1. INTRODUCTION

What general guidelines should fiscal policy follow in the new setting where Portugal has joined the group of countries founding the single currency? Should this policy continue to focus on the reference values for the deficit and debt as established in the Treaty, which provided the criterion for accession to that group? Or should other figures be used instead? Other reasons apart, the sole existence of the Stability and Growth Pact for the period post-1999, with the accompanied sanctions for indisciplined public finances, indicates by itself that the interest for fiscal discipline is not confined to the moment countries are selected for integrating the core founding the euro.

In this paper, we shall discuss these questions. Section 2 starts by identifying the main attributes of what might be considered a steady-state of economy, to be attained in the long-run, leaving aside for a while the problem of adjustment or transition to that situation. In this initial section, we stress the required consistency — or mutual compatibility — between the long-run reference values for budget and for public debt. Section 3 tackles the problem of cyclical fluctuations around the steady-state. In this context, we propose a rule for fixing the budget balance, that ensures the stability of the chosen long-run solution in the presence of perturbations affecting the economy. The specific form suggested for the rule solves, in turn, the transition problem since it ensures simultaneously the convergence from the initial situation to the long-run reference values. As a means of illustration, section 4 applies the methodology suggested in the previous section to the Portuguese case, stressing the fiscal effort required in the transition period. Section 5 compares our results with those of alternative specifications. Finally, section 6 concludes.

2. COMPATIBILITY OF OBJECTIVES

How to define a long-run steady-state in the euro regime from the viewpoint of the budget and public debt? The following features should necessarily be among the minimum requirements:

1. The public debt to GDP ratio, represented by $\beta = B / Y$, where $B$ and $Y$ stand respectively for the stock of public debt and GDP, should be stabilized. This is a simple corollary of the concept of steady-state\(^{(1)}\), which assumes that the relevant variables are stable at their final equilibrium levels.

2. The steady-state value of $\beta$ at which such stabilization takes place in the long-run should not surpass the 60 per cent threshold. This is the limitation imposed by the Treaty. Since this is an upper bound, the problem of knowing what should be the specific value (inside this limit) that better fits our budgetary policy arises. Therefore, the choice of such reference value — to which the public debt ratio must converge in the long-run — appears as one of the basic options present in the analysis that follows.

\(^{(1)}\) Note, however, that this is not strictly a necessary condition for dynamic sustainability. Indeed, dynamic sustainability requires only that $\beta$ grows at a rate smaller than the difference between the interest rate and the growth rate of the economy.
3. Medium-run budgetary positions must be close to balance or in surplus. Though not very precise in quantitative terms, this is a constraint imposed by the Pact.

4. The overall deficit as a percentage of GDP, hereafter represented by \( \phi \), should not surpass the 3 per cent threshold at each moment. This, too, is a constraint imposed by the Treaty, and takes the form of an upper limit.

We should start by identifying the options available regarding the long-run reference values for public debt and deficit, within the above constraints.

To what values should the debt ratio \( \beta \) and the overall public deficit \( \phi \) be forced to converge, through the continued implementation of budgetary policy during the transitional stage?

A first key aspect to bear in mind in choosing the long-run reference values for the debt and deficit ratios is that these choices are not independent, but interrelated. Under these circumstances, the mutual compatibility of values chosen is essential, since the fiscal policy designed may prove internally inconsistent otherwise.

It can be shown that the public debt to GDP ratio \( \beta \) evolves approximately according to the following expression\(^{(2)}\):

\[
\Delta \beta = \delta + \beta_{-1}(i - y) + u,
\]

where, for annual data, \( \Delta \beta \) indicates the annual change in the ratio \( \beta \), \( \delta \) stands for the primary deficit (as a percentage of GDP) in the respective year and term \( \beta_{-1}(i - y) \) is the debt ratio at the end of the previous year \( \beta_{-1} \) times the difference between the nominal interest rate \( i \) (that the State pays in debt) and the nominal GDP growth rate, \( y \). The residual term \( u \) reflects the effect of other non-fiscal impulses on the dynamics of debt — e.g., those resulting from revenue due to privatisation operations, or from public liabilities — whether explicit or implicit — in the Health, Social Security, guaranteed debt, financial system, etc. These impulses were not considered in the simulation, due to the inaccuracy of the available estimates, and also because some of these have opposing algebraic signs, hence partly cancelling out each other.

The stabilization of ratio \( \beta \) in a steady-state means a null change, \( \Delta \beta = 0 \), thus (1) yields:

\[
0 = \delta + \beta_{-1}(i - y),
\]

where \( \delta \) and \( \beta \) stand for the stabilized long-run values for \( \delta \) and \( \beta \).

Considering in turn that this is the steady-state of a small open economy, integrated in a wide European area with a single monetary policy, specification (2) can be further specialised. Indeed, under these circumstances we can admit that some of these parameters will be essentially exogenous.

For instance, the growth rate of nominal GDP is basically equal to the sum of European inflation\(^{(3)}\) \( p^* \) to the growth of domestic real potential output, \( q^* \) — two variables that for distinct reasons are difficult to be influenced by domestic authorities. Thus, we admit that \( y \) equals exogenous value \( y^* \), given by:

\[
y^* = q^* + p^*.
\]

Likewise, in such a framework it seems likely that the nominal interest rate should be considered also exogenous:

\[
i = i^*
\]

Therefore, only two non-exogenous variables remain in our specification, the primary deficit \( \delta \) and ratio \( \beta \):

\[
0 = \delta + \beta_{-1}(i^* - y^*),
\]

In turn, the following definitional relationship between primary deficit and overall deficit should hold in the long-run:

\[
\phi = \delta + \beta_{-1}i^*,
\]

where \( \phi \) stands for overall deficit in the long-run. From (5) and (6) we obtain:

\[
\beta \equiv \frac{\phi}{y^*}.
\]


\(^{(3)}\) Samuelson-Balassa-type effects are here being disregarded.
Expressions (6) and (7) reveal the mutual compatibility relationships that must necessarily prevail in the long-run: once known the interest rate \( i^* \) and the nominal growth rate of the economy \( y^* \), and once chosen a reference value for any of the three variables \( \beta \), \( \phi \) or \( \delta \), the remaining two variables are residually determined(4).

Diagram 1 illustrates this independence and the need for a consistent set of long-term targets, assuming a nominal growth rate of the Portuguese economy of 5 per cent and a nominal interest rate of 5.5 per cent(5).

Suppose that the direct choice made by the fiscal authority regards the public debt to GDP ratio \( \beta \), measured in the horizontal axis in diagram. The vertical axis indicates the compatible values for the overall and primary deficit. The upward sloping line stands for the overall deficit consistent with the value for \( \beta \) chosen in the horizontal axis, and is given by (7):

\[
\overline{\phi} = \overline{\beta} y^* ,
\]  

while the downward sloping line refers to the corresponding primary deficit, given by (5):

\[
\delta = \overline{\beta} (y^* - i^*) .
\]  

Since this line indicates negative values, these represent primary surpluses. Lastly, the horizontal line indicates the 3 per cent of GDP threshold the Treaty and the Stability Pact establishes for the overall deficit.

Choosing for instance a reference value of 60 per cent for the debt ratio, points \( a \) and \( a' \) indicate the corresponding long-run values for primary and overall deficit — in this case, -0.3 per cent (a surplus) and 3 per cent, respectively. \( b \) and \( b' \) indicate the values for the primary and overall deficit corresponding to a debt ratio of \( \overline{\beta} = 40 \) per cent, while points \( c \) and \( c' \) are associated to a 20 per cent ratio. Note again that primary surpluses are required in the long-run, independently of the choice of \( \overline{\beta} \). Also note that a balanced budget \( (\delta = 0) \) requires in the long-run that the public debt ratio is null \( (\overline{\beta} = 0) \), as well as the primary balance \( (\delta = 0) \).

Table 1 exhibits the compatible values for primary deficit \( \delta \) and overall deficit \( \phi \) for several alternative choices of \( \overline{\beta} \).

As shown, a primary surplus emerges in all cases, except when the public debt ratio in steady-state is null. In this case, both the overall balance and the primary balance are also null(6).

Once acknowledged the need for a consistent set of long-run objectives for the three key variables — debt ratio, overall balance and primary balance — another question rises: what additional criteria beyond consistency should guide choice?

\[(4)\] These results illustrate a conclusion previously advanced by other authors (e.g., W. Buiter (1993)): In a steady-state one and only one specific value for the nominal GDP growth rate \( y^* \) is bound to ensure the strict compliance to the two Treaty reference values.

\[(5)\] For a 2 per cent inflation rate, these values imply a real growth rate of 3 per cent and a 3.5 per cent real interest rate.

\[(6)\] The low value obtained for the primary balance in the various scenarios is a consequence of having admitted quite similar values for the interest rate \( i^* \) and for output growth \( y^* \).
This is a complex issue, due to the manifold implications, some of which not confined to the economic sphere. In what follows, nevertheless, we discuss one of the most relevant aspects to this issue: the implications of this choice in the context of the constraints imposed by the Stability Pact and the Excessive Deficit Procedure on the budgetary variables and debt. This is the objective of the following analysis.

3. CYCLICAL FLUCTUATIONS

Even with a consistent set of objectives for in the long-run, an additional complication must be considered: the effects of the cyclical fluctuations of the economy around that steady-state equilibrium. Indeed, budgets depend on the economic cycle, tending to worsen when production slows down and to improve when production accelerates. It is through this reaction of the budget to the cycle that “automatic stabilizers” operate. These represent a positive feature as it helps to attenuate the cyclical fluctuations in the economy.

Being a positive feature, “automatic stabilization” should at the least be preserved in the future design of fiscal policy. At the least, in the sense that with the loss of the exchange rate and monetary instruments, stabilization of asymmetric shocks will become virtually confined to the fiscal sphere.

In this context, how should the preservation of automatic stabilizers — and the fluctuations in the budget balance they imply — be made compatible with the deficit and debt limits resulting from the Treaty and the Pact? The obvious suggestion is to adjust the reference values to levels sufficiently below those limits, so that these thresholds are not crossed when negative cyclical fluctuations occur. More specifically, in what concerns the budget balance this implies that the overall deficit should be calibrated to a reference value below the 3 per cent threshold, so that when the economy decelerates the deficit is allowed to rise automatically (due to the stabilization mechanism) without triggering sanctions.

What value below 3 per cent should therefore be chosen?

Before answering to this question, a preliminary issue should be mentioned. One may ask whether the suggested reduction on the steady-state deficit to levels below 3 per cent would not bring negative consequences to aggregate demand — more specifically, a sustained reduction in its value, yielding systematic depressing effects on output and employment. It is our belief that a reduction of this kind cannot yield a chronic effect to aggregate demand. In the long-run — that which concerns the present analysis — the assumption of price flexibility must be taken into account, which implies that aggregate demand should equate equilibrium output. The sustained reduction of deficit may result in adjustments in composition of aggregate demand, but not in a reduction in its total value.

Returning to the issue of what should be the specific value for the budget that provides a reference to fiscal policy, let us consider the primary deficit $\delta$ broken-down into the following parts:

$$\delta = \bar{\delta} + z$$

where $\bar{\delta}$ is its average steady-state value (as a percentage of GDP) and $z$ is the cyclical deviation from $\bar{\delta}$. Component $z$ is therefore a stochastic variable, possibly exhibiting serial correlation, which depends on the cyclical position of the economy. So $z$ can be written as follows:

$$z = A(L) \cdot \text{cycle},$$

where $A(L)$ is a polynomial in the lag operator $L$. In turn, $\text{cycle}$ is a stationary variable following a path described by

$$\text{cycle} = B(L) \cdot \epsilon,$$

where $B(L)$ being a polynomial in the lag operator and $\epsilon$ an impulse with $E(\epsilon) = 0$ and $\text{Var}(\epsilon) = \sigma^2_\epsilon$. When output is sustainably at its equilibrium steady-state value $\text{cycle} = 0$, $z$ will take its zero steady-state value. Thus, $z$ is a stochastic variable with zero steady-state mean $E(z) = 0$, and steady-state variance $\sigma^2_z$. In turn, the overall deficit equals:

$$\phi = \delta + \beta_i \cdot i^* = \bar{\delta} + z + \beta_i \cdot i^*.$$

Assume in this decomposition that the major source of variability in $\phi$, in the steady-state, originates in the cyclical component of the economy,
the term z. We therefore admit that the variability in the interest expenditure is negligible in the context of our description of steady-state (due to the presumably stable behaviour of β, or the low volatility of i*), so that βi* basically behaves as a constant.

In this setting, the first question arising when attempting to design an appropriate rule for fixing each period the primary balance in the steady-state is that of the stability of the steady-state solution itself.

Consider the dynamic equation for debt previously indicated in (1), evaluated around the steady-state:

$$Δβ = 0 = Δβ + B(i* - y*).$$

Rearranging slightly, the deviations from the steady-state can be written as follows:

$$β = \delta + z + β_i[1 + (i* - y*)].$$

(14)

Note that the dynamics of β around the steady-state will be unstable when the coefficient for β<sub>-1</sub> is greater than one — i.e., when i* > y*, which happens under the current numerical assumption i = 0.055 and y* = 0.05.(7) This suggests the need for introducing a corrective term in the rule for fixing the primary balance, which may stabilise the dynamic behaviour of β, without however affecting the stationary expected value δ. As we shall see below this corrective term will simultaneously force the convergence of β to its steady-state value. Therefore, we propose that the planned value for δ at each period should be described by the following expression:

$$δ = \delta + E(z|Ω_{-i}) + λ(β - β_i).$$

(15)

In this expression, E(z|Ω_{-i}) stands for the expected value of the cyclical deficit in the period, conditioned on the information available in the previous period, Ω_{-i}. Therefore, this term represents the anticipated dynamics in the primary deficit — i.e., the inertia component of its behaviour. Its inclusion indicates that we want to allow for the automatic stabilizers to operate(8) — an operational attribute that, as referred above, is highly desirable. In turn,

$$θ = λ(β - β_i) < λ ≤ 1$$

(16)

is the correcting term in the dynamic behaviour of β, which will be stabilising if λ is appropriately chosen. Indeed, substituting rule (15) into (14) yields the dynamics around the steady-state described by:

$$β = \delta + z + β_i[1 + (i* - y* - λ)].$$

(17)

which is stable provided that λ > i* - y*.

However, a higher value for λ may still be preferable. In fact, if λ ≥ i*, not only stability is achieved but also an additional result is obtained: overall debt does not worsen when β suffers an exogenous shock (increase). Indeed, by including the corrective term (16) in the primary deficit, the overall deficit expressed in (13) can be rewritten as follows:

$$φ = \delta + z + λ(β - β_i) + β_i i*$$

$$= \delta + z + λβ - (λ - i*)β_{-1},$$

(18)

which, with λ ≥ i* ensures that an unexpected worsening of β_{-1} does not worsen the overall deficit in the following period — a result which may be of interest for fiscal policy design(9).

4. AN EXAMPLE

We shall refer to the Portuguese historical experience to illustrate a strategy of the type just suggested. Diagram 2 summarizes the basic ingredients of this strategy.

Our first concern refers to the description of the dynamic behaviour of the cyclical component, that is, the estimation of polynomial B(L). Therefore, we started by measuring the cycle applying the

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(7) This is the only relevant case, since the inverse relation i* < y* implies dynamic inefficiency in the economy. See for example Blanchard and Fisher (1989).

(8) Recall that the unconditional expected value of z is zero.

(9) In turn, comparing the value of overall deficit in (18) with its steady-state level δ, and ignoring the cycle term yields:

$$δ - φ = (λ - i*)(β_{-1} - β)$$

(19)

which shows that, with λ ≥ i* and β_{-1} > β, the overall deficit converges to its long-run level from below.
The left-hand side is the previously used variable \( \delta \). The second and third terms in the right-hand side reflect the cyclical influence on the balance, possibly with a lag. Hence, coefficients \( \gamma_1 \) and \( \gamma_2 \) reflect the sensitivity of the primary deficit to the cycle and the estimated values were used in the simulations.

Estimation of (22) gave the following results (\( t \)-values in brackets)\(^{(15)} \):

\[
\delta = 0.01 + 0.477 \text{cycle} - 0.429 \text{cycle}_{-1} + \eta. \tag{23}
\]

\[
R^2 = 0.47 \quad s.e.e = 0.01 \quad Q = 2.5(0.61)
\]

The size and sign of the coefficient \( \gamma_2 \) suggest a partial correction factor, after one year\(^{(16)} \). According to (15) and given the estimated coefficients for \( \gamma_1 \) and \( \gamma_2 \), the control instrument — i.e., the planned primary balance — was defined as:

\[
\delta = 3 + 0.477 \text{cycle} - 0.429 \text{cycle}_{-1} + \lambda(\beta - \beta_{-1}). \tag{24}
\]

Here, as previously noted, \( \delta \) and \( \beta \) should be compatible values. Furthermore, the choice of the coefficient \( \lambda \) requires caution. On the one hand, \( \lambda \) should be great enough, as mentioned, to ensure at the least dynamic stability\(^{(17)} \). On the other hand, an excessively high value, given the differential constraints of the model.

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\(^{(10)}\)The series was stretched to comprise years from 1994 to 2000, using estimates of the Banco de Portugal.

\(^{(11)}\)This analysis was limited to the period running from 1977 to 1996 due to the conviction (supported by some evidence) that the cycle dynamics in this period was different from that in the previous years.

\(^{(12)}\)Bowman-Shenton test, with result \( \chi^2(2) = 0.062[0.97] \).

\(^{(13)}\)A bootstrap analysis was also carried out using historical residuals \( \varepsilon \). However, given the limited sample, the density function found through this procedure was particularly jagged.

\(^{(14)}\)If the primary balance exerts simultaneously a significant contemporaneous influence on the cycle, the contemporary sensitivity of the balance vis-à-vis the cycle may be overestimated. This being the case, the conclusions below on the risk of violating the 3 per cent threshold for the deficit due to cyclical fluctuations may be overcautious. Nevertheless, alternative specifications are considered below.

\(^{(15)}\)See below the discussion of alternative specifications.

\(^{(16)}\)A conjecture consistent with this result would be that, after an improvement in the budgetary balance in a given year (for cyclical reasons) fiscal authorities would tend to relax fiscal discipline in the following year. Conversely, a deficit worsening in a given year is followed by a pressure towards greater fiscal control in the next year. Being systematic, this discretionary behaviour of authorities would become an additional component of the automatic stabilising mechanism, hence attenuating the impact of the latter. If this conjecture is valid, then the application of the Stability Pact may lead to the future elimination of this behaviour and the resulting amplification of the impact of conventional automatic stabilisers.

\(^{(17)}\)According to (17), stability is attained if \( \lambda > \lambda - y \), which in the present case requires \( \lambda > 0.005 \).
ence between the initial value of $\beta$ and its steady-state value may imply an initial effort of adjustment of such magnitude that its implementation becomes politically infeasible.

In the simulation below, and considering that the initial level of $\beta$ (its value in 1996) is around 67 per cent\(^{(18)}\), four alternative values were considered for $\lambda$\(^{(19)}\): 2.5%, 4.0%, 5.5% and 7%.

In turn, four alternative hypothesis were considered for the steady-state debt ratio: $\beta = 40\%$, $30\%$, $20\%$ and $0\%$. The corresponding steady-state values for primary and overall deficits which are compatible with those figures were presented in table 1.

Chart 1 depicts historical values up to 1996, together with a simulation of the overall and primary balances up to year 2030, with $\beta = 30\%$ chosen for the steady-state value of the debt to GDP ratio. The correcting term parameter $\lambda$ was fixed at 3.5%.

The behaviour of the cyclically-adjusted overall balance reflects the reduction in interest expenditure. This is due to the sustained reduction of the debt ratio, from its initial value ($\beta_{96} = 67\%$) to the steady-state level $\beta = 30\%$. Sometimes the overall balance exceeds the three per cent threshold, although the probability of such event is not constant through time.

It is therefore of great interest to know the probability of violating the threshold, measured as the percentage of time, for a given horizon, for which overall deficit $\phi$ exceeds the 3 per cent limit. Attempts to calculate this probability were made in the simulations below. Since in all the scenarios analysed the ratio $\beta$ decreases over time, from its initial value in 1996 to its steady-state level, interest expenditure decrease alongside the former, and the probability of surpassing the limit will thus tend to fall over time, until reaching a final value in the steady-state. On the other hand, however, the influence of the “initial conditions” must be taken into account in what concerns the cycle. Here the influence is contrary to the one of the debt: the initial cyclical position in 1996 is such that it allows us to foresee a positive contribution to the primary balance in the forthcoming years. This means that the term $E(z|\Omega_{96})$ in (15) is positive in the near future. This point is illustrated in chart 2, which describes the expected value of the cycle in the forthcoming years.

The long-term equilibrium value of zero for this term explains why, on this account, the probability of violating the limit is lower in the near future, tending to increase with time afterwards. Lastly, there is still the possibility that a very strong budgetary effort at the beginning results in such a drastic budget reduction that the deficit is promptly diminished to a level below its long-run equilibrium (see footnote 9), approaching this level from lower values. If this happens, the probability of surpassing the boundary shall tend to increase over time.

In view of this set of possibly contradictory effects, it would be interesting to calculate such probability for four distinct horizons: 2005, 2015, 2025, and only as a reference the stationary probability (infinite horizon)\(^{(20)}\). 1,000 simulations for the behaviour of overall balance were made for each horizon (and for each value of $\lambda$ and $\beta$). For each simulation the percentage of periods where $\phi > 3\%$ was calculated, and finally the average of those percent-

\(^{(18)}\)This was the best available estimate at the time simulations were ran (September 1997). In measuring gross debt, accumulated capitalised interest of saving certificates and CEDEP (sinking fund related to the payment of interest on capitalisation bonds) were excluded.

\(^{(19)}\)See previous discussion around expression (18).

\(^{(20)}\)The limit situation (infinite horizon) corresponding to steady-state probability was calculated by approximation: we considered an hypothetical horizon, sufficient long to eliminate completely any trace of the influence of initial conditions.
ages was computed. Tables 2, 3, 4 and 5 present the results. The following general conclusions can be drawn from an analysis of the tables:

a) The probability of violating the 3 per cent threshold (for overall deficit) does not evolve uniformly over time in all scenarios. Indeed, it tends to increase in some scenarios, while decreasing in others. This is basically a consequence of the choice of the intervention coefficient $\lambda$: as reported (21) the overall deficit tends to converge to its long-term value from below when $\lambda > i^* (i^* = 0.05)$, and from above whenever $\lambda < i^*$. Hence the probability of violating the threshold will tend to rise over time in the first case, decreasing in the second case.

b) For a given horizon, the greater the correcting budgetary effort — given by the term $\lambda (\bar{\beta} - \beta_0)$ in (15) — the lower the probability of violating the threshold. In turn, the greater the value of the intervention coefficient $\lambda$ and the more ambitious (i.e., the lower) the target for the steady-state debt ratio $\bar{\beta}$, the greater the required effort.

The tables suggest that the probability of violating the 3 per cent ceiling can be substantial in some scenarios. For example, if the objective is to lower the debt to 40 per cent of GDP in the long-run, and if the intervention coefficient equals 2.5 per cent, the overall deficit will, on average, surpass the ceiling in 3 years until year 2005 (38 per cent of the 9 years from 1997 up to 2005). However, this frequency can be lowered to 2 years if the intervention coefficient rises to $\lambda = 4\%$. Therefore, reducing the probability of violating the budgetary ceiling to small values may require a significant value for the intervention coefficient $\lambda$.

However, since one would expect that the increase of the corrective budgetary effort — given by term $\lambda (\bar{\beta} - \beta_0)$ in (15) — is associated with greater political difficulties in implementation, it is interesting to evaluate what this effort means in quantitative terms. We thus estimated the mean value of the corrective budgetary effort to be carried out in forthcoming years — i.e. up to year 2010 — in 6 distinct scenarios. Coefficient $\lambda$ takes one of three possible values: 4%, 5.5% and 7%, while the long-run value for debt ratio $\bar{\beta}$ is either 30% or 20%. Table 6 presents the measure of the required fiscal effort, in percentage points of GDP.

The figures in each cell are the mean value of 1,000 simulations of the cycle. The table shows that the required financial effort declines slowly in time, as a result of the progressive reduction in the debt ratio and in its gap vis-à-vis its steady-state level. Note that the budgetary effort here considered represents, according to rule (15), only one out of the three elements necessary for planning the primary balance. The remaining two are the (compatible) steady-state value for primary deficit $\delta$ in table 1, and the term representing the anticipated cyclical component of the balance, $E(z|\Omega_{-1})$ which enables the functioning of the automatic stabilizers(22).

The results now obtained are obviously consistent with those presented in the previous tables, and hence they link the budgetary effort to the probability of surpassing the deficit threshold. Thus, for example, for a long-run objective for $\bar{\beta}$ of 30 per cent, and fixing $\lambda$ at 4 per cent, the budgetary effort for 1997 would be 1.48 per cent of GDP. Moreover, in this case we have $\delta = -0.0015$. Given the initial conditions for the cycle,

(21)See (19) in footnote 9.

(22)Only to some extent, it should be said, since the correction term represented by the fiscal effort — of a contractionary nature — can possibly cancel this effect.
(21) the estimate for the cycle position in 1997 is:

\[
E(\text{cycle}_{97}) = -0.0081.
\]

With this result and the value of \( \text{cycle}_{96} = -0.01694 \) and \( \text{cycle}_{95} = -0.02015 \) and using (21) the estimate for the cycle position in 1997 is:

\[
E(\text{cycle}_{97}) = -0.0081.
\]

The primary deficit planned for 1997 in this intervention scenario thus equals:

\[
\delta = 3 + E(z | \Omega_{96}) + \lambda(\beta - \beta_{-1}).
\]

\[
= -0.0015 + 0.0034 - 0.0148 = -0.0129,
\]

that is, a primary surplus amounting to about 1.3 percentage points of GDP.

5. ALTERNATIVE SPECIFICATIONS

In the previous analysis the possibility of an influence from the budget to the cycle was disregarded. However, this possibility should be examined for two reasons: first, if this causality exists, the estimates for the sensitivity of the balance to the cycle in regression (23) are biased; second, in the simulations with alternative intervention scenarios (e.g., different values for coefficient \( \lambda \)) the impact of these interventions on the cycle itself would have to be included, instead of considering the cycle as an exogenous element.
However, an analysis of the possible causality from the budget balance to the cycle does not seem to provide clear-cut evidence that a significant influence exists. The equation that follows, estimated for the period running from 1986 up to 1996, does not reveal such influence:

\[
\text{cycle} = 0.89 \text{cycle}_{-1} - 0.26 \text{cycle}_{-4} + 0.35 \delta + 0.42 \delta_{-1}, \tag{25}
\]

\[
R^2 = 0.84, \quad \text{s.e.e} = 0.014, \quad Q = 1.3(0.53).
\]

The inability to find this direction of causality can possibly be rationalized in different ways (23). One of these — frequently referred in similar contexts — admits that the budget yields real effects on the cycle only in the presence of non-anticipated budget changes. Therefore, in a context of very predictable budgetary changes, with little innovative content, the balance would render no significant influence on the level of real activity.

Anyway, at least as regards the issue of the budget sensitivity to the cycle and the possible bias of its estimate (24), alternative hypothesis to the use of specification (23) should be tested. Therefore, an alternative specification based upon the European Commission Procedure was considered. This procedure uses elasticities to measure the sensitivity of the budget vis-à-vis the cycle. First, elasticities are estimated for the different components of tax revenue and expenditure, which are next integrated in an overall elasticity that weights each of these items (25). The application of the Commission methodology to the Portuguese case produced the following specification of the cyclical budget:

\[
\text{cyclical budget} = 0.44 \text{cycle}, \tag{27}
\]

where the overall coefficient 0.44 corresponds to the difference between the coefficient of revenue sensitivity to the cycle (0.34) and that of expenditure (-0.1).

It should be noted in the first place that the current methodology does not specify the level of the budget balance, around which cyclical fluctuations occur. Hence it can be calibrated to the following value:

\[
\delta + \lambda(\beta - \beta_{-1}),
\]

as done before. Secondly, note that the coefficient 0.44 is quite close to the value which in the previous specification (23) measures the sensitivity of budget to the contemporary value of the cycle, 0.48. However, despite a similar contemporaneous reaction of the balance, the previous specification also comprised a correcting term in the following period. Therefore, the implication of this disparity to the variability of the budget balance should be considered. Does the Community specification (27) imply a greater or smaller budget variability than the previous specification? That is, does it imply a higher or lower probability of surpassing the 3 per cent ceiling?

The variance of the primary balance in the current specification is given by:

\[
\text{var}(\delta) = (0.44)^2 \text{var} \left( \text{cycle} \right). \tag{28}
\]

Using (22) and (20) it can be shown that the variance of the primary balance in the previous specification is given by (26):

\[
\text{var}(\delta) = \left[ \gamma_1^2 + \gamma_2^2 + \frac{2 \gamma_1 \gamma_2 a_1}{1 - \alpha} \right] \text{var} \left( \text{cycle} \right). \tag{29}
\]

Despite the fact that the 0.44 coefficient is indeed close to coefficient \( \gamma = 0.48 \), the presence of the correcting term in the previous specification \( (\gamma_2 < 0) \) helps to lower variance below that yielded by the Community calculation method. Formally we have:

\[
(0.44)^2 \left[ \gamma_1^2 + \frac{2 \gamma_1 \gamma_2 a_1}{1 - \alpha} \right] =
\]

\[
(0.194) \left[ 0.23 + 0.18 + \frac{-0.54}{17} \right] = 2,
\]

meaning that the Community method implies a variability about twofold that previously calcu-

---

(23) The same specification, estimated for the longer period (1977 to 1996) still does not indicate unequivocally this influence:

\[
\text{cycle} = 1.38 \text{cycle}_{-1} - 0.74 \text{cycle}_{-4} + 0.22 \delta + 0.15 \delta_{-1}, \tag{26}
\]

\[
R^2 = 0.82, \quad \text{s.e.e} = 0.014, \quad Q = 9.7(0.08).
\]

(24) See footnote 14.

lated. Therefore, if this method is chosen, the fiscal policy guidelines should be more rigorous than those implicit in tables 2, 3, 4 and 5.

As a means of illustration, table 7 shows the probabilities of exceeding the 3 per cent threshold for $\beta = 20\%$ using the Community method of simulation of the budget.(27) The probabilities calculated according to this methodology are increased between 2 and 5 percentage points.

### Table 7
**PROBABILITY OF OVERALL DEFICIT ABOVE 3%**
Methodology of the Community for calculating cyclical budget
Public debt (at steady-state) =20% GDP

<table>
<thead>
<tr>
<th>$\lambda$</th>
<th>2005</th>
<th>2015</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.025</td>
<td>0.26</td>
<td>0.23</td>
<td>0.21</td>
</tr>
<tr>
<td>0.04</td>
<td>0.09</td>
<td>0.10</td>
<td>0.09</td>
</tr>
<tr>
<td>0.055</td>
<td>0.04</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>0.07</td>
<td>0.02</td>
<td>0.03</td>
<td>0.03</td>
</tr>
</tbody>
</table>

(27) By Community methodology we refer to the use of expression (27) instead of (23). Rigorously, the procedure here presented is different from the usual procedure of the European Community, since in the present simulation the autocorrelation in the cycle is taken into account.

6. CONCLUSIONS

Returning to the questions raised at the beginning, on the major fiscal policy guidelines to be followed in the context of the monetary union and the Stability Pact, the following general answers can be given based upon the previous analysis:

1. The choice of long-run objectives, defined in terms of primary and overall budget balances and public debt, should first of all be mutually consistent.

2. With plausible values admitted for the interest rate and the nominal growth of GDP, this compatibility requires a virtually balanced primary account in the long-run.

3. However, in the short- and medium-term, an additional budgetary effort is required for the primary balance, to reduce public debt to significantly lower values. This reduction is essential if a low probability of violating the 3 per cent ceiling for overall deficit, defined by the Stability Pact, is to be attained.

4. The budgetary effort ultimately depends on the violation probability one wants to admit. For instance, a violation probability ranging between 6 and 35 per cent up to year 2005 requires in the short run a budgetary effort on the cyclically adjusted primary surplus ranging between 0.8 and 1.8 per cent of GDP, respectively. Obviously, other options are feasible in our framework, including the use of the European Community methodology, which in general points to higher levels of budgetary intervention required.

5. The required budgetary effort should concentrate in the near future, since this is the period where the probability of exceeding the threshold is higher, due to the initial magnitude of the debt. It tend to decrease gradually afterwards with the progressive reduction of this magnitude. The need for concentrating the fiscal effort mostly at the beginning, together with the risks of an initial asymmetric recession are reasons that suffice for an increased monitoring of the recent and forthcoming fiscal developments, as well as their articulation with the contribution from privatisation revenues.

REFERENCES

European Economy (1995), European Commission, no. 60.