Political biases despite external expert participation? An empirical analysis of tax revenue forecasts in Germany

Thiess Buettner
(University of Erlangen-Nuremberg (FAU))[†]

Bjoern Kauder
(Ifo Institute)[‡]

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Abstract: This paper explores whether and how political biases arise in an institutional setting where revenue forecasting is delegated to a body that includes experts from institutions neither part of nor controlled by the government. The empirical analysis focuses on the performance of German federal tax revenue forecasts, in the preparation of which the advice of external experts has a long tradition as an institutional safeguard. While, on average, revenue forecasts turn out to be unbiased, the results show that the government exerts an influence. In particular, optimism/pessimism in the government's GDP forecast helps to explain why the revenue forecast turns out too optimistic/pessimistic. In addition, governmental estimates of the revenue effects of tax-law changes are found to contribute to forecast errors.

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[†]Address: University of Erlangen-Nuremberg
Lange Gasse 20
D-90403 Nuremberg
Germany

Phone: +49 911 5302 200
Fax: +49 911 5302 396
E-mail: Thiess.Buettner@fau.de

[‡]Address: ifo Institute
Poschingerstr. 5
D-81679 Munich
Germany

Phone: +49 89 9224 1331
Fax: +49 89 907795 1331
E-mail: kauder@ifo.de

1 Introduction

Formulating a public budget requires a forecast of the funds that will be available for allocation to the various government branches. Hence, the revenue forecast underlying the budget is often controversial and political incentives towards manipulation are ever present. For instance, the attempts in many countries to restrict deficits by means of budget rules have created a tendency towards overoptimism in revenue forecasts (*e.g.*, Frankel 2011; Beetsma, Giuliodori and Wierts 2009; von Hagen 2010; Pina and Venes 2011). One potential remedy discussed in the literature is to set up fiscal councils (*e.g.*, Wyplosz 2008; Debrun, Hauner and Kumar 2009; Calmfors and Wren-Lewis 2011; Merola and Pérez 2013) that assess or approve budget proposals, including revenue forecasts. With regard to revenue forecasting an element of such institutional precautions already is implemented in countries that delegate revenue forecasting to bodies that include experts from institutions that are neither part of nor controlled by the government (Buettner and Kauder 2010). While the details differ, one common approach is that the forecasting body will produce a consensus forecast that is then used as a parameter in the budget proposal. However, given government's substantial information advantages and the incentives of external members of the forecasting body not to deviate from the consensus, a bias still might arise (Auerbach 1999).

Against this background, this paper reconsiders the revenue forecasting performance in Germany where consensus forecasts of tax revenues involving external experts have been the basis of government budgeting over the past 60 years. Covering the period from 1971 until 2013, we are able to analyze the forecasting performance quantitatively over a period of roughly 40 years during which the institutional setting for forecasting basically remained unchanged. The paper explores whether

political biases arise in this setting despite the participation of external experts and identifies the weak elements of the institutional framework through which these biases materialize.

In Germany, revenue forecasting is assigned to the Working Party on Tax Revenue Forecasting (*Arbeitskreis Steuerschaetzungen*),[1] which includes not only government officials but also external experts, such as representatives of economic research institutes, of the central bank (*Deutsche Bundesbank*), and of the Council of Economic Experts (CEE).[2] Based on the forecasts of each of these external experts as well as on the forecast provided by the Federal Ministry of Finance, the group forms a consensus forecast. This forecast is a key input into the budgeting process of the federal government, as well as of the state and local governments.

The participation of external experts in the preparation of German revenue forecasts officially is regarded as a safeguard against political biases. This is not only the explicit intention of the German government, which notes that the composition of the Working Party on Tax Revenue Forecasting "ensures the independence of the body".[3] The EU Commission also includes the Working Party on Tax Revenue Forecasting in its list of independent fiscal institutions (EU Commission 2012, p. 111p.), which, according to EU regulation (*EU Sixpack*), are an essential element of appropriate budgetary frameworks (EU Commission 2013). Debrun *et al.* (2009, p. 68) follow this view and note that the working party has a reputation for "relative independence". However, the performance of

[1]The working party exists since 1955. The group is chaired by the Federal Ministry of Finance and includes the Federal Ministry of Economics, five economic research institutes, the Federal Statistical Office, the central bank (*Deutsche Bundesbank*), the German Council of Economic Experts, the finance ministries of the states and the associations of cities and counties.

[2]Note that the Council of Economic Experts (CEE) differs from the US Council of Economic Advisers (CEA) in the sense that the CEE is not part of the government but rather has an independent legal mandate.

[3]See website of the Federal Ministry of Finance (accessed November 6, 2014).

the working party is subject to criticism. In 2005 the Federal Court of Auditors noted that forecasts had been too optimistic in the past, with adverse implications for the budget, since efforts to balance the budget were hampered. The court specifically criticized the assumptions regarding economic growth and demanded more cautious predictions (see Bundesrechnungshof 2005, p. 66). Similarly, Gebhardt (2001) notes that the revenue forecasts tend to follow the government's prediction of GDP even if this deviates from the forecasts by other institutions. Large forecast errors also have been encountered in the aftermath of tax reforms. The difficulty of estimating the budgetary effects of tax reforms was spotlighted by the 2001 reform of the federal corporation tax, after which revenues plunged from 23.6 billion Euro in 2000 (in nominal terms) to an unpredicted record low of -0.4 billion.[4] Medium-term budget planning likewise has been criticized for being overly optimistic (Heinemann 2006).

Our paper contributes to the literature on forecast biases associated with public sector budgeting. Particular attention has been devoted to the US federal government budget (*e.g.*, Plesko 1988; Blackley and DeBoer 1993; Auerbach 1999). Feenberg, Gentry, Gilroy and Rosen (1989) and Boylan (2008), among others, have tested for biases in US states' revenue forecasts. Bretschneider, Gorr, Grizzle and Klay (1989) and Krause, Lewis and Douglas (2006) consider the determinants of forecast accuracy in US states' forecasts, Bischoff and Gohout (2010) consider revenue forecasts at the German state level. Another strand of the literature discusses the deficit forecasts of EU countries in the context of the Stability and Growth Pact (*e.g.*, Jonung and Larch 2006; Brueck and Stephan 2006; Beetsma 2009; von Hagen 2010; Frankel and Schreger 2013). The performance of revenue forecasts also has been considered for developing countries (*e.g.*, Kyobe and Danninger

[4]For details and the official government explanation, see http://dip21.bundestag.de/dip21/btd/14/098/1409811.pdf (accessed October 3, 2014).

2005).

Focusing on the German case allows us to include detailed information, especially on those elements of the revenue forecasting process that likely are subject to government manipulation. Following standard methodology (*e.g.*, Keane and Runkle 1989), we explore whether the forecasts are rational, *i.e.*, unbiased and efficient. We also test for the existence of electoral cycles, even if previous literature has found little evidence in the German case (*e.g.*, Berger and Woitek 1997), perhaps since Germany does not have a two-party system (Potrafke 2012). Our results indicate that forecasts generally are unbiased. Though a substantial part of the forecast error can be explained by macroeconomic uncertainty, the real-time analysis shows that reliance on external GDP forecasts could have improved the forecasts. More specifically, we find that governmental optimism/pessimism regarding GDP growth tends to be associated with revenue forecasts being too optimistic/pessimistic. Biases likewise are associated with tax reforms since revenue gains or losses tend to be overestimated. Our findings confirm concerns raised in the literature that the advice of external experts alone is not sufficient to ensure unbiased revenue forecasts.

The rest of the paper is structured as follows. The next section describes the empirical approach. Section 3 gives an account of the revenue forecasts in Germany and the likely sources of forecast errors. Section 4 presents the results of the empirical analysis. Section 5 concludes.

2 Empirical approach

Following Keane and Runkle (1989), rational forecasts are both unbiased and efficient (see also Nordhaus 1987; Keane and Runkle 1990). Unbiasedness refers to a forecast error that – on average – does not deviate significantly from zero and does not vary with the forecast. This implies that the expected value is consistent with the forecast. Efficiency requires utilization of all relevant information. With an efficient forecast, the forecast error should not exhibit a significant statistical relationship with the information that was available to the forecaster.

The assessment of forecasts is based on an equation that relates the revenue forecast for period t (rev_t^f) with the realized revenue in the same period (rev_t)

$$rev_t = \alpha' + \beta rev_t^f + \gamma' X_t + \delta' Z_t + u_t. \tag{1}$$

In this equation, X_t and Z_t are explanatory variables and u_t is the stochastic error term. To focus on the forecast error we rearrange this equation to obtain

$$f_t \equiv rev_t^f - rev_t = \alpha + (1-\beta) rev_t^f + \gamma X_t + \delta Z_t + e_t, \tag{2}$$

with $\alpha = -\alpha'$, $\gamma = -\gamma'$, $\delta = -\delta'$, and $e_t = -u_t$. A positive forecast error f_t indicates that actual revenues fall short of the prediction – a negative value of f_t indicates that revenues turned out to be higher than predicted. If α is not different from 0 nor β from 1, the forecasts are unbiased, and unbiasedness can be rejected, if α or $1-\beta$ are different from zero. To analyze efficiency, we need to specify the vector X_t. It includes variables capturing potentially relevant information that was

available at the time t. If γ does not differ significantly from 0, forecasts are efficient. If, however, γ is significantly different from 0, we can conclude that the forecast has not taken some relevant information into account. In order to capture information available to the forecaster in real time, the analysis below uses different pieces of information. This includes errors of previous forecasts as well as an indicator of the deviation of the government's prediction of GDP from the forecasts of external agents. A significant correlation of the deviation in the predicted GDP growth rate with the revenue forecast error would indicate that the revenue forecasts could have been improved by taking the alternative forecasts into account. This variable seems especially useful in testing for biases in the German institutional context (see below). Since tax reforms have major implications for revenues, we also test for an effect of revenue estimates of tax reforms that had been enacted at the time of the forecast. If a significant correlation with the forecast error exists, the forecast does not sufficiently address the revenue implications of tax reforms.

To explore sources of forecast errors, some specifications include a vector Z_t of indicators of unexpected shocks that may help to explain ex-post why a forecast error has emerged. One important determinant of aggregate tax revenues and a key variable in the forecasting process is the macroeconomy's anticipated growth rate. More specifically, tax revenue forecasts hinge crucially on the GDP forecast (*e.g.*, Buettner and Kauder 2010). Given substantial uncertainties associated with macroeconomic growth, the power of tests for unbiasedness and efficiency can be improved by conditioning on the error of a GDP forecast available at the time of the revenue forecast. The vector Z_t also includes an indicator of the estimated revenue consequences of tax reforms relevant for the forecasted period, but not approved by the parliament at the time of the forecast. This enables us to capture the revenue implications of unanticipated tax reforms.

3 Sources of revenue forecast errors

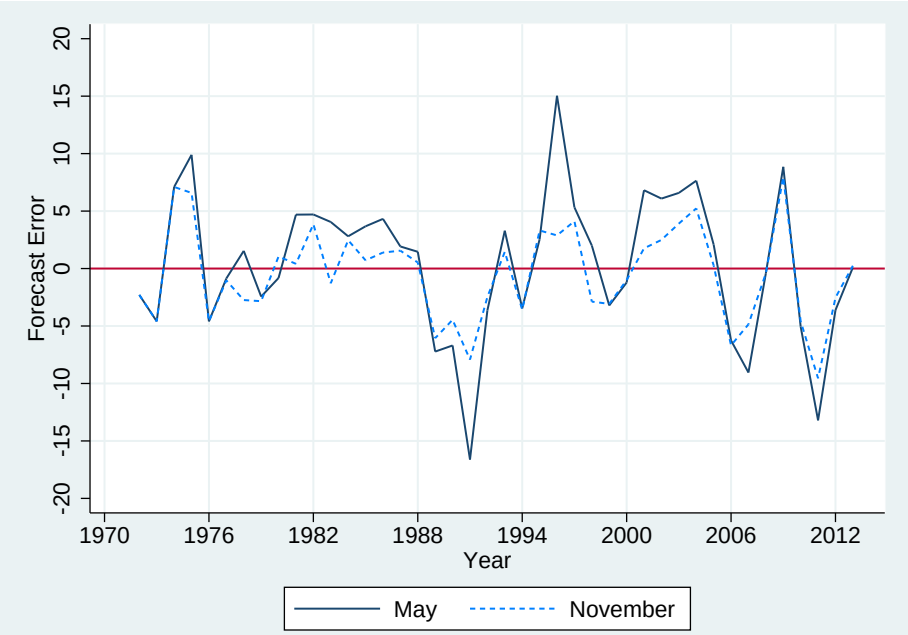
In Germany, the Working Party on Tax Revenue Forecasting issues forecasts twice a year. The spring forecast – usually published in May – provides forecasts for the current and the upcoming four years. The fall forecast – usually issued in November – is more narrow and provides forecasts only for the current and the next year.[5] Focusing on federal tax revenues from 1971 to 2013, we explore the performance of the May forecast for the current year, and the forecasts concerning the next year made in May and November. Since the forecasts for the next year play a key role in budget formulation, they are probably the most important forecasts for the government. Owing to the possibility of issuing an amended secondary budget and since it may serve as an important reference point, the forecast for the current year may also be subject to political influence.

Figures 1 and 2 depict the relative forecast errors over time as percentage deviations from zero. The forecast errors of the next-year forecasts exhibit larger variances in May than in November, while the forecast error for the current year shows the smallest variance.[6] This is intuitive since a shorter time span between the preparation of the forecast and the beginning of the forecasted period is associated with less uncertainty. As documented by Table 1, on average, there is a small overestimation of 0.41% in the next-year forecast from May, while the other forecasts display some underestimation of 0.26% and 0.48%.

[5]The fiscal year of the federal budget is the calendar year. Since 2011 the fall forecast includes revenue forecasts for the current and the next five years. For a discussion of medium-term revenue forecasts in Germany, see Breuer (2015).

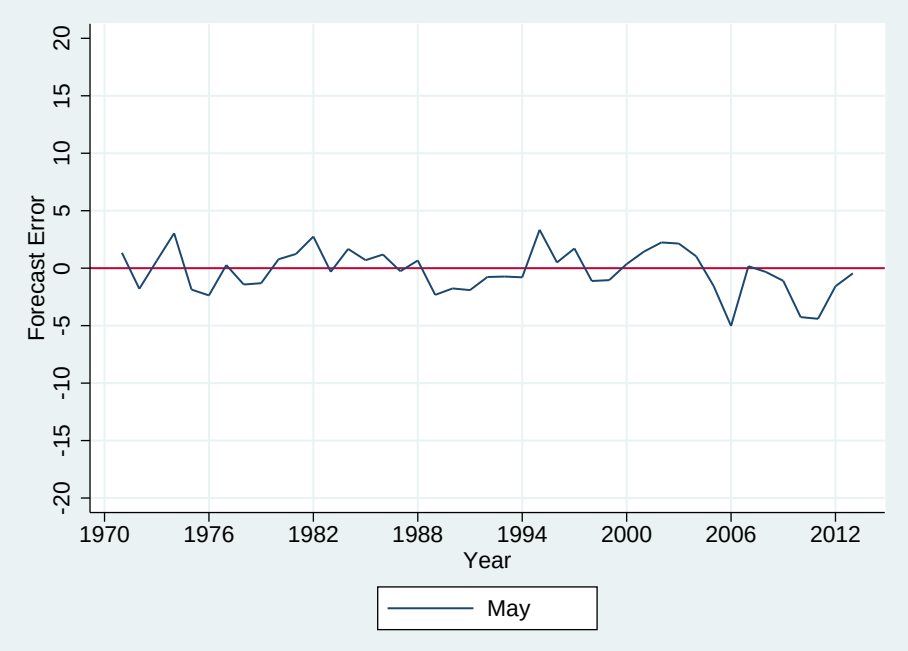
[6]Figure 1 points to a couple of large forecast errors: In 1991, the forecast error is associated with German reunification and the unanticipated introduction of a federal surcharge on the income tax ("solidarity surcharge"); in 1996, a reform of child allowances caused large revenue losses; in 2011, economic recovery and labor market developments turned out unexpectedly well.

Figure 1: Relative forecast error (in %): next-year forecasts



Error of the federal tax-revenue forecast for the next year according to the annual spring (May) and fall (November) forecasts, defined as 100 times the log difference between the forecasted and realized tax revenues. Own computation based on the official figures, see Table A1.

Figure 2: Relative forecast error (in %): current-year forecast



Error of the federal tax-revenue forecast for the current year according to the annual spring (May) forecast, defined as 100 times the log difference between the forecasted and realized tax revenues. Own computation based on the official figures, see Table A1.

To examine the performance of the forecasts using the approach outlined above, we include variables that capture unexpected shocks. A major source of unexpected shocks is, of course, the macroeconomic development. To capture macroeconomic uncertainty we employ an indicator of the realized GDP forecast error based on GDP forecasts available at the time of the revenue forecast. To compute this forecast error, we employ the GDP forecast issued by the Council of Economic Experts (CEE). Though there are many different GDP forecasts in more recent years, we use the CEE forecast as it is consistently provided at the same time every year during the entire observation period. As a robustness check, we employ alternatively the GDP forecasts from the OECD Economic Outlook, which is available for almost the same time – and at publication dates that roughly coincide with those of the CEE. Table 1 reports descriptive statistics for these indicators.

(include Table 1 about here)

The CEE's GDP forecast for the next year is issued in November, with the result that the GDP forecast error represents quite nicely the information available at the revenue forecast made in November. The members of the Working Party on Tax Revenue Forecasting have about the same information available to them as the CEE, which even is a member of the group. Regarding the May forecast, the information set available at the time the revenue forecast is made includes data more recent than those available to the CEE forecast issued some months beforehand. But since the timing difference between the CEE forecast and the revenue forecast is roughly constant over time, the CEE's forecast serves as a useful benchmark.

To take account of uncertainty associated with tax reforms, we add a variable that captures the

revenue effects of tax reforms, as estimated by the Federal Ministry of Finance. This series comprises the sum of the revenue estimates of tax-law changes that become effective in the predicted year. It is scaled by total revenues, such that it reports the revenue impact in percentage. The revenue estimates are prepared for each tax-law change at the time the tax bill is sent to the parliament (*Deutscher Bundestag*). If tax reforms are not anticipated, a negative correlation with the forecast error should be expected, indicating that a revenue-enhancing reform shifts the realized forecast error downwards. If the revenue estimates of reforms are unbiased, the coefficient for the revenue forecast error of an unanticipated reform should be equal to -1, since unanticipated tax reforms with a revenue effect of say 1% should be reflected in an underestimation of revenues by 1%. Though the revenue estimates take into account when a new tax law actually becomes effective, they are static, *i.e.*, they are not capturing dynamic effects in the sense of behavioral responses and economic repercussions (*e.g.*, Gebhardt 2001; for a discussion of dynamic scoring that takes account of such effects, see Auerbach 1996). If dynamic revenue effects are not taken into account in the estimation of the consequences of tax reforms, the coefficient on revenue gains from unanticipated reforms could differ from -1. More specifically, as revenue enhancing (reducing) reforms tend to have adverse (beneficial) secondary effects on the economy, static predictions would overestimate the revenue implications of tax reforms and, hence, a smaller coefficient in absolute terms should be expected.

A point of criticism raised against the revenue forecasting process in Germany is that members of the working party would tend to use the federal government's prediction of GDP, even if this deviates from the GDP forecasts of other institutions (*e.g.*, Gebhardt 2001). To what extent this criticism is justified is not fully clear, however. On the one hand, the working party includes

experts from institutions that are neither part of nor controlled by the federal government, such as the Council of Economic Experts (CEE), the Bundesbank, and the so called "leading" research institutes. Since all of these institutions issue own macroeconomic forecasts, they might be rather unwilling to adopt the government's assumptions. On the other hand, the external experts are not fully independent. In particular, the research institutes receive substantial funding from the government and may want to avoid conflict in order to raise the chances of receiving funds in the future. However, empirical evidence on whether biases in the government's GDP forecasts result in revenue forecast errors is lacking.

To test empirically whether or not forecasts tend to follow the government's own GDP prediction even if this is biased, we employ a measure of the deviation of the government's prediction from other GDP forecasts. If forecasters make efficient use of all available information in order to provide the best possible forecasts, this difference should not be correlated with the forecast error of tax revenues. But if the deviation of the government's GDP forecast from some benchmark forecast exerts a significant effect on the forecast error, we can conclude that this deviation captures valuable information that could have been taken into account in order to improve the forecast. Beyond the technical notion of forecast inefficiency, a significant effect of the deviation of the government's GDP prediction from other forecasts that serve as a benchmark, points to a political bias. If the revenue forecasts simply rely on the government's GDP prediction, the latter exerts an influence on the revenue forecasts. More specifically, if the deviation of the government's prediction of GDP exhibits a positive and significant effect on the forecast error, we could conclude that governmental optimism/pessimism tends to be associated with higher/lower revenue forecasts.

As benchmark forecasts we employ the GDP growth rate predicted by the Council of Economic

Experts (CEE) or, alternatively, the GDP growth rate predicted by the OECD's Economic Outlook. Since both institutions, CEE and OECD, are not part of the German federal government, their forecasts open up opportunities to test for political biases. But, of course, the power of the test for political biases associated with the GDP forecast hinges on the quality of the GDP forecast used as benchmark. The ideal benchmark being an unbiased and efficient forecast, one may note that both institutions are not fully independent. The Council of Economic Experts (CEE) is headed by academics, who hold tenured university positions. However, members are nominated by the federal government, partly in consultation with employers' associations and trade unions (Potrafke 2013). Yet the terms of office for the council members are fixed and not synchronized with the federal elections. As a consequence, only a few members will end their terms of office and may seek a new term during the current government's election period. Emphasizing that the mandate is fixed by federal law, the European Commission considers the CEE an independent fiscal institution (see EU Commission 2012). Since the CEE comments on fiscal policy, the literature refers to the CEE as some "soft" form of a fiscal council (Wyplosz 2008, p. 185, see also Debrun *et al.* 2009, p. 75, and Calmfors and Wren-Lewis 2011, p. 668).

Also in case of the OECD one might speculate whether its GDP forecasts are reflecting views of the member states' governments because this supranational agency has close relations with its member states. Merola and Perez (2013) argue that international agencies' budgetary forecasts, including those of the OECD, might to some extent be subject to political biases if these agencies base their forecasts on the assumption that the individual governments' forecasts include some private information. However, note that the analysis below does not employ the OECD's budgetary forecasts but its GDP forecast.

Empirically, a necessary pre-condition for a test of a government influence is that differences in fact exist between its forecast and the benchmark forecast. Even for the November forecasts where the timing of the government's GDP prediction roughly coincides with the CEE's and the OECD's forecasts, the descriptive statistics show that this has happened quite often during the last 40 years – though not all the time (Table A1 provides data for individual years). But, of course, if the GDP forecast used as benchmark contains a lot of noise or further political biases, the deviation will not have much explanatory power and might not turn out to be significant.

Another possible source of political bias is the revenue estimate for tax reforms. An important distinction is between unanticipated reforms that may become effective, but where legislation still is in process, and tax reforms that already have been approved by the parliament. Tax bills that won parliamentary approval should have no effect on the revenue forecast error. A significant correlation would suggest that the revenue forecasts do not fully account for the revenue effects of these tax reforms. Furthermore, as the official estimates of the revenue implications of tax reforms ignore behavioral and economic repercussions (see above), it is likely that the government's estimates of tax reform effects tend to overpredict (underpredict) revenues of revenue enhancing (reducing) reforms. Therefore, a positive coefficient for the revenue estimate of tax reforms would support the view that revenue forecasts adopt the official estimates that ignore dynamic revenue effects.

While the government's GDP forecast and its revenue estimate of tax reforms enable us to identify weak elements of the institutional setting through which political biases may arise, given concerns about the lack of independence, we also control for a direct influence of the government on revenue forecasts. To test for electoral cycles, we include a dummy variable that takes on the value 1 if

the forecast refers to a federal election year and the value 0 for non-election years.[7] To capture differences in political incentives over its term, we also include a variable measuring the number of days the government has been in office when a forecast is issued. To test whether government ideology is associated with forecast errors, we include a variable that takes on the value 1 if a left-wing government, the value 0.5 if a grand coalition, and the value 0 if a right-wing government was in office at the time of the forecast preparation.

4 Empirical results

Given the institutional setting discussed above, the empirical analysis considers three revenue forecasts and investigates whether they are unbiased and/or efficient:

(i) the May forecast for the current year,

(ii) the May forecast for the next year,

(iii) the November forecast for the next year.

Since timing and time horizons of the forecasts and, hence, information sets and uncertainty differ, each of these forecasts is analyzed separately, following the approach outlined above.

As a first step, for all three revenue forecasts we consider unbiasedness by testing whether the constant term for the forecast error is not significant and whether the forecast error is related

[7] While the federal elections usually take place in October, the elections in 1972, 1983, and 2005 were called early and were originally scheduled for the year after.

to the level of the forecast (see equation (2)). Note that we define the forecast error as the log difference between forecast and actual tax revenue. Table 2 reports the results of various basic specifications estimated with OLS. No specification shows a significant bias. As documented in columns (2), (4) and (6), no indication of an electoral cycle can be found. We also control for the time the government has been in office at the time of the forecast and for government ideology. We find, however, no significant effect of the duration of the term.[8] The ideology indicator shows a positive coefficient, which points to greater revenue optimism under governments on the left side of the political party spectrum. Yet this indicator also is not significant.

(include Table 2 about here)

Table 3 shows results controlling for ex-post realizations of macroeconomic shocks and the revenue effect of tax reforms. Macroeconomic shocks are captured by the forecast error of the Council of Economic Experts' growth forecast. The results show that this measure of macroeconomic uncertainty is related positively to the revenue forecast error and contributes substantially to the coefficient of determination. The regressions concerned with the error of the May forecast for the current year are able to explain about 30% of the variation in the relative forecast error. The R^2 is even larger (about 50%) in the case of next-year forecasts. The coefficient on the GDP forecast error also is much larger for the next-year forecasts. This seems reasonable, since in the case of the current-year forecast, some information already is available on the current year's revenue development. In the case of the next-year forecasts, however, macroeconomic uncertainty affects revenues coming in not only over the rest of the current year but also over the entire year ahead.

[8] We estimated other specifications that include separate dummies describing how many years the government is in office, but do not obtain a better prediction of the forecast error model.

(include Table 3 about here)

Also the revenue estimate of tax reforms shows significant effects. Consider first the next-year forecasts, where changes in the tax law that apply in the forecasted year will tend to be unanticipated. In the case of a tax reform that increases revenues, an underestimation of revenues is found. This seems reasonable, if forecasters did not anticipate the reform. In the May forecast for the next year, the point estimate of the revenue estimates of tax reforms is less than 1 in absolute value. This is consistent with the view that these estimates do not take account of secondary effects. It might also be that some elements of tax reforms already are decided and, hence, anticipated. At any rate, the coefficient is estimated with little precision. Since in November the parliament is more likely already to have passed some relevant tax reforms for the next year than in May, the effect should be weaker in the November forecast, as is confirmed by the smaller coefficient.

With the May forecast for the current year, the results are different. At this time, given that retroactive legislation is excluded, hardly any uncertainty remains regarding tax reforms becoming effective during the forecasted time horizon. If the revenue implications of tax reforms were fully acknowledged by the forecasts, we should see no significant effect.[9] Given that the parliament already has passed reforms and the forecast is based on the new law, the positive sign in the first two columns of Table 3 indicates an overestimation of the revenue effects of tax reforms. Accordingly, when a revenue-increasing reform is implemented, the revenue forecast anticipating its effect is overly optimistic. In case of a tax reform that lowers revenues, forecasts turn out to be too pessimistic. Technically, this bias may result if revenue forecasts just use the government's

[9]In a strict sense, therefore, testing for tax-reform effects in the current-year forecast is a test for efficiency of the forecast.

revenue estimates but ignore the fact that the government's revenue estimates do not take the behavioral responses of taxpayers into account.

Exploring further the efficiency of revenue forecasts brings us to the issue of whether other information available at the time of the forecast's preparation could have helped to improve its quality. With an efficient forecast none of the respective variables should show a significant effect on the forecast error. Table 4 reports results including the lagged revenue forecast error. For reasons of consistency, in the case of a May forecast, we use the revenue forecast error associated with the previous May forecast, and in the case of a November forecast we use the revenue forecast error associated with the previous November forecast.[10] Interestingly, for the May forecasts, we find a positive and significant effect, indicating that forecast errors are correlated through time. This suggests that May forecasts tend to stick with the previous years' assumptions – a pattern that has been found previously in the macroeconomic forecasts of the research institutes that take part in revenue forecasting (Kirchgaessner and Mueller 2006). No such effect is found for the November forecast, however.

(include Table 4 about here)

With regard to the May forecast for the current year and the November forecast for the next year, we also can enter the GDP forecast difference as a further piece of information that was available at the time when the forecast has been made.[11] As explained above, this variable captures the

[10]Note that at the time of the preparation of the next-year forecast, the forecast error for the current year is not yet available. In these cases, therefore, the previous revenue forecast error is computed using the current prediction at the time of the preparation of the next-year forecast rather than the final figure of revenues collected.

[11]Owing to the absence of data, the GDP forecast difference for May's next-year forecast is not available for the years under investigation.

difference between the government's GDP prediction and the last available forecast from the Council of Economic Experts (CEE). Alternatively, we compute the difference using the latest available OECD forecast. The results presented in Table 5 indicate that the GDP forecast difference has significant effects on the revenue forecast error. This finding suggests that revenue forecasts are not making full use of information available when the forecast is made. Moreover, the positive coefficient indicates that optimism/pessimism in the official GDP forecast is reflected in a revenue forecast that turns out to be too optimistic/pessimistic. Comparisons of columns (1)-(2) and (3)-(4) reveal that the difference between forecasts exerts a much larger effect on forecasts for the next year than for the current year. That reflects the differences in the forecasting horizon. Note also that in all four specifications, the slope parameters for the forecast difference are similar to the effect of the GDP forecast error. This suggests that a deviation of the official GDP forecast from the Council of Economic Experts' (CEE) forecast has a similar effect as a GDP forecast error that is associated with macroeconomic uncertainty. This result is consistent with the view that the Working Party on Tax Revenue Forecasting sticks closely to the government's GDP prediction. Since if the forecast simply conditions on the government's GDP prediction, any error made by the government, regardless of whether it arises from economic uncertainty or from political biases, will have the same effect on the revenue forecast error.

(include Table 5 about here)

As documented in columns (5) to (8), the results are quite similar when the GDP forecast difference and the GDP forecast error are based on the GDP forecasts of the OECD rather than on the forecasts of the CEE.

Interestingly, in specifications for the current year forecast that include the forecast difference, the positive effect of the revenue estimate of tax reforms does not turn out to be significant. This may indicate that important tax reforms took place in periods when the government also has issued overly optimistic GDP forecasts. Some support for this view comes from the correlation between the GDP forecast difference and the revenue effects from tax reforms.[12]

5 Conclusions

This paper has explored political biases in tax revenue forecasting. The literature has noted that governments may tend to manipulate their budget forecasts including forecasts of tax revenues. One potential remedy discussed in the literature is to delegate revenue forecasting to institutions/bodies involving experts from institutions that are not part of or controlled by the government. However, given the government's substantial informational advantage and because external members of the forecasting body may have incentives not to deviate from the consensus, a bias might still arise (Auerbach 1999).

The paper's analysis has focused on the German case, which enables us to study the properties and determinants of revenue forecast errors in a setting wherein the inclusion of external experts as an institutional safeguard against political biases has a long tradition. Based on the literature on rational forecasting, we have investigated whether evidence can be found for biased forecasts and whether room exists for improving the forecasts in terms of efficiency. In order to identify weak

[12]The partial correlation coefficient between the GDP forecast difference and the revenue effects is 0.575 and 0.492 in columns (2) and (6) of Table 5 concerned with the May forecast for the current year.

elements of the institutional framework through which a government influence is maintained we have also included indicators of the government's GDP prediction and its estimate of the revenue effects of tax reforms. The empirical analysis has focused on the spring (May) forecasts for the current and the next year as well as on the fall (November) forecast for the next year. Employing data for federal tax revenues covering the period from 1971 to 2013, the analysis confirms the general unbiasedness of the forecast in all three cases. We also find that the GDP forecast error explains a substantial fraction of the revenue forecast error. In addition, the forecast error is correlated significantly with unanticipated tax reforms.

With regard to efficiency, we find that the previous revenue forecast error has predictive power mainly for the May forecasts. This indicates an unwillingness to adjust the assumptions adopted earlier, even if they turn out to be wrong. We also find evidence for an influence of the government on the revenue forecasts. One finding is that the current-year forecast tends to be biased in the presence of tax reforms, in the sense that revenue estimates of tax reforms tend to be correlated with the forecast error. When a revenue-increasing reform is implemented, the revenue forecast turns out to be overly optimistic. In case of a tax reform that lowers revenues, revenue forecasts are found to be too pessimistic. This is in accordance with the view that the forecasts follow the official estimates of the reform's effects, which ignore dynamic revenue effects, and thus tend to overestimate (underestimate) revenue effects of revenue-enhancing (-decreasing) tax reforms. A second finding is that discrepancies between the government's forecast of GDP growth and forecasts by institutions such as the Council of Economic Experts or the OECD show up in the forecast error. More specifically, optimism/pessimism in the government's GDP forecast relative to the forecast of other institutions helps to explain why the revenue forecast turns out to be too

optimistic/pessimistic.

Our findings indicate that institutional precautions against political biases in budget forecasts that rely on external experts are limited by the information advantage of the government. The inclusion of the external experts in a consensus forecast may improve transparency and may also limit the government's influence on forecasts. However, our results show that in the German case, government influence is maintained as revenue forecasts follow government predictions of key parameters, such as the GDP growth rate or revenue estimates of tax reforms.

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A Data description

Federal Tax Revenue Forecast (in Bill. €): Issued by the Working Party on Tax Revenue Forecasting in May or November for the current or the next year as specified. The data cover the predictions for revenues in the period from 1971 to 2013. In current prices. Source: Press releases of the Federal Ministry of Finance.

Actual Federal Tax Revenue (in Bill. €): Realization of federal tax revenue. In current prices. Source: Federal Ministry of Finance.

Tax Revenue Forecast Error (in %): Log difference between the forecast and the actual tax revenues multiplied by 100. Source: Federal Ministry of Finance and own calculations.

Previous Revenue Forecast Error (in %): Revenue forecast error from the previous May forecast (in the case of considering a May forecast) or from the previous November forecast (in the case of considering a November forecast). For the next-year forecasts the forecast error for the current year is not known at the time the forecast is being prepared. In this case, the revenue prediction then available is employed. Source: Federal Ministry of Finance and own calculations.

GDP Forecast Difference: Difference between the GDP growth rate predicted by the government (Federal Ministry of Economics) and the growth rate predicted by the Council of Economic Experts as issued in November. In current prices. Source: Press releases of the Federal Ministry of Finance, annual reports of the Council of Economic Experts and own calculations.

GDP Forecast Difference (OECD): Difference between the GDP growth rate predicted by the government (Federal Ministry of Economics) and the growth rate predicted by the OECD as issued in November/December. In current prices. Source: Press releases of the Federal

Ministry of Finance, OECD Economic Outlook and own calculations.

GDP Forecast Error: Difference between the CEE forecast of the GDP growth rate as issued in November and the realized ex-post growth rate. Source: Federal Statistical Office, annual reports of the Council of Economic Experts and own calculations.

GDP Forecast Error (OECD): Difference between the OECD forecast of the GDP growth rate as issued in November/December and the realized ex-post growth rate. Source: Federal Statistical Office, OECD Economic Outlook and own calculations.

Estimated Effect of Tax Reforms (in %): The revenue effect for the forecasted period as estimated by the Federal Ministry of Finance relative to total tax revenues. In current prices. Source: Christian Breuer (Working Party on Tax Revenue Forecasting).

Federal Elections (Dummy): Takes a value of 1 if the forecast refers to an election year and a value of 0 for non-election years. Source: Own calculations.

Time in Office (in Days): Number of days the government has been in office when a forecast is issued. Source: Own calculations.

Government Ideology (left): Takes a value of 1 if a left-wing government, a value of 0.5 if a grand coalition, and a value of 0 if a right-wing government was in office at the time the forecast was being prepared. Source: Own calculations.

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Table 1: Descriptive statistics

Variable			Obs.	Mean	Std.Dev.	Min	Max
Tax Revenue Forecast Error (in %)	May	current year	43	-0.261	1.904	-5.025	3.339
	May	next year	42	0.411	6.233	-16.621	15.033
	Nov.	next year	42	-0.479	4.058	-9.548	7.966
Federal Tax Revenue Forecast (in Bill. €)	May	current year	43	148.781	62.616	47.704	258.700
	May	next year	42	152.174	61.552	50.822	260.100
	Nov.	next year	42	150.932	61.422	50.822	260.500
Actual Federal Tax Revenue (in Bill. €)			43	149.427	63.572	47.070	259.866
Previous Revenue Forecast Error (in %)	May	current year	42	-0.257	1.927	-5.025	3.339
	May	next year	41	0.715	5.401	-14.714	14.533
	Nov.	next year	41	-0.482	4.334	-9.981	8.447
GDP Forecast Difference	May	current year	42	-0.300	1.449	-6.934	3.249
	Nov.	next year	41	0.067	0.613	-1.348	0.971
GDP Forecast Difference (OECD)	May	current year	41	-0.316	1.562	-6.454	2.411
	Nov.	next year	40	0.115	0.666	-1.576	1.955
GDP Forecast Error			43	0.345	1.735	-2.699	5.598
GDP Forecast Error (OECD)			41	0.309	1.784	-3.382	5.118
Estimated Effect of Tax Reforms (in %)			43	-0.645	2.309	-7.060	4.077
Federal Elections (Dummy)	May	current year	43	0.209	0.412	0	1
	May	next year	42	0.238	0.431	0	1
	Nov.	next year	42	0.238	0.431	0	1
Time in Office (in Days)	May	current year	43	653.907	395.745	35	1297
	May	next year	42	638.905	387.969	35	1297
	Nov.	next year	42	582.548	405.739	1	1379
Government Ideology (left)	May	current year	43	0.488	0.482	0	1
	May	next year	42	0.500	0.481	0	1
	Nov.	next year	42	0.488	0.488	0	1

The dataset includes actual and predicted revenues for the period from 1971 to 2013. Forecast error is defined as 100 times the log difference between the federal revenue forecast and realized revenues. GDP Forecast Error is based on the difference between the Council of Economic Experts' or the OECD's forecast and actual GDP. GDP Forecast Difference measures the difference between the GDP forecast of the government and that of the Council of Economic Experts or the OECD. See section A.

Table 2: Basic results

	Forecast Error May current Year		Forecast Error May next Year		Forecast Error November next Year	
	(1)	(2)	(3)	(4)	(5)	(6)
log May Forecast for t (current year)	-0.643	-0.443				
	(0.612)	(0.691)				
log May Forecast for t+1 (next year)			-0.064	1.633		
			(1.953)	(2.172)		
log Nov. Forecast for t+1 (next year)					-0.305	0.515
					(1.497)	(1.533)
Federal Elections		-1.039		-0.093		1.402
		(0.895)		(2.227)		(1.740)
Time in Office (in Days)		0.001		-0.003		-0.002
		(0.001)		(0.003)		(0.002)
Government Ideology (left)		0.709		3.372		1.641
		(0.597)		(2.142)		(1.341)
Constant	7.325	4.375	1.174	-18.890	3.129	-6.457
	(7.181)	(7.843)	(22.883)	(25.224)	(17.660)	(18.277)
Observations	43	43	42	42	42	42
R-squared	0.027	0.078	0.000	0.082	0.001	0.072

Dependent variable is the forecast error, defined as log difference between federal revenue forecast and realized revenues. OLS regression results. Robust standard errors in parentheses.

Table 3: Accounting for macroeconomic shocks and tax reforms

	Forecast Error May current Year		Forecast Error May next Year		Forecast Error November next Year	
	(1)	(2)	(3)	(4)	(5)	(6)
log May Forecast for t (current year)	-0.990 *	-1.026				
	(0.522)	(0.614)				
log May Forecast for t+1 (next year)			-0.662	0.369		
			(1.517)	(1.629)		
log Nov. Forecast for t+1 (next year)					-0.673	-0.298
					(1.206)	(1.255)
GDP Forecast Error	0.460 ***	0.426 **	2.270 ***	2.248 ***	1.580 ***	1.533 ***
	(0.167)	(0.162)	(0.414)	(0.405)	(0.235)	(0.235)
Estimated Effect of Tax Reforms	0.264 **	0.316 **	-0.782 **	-0.660 **	-0.288	-0.280
	(0.125)	(0.125)	(0.292)	(0.270)	(0.209)	(0.204)
Federal Elections		-1.355 *		-0.359		0.443
		(0.772)		(1.737)		(1.240)
Time in Office (in Days)		0.001		-0.002		-0.001
		(0.001)		(0.002)		(0.001)
Government Ideology (left)		0.446		1.989		0.546
		(0.599)		(1.635)		(1.032)
Constant	11.442 *	11.067	6.875	-4.822	6.693	2.758
	(6.115)	(7.199)	(17.971)	(19.080)	(14.392)	(14.946)
Observations	43	43	42	42	42	42
R-squared	0.284	0.339	0.502	0.538	0.496	0.517

Dependent variable is the revenue forecast error, defined as log difference between federal revenue forecast and realized revenues. OLS regression results. Robust standard errors in parentheses. */**/*** indicates significance at the 10/5/1% level.

Table 4: Accounting for lagged forecast error

	Forecast Error May current Year		Forecast Error May next Year		Forecast Error November next Year	
	(1)	(2)	(3)	(4)	(5)	(6)
log May Forecast for t (current year)	-0.521	-0.614				
	(0.482)	(0.594)				
log May Forecast for t+1 (next year)			0.029	1.006		
			(1.728)	(1.738)		
log Nov. Forecast for t+1 (next year)					-0.212	0.076
					(1.362)	(1.360)
Previous Revenue Forecast Error	0.345 ***	0.356 ***	0.198 *	0.230 **	0.121	0.089
	(0.121)	(0.120)	(0.113)	(0.110)	(0.121)	(0.116)
GDP Forecast Error	0.343 **	0.298 *	2.413 ***	2.413 ***	1.635 ***	1.607 ***
	(0.167)	(0.167)	(0.450)	(0.424)	(0.239)	(0.238)
Estimated Effect of Tax Reforms	0.336 **	0.396 ***	-0.693 **	-0.546 *	-0.209	-0.229
	(0.130)	(0.134)	(0.283)	(0.284)	(0.198)	(0.195)
Federal Elections		-1.292		-0.590		0.271
		(0.783)		(1.712)		(1.136)
Time in Office (in Days)		0.001		-0.003		-0.001
		(0.001)		(0.002)		(0.001)
Government Ideology (left)		0.484		1.584		0.382
		(0.576)		(1.492)		(1.031)
Constant	6.047	6.317	-1.573	-11.989	1.249	-1.656
	(5.661)	(6.990)	(20.640)	(20.410)	(16.295)	(16.246)
Observations	42	42	41	41	41	41
R-squared	0.372	0.424	0.539	0.581	0.518	0.534

Dependent variable is the revenue forecast error, defined as log difference between federal revenue forecast and realized revenues. OLS regression results. Robust standard errors in parentheses. */**/*** indicates significance at the 10/5/1% level.

Table 5: Accounting for effects of government's GDP forecasts

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Forecast Error May current Year		Forecast Error November next Year		Forecast Error May current Year		Forecast Error November next Year	
log May Forecast for t (current year)	-0.460	-0.585			-0.408	-0.587		
	(0.552)	(0.631)			(0.624)	(0.672)		
log Nov. Forecast for t+1 (next year)			-0.558	-0.550			-0.874	-0.921
			(1.088)	(1.146)			(1.093)	(1.210)
GDP Forecast Difference	0.642 **	0.559 *	1.496 **	1.588 **				
	(0.302)	(0.290)	(0.655)	(0.618)				
GDP Forecast Difference (OECD)					0.709 **	0.665 **	1.175	1.319 *
					(0.279)	(0.268)	(0.745)	(0.730)
GDP Forecast Error	0.851 ***	0.781 ***	1.420 ***	1.423 ***				
	(0.267)	(0.268)	(0.224)	(0.228)				
GDP Forecast Error (OECD)					0.845 ***	0.794 ***	1.493 ***	1.508 ***
					(0.253)	(0.260)	(0.211)	(0.213)
Estimated Effect of Tax Reforms	0.127	0.170	-0.226	-0.237	0.125	0.165	-0.156	-0.168
	(0.125)	(0.131)	(0.188)	(0.189)	(0.123)	(0.124)	(0.194)	(0.200)
Federal Elections		-0.912		-0.382		-0.964		-0.656
		(0.848)		(1.233)		(0.807)		(1.082)
Time in Office (in Days)		0.001		-0.001		0.001		-0.000
		(0.001)		(0.001)		(0.001)		(0.001)
Government Ideology (left)		0.186		-0.242		0.077		-0.382
		(0.569)		(1.018)		(0.588)		(1.033)
Constant	5.090	6.245	5.467	5.940	4.571	6.389	9.432	10.38
	(6.549)	(7.432)	(12.97)	(13.71)	(7.443)	(7.932)	(13.03)	(14.37)
Observations	42	42	41	41	41	41	40	40
R-squared	0.363	0.381	0.547	0.556	0.349	0.369	0.551	0.558

Dependent variable is the revenue forecast error, defined as log difference between federal revenue forecast and realized revenues. OLS regression results. Robust standard errors in parentheses. */**/*** indicates significance at the 10/5/1% level.

Table A1: Forecasts for individual years

Year	Tax Revenue Forecast Error (in %)			GDP Forecast Error (in %)		GDP Forecast Difference (in %)				Revenue Estimate Reform (in %)
						Gvmt. vs. CEE		Gvmt. vs. OECD		
	May CY	May NY	Nov.NY	CEE	OECD	May CY	Nov.NY	May CY	Nov.NY	
1971	1.338			-1.180						-0.218
1972	-1.792	-2.293	-2.293	-2.699	-1.667	3.249	0.705	2.216	-0.327	-0.368
1973	0.643	-4.591	-4.591	0.537		0.445	-1.348			2.316
1974	3.042	7.100	7.100	1.650	2.083	-0.547	0.454	-0.980	0.020	3.115
1975	-1.865	9.894	6.582	2.912	3.983	-3.294	0.922	-4.365	-0.149	-7.060
1976	-2.368	-4.596	-4.596	0.000	-1.038	1.373	0.917	2.411	1.955	-2.003
1977	0.271	-0.861	-1.030	2.414	1.159	-0.922	0.000	0.334	1.256	1.662
1978	-1.420	1.539	-2.742	0.000	0.355	-0.468	0.000	-0.823	-0.355	-3.133
1979	-1.307	-2.437	-2.839	-1.208	-0.611	0.466	0.466	-0.130	-0.130	-2.771
1980	0.776	-0.822	1.047	0.466	-0.139	-0.373	-0.373	0.233	0.233	-0.640
1981	1.236	4.693	0.411	0.477	-0.730	-1.439	-0.382	-0.232	0.826	-2.868
1982	2.750	4.703	3.863	0.861	0.664	0.380	0.475	0.577	0.672	-0.652
1983	-0.314	4.052	-1.280	-0.287	-1.499	-0.480	-0.768	0.732	0.443	-1.021
1984	1.673	2.807	2.467	0.190	-0.471	0.000	0.000	0.661	0.661	-0.650
1985	0.701	3.677	0.714	0.952	0.536	-0.475	-0.952	-0.059	-0.536	-0.120
1986	1.187	4.321	1.394	0.380	-0.041	0.473	0.000	0.894	0.421	-2.338
1987	-0.263	1.922	1.555	1.355	1.878	0.000	0.957	-0.523	0.434	-0.857
1988	0.668	1.459	0.527	-2.387	-2.603	0.000	0.482	0.216	0.698	-2.845
1989	-2.320	-7.225	-6.059	-2.364	-2.316	0.477	0.000	0.429	-0.048	0.165
1990	-1.764	-6.693	-4.458	-2.137	-2.328	0.468	-0.943	0.660	-0.752	-4.400
1991	-1.907	-16.621	-7.921	-0.559	-0.159	0.000		-0.400		1.840
1992	-0.766	-3.634	-2.465	0.283	0.642	0.000	0.000	-0.359	-0.359	0.565
1993	-0.728	3.293	1.455	2.643	2.790	-1.951	0.674	-4.201	-1.576	-0.210
1994	-0.795	-3.464	-3.573	-1.837	-1.249	1.357	0.584	0.170	-0.603	1.994
1995	3.339	2.543	3.312	1.701	1.089	-0.285	-0.285	0.328	0.328	3.691
1996	0.500	15.033	2.882	2.739	2.928	-2.084	0.335	-2.274	0.145	-1.342
1997	1.713	5.330	4.119	1.937	1.405	-0.482	-0.192	0.050	0.339	-0.865
1998	-1.114	2.005	-2.877	2.208	1.775	-0.719	-0.335	-0.286	0.098	-0.327
1999	-1.040	-3.211	-3.074	1.153	1.408	-0.242	0.242	-0.497	-0.013	1.734
2000	0.359	-1.216	-1.008	0.424	1.245	0.679	0.679	-0.142	-0.142	-0.540
2001	1.448	6.815	1.759	1.011	1.025	-0.193	-0.920	-0.207	-0.935	-5.387
2002	2.239	6.089	2.494	0.745	0.652	0.196	0.780	0.288	0.873	1.848
2003	2.143	6.581	3.912	1.754	2.007	-0.489	0.971	-0.742	0.718	0.901
2004	1.027	7.642	5.235	-0.044	0.403	0.098	0.293	-0.349	-0.154	-2.276
2005	-1.553	2.085	0.275	0.780	0.875	-0.491	0.586	-0.586	0.491	-1.962
2006	-5.025	-6.255	-6.682	-2.161	-1.525	0.196	0.000	-0.439	-0.636	-0.080
2007	0.172	-9.047	-4.855	-1.587	-1.420	0.675	-0.680	0.508	-0.847	4.077
2008	-0.327	-0.411	-0.411	1.592	1.588	-0.097	0.000	-0.093	0.004	-0.135
2009	-1.101	8.853	7.966	5.598	5.118	-6.934	0.491	-6.454	0.972	-3.265
2010	-4.257	-5.046	-4.581	-2.299	-3.382	-0.880	-1.077	0.203	0.006	-3.336
2011	-4.403	-13.208	-9.548	-1.062	-1.002	0.000	-0.484	-0.060	-0.545	-0.246
2012	-1.574	-3.616	-2.530	0.132	-0.235	-0.098	0.098	0.270	0.465	0.457
2013	-0.450	0.090	0.244	-0.264	-0.506	-0.196	0.390	0.047	0.632	-0.186

CY: Current year; NY: Next year. Data set covers the revenues and predictions for the period from 1971 to 2013. Tax Revenue Forecast Error is defined as 100 times the log difference between the federal revenue forecast and realized revenues. GDP Forecast Error is based on the difference between the Council of Economic Experts' (CEE) or the OECD's forecast and actual GDP. GDP Forecast Difference measures the difference between the GDP forecast by the government and that by the Council of Economic Experts or the OECD. Revenue Estimate Reform captures the estimated change in revenues due to tax reforms as predicted by the Federal Ministry of Finance. See also section A.