COMMUNICATIONS

ASSESSING A SAFETY MARGIN FOR THE FISCAL DEFICIT *VIS-A-VIS* THE EMU CEILING

1 INTRODUCTION

The 3% EMU ceiling for the fiscal deficit, as laid down in the Maastricht Treaty, introduces a new element in designing fiscal policy. During the past decades, the major considerations in setting targets for fiscal policy in The Netherlands were stabilization of the economy (from the second half of the 1950s on to the late 1970s) and deficit reduction (in the period from 1982 to 1994). Unlike these considerations, the EMU ceiling introduces an element that is not directly based on the state of the (Dutch) economy or public finances. Its immediate significance for designing fiscal policy lies in the restriction it brings about by imposing a cost if the ceiling is exceeded.[1] Moreover, continuously respecting this restriction calls for a margin between the projected deficit and the ceiling for reasons explained below. This paper deals with the problem of assessing a reasonable size for this margin.

One of the relevant factors for determining the necessary margin is the present line of fiscal policy in The Netherlands. This policy line has been pursued by the cabinet that took office in 1994 and will probably be followed by the succeeding cabinet. One of its characteristics is that the deficit policy is a-cyclical in nature. The deficit is allowed to fluctuate in response to the business cycle, up to a maximum bounding its upward deviations. This allows for the beneficial effect of automatic stabilizers. It also renders the necessary margin between the deficit and the ceiling as the relevant issue. Assessing this margin is the aim of this paper. This has also been one of the questions addressed by the 'Studiegroep Begrotingsruimte' (Study Group on the Budget Margins) in its 1997 report.

1 This cost has the form of the obligation for the country to deposit a non-interest bearing sum of money at an international institution. This sum depends on the size of the excess deficit. If the EMU ceiling is still exceeded after two years the deposit is converted into a penalty. The country then loses the money. In addition there are of course costs in terms of reputation and credibility which might show up in a higher risk premium on the interest rate of national debt.

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Another feature of present fiscal policy in The Netherlands is the cautions macro-economic growth assumption underlying the calculation of the budgetary room for tax relief, spending increases and/or deficit reduction during the four-year cabinet period. GDP growth is set at 2% per year, which is below the 2¼% average in the 1974-1997 period and far below current growth rates, which are in the order of 3% or more. This cautiousness obviously reduces the probability of exceeding the ceiling. The necessary margin in a cautious scenario is obviously smaller than what would be required in case of an unbiased forecast.

The other major factor determining the safety margin is the magnitude of the possible deficit variations. Its main determinants are the fluctuations in real GDP growth and the sensitivity of the deficit to these fluctuations in GDP. This sensitivity has been explored both by the OECD (1995) and CPB Netherlands Bureau for Economic Policy Analysis (Rele (1995)) in order to estimate the cyclical component of the deficit. Both studies yield comparable results. In particular, a 1% higher GDP level leads to a 0.7 percentage point lower deficit (expressed as a fraction of GDP). According to the CPB study the relevant time lag is about one year.[2]

2 TIME-SERIES ANALYSIS

In exploring the margins for future GDP growth, we apply univariate time-series analysis (Box and Jenkins (1976)). As will be shown in section 3, this approach enables us to draw conclusions with respect to the risk margin associated with the uncertainty of future GDP growth. This approach only employs past information on GDP growth. The method is merely descriptive in nature and does not offer an explanation of economic growth.

What would be an appropriate time period for the analysis? Since the oil crisis in the early seventies, the European economies have entered a new era characterised by lower growth rates than before. However, starting the analysis at this point would leave us with a fairly small number of observations even more so because we lose observations by using lagged variables. Accordingly, we analyze GDP data over the years 1970-1998 and use GDP figures for earlier years as lagged variables. The most recent observations are estimates. The choice of the observation period of course introduces an element of uncertainty in the analysis. In the next section we shall further discuss this issue.

The time series for total GDP growth passes the Augmented Dickey-Fuller test at the 5% level and the data generating process may thus be considered stationary. Applying standard Box-Jenkins identification and estimation to the time series for total GDP growth we arrive at the following model:

2 Both studies indicate that the deficit response to GDP fluctuations is primarily located at the revenue side of the budget. Taxes and social security contributions have an elasticity of 0.6. The remaining 0.1 at the expenditure side is a result of unemployment benefits.

$$Y_t = 1.51 + 0.42\ Y_{t-1} + e_{yt}$$
$$\quad\ (3.0)\quad (2.8)$$

$\overline{R^2} = 0.19$, S.E. of regression = 1.47
Ljung-Box Q-statistic lags 1−10 = 4.77, probability 0.91
Jarque-Bera normality statistic = 0.130, probability 0.94

where t-statistics are given in parentheses; Y_1 is the growth rate of GDP in year t and e_{yt} is the error term in year t. Average GDP growth according to this model is 2.6% (=1.51/(1-0.42)x100%). The Ljung-Box statistic does not signal autocorrelation in the error term. The model thus appears to be adequate. Furthermore the Jarque-Bera test statistic indicates that the error term does not violate the assumptions of a normal distribution. This result will be used in assessing the risk margin of GDP growth in the next section.

3 MONTE CARLO SIMULATION

The estimated time-series model presented in the previous section enables us to make a prediction of GDP growth over the next years. The main source of uncertainty in this prediction is the future value of the error term. Furthermore, the estimated coefficients in our model may well deviate from the actual values. As the number of observations used in estimating the model is relatively small, this effect will not be negligible. In principle, the risk margins associated with the error term and the coefficients can be derived analytically. However, for reasons of convenience, we prefer to estimate them by means of Monte Carlo simulation. We can compute random values for the error term and the estimated coefficients using the residual variance and the variance-covariance matrix of the estimated coefficients. For the error term, the normal distribution is appropriate, as was shown in the previous section. The coefficients are supposed to be normally distributed as well. Since the coefficients are not fully independent a bivariate normal distribution is applied. The results are used to predict GDP growth up to 2002. This procedure is repeated many times to obtain statistically meaningful results.

The distribution of the results in terms of GDP growth enables us to derive a risk margin. Table 1 presents the model prediction and its lower bound at a probability level of 95%. The probability that actual GDP growth will be less than the lower bound is only 5% in each year. This lower bound implies an average GDP growth of 1% per annum during the four-year period. The choice of a probability level of 95% is of course somewhat arbitrary. If we choose a 90% probability instead, the lower bound would imply an average growth rate of 1.4%.

What is the probability that the lower bound in Table 1 will not be violated during the next three years? If the probabilities for the individual years were in-

dependent, the answer would be 86%. However, if cumulated GDP growth in a certain year is above the lower bound, this creates a buffer for the following years. So the probabilities for successive years are not independent. The Monte Carlo simulation enables us to estimate the overall probability of no violation of the lower bound during the three-year period: this turns out to be 91%. If we were to apply a probability level of 90% instead of 95% for individual years, the probability of no violation of the lower bound during the three-year period would be slightly over 83%.

In the previous section the question was raised what would be the appropriate time period for the analysis. Having estimated our time-series model over the years 1970-1998, we now can employ Monte Carlo simulation to test how easily this model can reproduce average GDP growth over the years 1975-1997, which was on average only 2¼%. This figure does not turn out to be very exceptional: 30% of the simulations yield an even lower average growth rate. Accordingly, there seems to be no indication that we chose the wrong time period.

TABLE 1 – PREDICTION AND LOWER BOUND OF CUMULATED GDP GROWTH

	1999	2000	2001	2002	average growth rate
	% of 1998 GDP				
Model prediction	3.1	6.1	8.9	11.8	2.8
Lower bound (95%)	0.7	1.7	2.7	3.9	1.0

4 A SAFETY MARGIN FOR THE DEFICIT

The budget for the next four years is assumed to be based on a cautious scenario with an average GDP growth of 2% per annum. This is lower than the model prediction of 2.8% (see Table 1). Hence, some downward risk is already accounted for. However, this is not sufficient. The lower bound implies an average

TABLE 2 – DOWNWARD RISK OF ACCUMULATED GDP GROWTH

	1999	2000	2001	2002	average growth rate
	% of 1998 GDP				
Cautious scenario[a]	2.3	4.4	6.3	8.2	2.0
Downward risk[b]	1.6	2.7	3.6	4.3	1.0

[a] model prediction per year minus 0.8%
[b] cautious scenario minus 95% – lower bound

TABLE 3 – SAFETY MARGIN FOR THE DEFICIT

	1999	2000	2001	2002	average
	% of current GDP[a]				
Downward risk GDP[b]	1.5	2.6	3.4	4.0	2.9
Necessary margin deficit[c]	0.0	1.1	1.8	2.4	1.3
Maximum deficit[d]	3.0	1.9	1.2	0.6	1.7

[a] according to the cautious scenario
[b] figures are slightly lower than those in Table 2 as they are related to current GDP
[c] = 0.7 times downward risk GDP in the previous year (1998 = 0)
[d] EMU ceiling (3.0) minus necessary margin deficit

growth rate of about 1%, corresponding to a loss of accumulated GDP growth of about 4% in the year of 2002 (see Table 2).

What does the calculated downward risk for GDP imply for the fiscal deficit? It should be recalled that GDP fluctuations affect the fiscal deficit with a time lag of one year. This implies that the deficit over the years 1999-2002 depends on GDP growth in 1998-2001. Table 3 derives the necessary margin and corresponding maximum admissible deficit, taking into account the downward risk with respect to GDP growth in 1998-2001, as derived in Table 2. There is some ambiguity with respect to GDP growth in 1998. On the one hand, it is evident that any estimate made before the year is over, will be subject to uncertainty. On the other hand, this uncertainty may be relatively small because we already have a lot of relevant information at our disposal. In the present exercise we treat GDP growth in 1998 as fixed. This may lead to some underestimation of uncertainly.[3]

The results in Table 3 indicate that the maximum admissible deficit gradually decreases from 3% GDP in 1999 to 0.6% in 2002. It should be noted that these results are conditional on a 95% probability level for individual years. If, for instance, we were to apply a probability level of 90% the maximum admissible deficit in 2002 is about 1.6%. These figures are not influenced by GDP growth in 2002. The consequences of disappointing economic growth in that year will be fully passed on to the following cabinet period. As far as complying with the EMU ceiling in the years 1999-2002 is concerned, this procedure is correct. However, it may be argued that the risk of a bad start in the following cabinet period should be reduced. This would call for a lower deficit in 2002 than mentioned above.

3 In order to obtain some idea about the uncertainty related to GDP growth in 1998, we carried out a sensitivity analysis, also applying our model to 1998, thus ignoring any relevant information on economic growth in that year. The maximum deficit in 2002 turned out to be 0.8% lower as compared to the results in Table 3. As this case is obviously rather extreme, the actual error we make by taking GDP growth in 1998 to be fixed, will only be a fraction of this figure.

So far, only uncertainty with respect to GDP growth has been taken into account. However, as pointed out in the report of the 'Studiegroep Begrotingsruimte' (1997), other factors may contribute to uncertainty regarding the future deficit as well. Examples are revenues from natural gas exploitation and the deficit of local government, which is determined outside the direct control of the central government. The additional risk margin associated with these factors, however, is estimated to be less than 0.1%.[4] Consequently, the resulting figure for the maximum admissible deficit in 2002 is 0.5% GDP. The 'Studiegroep Begrotingsruimte' concludes – using a different analysis – that a figure of 1% GDP would be appropriate. In our analysis we would arrive at the same conclusion, if we would apply a probability level between 90% and 95%.

5 CONCLUSIONS

The Maastricht Treaty imposes a 3% ceiling for the fiscal deficit of EMU-member states. Allowance for business cycle fluctuations implies that the average deficit should be smaller. This paper assesses the order of magnitude of the necessary safety margin for The Netherlands, using a time-series analysis of GDP data. It should be pointed out that this is only one approach to investigate the matter. The analysis indicates that the 3% ceiling has a 91% probability not to be violated if the budget is based on a cautious scenario of 2% GDP growth per year, and the projected deficit is set on a course to move to 0.5% in 2002.

However, the analysis does not allow for a flexible policy response. If economic growth turns out to be disappointing, one can still resort to discretionary budgetary adjustments. The lagged deficit reaction to changes in economic growth even increases the scope for a timely policy response, a consideration which could justify a less strict policy line.

Hans Roodenburg, Reijer Janssen and Harry ter Rele*

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4 Separately, these additional factors require an estimated 0.5% of GDP risk margin (at the 95% probability level). The required additional risk margin of 0.1% GDP is the result of combining this risk margin with that associated with GDP growth and assuming no correlation between the two. The combined risk margin is then calculated by taking the root of the sum of squares of the separate risk margins.

* The authors work at CPB Netherlands Bureau for Economic Policy Analysis, PO Box 80510, 2508 GM The Hague, The Netherlands, e-mail: hjr@cpb.nl. They are indebted to Henk Don and Barthold Kuipers for valuable suggestions.

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