CPB Background Document

A fiscal Taylor rule

24 april 2013

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Summary

In most OECD countries, the financial crisis leads to a drop in GDP and has brought government finances into a state of disarray. As high public debt will slow down GDP growth, order in government finances must be restored, sooner or later. But by how much spending should be cut, or taxes increased, and at which pace should this be implemented?

What policy response would be optimal depends on whether a GDP shock is permanent or only temporary. The optimal response to a permanent downward shock would be slightly anti-cyclical initially, followed by a long period of gradual, permanent budgetary adjustments to curtail the public debt. When the downward shock is expected to be temporary, however, a strong expansionary response would be the best remedy. These types of shocks may be distinguished using a simple macroeconomic model; a temporary downward shock causes a considerable and immediate rise in unemployment, while under permanent shocks this is much less the case. For upward shocks, the opposite applies. It is often said that anti-cyclical policies are ineffective because policymakers react too slowly to shocks. However, even when the time to prepare policy is taken into account, an anti-cyclical response to a temporary shock can still be effective.

The timing of policy depends on the economic situation. Implementing spending cuts in the middle of a recession is unwise, because at that time the cost of such measures is the highest. Postponement gives the economy the opportunity to recover and may even contribute to strengthen public finances.

This analysis shows the importance of making policymakers aware of the difference in character between these types of shocks and of determining whether a particular shock will be permanent or temporary. Forecasters should outline this particular distinction. Temporary shocks should not be addressed by implementing spending cuts, but rather by expansionary policies. As temporary shocks are characterised by rising unemployment, a simple measure would be not to implement additional spending cuts when expenditures on unemployment and welfare benefits increase.

1 The policymaker's dilemma

The financial crisis of 2008 caused a sharp decline in GDP growth in most OECD countries. This has brought public finances in disarray; budget deficits are high and government debts are increasing. Policymakers can no longer sit back and watch how this situation spins further out of control. Government budgets will need to be adjusted, sooner or later, either through tax increases or reduced spending.

Economic research on past recessions, both in the Netherlands and in other OECD countries, has shown that spending cuts hamper GDP growth in the short term. Less growth leads to lower tax revenue, thus undoing, at least partially, the initial effect of the spending cuts.[1] And in certain situations, spending cuts are even outright counterproductive with respect to lowering the sovereign debt ratio (sovereign debt as percentage of GDP).[2] If one euro in spending cuts leads to a decrease of more than one euro in GDP in the short term, and if such cuts achieve only a limited reduction in deficit, the negative impact on the denominator of the sovereign debt ratio (the GDP) may be larger than the deficit reduction (and therefore the numerator of the debt ratio), thus resulting in a higher debt ratio.[3]

Policymakers, therefore, face a complicated dilemma under these circumstances: what are the most appropriate timing and magnitude of the required spending cuts? Acting too late would cause the sovereign debt ratio to spiral out of control, whereas taking action too early could deepen the recession. Would a single, severe intervention be best, or would the problem be better served by solving it one step at a time, addressing spending first and subsequently waiting for the economy to improve? Or would it be wisest to pull the economy out of the recession by an expansionary policy, leaving financial affairs to be put in order later?

This background document seeks, on the basis of recent economic research, a more systematic answer to these questions. What can we learn from this economic research about how economies react to recessions and to the subsequent additional spending cuts that usually follow? Can a general policy rule be derived that provides policymakers with an indication of how recession-related increasing deficits have to be addressed?

In times of economic boom, the opposite dilemma presents itself. In those times, there is more scope for government spending and/or tax reductions. But what would be the best moment to utilise this scope? Here, the same general policy rule can be applied in the reverse. For reasons of simplicity, this background document focuses on periods of recession and leaves the reader to interpret the reversed policy rule for times of economic boom.

[1] These are negative secondary effects.
[2] See DeLong and Summers (2012).
[3] A numerical example illustrates this: Assuming a spending cut of 1% of GDP would reduce the deficit by 0.5% and GDP by 1%, then, at a 70% government debt level, this would lead to an increase in sovereign debt from 70% to (70% - 0.5%)/(100% - 1%) = 70.2%.

To answer the questions above, Section 2 addresses the distinction between temporary and permanent shocks in GDP. For temporary shocks it is conceivable that no action is taken, as these types of shocks, after all, will pass by themselves. For permanent shocks, however, sooner or later, spending cuts cannot be avoided. Therefore, policymakers and economic forecasters (such as CPB Netherlands Bureau for Economic Policy Analysis), should study – more so than currently – the question of whether shocks can be expected to be permanent or temporary. Section 3 subsequently discusses the point in time at which spending cuts would be the least harmful. The worse the economic situation, the stronger the ensuing negative effect on GDP and, thus, on tax revenue. This has consequences for the best timing of spending cuts. For both scenarios, Section 4 distils the optimal policy rule and shows its economic advantages. The analysis is a first exploration of this important theme and results in two 'no-regret' recommendations. Finally, Section 5 discusses additional research questions raised by this exploration.

The first recommendation is for policymakers to make a clearer distinction between temporary and permanent shocks. The second recommendation concerns the fiscal policy framework. The Structural Budgetary Policy[4] which the Netherlands traditionally followed has increasingly been abandoned in favour of steering on a deficit target since 2010; in part motivated by the European obligation to bring the EMU deficit below 3% of GDP. In addition to the fact that the timing of budget cuts is not optimal, it also leads to pro-cyclical policy, which is undesirable especially for temporary shocks. As temporary shocks are characterised by rising unemployment, this should be addressed by excluding the higher expenditure on unemployment and welfare benefits from the deficit target, to ensure that these higher expenditures do not lead to additional spending cuts.

2 Temporary versus permanent shocks

The Netherlands has a long tradition of using large models to describe macroeconomic developments. Jan Tinbergen, the first director of CPB Netherlands Bureau for Economic Policy Analysis, received the Nobel Memorial Prize for it. These types of models are still often used today. They are meant to provide a complete description of the causal relationships between the main economic variables and, therefore, are called *structural* models.

Since the early 1980s, economists have gradually become aware of the fact that using these structural models in projections has only limited added value. This insight was largely provided by Nobel Memorial Prize winner Christopher Sims. In order to understand the basis of his conclusion, the following extremely simple model provides a useful example:

(1) Next year's growth = 0.6 x this year's growth + constant + sudden shocks

[4] The so-called *Trendmatig begrotingsbeleid*, see Bos en Teulings (2011).

Tomorrow's growth, according to the model in Equation (1), depends on current growth: 1% additional growth, thus, leads to 0.6% additional growth in the following year.[5] The constant indicates that growth always returns to a certain multi-annual average, for example 2%. Sudden shocks represent unpredictable factors. Unexpected events are unavoidable in the economy. Year on year, the economy is hit by new unexpected events, which have to be taken into account in any economic model. This simple model, which projects next year's growth in GDP on the basis of current growth, has proven to work quite well. However, it could be improved by including the unemployment rate in the projection. This causes the model to become slightly more complicated:

(2) Next year's growth = 0.6 x this year's growth + 0.3 x this year's unemployment + constant + sudden shocks

According to the model in Equation (2), both high growth and high unemployment in this year will lead to high growth in the next. Next year's unemployment can be projected in the same way:

(3) Next year's Unemployment = -0.6 x this year's growth + 0.9 x this year's unemployment + constant + sudden shocks

High growth this year leads to low unemployment next year, and high unemployment this year leads to high unemployment next year. Growth and unemployment, thus, can be projected from their own past.[6]

Reduced form models are good forecasters

This simple growth and unemployment model was analysed for the first time by Blanchard and Quah.[7] In all its simplicity, it very accurately describes both growth and unemployment. In practice, many other variables undoubtedly are also important in the effect of today's unemployment on tomorrow's growth. For example, a higher unemployment leads to a lower wage increase, which would benefit the competitive position of the Netherlands and, thus, increases its market share on the global market, which in turn would increase growth. This channel is not included explicitly in these simple models. They go straight from ultimate cause to final consequence, skipping the explanation via wage determination. Such models are called *reduced form* models, in contrast to the previously discussed *structural* models which explicitly describe the channel via wage determination.[8]

Since their introduction by Sims in 1980, many other models of this type, in addition to the Blanchard–Quah model, have been estimated. The forecasting power of these models has proven difficult to surpass. Elbourne and Teulings show that, for the projection of growth in

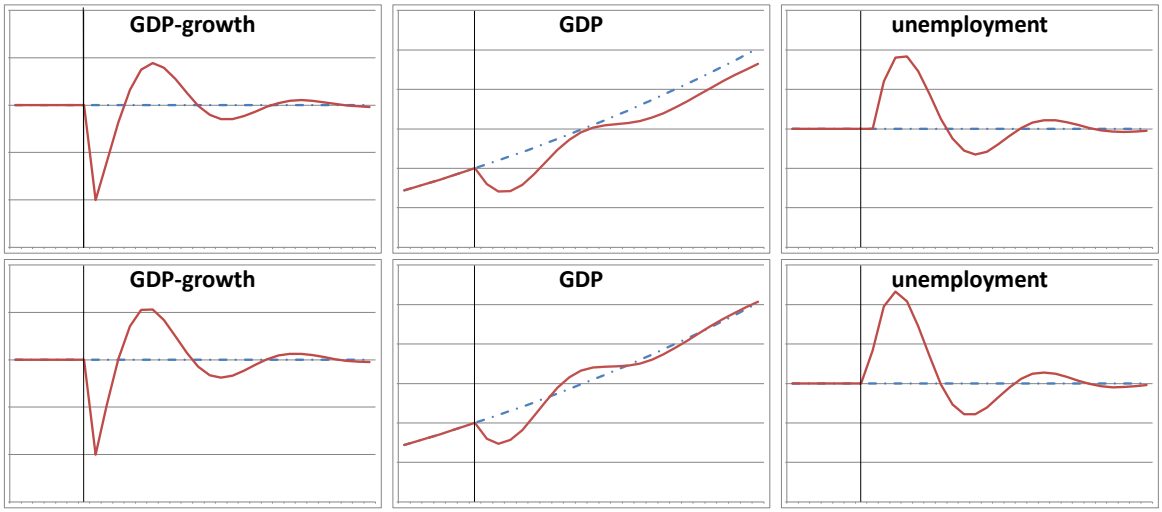
[5] This comparison has been included here as a didactic aid. The coefficient 0.6 applies to the Netherlands between 1979 and 2009.
[6] The coefficients of the model in Equation (2) and (3) have been taken from Table 1 of Elbourne and Teulings (2011).
[7] Blanchard and Quah (1989).
[8] Structural models have the disadvantage that one can never be certain whether the structure imagined by the researcher matches that of reality. High unemployment, for example, may also directly raise next year's growth as it is easier for businesses to fill their vacancies. Researchers who use a structural model have to consider continually whether or not the description of the structure is complete. Reduced form models do not have such problems, as all imaginable influences of variables for the current year generally are included in the forecast for the coming year. See Sims (1980) for an elaboration.

GDP and unemployment, both the Blanchard–Quah model and CPB's much more elaborate structural Saffier model work equally well.[9] Thus, a fair projection of next year's growth and unemployment can be made with nothing more than the data on this year's growth and unemployment.[10] A larger model often is less precise, as with more data also more interference finds its way into the model's projections. Nevertheless, slightly larger models also have their merit, in particular when additional variables introduce information that the other variables do not contain. Section 5 elaborates further on this subject.

Shocks in GDP may have a permanent impact ...

For the purpose of the analysis in this background document, the simple model suffices nicely, as a number of important lessons may be learned from this model. First, the model in Equation (2) shows that sudden shocks may have a permanent impact on GDP level.

Figure 1 Permanent shocks (upper) and temporary shocks (lower)[11]



Note: Vertical black line indicates the moment the shock hits the economy.

If a sudden shock causes growth in a year to be lower than usual, then so will the growth in the year after, because, according to the model, low growth in a year gets carried over for 60% into lower growth in the following year and for 36% in the year after that. This effect gradually diminishes and growth will return to its long-run equilibrium level. However, a couple of years of low growth will lead to a permanently lower level of GDP; nothing in the model points to a correction in later years. Figure 1 illustrates this: GDP-growth is shown on the left, and the centre graphs show the GDP level. While growth is seen to return to its long-term average, GDP itself remains below its pre-shock trend permanently. Empirical research shows that this does not apply to unemployment. Whenever the level of unemployment in a given year is higher than normal, the empirical analysis on which the Blanchard–Quah model

[9] See Table 3 in Elbourne and Teulings (2011) for a comparison of forecasting errors.
[10] This also applies to the fact that GDP forecasting quality mostly is determined by global trade. Although growth in GDP and global trade are indeed strongly related, their correlation is of little benefit to the projection of GDP, because next year's growth in both GDP and global trade are equally unknown. First projecting world trade and then using that use that in the projection of GDP growth does not improve the forecasting quality; see Elbourne and Teulings (2011).
[11] Effects of negative shocks based on estimations by Equations (2) and (3).

is based estimates that it will return to its long-term equilibrium within approximately round five years.[12] See the right-hand graphs of Figure 1.

… but a GDP shock also may be temporary

Shocks in GDP may also be temporary. If a sudden shock lowers GDP growth while also driving up unemployment, Equation (2) shows the impact on GDP to be temporary, as a higher unemployment in one year leads to an increase in growth in the following year. Thus, a drop in GDP in the first year will be cancelled out by higher growth in the following years. This is shown in the lower graphs of Figure 1; here, the drop in GDP growth caused by a shock goes hand in hand with a rise in unemployment. Initially, the growth is lower and then higher than its long-term balance (and also higher than following a permanent shock). GDP temporarily drops below the trend line, but goes back up again after a certain amount of time.

It is tempting to interpret both temporary and permanent shocks. Permanent shocks, thus, could be said to be related to technological changes that cause productivity to be at a permanently higher or lower level. Temporary shocks appear more related to Keynesian demand shocks. For policymakers, however, the value of interpretation is secondary to making the actual distinction between temporary and permanent shocks. If a negative shock has a permanent impact on GDP it will also have permanent consequences for public finances – something which will ultimately lead to spending cuts. If a shock is temporary, the recession could be left to run its course. In that case, time will heal all wounds. By not immediately implementing spending cuts but leaving matters to the automatic stabilisers, the economy will stabilise.

The first conclusion, here, is an obvious one: policy response to permanent shocks will have to be entirely different from the response to temporary shocks. The question, therefore, is whether both types of shocks could be distinguished. Blanchard and Quah developed such a method. Without describing this method in great detail, it can be said to be closely linked to the discussion above. If a shock initially only affects GDP it will be permanent. However, if it also affects unemployment it may be expected to be temporary. The model projects that, under a temporary negative shock, GDP will grow slightly more in the ensuing years, which will neutralise the impact of the shock. The unemployed will find employment again, causing GDP to grow above trend for some years. However, in most cases, annual shocks are some combination of a temporary and a permanent shock. Therefore, the policy response must also consist of a combination of temporary and permanent responses. Knowing the relative weight of both types of shocks is then necessary for formulating the correct policy response.

[12] In the Netherlands, currently, there hardly seems to be any hysteresis, as this would require inactivity or a lack of incentive for the inflow into the labour market by the unemployed, as well as the presence of an insider–outsider problem for wage negotiations. See also Blanchard and Summer (1986) for further elaboration.

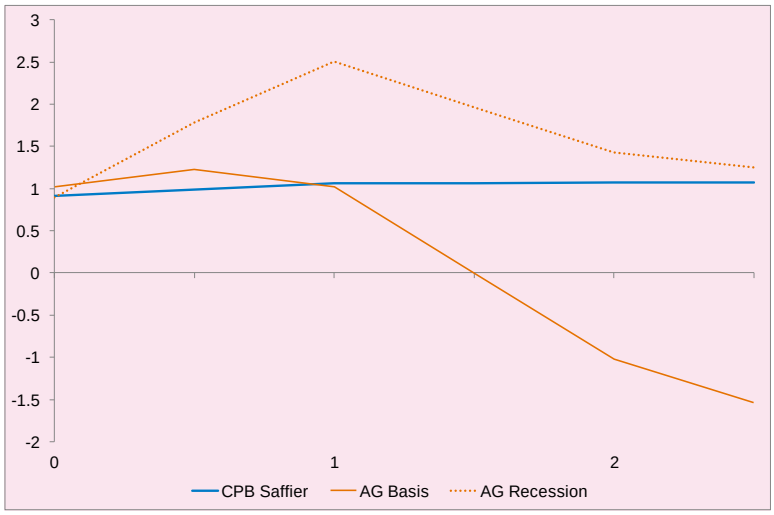
Temporary shocks related to 'output gap'

Temporary shocks are closely related to the 'output gap' concept. The output gap is potential GDP (which is roughly GDP under full employment) minus actual GDP. When the output gap is positive the deficit is - temporarily - higher, as those who are unemployed do not pay taxes and the expenditure on unemployment benefits is higher than normal. Here, the Blanchard–Quah decomposition provides an approach to estimate the output gap: the output gap equals the deviation of GDP which originates from temporary shocks. This decomposition offers an alternative to the filtering method that is currently used by the European Commission to determine the output gap, which is problematic in practice (see Larch and Salto, 2005; Kranendonk, 2003). Measuring the output gap is of great practical importance, as it is used by the European Commission to determine the magnitude of the required budgetary adjustment for each Member State. It is therefore important for policymakers to focus on distinguishing temporary shocks from permanent ones.

3 When should we consolidate?

In the short term, spending cuts reduce growth and increase unemployment. The magnitude of this negative impact is indicated by the so-called multiplier. If the multiplier equals 1, then additional spending cuts of 1% of GDP will lead to an equal decline in GDP. There would be no need to worry about the precise timing of spending cuts if the multiplier would always be the same. After all, the impact on GDP would always be the same. If a country will have to bite the bullet sooner or later, so why not do so straight away? However, when the level of the multiplier depends on the economic circumstances, the correct timing of spending cuts should be considered, as it would be best to implement them on the economically least damaging moment.

Figure 2 Fiscal multipliers are larger in times of recession[13]



[13] See CEP 2013, Section 1.2, and Suyker (2011) for an overview of fiscal multipliers during a recession. The shock occurs in material government consumption at time 0. The time indication is in years. In Auerbach and Gorodnichenko (2012) the shock is an impulse, in Saffier it is a permanent increase. The comparison, therefore, is an approximation.

Spending cuts more costly during a recession

To our best knowledge, the first articles that carefully analyse the dependency of the multiplier on the economic situation are, remarkably enough, all published within the last three years. Figure 2 shows the multipliers from a study by Auerbach and Gorodnichenko.[14] It presents the impact on GDP in subsequent years when, in the first year, public spending increases by 1% of GDP. The dotted orange line represents the multiplier during a period of recession with high unemployment. The solid orange line represents the multiplier in normal times. That multiplier clearly is lower.[15] The solid blue line in the figure represents the multiplier according to CPB's Saffier model. During the first years, this line corresponds well with the multiplier in the base scenario by Auerbach and Gorodnichenko. In times of crisis, however, it underestimates the multiplier.

Why are multipliers higher in times of recession? When the government stimulates the economy through increased spending, this has no impact on GDP if everybody in the labour force is already employed. In such a situation, there are no additional unemployed people to employ; therefore, employers can only attempt to draw new staff away from other firms. This does lead to additional inflation, but hardly to a higher GDP. However, in times of large labour surpluses, employers do not have to offer higher wages to attract new staff. Fiscal stimulus may then quickly lead to additional employment opportunities as well as to a higher GDP.[16]

From this, a first conclusion about the best timing of spending cuts can be drawn: they preferably should be implemented when unemployment is low. Employment policy should also be aimed to keep GDP as close as possible to potential GDP – in other words, to stimulate the economy if unemployment reaches a level that is above its natural long-term rate, and vice versa, to slow it down if unemployment is lower. This may also be viewed from Blanchard–Quah's decomposition of GDP in times of temporary and permanent shocks: fiscal policy should be countercyclical following temporary shocks (where unemployment moves in the opposite direction to GDP) and go with the tide when shocks have a permanent impact (particularly when only GDP changes).

High debt, low growth

The state of the economy is not the only variable that influences the effectiveness of fiscal policy. Several researchers have shown that a high sovereign debt ratio is connected to low growth and, thus, to a lower future GDP, which in turn has an impact on the government deficit. Growth, on average, declines by an annual 0.1% under a 10% higher debt ratio.[17]

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[14] See Auerbach and Gorodnichenko (2012). This study looks at the GDP response to an unexpected rise in public spending in OECD countries, from 1985 onwards. Recessions are defined, among other things, as periods of high unemployment.

[15] As in our estimation of the Blanchard–Quah model, Auerbach and Gorodnichenko also use data on a group of highly developed economies. If they had based their research solely on data from a single country, they could never have measured these differences in multiplier values, simple because individual countries go through too few crises to identify this effect.

[16] Many other channels are also imaginable as well. For example, banks become stricter in their lending policy during a recession, which leads to declining private investments. In a reduced form model, however, the channel is irrelevant.

[17] This report uses the 1979–2009 period. For this period there was no significant, negative quadratic relationship between debt level and economic growth in the OECD countries. In the Netherlands, when considered in isolation, this relationship is not significant. See Lukkezen and Suyker (2013) for an overview of the literature.

This effect is non-linear; an increase in public debt has a larger negative effect on growth at a higher debt level. A possible explanation for this relationship could be that entrepreneurs prefer not to invest in countries with a high debt level. Investors fear that future investment profits could be swallowed up by taxes imposed to reduce sovereign debt. Thus, high sovereign debts create uncertainty about the future tax climate. The higher the debt ratio, the more urgent the prevention of a further increase in debt.

This leads to a second conclusion about fiscal policy. A high debt level is harmful to the economy and therefore must lead to spending cuts. Different from the effects of fluctuations in unemployment, the impact of high debt is mostly long-term. In normal circumstances, an upward shock to unemployment fades away in roughly five years. Even if policymakers adopt pro-cyclical policies, unemployment eventually returns to its long-term equilibrium. This does however not apply to sovereign debt. Fluctuations in sovereign debt have a much longer periodicity, and a reduction in this debt can only be achieved by a change in policy. The observation that sovereign debt mostly is a long-term problem also implies that the precise timing of spending cuts is not very relevant; consistency and long-term continuation of austerity policies form the key to success.[18]

Smoothing adjustment over time is a good thing

Combining the first and second conclusion leads to a third conclusion regarding permanent shocks. Spending cuts temporarily raise unemployment and slow-down growth. The higher the unemployment, the bigger are these effects. Smoothing the adjustment over time, so that there is time for unemployment and growth to return to their long-run equilibrium before the implementation of a new round of spending cuts may then be less harmful for the economy, than a sudden, one-shot adjustment.

4 General policy rule

A proper size and timing of spending cuts would have large economic benefits. The analysis in this section presents a first investigation of this important issue. Various issues have to be sorted out in future research. The subsequent section discusses the practical implications that can nevertheless be drawn.

Deriving a general policy rule on the magnitude and timing of spending cuts requires the integration of the elements mentioned in Sections 2 and 3 into one model. A modified version of the Blanchard–Quah model achieves this. The full model is presented in Lukkezen and Teulings (2013). The current section is based on that analysis. Readers interested in details should consult the underlying paper.

[18] This observation is not intended to put the danger of a high government debt into perspective; eliminating a government debt that is too high, is extremely difficult. Moreover, a high government debt level today, will affect future GDP for years to come, due to its negative effect on current growth in GDP. Japan and Italy both serve as examples of this problem.

We estimate a multi-country setting using data for 17 OECD countries[19] over the 1979–2009 period. This multiple-country approach, on the one hand, has the advantage that, because this involves more data, empirical results are more reliable. The disadvantage, on the other hand, is that differences between countries are understated due to the structure of the model. Experience has shown that, in many cases, the advantage carries more weight than the disadvantage.[20] This is further elaborated in the following section.

Instead of actual GDP growth we use potential growth, that is, we use the growth rate that would have applied if unemployment was at its equilibrium level. Furthermore, we use the square root of the level of unemployment. This is a convenient way to implement the idea that the impact of fiscal policy depends on the state of the economy: fiscal policy now leads to a change in the root of unemployment and therefore to a change in unemployment which depends on the initial level of unemployment.[21] The correction of GDP growth[22] causes this effect to occur not only on unemployment but also on GDP growth. In addition to the adjusted variables for GDP growth and unemployment, this model also includes formulas for the *primary deficit* (= the deficit minus interest charges) and the *sovereign debt ratio*.

Furthermore, one additional variable has been included in the model to represent *fiscal policy* as implemented by the policymaker. This variable captures real discretionary policy changes, such as tax increases or expenditure cuts. Hence, this variable does not measure the negative impact of a slowdown in growth on government finances. This is important because, in analysing the economic consequences of fiscal policy our main point of interest is the impact of a higher primary deficit (= fewer spending cuts) on GDP, and not the reverse, the effect of a lower GDP on primary deficit. By basing our analysis on planned policy changes instead of the primary deficit, the risk of reversed causality is small.[23] In the Netherlands, these policy changes are stated in the *Miljoenennota*, the annual budget memorandum. For the 17 OECD countries involved, the IMF has studied the relevant policy documents, and outlined the size of announced fiscal consolidations.[24] We use the IMF data set in our analysis.

In the modified Blanchard–Quah model, spending cuts and a higher growth – due to higher tax revenues – reduce the primary deficit, while unemployment – due to higher unemployment benefit payments - increases it. In turn, the primary deficit and GDP growth have an impact on sovereign debt, the size of which is determined by the data. Again,

[19] This refers to the following countries: Australia, Belgium, Canada, Denmark, Germany, Finland, France, Ireland, Italy, Japan, the Netherlands, Austria, Portugal, Spain, the United Kingdom, the United States and Sweden. For the analysis, we determined whether the individual countries had a significantly divergent structure. This was found to be the case only for Spain.

[20] Differences in the natural rate of the unemployment and GDP growth rate are taken into account in the analysis. The Netherlands, for example, has a very low natural rate of unemployment. Another difference between countries is in the magnitude of sudden shocks; shocks are small in Belgium, Denmark and Germany, similar to those in the Netherlands. Currently, Bayesian research methods are being studied, taking into account both differences and similarities between countries.

[21] Here, we used the curvature of the square root function: Change in unemployment = 2 * square root of the unemployment * change in the square root of unemployment.

[22] This is known as Okun's law. Lukkezen and Teulings (2013) estimate the size of this correction.

[23] This risk can hardly be completely avoided. After all, policymakers do not formulate their policies in isolation but in response to economic circumstances. A higher financial deficit, therefore, leads to additional austerity measures. See Lukkezen and Teulings (2013) for an elaboration on the role of causality in this analysis.

[24] Devries et al. (2011).

empirical results confirm that spending cuts are bad for the economy in the short term, as unemployment rises and growth slows down. Crucial element in the analysis is that the magnitude of the impact depends on the unemployment level. The higher this level is, the larger the negative impact of spending cuts will be. Finally, the negative impact of sovereign debt on economic growth, as discussed in the previous section, is taken into account; additional sovereign debt is bad for economic growth and the higher the original level of sovereign debt, the greater the negative impact.

The modified Blanchard–Quah model has been used to analyse what would be the best moment in time to implement spending cuts. We assume that policymakers in formulating their policies strive for both a high GDP and a low unemployment level. However, because a high sovereign debt affects growth and thus future GDP, policymakers also have to take future developments in GDP into account. Therefore, our policymaker considers the current expected value of discounted GDP in both the short and the long term.[25]

Unemployment causes unhappiness

Research shows that people derive a large degree of happiness from being employed,[26] while becoming unemployed causes a substantial decline in happiness. The latter applies not only to people's personal unemployment but also to the general increase in unemployment within society. Based on research into personal happiness, Di Tella, MacCulloch and Oswald estimate that an annual 1% decrease in unemployment has the same impact as a 2.2% increase in GDP[27]. We assume policymakers to award similar weight to the relative importance of GDP and unemployment.

A simple policy rule

The model below provides insight into the optimal policy response in various economic circumstances:

$$(4)\quad \text{Fiscal policy}_{t+1} = \begin{cases} 0.23 * \text{adj. growth}_t & +0.22 * \text{adj. growth}_{t-1} \\ +1.56 * \sqrt{\text{unemployment}_t} & -0.59 * \sqrt{\text{unemployment}_{t-1}} \\ -0.29 * \text{prim. deficit}_t & -0.33 * \text{prim. deficit}_{t-1} \\ -0.13 * \text{debt}_t & \end{cases} + \text{const.}$$

The optimal policy response calls for a pro-cyclical response to both growth and primary deficit; in cases of lower growth and higher deficit, spending cuts are required. This policy response also calls for a strong anti-cyclical response to unemployment, which will be partly corrected in the subsequent period. The size of the response depends on the level of unemployment; fiscal policy is more effective when the unemployment level is higher. And, finally, a higher debt level requires the implementation of spending cuts. The optimal fiscal policy response is the sum of these contributions.

[25] This also applies to unemployment, but because the unemployment level regains its balance relatively quickly, the future plays a more limited role.
[26] See Winkelmann and Winkelmann (1998) and Di Tella et al. (2001, 2003).
[27] See Di Tella et al. (2003). In addition, a discount rate is chosen to enable comparison between contributions to welfare in various years.

We illustrate the implications of the model for two types of shocks: one that predominantly affects GDP growth and one where both growth and unemployment are affected. This roughly corresponds to the distinction between permanent and temporary shocks. Figure 3 shows a permanent downward shock to GDP, with a direct impact on growth, while unemployment initially remains more or less unaffected. Figure 4 shows the impact of a temporary shock, which causes a slowdown of growth and an increase of unemployment. In practice, the economy is affected by a mix of temporary and permanent shocks every year, but for illustrative purposes we have concentrated on the impact of these stylised types. Actual policy has to be a combination of both responses, depending on the relative weight of the temporary and permanent components, which is determined according to the initial magnitude of the shocks in growth and unemployment, as discussed in Section 2.

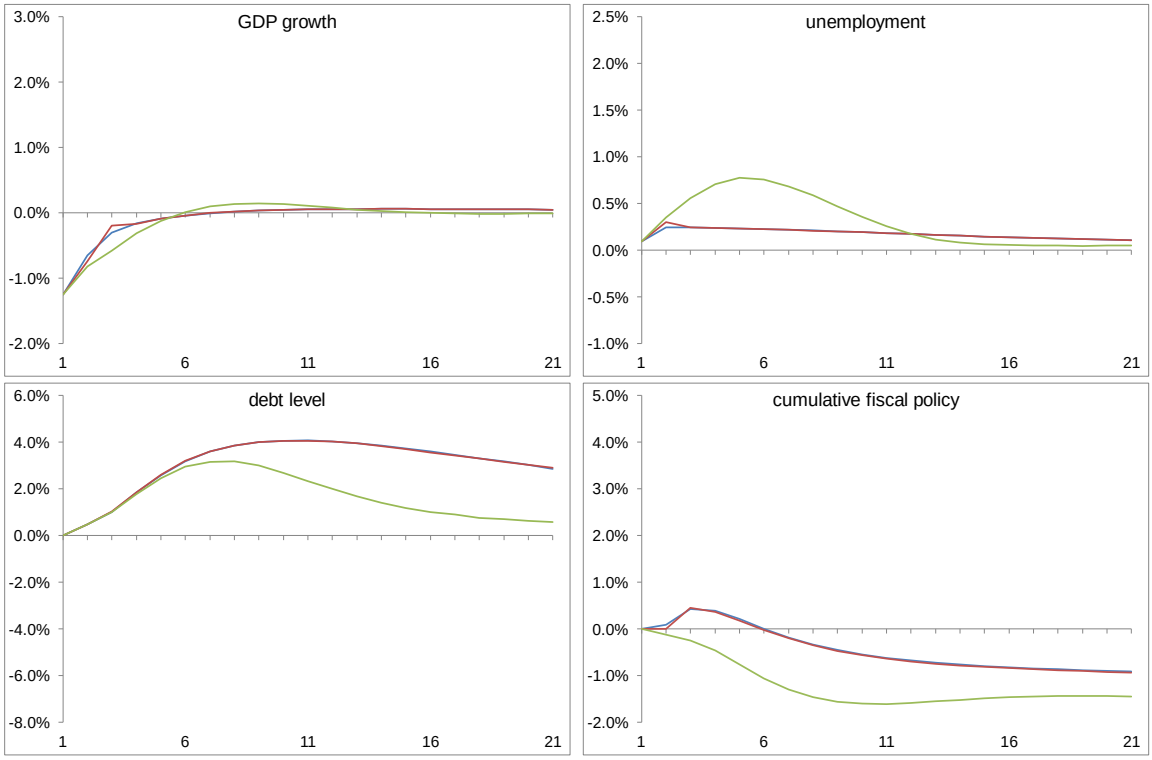
In both figures, the shock occurs in the first year. Policymakers then assess the impact of the sudden shock on growth and employment in that first year. Based on this information, the policy response for the years to come is determined. After the initial year, the economy is bound to again become affected by new shocks, which will lead to new policy adjustments. The lines in the figure indicate future development of growth, employment, sovereign debt and fiscal policy when no additional shocks affect the economy. Both figures show the development for three fiscal policy responses: the first is the theoretically optimal policy response (the blue lines); the second represents the policy response if policymakers would need more time to formulate policy and, therefore, cannot respond until in the third year following a shock (the red lines); and the third shows the response according to the policies which was implemented on average in the 17 OECD countries in the past (the green lines).[28] To provide a sense of proportion, both figures also present an average-sized shock for the Netherlands.

Permanent shocks call for pro-cyclical policy

Negative average-sized permanent shocks cause GDP growth to decline by 1% and unemployment to rise by 0.1%. Permanent shocks require a pro-cyclical response, but not immediately. First a small stimulus is required to contain the rise in unemployment. This, in combination with lower growth and higher unemployment, causes the debt level to increase by 4%, which will be slowly reduced over a long period of small adjustments. Therefore, a permanent shock may be said to have a large impact on sovereign debt. Such a shock, in addition, leads to a rise in unemployment of around 0.3%. This elevated level of unemployment generally persists for a long time (over a decade).

[28] The average response is based on the IMF dataset, which enables analysis of how policymakers in actually tend to respond to shocks.

Figure 3 Policy response to a permanent shock[29]



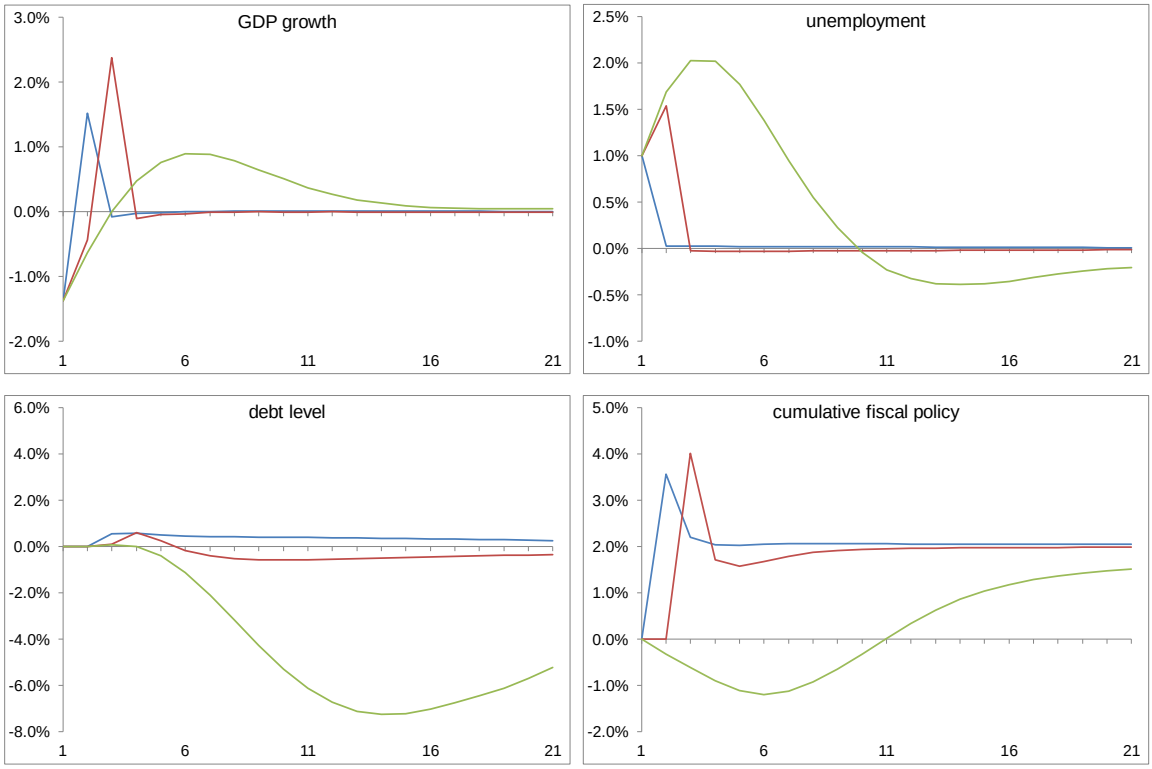
Policymakers appear to act more or less conform the optimal policy rule (the blue lines). Differences in GDP growth between the red, blue and green lines of Figure 3 are limited. For unemployment, however, differences are greater; the red and blue lines show a much more limited rise in unemployment. According to the optimal policy rule, the economy initially is stimulated to prevent an excessive rise in unemployment, subsequently followed by spending cuts. However, compared with temporary shocks these differences are only minor – apart from the impact on the debt level.

Temporary shocks call for a strong policy response

Negative average-sized temporary shocks cause GDP growth to decline by 1.4% and unemployment to rise by 1%. The impact on unemployment thus is much greater than for a permanent shock. Policymakers appear to respond very differently to temporary shocks then would be required according to the optimal policy rule. The optimal policy calls for a strong anti-cyclical response. Such policy shows a sawtooth pattern; as quickly as possible, the government should stimulate the economy in a single burst, and subsequently reduce part of this stimulus. By responding in an anti-cyclical manner, unemployment can be returned to its natural rate quickly. This does involve a slight increase in the debt level by ½% of GDP.

[29] Horizontal: time in years; vertical: deviation in percentage points. Shock at t=1. Best policy response in blue, delayed response in red and current policy in green.

Figure 4 Policy response to a temporary shock[30]



Actual policy has responded in a totally different manner on average. Its response is slower and pro-cyclical. This initially causes unemployment to rise even further, to 2% above the long-term average. Because policy is so slow to react, the drop in unemployment continues even after ten years; ultimately, even reducing it temporarily to 0.4% below the natural rate. Temporary shocks cause the sovereign debt to remain low for a prolonged period of time, at a maximum of as much as 7% of GDP below the long-term average.

Currently, actual policy (the green lines) seems to make little distinction between temporary and permanent shocks. Policy responses are more or less similar in both cases, while the optimal response for each case would be completely different. This adds additional weight to the conclusion drawn in Section 2, namely that policymakers should be better informed about the nature of economic shocks – about whether these are temporary or permanent. The policy responses in Figure 4 are substantial; we elaborate further on this in Section 5.

Delayed policy response only partly explains the difference

Figures 3 and 4 show that the actually implemented policy deviates from what would be the optimal policy response. The latter, however, is very demanding of policymakers; they must be able to respond to sudden economic events no later than in the year following such an event. This seems unrealistic, as policy preparations are time-consuming. The red lines in Figures 3 and 4 show the optimal policy response if policymakers are unable to respond until

[30] Horizontal: time in years; vertical: deviation in %. Shock at t=1. Best policy response in blue, delayed response in red and current policy in green.

the third year. The red lines always are in-between the blue and green ones.[31] The required policy preparation time, thus, partly explains the difference between what would be the optimal policy response and the actually implemented policy. Generally though, policymakers respond incorrectly to temporary shocks.

It is often said that active stabilisation is pointless, because policymakers tend to respond too slowly. However, the analysis above shows this conclusion to be incorrect. Stabilisation would be effective, even if a longer policy preparation time is taken into account.

A loss in happiness related to unemployment is not the deciding factor for the policy rule

The results presented above do not change substantially, if the cost to happiness related to unemployment is disregarded by the policymaker. This cost is real, therefore, there is every reason for policymakers to include it in their considerations. However, some economists would doubt the relevance of these costs. Therefore, it is prudent to establish whether including these costs is relevant for the optimal policy rule. The reason for this robustness is that stabilisation of GDP in response to temporary shocks simply leads to more GDP. In addition to the fact that the unemployed experience a loss in happiness, the GDP loss due to part of the population being unproductive also is wasteful.

5 Practical implications

This background document seeks answers to the question of what would be the optimal size and timing of fiscal policy in response to economic shocks. A suitable analytical framework to answer such a question should work on the principle of maximum simplicity: leave out everything that is not directly relevant and concentrate on the main question. This principle has led to an analysis based on only five variables: growth, unemployment, primary deficit, sovereign debt and fiscal policy. Our model is low on theory; in addition to the objective of policymakers and the selection of the five variables mentioned above, we used a reduced form model in which conclusions are led by the data. Thus, theoretical trench wars are largely avoided.

More than two types of shocks

The question of whether, with all these simplifications, essential elements are perhaps being overlooked, is justified. As the economic core of the model only consists of two variables (growth and unemployment), it can only distinguish two shocks, which can be conveniently classified as either temporary or permanent. If the model were to be expanded, such as by including inflation, real estate prices, the nominal interest rate and financial variables,[32] many more shocks would be available, which can affect each of these variables. The same technique can be applied to derive a simple decision rule here. Now, however, there are more types of shocks (one for each included variable) and therefore more different policy responses.

[31] The exception to this is the policy response to temporary shocks. In these cases, a delayed policy response must be more severe because meanwhile unemployment has risen even further.
[32] An expansion that includes financial variables is likely to be needed in order to understand the economic developments in 2009.

Could the inclusion of more variables lead to totally different policy conclusions? Perhaps. However, as far as projection is concerned, the simple Blanchard–Quah model is hard to beat. Therefore, it is likely that a large part of the variety in economic shocks is already captured by just using growth and unemployment[33], and that the inclusion of other shocks is unlikely to lead to entirely different insights. The inclusion of interest rate shocks, however, would offer the possibility to analyse the interaction between monetary and fiscal policies. Furthermore, including real estate prices seems a priority in the current climate. Fluctuations in real estate prices have large macroeconomic impacts. The CPB is currently experimenting with larger reduced form models. The scientific literature suggests that this would present sizeable improvements in forecast quality, compared to that of structural models and smaller reduced form models.[34]

The policy recipe from Equation (4) cannot be applied directly to the Netherlands, as it is based on the average structure of the 17 OECD countries from the data set on which our analysis is based. The Dutch economic dynamics may deviate (in part) from that of the average OECD country. Here, a more flexible reduced form model could also be the answer.[35] More generally though, the attention in this background document is solely focused on the budgetary impacts of policy. The impact on the structure of the economy, for example, is left out of the equation. In the long term, however, this would be at least as important for the government budget as the direct impact.[36] In addition, the short-term impact of a tax increase is different from that of cuts in government expenditures. This analysis is limited to the balance in government income and expenditure. Given this balance, a separate analysis is required to determine the right mix of tax increases and spending restrictions.

Why is this analysis drawing different conclusions?

Finally, we address the key question. Common opinion, to date, has been that fiscal policy should not play an active role in macroeconomic stabilisation (see the text box on *A stabilising role for fiscal policy*). This role has traditionally been reserved for monetary policy. Fiscal policy was to concentrate on passive automatic stabilisation, by not immediately compensating losses in the government budget, but charging this to the deficit. This policy has been internationally successful. It has contributed to *The Great Moderation*, the decline in sensitivity of the economy to macro-shocks. Why then is this analysis drawing a different conclusion? The reasons for this are several.

The first reason for the renewed interest in fiscal policy is the current financial crisis, which has eroded the effectiveness of monetary policy: the monetary policy rate is close to zero.

[33] This concerns a reduced form model. Unemployment, thus, also includes shocks in other variables, such as fluctuation in inflation (which is strongly correlated to unemployment). Adding additional variables only has added value if the shock to these variables depend substantially on the variables already included.
[34] Model builders considering a larger model always face a trade-off between being able to account for more relevant factors and increasing the uncertainty about the model parameters. Bayesian techniques may offer a solution to this dilemma. Banbura et al. (2010) show that large Bayesian models can achieve substantial improvements in projection quality.
[35] Following the previous footnote: Bayesian techniques also enable the use of data from multiple countries (such as for the analysis in this background document) while allowing for the differences between them.
[36] Structural reform could serve as a substitution for spending cuts (Teulings, 2012). Babecký and Campos (2011), in a meta-analysis, conclude that reform initially has a negative impact on growth, followed by a positive impact.

Moreover, the financial crisis has led to a serious recession, to which policymakers are struggling to find an adequate solution.

The second reason is that, over the past decades, increasingly better methods have been developed to empirically evaluate macroeconomic policy. This does not automatically mean that there is unanimity among economists, but it does lead to a clearer insight into the relevant empirical relationships.

The third reason relates to the second. New analysis techniques enable a systemic distinction between temporary and permanent shocks. Policy responses to both shocks are different. For permanent shocks there is only a minor problem: the slight delay in the response by current structural fiscal policy. Action is not taken until a new coalition agreement is reached and a new government is installed. For temporary shocks, policy response is not only too slow, but it is also focused in the wrong direction.

Because of their size, the optimal responses to temporary shocks, depicted in Figure 4, are in fact extrapolations; they are larger than those documented by the IMF in the past. This begs the question whether there are certain restrictions for policymakers that have not been included here. The policy pursued in practice is likely also to involve adjustment costs, in addition to the already mentioned delay caused by policy preparation. These costs currently are not included in the model. Including them would result in a substantially smaller policy response that would be more in line with the policy pursued according to the data. However, it seems unlikely that this would influence the desired response direction or timing.

Two ‘no-regret’ actions

The analysis in this background document leads to two ‘no-regret’ recommendations, which in all cases would result in a better founded policy.

Distinguish between temporary and permanent shocks

In the first place, it is important to make a clearer distinction between temporary and permanent shocks. The Blanchard–Quah model could be a simple tool to achieve this. If, later on, models would be developed that include more types of shocks it could possibly be desirable to make a more detailed classification of shocks. A broader spectrum of shocks would lead to a better tailored decision rule for fiscal policy. For example, a major shock, such as the current real estate price crisis, obviously should draw a different policy response than those described here for temporary and permanent shocks. Therefore, the analysis of shocks should have a higher priority in macroeconomic analysis.

Smooth governance: unemployment benefits as stabiliser

As is shown in Figure 4, the optimal decision rule calls for a substantial policy response to temporary shocks – much more substantial than currently imaginable. It would not be easy to implement such substantial stimulus measures over a short period of time and subsequently undo them again, as should be done according to the decision rule. Moreover, smooth governance is very important; organizations that implement policy need clarity on their budget over a longer period than that of the annual budgetary cycle. Institutions must

therefore be created that effectuate such impulses automatically. Here, a simple improvement seems easily at hand. The Blanchard–Quah decomposition shows that a temporary shock may be recognized by increasing unemployment. Therefore, the additional expenditure related to this unemployment should not be compensated by spending cuts, but should rather function as an additional stimulus for the economy. Excluding the expenditures on unemployment and welfare from the budgetary framework, such that financial losses in these areas do not have to be compensated by spending cuts, would be a first step in this direction.

A third recommendation is making the fiscal policy framework dependent on debt level. This would lead to a policy that, on average over the economic cycle, contributes to a reduction in debt level. The obligation of EU member states to annually reduce 1/20 of the debt level above 60% of GDP is in line with this recommendation. A policy framework that is more austere for higher debt levels, but excludes expenditures on unemployment, prescribes a better path for fiscal adjustment.

A stabilising role for fiscal policy

The underlying factor in this analysis is a debate on the role of fiscal policy. According to the standard New Keynesian economic division of tasks, monetary policy should stabilise the economy, while fiscal policy is limited to intra- and intergenerational redistribution. The intergenerational redistribution then determines the government balance and the equilibrium debt level.

The exercise in this background document, however, positions fiscal policy explicitly in a stabilising role. This has three reasons:

1. For the Netherlands, the European Central Bank (ECB) would never be able to perfectly fulfil its stabilising task. A central bank of a monetary union cannot absorb asymmetrical shocks – shocks that do not affect all monetary union members equally. After all, it has only one stabilising instrument that it applies to symmetrical shocks. This means that part of the stabilising task will always remain unaddressed. The divergence after 2008 has shown this part to be substantial (Holinski et al., 2012).
2. There are multiple real distortions in the economy. Blanchard and Galí (2007) show that when more than one distortion is present, such as price and wage inertia, monetary policy cannot simultaneously stabilise the price level and the real economy. Furthermore, while the Federal Reserve System (FED) has a dual mandate, the mandate of the ECB only involves price stabilisation. It will only stabilise the economy if this does not conflict with price stabilisation.
3. The optimal policy rules in the New Keynesian framework have been derived from a utility function for a representative household (Woodford, 2003). In this utility function, the costs of a recession roughly equal to the benefits of expansion. As a result, the benefits of stabilisation are only minimal (Lucas, 1987). The impact of crises, therefore, is limited, and income stability and the reduction in fluctuation of the unemployment level hardly have any added value.

These reasons leave room for fiscal policy to stabilise the economy. How does this relate to monetary policy? Our model is an entirely real, reduced form model, from which monetary variables have been excluded for the sake of simplicity. This means that no assumptions about monetary policy are made, other than that past monetary policy is a good predictor for future monetary policy given the state of the economy. We carried out a robustness analysis for Lukkezen and Teulings (2013) that included the central bank's interest rate as an additional explanatory variable. This did not provide qualitatively different results.

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