non-linear) between the ranking of employment protection and the rate of self-employment is shown in Chart 1, that plots the self-employment rate against the OECD's index of employment protection (using data from the late 80's).

The explanation put forward for this result is that employers may attempt to circumvent the effects of regulations on their ability to hire and fire employees by contracting-out self-employed workers.

Besides addressing the labour demand incentives for hiring self-employed workers, this argument also relates to the opportunity cost of entering self-employment. On the one hand, while employment protection legislation reduces the flows into paid-employment, it also decreases the oppor-

(3) I computed the Spearman's rank correlation coefficient (S) between the index of employment protection (OECD (1999)) and the self-employment rate. The value obtained for S was 0.5398. Under the null hypotheses of independence the mean of S is equal to zero, the significance value obtained for the test of independence between the employment protection index and the self-employment rate is 0.0140, meaning that there is a true association between these two variables.

Chart 2
SOCIAL SECURITY CONTRIBUTIONS PER SELF-EMPLOYED AS A FRACTION OF *PER CAPITA* GDP



tunity cost of entering self-employment, since it reduces the expected income stream of future paid-employment matches. On the other hand, however, this reduction affects specially those who fare worst in the labour market, and face lower prospectus of being offered a paid-employment position. This implies that it can be magnified by other factors affecting the likelihood of a worker making a transition into self-employment, specially those related with income formation in self-employment.

It has been argued elsewhere (Pfeiffer and Reize (2000)) that the threshold of the income stream at which a decision in favour of self-employment is made depends on the previous experience of the worker. However, this threshold would also be affected by the tax and contributory systems in place at the time a worker faces the decision to enter self-employment. Systems that are financially more demanding would raise this threshold and act as a barrier to self-employment entry, specially for those with lower levels of expected income.

In the empirical application made in this paper, I use the differences across time and countries in social security contributions paid by the self-employed (along with the degree of labour market flexibility) to explain differences in the self-employment share. Most OECD countries (more notably European ones), have introduced compulsory social security contribution systems since the 80's. While these systems aimed at insure self-employed workers in a similar fashion as those in paid employment, they introduced a barrier to self-employment entry, especially for low income workers. If self-employment composition is made of the so-called ''false'' type, this will act as a transfer of the burden of contributions from the employer to the worker. Some countries created specific systems to the self-employed, while in other countries self-employed workers were included in the general system. However, in most cases this represented a substantial increase in self-employed contributions (see Chart 2) since, to prevent income under-report, in almost every case minimum compulsory levels of contributions were defined independently of the workers' activity level (see Schoukens (1999) for a detailed description of all the European systems)[4].

3. THE INTERACTION OF SOCIAL SECURITY CONTRIBUTIONS AND LABOUR MARKET RIGIDITIES

In order to study the effect of labour market rigidity and self-employed social security contributions on self-employment incidence, the following regression was estimated:

$$SE_{it} = \beta_1 + \beta_2 LMF_{it} + \beta_3 SSC_{it} + \\ + \beta_4 (LMF * SSC)_{it} + \beta_5 X_{it} + \mu_i + v_t + \varepsilon_{it} \qquad (1)$$

where *SE* is the share of self-employment, *LMF* is the index of labour market flexibility, *SSC* is the level of social security contributions paid by the self-employed and *X* is a vector of other cova-

(4) Cross country comparisons of the financing of social security systems for the self-employed is an extremely hard task. This is because of the differences in the mechanisms used to determine the income basis and in the areas covered which are never completely the same. This makes the comparison of percentages of contributions of little use. The Spanish and Portuguese cases are simpler to compare because the minimum income basis are easier to determine and the systems cover basically the same areas (if anything, the Portuguese system was more generous in some periods). In 1996, the ratio of the minimum compulsory social security contributions to the minimum wage in Portugal is half those in Spain. In that year, minimum contributions to the social security system were 45 per cent of the minimum wage in Spain and only 23 per cent in Portugal. This is due to both a lower contributory percentage and a lower minimum level of income basis.

riates. I included country (μ) and time specific effects (υ) in order to control for omitted variables bias.

The interaction term captures possible non-linearities in the impact of labour market flexibility and social security contributions on self-employment share. As stated above, it is likely that, since the first variable is directed to capture the demand for self-employment and the second the supply side of the market, their full impact on self-employment cannot be captured if they enter only in levels. Also note that the force of labour market rigidities may be non-linear. It can be argued that, for a given firm, once these rigidities get large enough, no firing occurs and self-employment becomes more important, which implies a non-linear rigidity effect. Thus, in some specifications I include the square of *LMF*.

The results of estimating equation (1) using a fixed-effects estimator are presented in Table 3[5]. The set of control variables includes flexibility squared, and the interaction term with social security contributions. In line with previous research on self-employment share I also include the logarithm of GDP and the unemployment rate[6]. These two variables were consistently found significant in previous studies on self-employment. The level of GDP *per capita* has been found by Acs, Audretsch and Evans (1994) to have a significant negative impact on the share of non-agricultural self-employment in a sample of OECD countries. The explanation put forward for these results is that a rise in the level of GDP *per capita* is associated with a decline in the returns to self-employment relative to those from paid-employment. A number of studies also find that the share of self-employment is negatively related with the unemployment rate, as is the case of Blanchflower (2000).

All coefficients are significantly different from zero. However, the more important result is the coefficient on the interaction term. Being positive, it indicates that more flexibility reduces the impact of lower social security contributions in fostering self-employment growth, but more notable, higher social security contributions reduces the ability of labour market rigidity to explain the self-employment share. For sufficiently high values of contributions, the flexibility variable has an impact no longer significantly different from zero.

Note also, that the impact of the flexibility variable is non-linear. For smaller values of the flexibility indicator the impact on self-employment incidence is larger.

These results are important in two respects. First, they explain the partial failure of previous research (OECD (1999) and Robson (2000)) to find a consistently significant relationship between labour market flexibility and self-employment. These studies did not consider the non-linearities in this relationship and omitted the role of other policy variables affecting the supply of self-employment matches. Secondly, the policy implications of these results are quite important. Since different policies affect self-employment in different ways, they can undo the effect of each other in such a way that omitting one of them lead us wrongly to conclude that they have no effect. Policies that act as a barrier to self-employment entry might prevent those who potentially foster self-employment to have perceivable effects.

Table 3

THE DETERMINANTS OF SELF-EMPLOYMENT RATE: 18 OECD COUNTRIES 1984-1997

Dependent variable: share of non-agricultural self-employment

	Fixed Effects
Flexibility	-0.023
	(0.005)
Social Security Contributions	-0.186
	(0.071)
Flexibility * Social Security Contributions	0.019
	(0.013)
Flexibility^2	0.002
	(0.0005)
Log GDP *per capita*	-0.136
	(0.028)
Unemployment rate	-0.001
	(0.0006)
F – test	9.07
Number of observations	248

Notes:
Variables are defined in the data appendix.
Standard errors are in parenthesis.

(5) Detailed results are available from the author upon request.

(6) Other variables were included but proved to be statistically non-significant in this regression.

4. CONCLUSIONS

In this paper, I explore the role of self-employment as a close alternative to paid-employment and as a response to labour market policies that affect the opportunity cost of entering and remaining self-employed, such as employment protection legislation and compulsory contributions to the social security system made by the self-employed.

I present empirical evidence on a panel of OECD countries showing that the positive relationship between labour market rigidity and the share of self-employment is sensitive to the inclusion of more variables capturing the costs of entering (and surviving) self-employment. Proxying these costs with the level of social security contributions paid by the self-employed (as a fraction of *per capita* GDP) I find a non-linear relationship between flexibility and the self-employment share.

There are important policy implications of these results. Since different policies affect self-employment in different ways, they can undo the effect of each other in such a way that omitting one of them lead us wrongly to conclude that they have no effect. Policies that act as a barrier to self-employment entry might prevent those who potentially foster self-employment to have perceivable effects.

In a model of the labour market in which paid- and self-employment decisions are simultaneous, the above results point to the importance of self-employment as a key channel of labour market flexibility, increasing market flows and crowding-out the effects of employment protection legislation.

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DATA APPENDIX

The flexibility data used in this paper come from the World Competitiveness Report (WCR). This is an annual survey that requests the opinion of a number of managers on, among many other questions, the flexibility of enterprises to adjust things like compensation and employment levels to economic realities in their countries. Di Tella and MacCulloch (1999) present a detailed description of these data and compare them with other labour market flexibility data. They find the WCR data to be highly correlated with the OECD measure. The data also capture most changes in employment protection legislation occurred in European countries over the sample period and coded in Saint-Paul (1996).

This paper covers the period from 1984 to 1997, which is considerably larger than the one used in previous studies. Despite all the criticism associated with the usage of survey (and subjective) data I think these data are still worth using given the larger sample available and the relevance of the question being answered.

The variable measuring labour market flexibility varies from 0 to 10, and is higher for more flexible labour markets. It is the answer of managers to the following question: ''What is the flexibility of enterprises to adjust job security and compensation standards to economic realities: 0 = none at all to 10 = a great deal''. We must be concerned with changes in the question that occurred in 1990 and than again on 1992. However, the basic interpretation and the goal of the question remained the same, which makes one more comfortable in using and interpreting the results.

To measure the cost of entering and remaining self-employed I use the ratio of social security contributions paid per self-employed to the nominal *per capita* GDP. To construct this variable, the level of total contributions paid by the self-employed as reported by the OECD's Revenue Statistics (code 2300 — total contributions paid by the self-employed), is divided by the number of self-employed workers. This is a measure of the level of contributions per self-employed, and is divided by the nominal *per capita* GDP, to give us a measure of the financial burden imposed on the self-employed by the social security contributory system.

Next, I present a detailed definition and summary features of the data used in this paper.

Table 1A

DESCRIPTION OF THE DATA – AVERAGE FOR 1984-1997

	Flexibility	Self-employment share %	Social security contributions	GDP *per capita*	Unemployment rate %
Germany	3.745	7.59	0.030	0.019	
Austria	4.317	6.25	0.158	0.030	5.31
Belgium	3.841	10.69	0.117	0.031	11.35
Canada	6.042	8.74	0.025	0.034	9.47
Spain	3.129	16.96	0.066	0.022	19.52
United States	7.045	6.97	0.053	0.041	6.02
Finland	4.708	8.44	0.053	0.029	10.55
France	3.749	8.89	0.214	0.030	10.75
Greece	3.743	24.15	0.066		8.84
Ireland	5.276	12.07	0.015	0.025	13.63
Italy	3.096	20.80	0.074	0.027	10.29
Japan	5.437	10.53	0.065	0.031	2.89
Norway	4.499	5.73	0.058	0.033	4.13
Netherlands	4.054	8.10	0.461	0.029	6.77
Portugal	3.589	15.56	0.018	0.018	6.25
United Kingdom	6.749	10.82	0.024	0.027	8.66
Sweden	3.725	6.90	0.073	0.030	4.73
Switzerland	6.976	9.27	0.076	0.037	2.40

Sample of 18 countries

Austria, Belgium, Canada, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States.

Definition of variables

Share of Non-Agricultural Self-employment in Total Civilian Non-Agricultural Employment

The non-agricultural self-employment divided by total civilian non-agricultural employment from the *OECD Labour Force Statistics.*

Unemployment rate

The unemployment rate from the *OECD Main Economic Indicators.*

GDP per capita

The log *per capita* GDP expressed in constant 1995 prices, from the OECD *Main Economic Indicators* (millions of national currency units).

Flexibility

The survey question that I use (classified as 2.17 Labour-Cost Flexibility in 1984) asked the respondents: ''Flexibility of enterprises to adjust job security and compensation standards to economic realities: 0=none at all, to 100=a great deal''. This question was changed in 1990 to ''Flexibility of management to adjust employment levels during difficult periods: 0=low, to 100=high''. Again in 1992 the question was changed to ''Flexibility of hiring and fire practices by the government: 0=are too restricted by government, to 100=are flexible enough''. *From the World Competitiveness Report, EMF Foundation*, Geneva.

Self-employed Workers Social Security Contributions

Social security contributions of the self-employed divided by nominal GDP *per capita.* From the OECD *Revenue Statistics and OECD Main Economic Indicators.*

January*

11 January (Circular Letter of Banco de Portugal no. 2/DMRCF/CR)

Informs that it is available on the Website of Banco de Portugal, the list of eligible assets proposed by the Banco de Portugal and accepted by the European Central Bank.

27 January (Circular Letter of Banco de Portugal no. 4/DMR)

Informs that, following Circular Letter no. 347/DMR, of 27 October 1999, the rate of return on Certificates of Deposit, Series B, was fixed at 3%, to prevail on the quarter started on 4 February 2000.

February

8 February (Regulation no. 5/2000, Supplement to Official Gazette no. 45, Series II of 23 February)

Under the provisions laid down in no. 2 of Article 5, in Article 212, in no. 2 of Article 351 and in paragraph b) of no. 1 of Article 353 – all of the Stock Market Code, approved by Decree-Law no. 486/99 of 13 November –, regulates the functioning of markets, in general, and of stock markets, in particular. This Regulation comes into force on 1 March 2000.

8 February (Regulation no. 7/2000, Supplement to Official Gazette no. 45, Series II of 23 February)

Under the provisions laid down in Article 11 and for the purposes specified in Article 12 of the Stock Market Code, approved by Decree-Law no. 486/99 of 13 November, establishes the legal framework of credit-rating agencies. This Regulation comes into force on 1 March 2000.

8 February (Regulation no. 8/2000, Supplement to Official Gazette no. 45, Series II of 23 February)

Under the provisions laid down in no. 4 of Article 265 of the Stock Market Code, approved by Decree-Law no. 486/99 of 13 November, lays down the rules applicable to contango and securities lending operations, and exempts from this system the operations performed by the Banco de Portugal. This Regulation comes into force on 1 March 2000.

10 February (Regulation no. 14/2000, Supplement to Official Gazette no. 45, Series II of 23 February)

Under the provisions laid down in no. 2 of Article 5, in no. 2 of Article 59, in Article 60, in no. 6 of Article 91, in no. 5 of Article 99, in Article 105 and in paragraph b) of no. 1 of Article 353 – all of the Stock Market Code, approved by Decree-Law no. 486/99 of 13 November –, lays down the regulations applicable to central securities depositories and to the compulsory registration of securities with a single financial intermediary. This Regulation comes into force on 1 March 2000.

11 February (Notice of the European Central Bank 2000/C 39/04)

Notice of the European Central Bank on the imposition of sanctions for breaches of the obligation to hold minimum reserves.

15 February (Regulation no. 15/2000, Supplement to Official Gazette no. 45, Series II of 23 February)

Under the provisions laid down in nos. 1 and 5 of Article 260, in no. 1 of Article 264 and in nos. 1 and 2 of Article 273 – all of the Stock Market Code, approved by Decree-Law no. 486/99 of 13 November –, lays down the rules governing the securities settlement systems, irrespective of their managing entity, and provides for the adequacy of the settlement system managed by the Lisbon Stock Exchange Association until 1 September 2000. This Regulation comes into force upon the registration at the Securities Market Commission (CMVM) of the operational rules governing the systems, under the terms laid down in no. 3 of Article 6 of Decree-Law no. 486/99 of 13 November.

15 February (Regulation no. 16/2000, Supplement to Official Gazette no. 45, Series II of 23 February)

Under the provisions laid down in Article 212 and in no. 4 of Article 214 of the Stock Market Code, approved by Decree-Law no. 486/99 of 13 November, lays down the legal framework, the organisation and the functioning of the second market managed by the Lisbon Stock Exchange Association. This Regulation comes into force on 1 March 2000.

* The chronology for monetary measures of the Eurosystem can be found in the Monthly Bulletin of the European Central Bank.

15 February (Regulation no. 17/2000, Supplement to Official Gazette no. 45, Series II of 23 February)

Under the provisions laid down in Article 212 of the Stock Market Code, approved by Decree-Law no. 486/99 of 13 November, lays down the regulations governing the functioning of the market without quotations managed by the Lisbon Stock Exchange Association. This Regulation comes into force on 1 March 2000.

15 February (Regulation no. 18/2000, Supplement to Official Gazette no. 45, Series II of 23 February)

Under the provisions laid down in Article 212 of the Stock Market Code, approved by Decree-Law no. 486/99 of 13 November, sets forth the provisions governing the Special Market for Wholesale Transactions. This Regulation comes into force on 1 March 2000.

16 February (Circular Letter of Banco de Portugal no. 4/00/DSBDR)

Sets forth that all credit institutions subject to the supervision of the Banco de Portugal must previously communicate their projects regarding the direct or indirect acquisition of qualifying holdings in credit or financial institutions having their head-office abroad and which represent 10% or more of the capital of the undertaking or 2% or more of the shareholder's capital.

May

16 May (Council Regulation No.1010/2000, OJ L 115)

Adopts measures relating to further calls by the European Central Bank on the national central banks' foreign reserve assets.

23 May (Executive Order no. 284/2000, Official Gazette no. 119, Series I, B)

Taking into account the provisions laid down in Executive Order no. 95/94 of 9 February and under the terms laid down in no. 1 of Article 95 and in no. 1 of Article 196 of the Legal Framework of Credit Institutions and Financial Companies, approved by Decree-Law no. 298/92 of 31 December, fixes the minimum capital stock for credit securitisation funds managing companies and for credit securitisation companies.

25 May (Executive Order no. 289/2000, Official Gazette no. 121, Series I, B)

Under the provisions laid down in paragraph b) of no. 1 of Article 59 of the Stock Market Code (*Código dos Valores Mobiliários*), establishes the rules governing the registration of book-entry securities with the issuer. This Executive Order takes effect on 1 March 2000.

25 May (Executive Order no. 290/2000, Official Gazette no. 121, Series I, B)

Under the provisions laid down in paragraph a) of no. 1 of Article 59 of the Stock Market Code (*Código dos Valores Mobiliários*), approves the model for the registration of securities issues with the issuer, provided for in Article 43 of the aforementioned ordinance. This Executive Order takes effect on 1 March 2000.

26 May (Directive 2000/12/EC of the European Parliament and of the Council, OJ L 126)

Adopts measures relating to the taking up and pursuit of the business of credit institutions. Directives 73/183/EEC, 77/780/EEC, 89/299/EEC, 89/646/EEC, 89/647/EEC, 92/30/EEC and 92/121/EEC, as amended by the directives set out in Annex V, Part A are repealed, without prejudice to the obligations of the Member States concerning the deadlines for transposition of the said directives listed in Annex V, Part B. References to the repealed directives are to be considered as being made to this directive and should be read in accordance with the correlation table in Annex VI.

June

2 June (Decree-Law No. 101/2000, Official Gazette No. 128, Series I, A)

Transposes to Portuguese law Directive 98/7/EC of the European Parliament and of the Council of 16 February amending Directive 87/102/EEC of 22 December 1986 for the approximation of the laws, regulations and administrative provisions of the Member States concerning consumer credit. Replaces annexes nos. 1 and 2 of Decree-Law no. 359/91 of 21 September with annexes I and II of the above Decree-Law.

26 June (Regulation of the Stock Market Commission no. 20/2000, Official Gazette no. 145, Series I)

For the purposes laid down in Article 26 of Decree-Law no. 276/94 of 2 November reworded by Decree-Law no. 323/99 of 13 August, provides for the terms and conditions to be complied with in the disclosure to the public of the profitability measures of real estate investment funds. Revokes Regulation no. 10/97 of 26 June.

28 June (Executive Order no. 382/2000, Official Gazette no. 147, Series I, B)

Pursuant to the provisions set forth in no. 3 of Article 1 of Decree-Law no. 88/94 of 2 April, establishes that the securities representing the public debt, issued under the terms of the Resolution of the Council of Ministers no. 19-A/2000 of 2 May, shall be added to the list published through Executive Order no. 377-A/94, of 15 June.

30 June (Regulation of the Stock Market Commission no. 22/2000, Official Gazette no. 149, Series I, Supplement)

Regulates the operation of the Public Debt Special Market (Portuguese acronym: MEDIP), and provides for the application to this market of the rules laid down in Regulation no. 5/2000 of 23 February, that do not run counter to this Regulation.

July

5 July (Circular Letter of Banco de Portugal no. 23/DMRCF/DMC)

Sends diskette containing a file with the list of all institutions subject to reserve requirements in the euro area, on 29 June 2000.

7 July (Council Regulation no. 1478/2000, OJL 167)

Introduces changes in Regulation (EC) no. 2866/98 on conversion rates between the euro and the currencies of the Member States which adopted the euro. This regulation enters into force on 1 January 2001.

7 July (Council Decision no. 2000/427, OJL 167)

Council Decision, under the provisions of Article 122 (2) of the Treaty, on the adoption of the single currency by Greece, on 1 January 2001. The derogation granted to Greece in recital 4 of the Decision 98/317/CE is revoked, coming into effect as from this date.

13 July (Circular Letter of Banco de Portugal no.13/00/DSBDR)

Recommends, in the wake of previous recommendation of the GAFI-*Grupo de Acção Financeira,* that credit institutions and financial companies should carefully examine the operations in which the respective counterparties have residence or are established in the following countries and territories: Bahamas, Cayman Islands, Cook Islands, Dominica, Philippines, Israel, Lebanon, Liechtenstein, Marshall Islands, Nauru, Niue, Panama, Russia, St. Kitts and Nevis and St. Vincent and Grenadines.

15 July (Decree-Law no. 144/2000, Official Gazette no. 162, Series I, A)

Creates an interest-rate subsidy in credit lines intended to the complementary financing of investment projects of municipal and inter-municipal nature subsidised by the ERDF and approved within the scope of the Community Support Framework (CSF 2000-2006) or of programmes implemented by the Community.

17 July (Regulation of the Stock Market Commission no. 25/2000, Supplement to Official Gazette no. 163, Series II)

Lays down a set of special regulations applicable to registration, clearing and settlement services of over-the-counter purchase and sale transactions of transferable securities, provided by a managing company operating in a regulated market.

17 July (Notice of the Minister of Finance no. 11223/2000, Official Gazette no. 163, Series II)

Announces, in compliance with the provisions laid down in Article 2 of Decree-Law no. 1/94, of 4 January, that the average interest rate to prevail in July 2000 is set at 2.53672%, which, multiplied by the 1.10 factor, is 2.79039%.

17 July (Notice of the Minister of Finance no. 11224/2000, Official Gazette no. 163, Series II)

Announces, in compliance with the final provisions laid down in Article 1 of Decree-Law no. 125/92, of 3 July, that the interest rate to prevail in July 2000, after multiplication by the 0.96 factor, is 2.43525%.

18 July (Regulation of the Stock Market Commission no. 23/2000, Official Gazette no. 164, Series II)

Establishes, under the provisions laid down in Article 34 (1) of the Stock Market Code, approved by Decree-Law no. 486/99, of 13 November, the voluntary intermediation procedure applicable to conflicts arising from relationships involving transferable securities.

19 July (Regulation of the Stock Market Commission no. 24/2000, Official Gazette no. 165, Series II)

Revises the regulatory base regarding the information to be released to the market. Introduces changes in different articles, adds the new articles 1-A and 1-B, and republishes the full version of Regulation no. 11/2000, of 10 February, with the changes introduced therein.

19 July (Notice of Banco de Portugal no. 1/2000, Official Gazette no. 165, Series I - B)

Establishes, under Articles 99 and 196 of Decree-Law no. 298/92, of 31 December (Legal Framework of Credit Institutions and Financial Companies), the relationship between the own funds of credit securitisation companies and the amount of the respective issues of asset-backed securities that comply with the provisions laid down in Article 50 of Decree-Law no. 453/99, of 05 November.

19 July (Decision no. 14580/2000, Official Gazette no. 165, Series II)

Authorises the *Instituto de Gestão do Crédito Público* (Public Debt Management Institute), under the provisions laid down in Article 92 (2) of Law no. 3-B/2000, of 4 April, to intervene in the public debt secondary market as a counterpart in reporting operations of transferable securities representing direct public debt of the State accepted in the Public Debt Special Market (Portuguese Acronym: MEDIP).

24 July (Notice of Banco de Portugal no. 2/2000, Official Gazette no. 169, Series I - B)

Rewords the first indent of no. 2 c) of part I of the attachment to Notice no. 1/93, of 19 May, published in the Supplement to Official Gazette no. 133, Series II, of 8 June 1993.

25 July (Circular Letter of Banco de Portugal no. 24/DMR)

Informs that, following Circular Letter no. 347/DMR, of 27 October 1999, the rate of return on Certificates of Deposit, Series B, was fixed at 3%, to prevail on the quarter started on 4 August 2000.

August

1 August (Regulation no. 28/2000 of the Stock Market Commission, Official Gazette no. 176, Series II)

Lays down regulations on capital stocks, internal control requirements and the obligation to report to the Stock Market Commission applicable to market management companies, securities settlement systems and securities pooling systems, as well as their holding companies.

2 August (Circular Letter of Banco de Portugal no. 25/DMRCF/DMC)

Sends diskette containing a file with the list of all institutions subject to reserve requirements in the euro area, on 28 July 2000.

9 August (Executive Order no. 1197/2000, Official Gazette, no. 183, Series II)

Introduces changes in Executive Order no. 95/94, of 9 February, setting forth new minimum amounts for the capital stock of mutual agricultural credit banks.

10 August (Decree-Law no. 181/2000, Official Gazette no. 184, Series I, A)

Introduces changes in Decree-Law no. 408/91, of 17 October, which sets forth the new legal system governing minimum reserves.

17 August (Guideline of the European Central Bank no. 2000/516/EC, OJ L 207)

Guideline on the management of the European Central Bank reserve assets by national central banks and on juridical agreements relating to operations with European Central Bank reserve assets. (ECB/2000/1). This guideline comes into force on 3 February 2000.

19 August (Regulation no. 26/2000 of the Stock Market Commission, Official Gazette no. 191, Series II)

Introduces changes in Articles 5 (definition of criteria adopted for the valuation of listed assets) and 9 (responsibility of the managing entity) of Regulation no. 16/99, relating to the valuation of the assets of transferable securities investment funds and to the calculation of the value of the units, published in the Official Gazette no. 240, Series II, of 14 October 1999.

19 August (Regulation no. 27/2000 of the Stock Market Commission, Official Gazette no. 191, Series II)

Introduces changes in Article 7 (Information) of Regulation no. 21/99, relating to the use of derivative financial instruments by mutual funds, published in the Official Gazette no. 295, Series II, of 21 December 1999.

22 August (Notice of the Banco de Portugal no. 3/2000, Official Gazette no. 193, Series I, B)

Sets forth the Direct Debits System (Portuguese acronym SDD). This notice comes into force on 1 October 2000.

23 August (Regulation no. 30/2000 of the Stock Market Commission, Official Gazette no. 194, Series II)

Introduces changes in Article 67 (representative for the relationship with the market) of Regulation no. 10/2000, relating to offers and issuers, published in the Supplement to the Official Gazette no. 45, Series II, of 23 February 2000.

23 August (Circular Letter of the Banco de Portugal no. 27/DMR)

Informs of the changes introduced in Instruction no. 1/99 (BNPP no.1, of 15 January 1999), regarding valuation haircuts applied to some assets in Tier 1 and to assets in Tier 2. These changes will come into force as from 31 August 2000.

23 August (Regulation no. 29/2000 of the Stock Market Commission, Official Gazette no. 194, Series II)

Revokes Article 8 and introduces changes in Article 2 (2) (characteristics of underlying assets) as well as in Articles 4 (setting up of the price of the underlying asset), 6 (changes in the underlying asset), 12 (tradability in the spot stock market) and 13 (admission to trading of warrants issued by entities subject to foreign law) of Regulation no. 19/99, relating to autonomous warrants, published in the Official Gazette no. 275, Series II, of 25 November 1999.

29 August (Notice of the Banco de Portugal no. 4/2000, Official Gazette no. 199, Series I, B)

Sets forth, under the provisions laid down in Article 3 (2) of Decree-Law no. 408/91, of 17 October, reworded by Decree-Law no. 181/2000, of 10 August, the conditions of remuneration of cash certificates with nominal value below 50.000 euro, put out to public subscription.

September

5 September (Regulation no. 31/2000 of the Stock Market Commission, Official Gazette no. 205, Series II)

Establishes, for the purpose of the provisions laid down in Article 35 (1) of Decree-Law no. 276/94, of 2 November, reworded by Decree-Law no. 323/99, of 13 August, the legal system governing the accounting of transferable securities investment funds. Revokes Regulation no. 95/14, of 21 December. The present Regulation comes into force on 1 January 2001.

5 September (Executive Order no. 1338/2000, Official Gazette, no. 205, Series II)

Introduces changes, under the provisions laid down in Article 211 of the Stock Market Code, approved by Decree-Law no. 486/99, of 13 November, in the interest rates on out-of-the-market operations. Rewords Articles 3 and 4 and adds article 5-A to the Executive Order no. 313-A/2000 (Series II), of 29 February. The present Executive Order will enter into force immediately, except Article 5-A, which will enter into force on 1 January 2001.

9 September (Decree-Law no. 221/2000, Official Gazette no. 209, Series I - A)

Transposes into national legislation, within the scope of the payment systems, Directive no. 98/26/EC, of the European Parliament and of the Council, of 19 May, on settlement finality in payment and securities settlement systems.

9 September (Regulation (EC) no. 1921/2000 of the European Central Bank, OJ 229, Series L)

Introduces changes in articles 1, 3, 5, 6 and 13 of Regulation (EC) no. 2818/98 of the ECB, of 1 December 1998, on the application of minimum reserve requirements, as well as in articles 4 and 5 of Regulation (EC) no. 2819/98 of the ECB, of 1 December 1998, on the consolidated balance-sheet of the monetary financial institutions sector. The present Regulation will be effective on the reserve maintenance period starting on the month following its publication in the Official Journal. An amendment to Regulation (EC) no. 1921/2000 of the ECB was published in the Official Journal no. 242, series B.

16 September (Notice of the Banco de Portugal no. 5/2000, Official Gazette no. 215, Series 1- B)

Lays down a set of regulations on the remuneration of deposits redeemable at notice, time deposits, time deposits not withdrawable before maturity and deposits opened under a special system, of an amount up to PTE 10 million, mentioned in article 1, (1), b), c), d) and e) of Decree-Law no. 430/91, of 2 November.

23 September (Decree-Law no. 228/2000, Official Gazette no. 221, Series I - A)

Sets up the National Council of Financial Supervisors, with a view to promoting, inter alia, the co-ordination of the performance of national authorities supervising the financial system. It shall be chaired by the Governor of the Banco de Portugal. In addition to the Stock Market Committee and to the Portuguese Insurance Institute, this Council expects to have the participation of representatives of public or private entities, in particular the Deposit Guarantee Fund, the Agricultural Credit Guarantee Fund, the Investor Compensation System, the entities managing regulated markets and associations representing any types of institutions subject to prudential supervision.

25 September (Circular-Letter of the Banco de Portugal no. 29/DMR)

In the wake of the decision of the ECB Council that established the closing days of the TARGET and concomitant closing of the RTGS system in the year 2001, it informs which will be the value-dates or repayment dates of the operations that cannot be carried out through SITEME in 2001. It also informs on which holidays the minimum services shall be ensured.

October

3 October (Circular-Letter of the Banco de Portugal no. 30/DMRCF/DMC)

Sends diskette containing a file with the list of all institutions subject to reserve requirements in the euro area on 28 September 2000.

13 October (Decree-Law no. 250/2000, Official Gazette no. 237, Series I, A)

Transposes into Portuguese legislation Directive 98/33/EC of the European Parliament and of the Council of 22 June amending article 12 of Directive 77/780/EEC on the coordination of laws, regulations and administrative provisions relating to the taking up and pursuit of the business of credit institutions, articles 2, 5, 6, 7 and 8 and annexes II and III of Directive 89/647/EEC on a solvency ratio of credit institutions, and article 2 and annex II of Council Directive 93/6/EEC on the capital adequacy of investment firms and credit institutions. Rewords articles 81 and 82 of the Legal Framework of Credit Institutions and Financial Companies approved by Decree-Law no. 298/92 of 31 December. Increases the number of bodies performing co-operation tasks in the supervisory field, includes certain concepts (e.g. recognised market), fixes weighting coefficients for the calculation of the solvency ratio (e.g. unpaid share in the capital of the European Investment Fund) and introduces changes in the calculation of credit risk in the over-the-counter derivative instruments.

16 October (Regulation no. 32/2000 of the Stock Market Commission, Official Gazette no. 239, Series II)

Regulates some features relating the canvassing for investors within the scope of financial intermediation activities. Amends article 50 and adds articles 19-A, 50-A, 50-B and 50-C to Regulation no. 12/2000 of 10 February.

18 October (Decree-Law no. 263/2000, Official Gazette no. 241, Series I, A)

Transposes into Portuguese law Directive 98/32/EC of the European Parliament and of the Council of 22 June amending - in particular the provisions relating to mortgage credit - Council Directive 89/647/EEC on the solvency ratio of credit institutions, the Banco de Portugal being authorised to change these regulations, under the terms of this Decree-Law..

20 October (Circular Letter of Banco de Portugal no. 31/DMR)

Informs credit institutions that for the calculation and confirmation of reserve requirements of the ESCB, they must comply with the provisions set forth in Regulation (EC) no. 1921/2000 of the European Central Bank of 31 August (ECB/2000/8), which amended Regulation no. 2818/98 of the European Central Bank of 1 December (ECB/1998/15) on the application of minimum reserves and Regulation no. 2819/98 of the European Central Bank of 1 December (ECB/1998/16) concerning the consolidated balance sheet of the monetary financial institutions sector.

30 October (Notice of Banco de Portugal No. 6/2000, Official Gazette No. 251, Series I, B)

Defines the own funds requirements applicable to credit institutions and financial companies assigning claims in securitisation operations, which within the scope of these operations have assumed engagements or received assets or off-balance-sheet items. Adds nos. 7 and 8 to Part I, of the annex to Notice No. 1/93, of 8 June.

November

6 November (Notice of the Banco de Portugal no. 7/2000, Official Gazette no. 256, Series I, B)	Cuts from three years to eighteen months the deadline (as from the date of the respective maturity) for the full provisioning of claims that only have a personal guarantee. Amends Notice no. 3/95, published in the Official Gazette no. 149, Series II.
7 November (Executive Order of the Ministry of Finance no. 1689/2000, Official Gazette no. 257, Series II)	Creates a regulated market, called "new market", for the trading, during a first stage, of shares issued by entities showing a high growth potential or developing technologically innovative activities. The specific requirements for trading in the "new market" include an orchestrated participation between the issuer, the promoter, the holders of qualifying holdings and the market creators.
15 November (Instruction of the Banco de Portugal no. 25/2000, BNBP 11/2000)	Fixes at 75 per cent the limit for the irrevocable payment commitment applicable to contributions relating to the year 2001 to the Deposit Guarantee Fund.
15 November (Instruction of the Banco de Portugal no. 26/2000, BNBP 11/2000)	Fixes at 0.1 per cent the basic contributory rate, applicable to the calculation of the annual contributions relating to the year 2001 to the Deposit Guarantee Fund.

December

14 December (Regulation no. 34/2000 of the Stock Market Commission, Official Gazette no. 287, Series II)	Lays down the general framework and the principles governing the "new market". Amends Regulations nos. 10/2000 and 11/2000 of the Stock Market Commission, published in the Official Gazette no. 45 (Supplement), Series II.
22 December (Decision no. 851/2001, Official Gazette no. 14, Series II)	Approves a set of guidelines governing the management of the direct government debt to be followed by the Public Credit Management Institute.
28 December (Regulation no. 37/2000 of the Stock Market Commission, Official Gazette no. 28, Series II)	Amends Regulation no. 10/2000, so as to cover in the reporting requirements to the Stock Market Commission the issuance of shares through the incorporation of reserves or resulting from the merger or splitting of companies, and consequently changes the respective reporting model. Rewords the title of Chapter I as well as articles 1 and 3, and adds an article 1 - A to the aforementioned Regulation.
29 December (Law no. 30-C/2000, Official Gazette no. 299, Series I, A, 2nd Supplement)	Approves the State Budget for 2001. Enshrines a set of provisions, a number of which of a tax nature, the corresponding amendments having been introduced in the several legal acts referred to thereon, with the exception of the amendments to paragraph 22 of article 11, and to paragraph 2 and the single paragraph of article 33 of *Código do Imposto Municipal de Sisa e do Imposto sobre as Sucessões e Doações* (Municipal Property Transfer Tax and Gift and Inheritance Tax Code), approved by Decree-Law no. 41969 of 24 November 1958. This Law comes into force on 1 January 2001.
29 December (Regulation no. 35/2000 of the Stock Market Commission, Official Gazette no. 299, Series II)	Under the provisions laid down in subparagraph n) of article 9 and of article 26 of the Statute of the Stock Market Commission, approved by Decree-Law no. 473/99 of 8 November, and subparagraph b) of paragraph 1 of article 353 of the Stock Market Code, approved by Decree-Law no. 486/99 of 13 November, fixes the rates due to the Stock Market Commission. Revokes Regulation no. 9/2000 of 23 February. This Regulation comes into force on 1 January 2001.
29 December (Law no. 30-B/2000, Official Gazette no. 299, Series I, A, Supplement)	Approves the Major Options of the Plan for 2001.

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