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Tax Cuts Starve the Beast! Evidence from Germany

Abstract

The ‘starving the beast’ hypothesis claims that tax cuts lead to lower public spending, rather than higher debt levels and higher taxes in the future. This paper uses the institutional setting of German fiscal federalism to its advantage in order to explore how fiscal policy reacts to exogenous tax revenue shocks. We use panel data from the German states covering the period from 1992 to 2011, and assess to what extent exogenous changes in tax revenues affect aggregate public expenditure as well as specific sub-categories of government spending. Applying the narrative approach pioneered by [Romer and Romer \(2009\)](#), we construct a measure of exogenous tax shocks. This allows us to identify the causal effect of tax changes on fiscal policy. Our results suggest that an exogenous decrease in tax revenues triggers a reduction in public spending of roughly the same amount, with a delay of two to three years. We find that a revenue decline of one Euro reduces public spending on administration and, with a larger delay, social security, by 30 to 45 cents in each case. Spending on infrastructure declines by ten cents. We find no significant effects on spending on education, legal protection and public safety, or culture.

JEL-Codes: E620, H110, H200, H620, H720.

Keywords: taxation, fiscal policy, tax-spend, public expenditure, narrative approach.

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1. Introduction

Over the past 25 years, many Western democracies have witnessed a rapid increase in public spending, and a corresponding increase in the tax burden. For instance, in the member states of the European Monetary Union (EMU), public spending in relation to GDP increased on average from 41.6 per cent to 46.7 per cent between 1990 and 2015. This implies that government spending has grown notably faster than private spending. Over the same period, public revenues have grown from 39.8 per cent to 44.6 per cent in relation to GDP.¹

Whether this development should be considered good or bad in terms of economic welfare is disputed. Those who support higher government spending claim that public investment is highly productive, and that demand for publicly provided services and social insurance increase as incomes rise and the population ages. Critics object that the expansion of public spending and taxation reflects inefficient government growth. For both sides of this debate, it is important to understand the factors that enhance or inhibit the growth of public spending.

There is a widespread view among critics that the best way of containing public spending is to cut taxes. At an early stage, Milton Friedman has argued “[...] that the only effective way to restrain government spending is by limiting government’s explicit tax revenue – just as a limited income is the only effective restraint on any individual’s or family’s spending.” A similar argument was made by Alan Greenspan around the same time at a hearing of the Senate Finance Committee and later used by Ronald Reagan during his presidential election campaign in 1980.

The idea that lower tax revenues will restrain government spending later became known as the *starving the beast* hypothesis. Its proponents have argued that tax cuts compel legislators to enact spending cuts in order to ensure long-term fiscal sustainability. Critics, however, cast doubt on the notion that legislators will bow to the threat of a government’s fiscal position worsening in the future. They argue that tax cuts will inevitably lead to accelerating public debt levels or to even larger tax increases later down the line, as opposed to spending cuts. For instance, [Romer and Romer \(2009\)](#) investigate the impact of tax cuts on US federal spending and find no evidence supporting the *starving the beast* hypothesis. They conclude that “[...] policymakers should be aware that the historical experience suggests that tax cuts tend to lead to tax increases rather than to spending cuts.” ([Romer and Romer \(2009\): 198](#)). However, the empirical approach adopted by [Romer and Romer \(2009\)](#) faces challenges. They try to identify effects of tax cuts on spending for the US federal government only, and they concede that “[...] because our estimates are not highly precise, the hypothesis that tax cuts exert some restraining influence on spending cannot be rejected.”([Romer and Romer \(2009\): 197](#)).

In this paper, we test the *starving the beast* hypothesis in a different institutional context, which enables the impact of tax cuts to be identified in a more convincing way. We use panel data from the German states (*Bundesländer*) spanning the years from 1992 to 2011 in order to study the fiscal consequences of changes in tax revenues driven by changes in tax legislation. The German states provide an ideal institutional setting for an empirical

¹ The figures represent the unweighted average public spending to GDP and public revenues to GDP ratios across the EMU11. Source: IMF Government Finance Statistics.

test of the *starving the beast* hypothesis. While the states have full autonomy regarding debt financing and the level and structure of public spending, they have only very limited influence on the level of their revenues. For most taxes, rates and bases are set collectively by the federal government and representatives of the state governments.² Each state then receives a certain share of total tax revenues, the size of which is determined by a formula-based multi-step fiscal equalisation scheme (cf. section 3). Thus, changes in tax revenues at the state level that are driven by changes in tax legislation, can be considered exogenous insofar as they are beyond the control of an individual state government. This is a prerequisite for the identification of the causal effect of tax cuts on public spending. It is worth noting, though, that this also implies German state governments only being able to choose between adjusting spending and debt financing in response to a tax cut, whereas they cannot raise taxes retrospectively. Methodologically, we apply the so-called narrative approach pioneered by [Romer and Romer \(2009\)](#) to ensure that the changes in tax legislation that we utilise in our empirical analysis, are unrelated to the current or expected future economic or fiscal situation. To this end, we collect information from official government sources to identify the motivation behind each tax bill.

Our main findings are as follows. First, unlike [Romer and Romer \(2009\)](#), we identify strong support for the *starving the beast* hypothesis. Our results suggest that an exogenous decrease in tax revenues triggers a reduction in public spending of roughly the same amount. The adjustment takes place with a considerable delay of two to three years, however. The decline in public spending following a tax cut, occurs more quickly than the increase in spending triggered by a tax revenue hike. Neither the size nor pace of the adjustment seem to be connected to the political and fiscal situation of the state. No matter whether single-party versus coalition governments, right-wing versus left wing governments, states with high versus low levels of debt: they all react similarly. Regarding different types of public spending, we find that a revenue decline of one Euro reduces public spending on administration and, with a larger delay, social security, by 30 to 45 cents in each case. Spending on infrastructure declines by ten cents. We find no significant effects on spending on education, legal protection and public safety, or culture.

The remainder of this paper is structured as follows. The next section briefly reviews the literature to which our paper refers, and highlights the contribution we make. Section 3 provides background information on the system of fiscal federalism in Germany, and the degree of tax and spending autonomy of the German states. The construction of our exogenous tax shock series is explained in section 4. Section 5 discusses necessary assumptions for causal inference. In section 6, we introduce our empirical model. Section 7 presents our results, followed by various extensions and robustness checks in section 8. Section 9 reflects on the external validity of our findings. Section 10 concludes.

2. Related Literature and Contribution

By studying the relationship between public spending and revenues, our paper relates to a longstanding strand in the empirical public economics literature (see [Payne \(2003\)](#) for a review of the literature). Early contributions to this literature focus on public spending and

² Since 2006, states are allowed to set the rate of the real estate transfer tax. In 2005, the last year before the reform, revenue from this tax was only 2.7 per cent of overall state tax revenue.

revenues at the federal level in the US and apply VAR models as well as Granger causality tests to analyze whether tax changes are followed by public expenditure adjustments and vice versa. With regard to the *starving the beast* hypothesis, the results are mixed. [Anderson et al. \(1986\)](#) as well as [von Furstenberg et al. \(1986\)](#), find that changes in public spending trigger subsequent changes in tax revenues, but not the other way around; thus, finding no support for the *starving the beast* hypothesis. [Manage and Marlow \(1986\)](#) as well as [Blackley \(1986\)](#), in contrast, provide evidence supporting the *starving the beast* hypothesis. Subsequent contributions to the literature that apply more advanced methods for the analysis of time-series data, especially vector error correction models and cointegration techniques, as well as studies focusing on countries other than the US, provide inconclusive results, too.³

Arguably, the lack of consensus in the empirical literature may be due to the difficulty in identifying changes in tax revenues unrelated to the underlying economic or fiscal situation. Since changes in the economic or fiscal situation potentially affect both tax revenues and public expenditure at the same time, identifying the causal effect of tax changes on public spending poses a challenge. Business cycle fluctuations, for instance, tend to give rise to adjustments in tax revenues and public spending in opposite directions; hence implying that estimates of the effect of tax changes on public spending would be biased downwards. Furthermore, tax changes may be enacted in anticipation of changes in the future fiscal situation (to finance spending hikes resulting from the enactment of government programmes or to reduce the debt burden). This indicates that decisions about taxation and expenditure are made concurrently, although they may become effective at different points in time.

The paper by [Romer and Romer \(2009\)](#) addresses those concerns by using a so-called narrative approach to identify tax changes unrelated to the current or expected future economic or fiscal situation. The idea is to use official sources in order to identify the legislator's motivation behind the introduction of a tax bill. Based on this information, we can separate tax bills that have been enacted for reasons unrelated to the economic or fiscal situation, from those that are not, thus allowing us to compile a list of exogenous tax shocks. [Romer and Romer \(2009\)](#) apply the narrative approach to study how exogenous tax changes affect the US federal government's fiscal policy stance. Their findings suggest that tax cuts lead to future tax hikes, but not to any adjustment in the level of public spending. Accordingly, the *starving the beast* hypothesis is not supported.

In our empirical analysis, we adopt the narrative approach pioneered by [Romer and Romer \(2009\)](#) to study the effect of exogenous tax shocks on fiscal policy at state level in Germany. It is worth noting, however, that our study differs from [Romer and Romer \(2009\)](#) in at least three important aspects. The most important difference is the institutional framework. Unlike the US federal government, German state governments have almost no tax autonomy and would be unable to retrospectively react to tax cuts with the use of tax hikes even if they wanted to. They can only respond by either decreasing public spending or increasing public debt. In this respect, our results should not be interpreted as a direct contradiction of [Romer and Romer \(2009\)](#). Rather, our results suggest that the *starving the beast* effect does work in the context of the German institutional framework. If we had

³ Our analysis is also related to the literature on the impact of grants on subnational government spending and the flypaper effect (see [Courant et al. \(1979\)](#) and [Hines and Thaler \(1995\)](#)). We return to this issue in the discussion of our results.

found that states respond to tax revenue shocks by adjusting public debt, the *starving the beast* hypothesis would have to be rejected. Here, you could object that deficit financing has its limits because highly indebted states might damage investor trust. Yet, German states enjoy far-reaching bailout guarantees, implying that there are practically no risk premia on state level debt. In addition, our results also apply to states with low debt levels. The second major difference to [Romer and Romer \(2009\)](#) is that we do not only study the consequences of exogenous tax changes on aggregate public spending, but also on different types of spending. These include public administration, education, and infrastructure. This is important because one concern about pressure to cut spending is that it will harm public investment above all. A third difference is that we investigate whether the effects of tax changes on public spending vary across single-party governments and coalition governments, right and left-wing governments, as well as with the level of public debt.

3. Fiscal Federalism in Germany

The German federal system consists of three levels of government – the federal government, the state governments, and the municipal governments. Each level is endowed with its own legislative competencies and responsibilities, as specified by the German Constitution. Since the German reunification in 1990, there have been 16 German states (*Bundesländer*). Three of these 16 are so-called city-states (Berlin, Bremen, and Hamburg), which combine state and municipal-level competencies. The competencies assigned to the German states are extensive and mainly defined in Articles 71 to 74 of the constitution. They include policy areas such as public safety, education, infrastructure, social security, administration, and health.

Although equipped with far-reaching legislative competencies, fiscal autonomy at the state level is restricted. While enjoying full discretion about the level and priorities of public spending (at least in those policy areas for which they are responsible), the German states have scarcely any tax setting authority. With few exceptions, taxes are levied and tax revenues are collected by the federal government. In order to ensure that each state has sufficient means to perform its functions and to harmonise living conditions across all 16 German states, tax revenues are allocated across states applying a multi-step mechanism (the so-called ‘*Länderfinanzausgleich*’ or inter-state fiscal equalization scheme).

In a first step, the vertical allocation mechanism, tax revenues from the income tax, corporate tax, capital gains tax and value added tax are allocated across different levels of government according to fixed ratios. For example, the federal government and the state governments each receive 42.5 per cent of the income tax, 50 per cent of the corporate tax and 44 per cent of the capital gains tax. With regard to the value added tax, the federal government receives 51.4 per cent and the state governments 46.4 per cent of the revenues. The remainder is for the municipal governments. Revenues from some other tax measures are fully allocated either to the federal government (for instance energy and tobacco taxes) or the state governments (such as inheritance tax).

In the second step, the horizontal allocation mechanism, each single state’s share in the total amount of tax revenues allocated to the state level is determined. Income tax revenues are distributed in order to roughly match the amount of taxes paid by each stat’s inhabitants. The allocation of corporate tax revenues follows a similar principle. Each

state's share in total corporate tax revenues depends on the amount of taxes paid by the firms who have their headquarters or affiliated production units in that state. The allocation of VAT revenues largely serves the purpose of harmonising tax revenues across states. Up to 25 per cent of the total VAT revenues are assigned to those states that have received below average per capita tax revenues from other tax sources. The rest is distributed according to the number of inhabitants in each state.

The inter-state fiscal equalization scheme comprises a third and fourth step, which both aim at further mitigating the differences in per capita tax revenues across states. In the third step, states with higher than average per capita tax revenues pay transfers to states with below average per capita tax revenues. This redistributive scheme is justified by the fact that each state is believed to require financial resources of a comparable level in order to properly fulfill its functions. As a final step, the federal government pays vertical grants to those states that still have below-average financial resources.

In 2017, the sum of tax revenues allocated to the German states was roughly 300 billion Euro, which is only slightly below the level of tax revenues of the federal government (approx. 310 billion Euro). The tax revenues of German municipalities amounted to some 105 billion Euro. Thus, the state governments possess more than 40 per cent of total tax revenues collected in Germany.

The only channel available to state governments to influence tax legislation is through the Second Federal Chamber, that is, the *Bundesrat*. The *Bundesrat* represents the interests of the state governments vis-à-vis the federal government. Its members are not elected, and are instead delegated by the state governments. In general, the extent to which the *Bundesrat* participates in the legislation process depends on the nature of the proposed legislation. Legislation affecting states' interests requires the approval of the *Bundesrat* (so-called 'Consent Bills'). This includes legislation on all taxes where the states (or local governments) participate in revenues (Art. 105 III, German Constitution). In principle, the *Bundesrat* may also propose changes or amendments to (tax) bills introduced by the federal government. However, it is ultimately the German Federal Parliament that decides whether changes proposed by the *Bundesrat* will be adopted.

4. Constructing an Exogenous Tax Shock Series

We adopt the narrative approach pioneered by [Romer and Romer \(2009\)](#) in order to identify the causal effect of tax shocks on fiscal policy outcomes. Over the past years, the narrative approach has become a popular tool to investigate the impact of legislated tax changes on macroeconomic aggregates, especially GDP (see [Romer and Romer \(2010\)](#) for the US, [Cloyne \(2013\)](#) for the UK and [Hayo and Uhl \(2014\)](#) for Germany). As a starting point, we collect information on all discretionary changes in the federal tax legislation in Germany over the period from 1988 to 2011, together with the expected impact of each legislated tax change on tax revenues. Our source of information is the *Finanzbericht* (fiscal report), which is the Federal Ministry of Finances annual publication. The *Finanzbericht* contains detailed information on every piece of tax legislation, including (i) the date the tax bill was passed, (ii) the motivation and objective behind the tax bill, and (iii) forecasts of the annual revenue impact over the coming years for each level of government; for instance federal, state, and municipal level. Note that the forecasts for the state and municipal level

represent aggregates, in other words, the *Finanzbericht* reports the prospected cumulative revenue impact for all states and municipalities combined.

We proceed in several steps in order to construct a measure of exogenous tax shocks. First, we assign each piece of tax legislation to one out of seven different categories, depending on the motivation behind the tax bill, thereby, closely following the schemes applied in [Romer and Romer \(2010\)](#), [Cloyne \(2013\)](#) and [Hayo and Uhl \(2014\)](#). By rules of the parliamentary procedure, the motivation for any tax change needs to be explained in detail in the draft bill.

The first category comprises tax changes primarily intended to stabilise supply or demand-driven fluctuations in aggregate output. We label these tax measures ‘counter-cyclical’. There are several examples of tax changes falling into this category, most prominently the fiscal stimuli packages that were implemented during the economic and financial crisis in 2010 (*Konjunkturpaket*; economic stimulus package).⁴

The second category are ‘spending-driven’ tax changes. This label refers to tax measures that are implemented in anticipation of higher future public expenditure over the short and mid-term. Examples include the increase in taxes on cigarettes in 2003, explicitly adopted with the aim of financing the fight against international terrorism. Related to this are tax measures that were implemented in order to consolidate public finances. These ‘deficit-driven’ tax changes merely constitute tax hikes. A prime example is the value-added tax increase (the VAT rate rose from 16 per cent to 19 per cent) of 2006 with a prospected rise in public revenues of roughly 24 billion Euro each year.

Fourth, some policy measures were taken in response to ‘macroeconomic-shocks’, such as German reunification and the introduction of the Euro as a common currency in Europe. In 2000, for example, the German government issued a bill converting and rounding amounts denoted in the German tax law in *Deutsche Mark* (such as allowances or income thresholds important for determining tax rates) into *Euro* amounts.

The fifth category includes tax changes adopted in an attempt to steer taxpayers’ behaviour into the desired direction (‘Pigou taxes’). The intention behind this type of tax is generally to force taxpayers to internalise some sort of externality. Most of the tax bills falling into this category are environmental taxes.

Our sixth category is for tax measures that were implemented for ‘structural reasons’. This label applies to tax instruments intended to improve the long-term economic conditions, while being unrelated to the contemporary economic situation at the same time. Examples include tax measures that aim to reduce the bureaucratic burden of taxation for firms or to improve conditions for private investments.

Seventh, some tax changes reflect the transposition of EU law into national legislation, or they are passed due to a ruling of the European Court of Justice. For instance, in 2010, a bill was introduced extending the possibility to deduct donations to Germany-based charitable organisations from the taxable income to donations directed to charitable organisations based in other EU countries. Introducing these tax bills into national legislation is compulsory and the German government generally has only little – if any – leeway with regard

⁴ [Cloyne \(2013\)](#) explicitly distinguishes between demand and supply-driven tax policy reactions within this broader category of ‘counter-cyclical’ tax policy measures. This distinction is not important for our purpose, as we are only concerned with the identification of exogenous tax measures.

to the details of the law's content. Those tax bills are typically intended to harmonise tax legislation across EU Member States.

In a second step, we classify each tax category as either endogenous or exogenous. In the process, we closely follow the examples of [Romer and Romer \(2009\)](#), [Cloyne \(2013\)](#) and [Hayo and Uhl \(2014\)](#). Discretionary tax changes that can be unambiguously labelled as exogenous, should not be correlated with factors that may concurrently affect government spending and revenues. One example of a tax category that clearly fails to meet this criterion are counter-cyclical tax measures. Tax cuts (tax hikes) implemented during downturns (upsurges), tend to be accompanied by spending hikes (cuts) so as to amplify the impact of the fiscal stimulus (contraction). Moreover, automatic stabilisers mechanically trigger expenditure adjustments in the presence of business cycle fluctuations, and therefore coincide with counter-cyclical tax measures. However, they are not caused by tax changes.

In addition, exogenous tax changes must not automatically entail decisions about public expenditure or be triggered by them. Tax hikes adopted for the purpose of financing a specific government programme for instance, clearly violate this condition, and thus, must be considered endogenous. Tax hikes that aim at consolidating public finances, on the other hand, may be inversely related to spending changes. Hence, including these tax changes would most certainly induce a downward bias in our coefficient estimates. All remaining tax changes are labelled as exogenous for two reasons. Firstly, they are neither the result of changes in public expenditure, nor are they related to economic or fiscal variables that affect tax revenues and public expenditure at the same time. Secondly, since they reflect decisions taken at the federal government level and are, thus, 'externally' imposed, they are unrelated to the political situation in the state where the revenue 'shock' occurs.

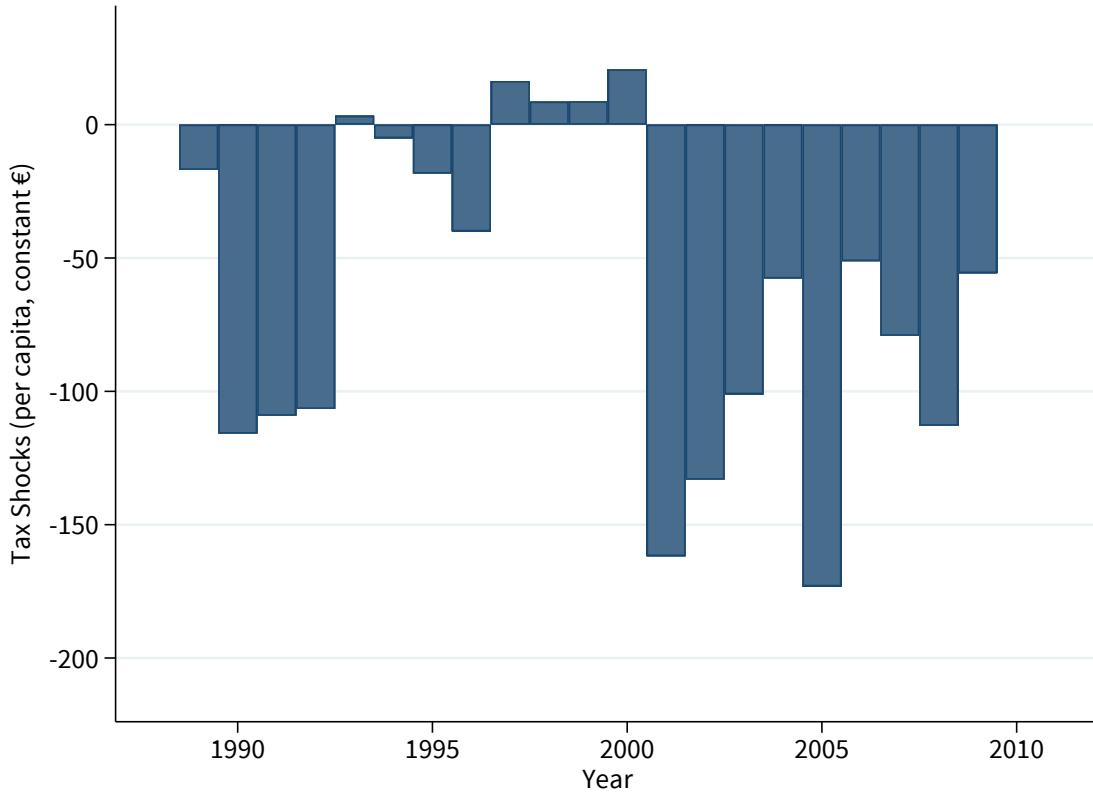
Finally, for each year of our sample period, we compute the aggregated revenue impact of past and present exogenous tax changes. For each tax measure, the *Finanzbericht*, a yearly report about public finances in Germany, includes the forecasted annual revenue impact for k consecutive years, with k varying across publications and tax changes. We simply multiply the tax revenue changes projected for year t of all tax measures adopted between t and $t - k$. Therefore, our exogenous (indicated with x) tax shock measure is equal to

$$\Delta\tau_t^x = \sum_{j=0}^k \Delta\tau_{t|t-j}^x,$$

where $\Delta\tau_{t|t-j}$ is the sum of tax revenue changes projected for year t across all tax measures introduced in year $t - j$.

Note that, in contrast to [Hayo and Uhl \(2014\)](#), who omit tax measures with a prospected revenue impact of less than 0.1 per cent of GDP from their analysis, our analysis includes all pieces of tax legislation that are adopted during our sample period. The reason is that several tax changes are introduced each year and we are interested in their cumulative impact. Even if each single tax measure implemented in a particular year has a rather modest impact on tax revenues, the cumulative effect of all tax changes introduced that year may be large enough to exert a significant influence on the public budget. In total, our dataset covers 129 pieces of legislated tax changes, of which we consider 93 to be exogenous and 36 to be endogenous.

Figure 1: The Exogenous Tax Shock Series at the State-Level



The resulting exogenous tax shock series is depicted in Figure 1 with the projected per capita tax revenue changes at the state-level in constant prices on the vertical axis. We can see that the projected aggregate revenue change is positive in only five out of 21 years. Moreover, in those five years, the projected increase was of rather modest size. A very similar picture emerges when focusing on the single tax bills. We find that around two thirds of the exogenous tax changes are estimated to have a negative revenue impact. What is more, on average the projected revenue impact of negative tax shocks is larger than that of positive tax shocks (in absolute terms). Some years stand out in this context: Substantial drops in tax revenues in our exogenous tax shock series in the early and mid-2000s are mostly driven by structural changes in labour, as well as corporate profit taxation predominantly enacted in the year 2000 when the economy experienced strong growth. The corresponding tax bills were intended to spur domestic demand and private investment over the longer-term. Similarly, the negative tax revenue shocks of 2007/08 that we label exogenous, were not a reaction to the upcoming financial and economic crisis but instead reflect an accumulation of smaller tax changes aimed at changing the long-run conditions. For example, the largest tax change in terms of revenue impact at that time emanates from the introduction of tax deduction possibilities for private pension plans. This instrument was implemented in light of the projected demographic change over the coming decades.

Clearly, these changes are not driven by contemporary economic conditions but focus on solving longer-term challenges.

5. Conditions for Causal Inference

The aim of our analysis is to identify the causal effect of changes in tax revenues on the fiscal policy of German state governments in order to empirically test the *starving the beast* hypothesis. The following conditions must apply in order for our identification strategy to be valid.

5.1 Accuracy of Revenue Projections

Tax projection experts at the Federal Ministry of Finance provide the revenue projections reported in the *Finanzbericht*. Unfortunately, there is little information on how and on which basis they are obtained. Given that we use these projections to construct our key explanatory variable, our identification strategy depends on the accuracy of these projections. In order to assess their accuracy, we regress the absolute change in state tax revenues per capita on our exogenous tax shock series. Table 1 shows the regression results for different specifications of the regression model. Since the point estimate of the contemporary effect of the tax shock series is close to 1 across all three specifications (and never significantly different from 1, as the bottom row of Table 1 indicates), we have no reason to believe that the ministry's projections are systematically biased. We are therefore confident that they are sufficiently precise for our purpose.

Table 1: Accuracy of Revenue Projections

	Dep. variable: Total revenues per capita		
	(1)	(2)	(3)
$\Delta\tau_t^x$	0.889*** (0.257)	0.882*** (0.252)	1.146*** (0.326)
linear trend	✗	✓	✓
quadr. trend	✗	✗	✓
Observations	224	224	224
R^2	0.049	0.051	0.059
$H_0: \beta_{\Delta\tau_t^x} = 1$	$p = 0.67$	$p = 0.64$	$p = 0.65$

Notes: Results are based on OLS estimation. We use heteroskedasticity robust standard errors which are displayed in brackets below. The coefficient of the constant is omitted to ease readability.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5.2 Exogeneity of Tax Shock Series

To establish a causal link between changes in tax revenues and public expenditure, it is important that our tax shock series is unrelated to the underlying economic and fiscal conditions. Applying the narrative approach ensures that the tax changes we consider are not motivated by current economic conditions. What about the timing of those tax changes, however? Even if a tax change may not be motivated by the current economic situation, policymakers might still take the business cycle into account when making decision on the timing of a tax change. For instance, policymakers may be reluctant to implement tax hikes during downturns or tax cuts during upswings, which would render our identification strategy invalid. However, when comparing the realisations of our tax shock series depicted in Figure 1 to contemporary income growth rates, it becomes evident that the tax changes we consider to be exogenous are not related to business cycle fluctuations. Some of the largest negative tax shocks have been adopted in ‘normal’ economic times characterised by income growth rates that are close to the sample average. For example in the early 1990s, income growth was about 1.5 per cent p.a., and in the early 2000s it was roughly 1.9 per cent. Other peaks in the tax shock series seem to be evenly distributed across economic downturns and upswings. In 2005, when the German economy reached the height of an upswing phase with an annual income growth rate of 3.8 per cent, a large negative tax shock occurred. The next sizable negative tax change was implemented in 2009, at a time Germany was still suffering from the repercussions of the financial and economic crisis, and income growth was negative.

5.3 No Anticipation Effects

Another concern that may be raised is that state governments might anticipate future tax changes and adjust public spending in advance, not least because they could potentially influence the legislation process through the Second Federal Chamber, for example the *Bundesrat* (cf. section 3). State governments’ ability to influence tax legislation may raise concerns about reverse causality. The question arises whether states adjust their expenditure in anticipation of future tax changes, which they could potentially influence. To test the validity of this concern, we regress our tax shock series on contemporary and past changes in state public expenditure per capita.⁵ The results are presented in Table 2. Our findings do not indicate that state governments anticipate future tax changes. The coefficient estimates for present and past changes in public spending are not only statistically insignificant, but also economically negligible. Thus, we are confident that reverse causality is not an issue.

⁵ Note that according to Reutter (2007), the time span between the initiation of a bill and its adoption is, on average, 250 days. In fact, all the tax bills covered in our analysis became effective the year after they were introduced to parliament. Therefore, we believe that it is sufficient to control for the first lag of public expenditure in order to test for reverse causality.

Table 2: Reverse Causality Check

	Dep. variable: Tax Shock Series ($\Delta\tau_t^x$)		
	(1)	(2)	(3)
Δy_t	-0.015 (0.023)	0.014 (0.022)	-0.006 (0.021)
Δy_{t-1}	0.009 (0.025)	0.001 (0.021)	-0.020 (0.020)
linear trend	✗	✓	✓
quadr. trend	✗	✗	✓
Observations	224	224	224
R^2	0.002	0.203	0.303

Notes: Results are based on OLS estimation. We use heteroskedasticity robust standard errors which are displayed in brackets below. The coefficient of the constant is omitted to ease readability.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

6. Empirical Approach

Our aim is to evaluate the influence of legislated tax changes on fiscal policy outcomes. To this end, we utilise panel data from the German states spanning the years from 1992⁶ to 2011, the latest year for which state-level fiscal data is currently available.⁷ We estimate the following empirical model:

$$\Delta y_{it} = \alpha + \sum_{j=0}^n \beta_j \Delta\tau_{t-j}^x + \sum_{j=1}^n \gamma_j y_{it-j} + X_{it}\delta + \epsilon_1 t + \epsilon_2 t^2 \quad (1)$$

The index t refers to the year, and i to the state. In our baseline specification, the dependent variable is the absolute change in total public spending per capita. As part of an extension, we also focus on public spending in different policy areas (cf. section 8.2). Our explanatory variable of main interest is our measure for exogenous tax shocks $\Delta\tau^x$. As described in section 4, our tax shock indicator is equal to the sum of the changes in tax revenues projected for year t across all tax changes adopted between t and $t - k$. Since for most volumes of the *Finanzbericht*, k is equal to four (and never smaller), our empirical model includes four lags of the tax shock variable. X_{it} is a vector of state-specific covariates. This vector includes the level of net income per capita, the unemployment rate, the level of public debt per capita, the dependency ratio (for example, the share of people below 25 or above 65 years of age), as well as dummy variables for election years, coalition

⁶ Note that state-level forecasts of the revenue impact of tax changes are only reported from 1988 onwards.

In the *Finanzbericht* of 1988, revenue forecasts are provided for the years from 1988 to 1992. Thus, if we were to utilise data from before 1992 in our analysis, we would not take into account the estimated state-level revenue impact of tax measures introduced before 1988.

⁷ State-level fiscal data are published with a considerable time-lag as the variables need to be made comparable across states by the Federal Statistical Office.

governments, and left-wing governments (such as governments led by the Social Democratic Party).⁸ Note that net income, the unemployment rate, and the level of public debt are lagged by one year to mitigate concerns about reverse causality. In order to account for gradual budget adjustments, we also include the four lags of the dependent variable in our empirical model. To test whether the coefficient estimates of our tax shock series are sensitive to the inclusion of additional explanatory variables, we consecutively add the lags of the dependent variable and the vector of controls to our empirical specification. Finally, we add a linear and a quadratic time trend to our model to account for homogeneous trends. Data on all fiscal and economic variables are provided by the Federal Statistical Office (*Statistisches Bundesamt*), while the political variables are taken from the State Election Commissioners (*Landeswahlleiter*). The economic and fiscal variables are adjusted for inflation using the national CPI.⁹ We estimate Equation 1 using ordinary least squares (OLS).

Given that the *Finanzbericht* only reports forecasts of the aggregate tax revenue effect for all German states combined, we need to make an assumption about how the aggregate tax revenue effect influences the budgets of individual states. Since, generally speaking, the allocation of tax revenues across states is primarily determined by the number of citizens residing in a state, we divide our tax shock variable by national population figures and our dependent variables by state population figures. That way, we implicitly assume that the change in tax revenues in each state resulting from a legislated tax change, is proportional to its number of inhabitants (and that the per-capita revenue impact of a legislated tax change does not vary across states).

Three of the 16 German states are so-called city states (*Stadtstaaten*), namely Berlin, Bremen, and Hamburg. These states adopt functions at both the state and local government level. As a result, they receive tax revenues designated for the state and local level, which is why the tax shock series for the city states combines prospected changes in tax revenues at both state and the municipal level.¹⁰

Since we use the first difference of public spending as the dependent variable, the coefficients β_j can be interpreted as the tax shock-induced deviations of state-level public spending from its long-term trend. In the full model that includes net income and the unemployment rate as control variables, the dependent variable can be interpreted as the cyclically-adjusted long-term trend in public spending. Note that the inclusion of a linear and a squared time trend in our empirical model implies that we allow the trend to vary over time.

The lack of precision with which the state-level revenue impact of a tax shock is measured, represents an important limitation for our empirical analysis. Our tax shock series is constructed based on forecasts of the aggregate revenue impact of legislated tax changes across all 16 states. Nevertheless, as witnessed in Section 5, those forecasts appear to be accurate on average, yet we know nothing about how well they predict the revenue changes in each individual state. Thus, our independent variable of main interest is likely measured with noise. Consequently, under the classical errors-in-variables assumption, our estimates

⁸ Descriptive statistics are shown in Table 9 of the Appendix.

⁹ The base year is 2000; the data is also taken from the Federal Statistical Office.

¹⁰ Our baseline results in Table 3 do not change if we also include municipality-level revenue projections for all other states.

of β_j will suffer from an attenuation bias, meaning that they are biased toward zero. Our estimates can thus be interpreted as a lower bound of the true parameter β_j .

7. Results

The estimation results for Equation 1 are presented in Table 3. The first column of Table 3 shows the estimates when omitting the AR(4) term and the control variables, the second column when omitting only the control variables, and the third column for the full model. Our results indicate a strong and statistically significant impact of legislated tax changes on aggregate spending at the state level. However, spending adjustments only occur with a significant delay. According to our estimates, an increase (decrease) in tax revenues by one Euro is associated with an increase (decrease) in public spending by 0.40 to 0.70 Euro two years after the occurrence of the tax shock, and by another 0.40 to 0.70 Euro after three years. Note that for each specification, the sum of significant coefficients never substantially differs from one, implying that any tax hike (tax cut) is followed by an increase (a reduction) in public spending of the same amount over the long-run. The delayed reaction of public spending after a legislated tax change, suggests a delay in political decision-making. State governments take time to adapt to revenue change and agree on an adjustment of public spending.

8. Extensions and Robustness Checks

8.1 Heterogeneous Spending Adjustments

8.1.1 TAX HIKES VS. TAX CUTS

We do not differentiate between tax hikes and tax cuts in our baseline specification. Instead, we study their effects combined. The *starving the beast* hypothesis, however, suggests exclusively focusing on tax cuts. In addition, Figure 1 of Section 4 illustrates that our sample mainly comprises tax cuts. In fact, tax hikes have been a rare event during our sample period, and if they did occur, they have only been of modest size. In light of that, it seems natural to merely focus on the effect of tax cuts. To this end, we re-estimate Equation 1 after omitting all tax hikes from our sample. The results are presented in the second column of Table 4. To facilitate the comparison with our baseline estimates, the first column of Table 4 replicates the results from our baseline specification.

The findings indicate that state governments appear to react faster to a tax cut than a tax hike. When omitting tax hikes from our sample, we see a statistically and economically significant adjustment in public spending one year after a tax shock occurs. Moreover, the coefficient estimates for the first three lags of our tax shock series become notably larger when only focusing on tax cuts. The sum of significant coefficient estimates is roughly equal to 2.6, thus indicating that the decrease in public spending far exceeds the magnitude of the tax cut.¹¹ A possible explanation is that state governments seek to repay the debt they incurred due to the delayed adjustment of public spending. On the whole, our findings lend strong support to the *starving the beast* hypothesis.

¹¹ The lower and upper bound of the 95% confidence interval is [1.6; 3.7].

Table 3: Baseline Regressions

	Dependent variable: Aggr. Spending per capita		
	(1)	(2)	(3)
$\Delta\tau_t^x$	0.068 (0.212)	-0.079 (0.235)	-0.162 (0.210)
$\Delta\tau_{t-1}^x$	0.288 (0.205)	0.107 (0.187)	-0.182 (0.164)
$\Delta\tau_{t-2}^x$	0.585** (0.242)	0.734*** (0.238)	0.417** (0.205)
$\Delta\tau_{t-3}^x$	0.491*** (0.183)	0.569*** (0.190)	0.424** (0.189)
$\Delta\tau_{t-4}^x$	-0.282 (0.218)	-0.103 (0.194)	-0.162 (0.180)
AR(4)	✗	✓	✓
Controls	✗	✗	✓
linear trend	✓	✓	✓
quadr. trend	✓	✓	✓
Observations	224	218	218
R^2	0.125	0.193	0.341

Notes: Results are based on OLS estimation. We use heteroskedasticity robust standard errors which are displayed in brackets below. The coefficient of the constant is omitted to ease readability.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

8.1.2 HIGHLY VS. MODESTLY INDEBTED STATES

The degree of flexibility governments have when it comes to decisions about public spending depends on the level of public debt. It is typically assumed that the marginal costs of public debt increase with the level of debt. This implies that a high debt level restricts the government's room for manoeuvre and forces the government to react faster to a negative tax shock. To test this conjecture, we construct a dummy variable that takes the value one if a state's level of public debt in a given year is above the sample median and zero otherwise. Subsequently, we interact this dummy variable with our tax shock series in order to estimate separate coefficients for highly and modestly indebted states. The results are presented in Table 5. The coefficient estimates for highly and modestly indebted states are virtually identical and scarcely differ from one another. Thus, our conjecture is not supported by the data. Note that this conclusion does not change when exclusively focusing on tax cuts.¹²

12 Results available on request.

Table 4: Effects of Tax Cuts Only

	Dependent variable: Aggr. Spending per capita	
	All tax changes	Only tax cuts
$\Delta\tau_t^x$	-0.079 (0.235)	0.396 (0.356)
$\Delta\tau_{t-1}^x$	0.107 (0.187)	0.649** (0.275)
$\Delta\tau_{t-2}^x$	0.734*** (0.238)	1.127*** (0.323)
$\Delta\tau_{t-3}^x$	0.569*** (0.190)	0.831*** (0.227)
$\Delta\tau_{t-4}^x$	-0.103 (0.194)	-0.490 (0.342)
AR(4)	✓	✓
linear trend	✓	✓
quadr. trend	✓	✓
Observations	218	218
R^2	0.193	0.239

Notes: Results are based on OLS estimation. We use heteroskedasticity robust standard errors which are displayed in brackets below. The coefficient of the constant is omitted to ease readability.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

8.1.3 SINGLE-PARTY VS. COALITION GOVERNMENTS

Another potentially important factor that may affect a government's reaction to a tax shock, is a phenomenon referred to as the 'war of attrition' (e.g., [Poterba and von Hagen \(1999\)](#); [Persson and Tabellini \(1999\)](#)). Here, the argument is that divided governments or coalition governments have an incentive to delay an adjustment in response to a fiscal shock because they have different preferences regarding the measures of adjustment. For example, in the event of a tax shock, the parties forming a coalition may opt for spending hikes or cuts in different policy areas. The first party that concedes will alienate its constituents and thus bear a larger share of the political costs associated with spending adjustment. This is why each party tries to outlive the other(s) ([Padovano and Venturi \(2001\)](#)). For that reason, we would expect that single-party governments adjust public spending faster than coalition governments when a tax shock occurs. To test this hypothesis, we combine our tax shock series with a dummy variable that adopts the value one for coalition governments and zero for single-party governments. We thus obtain separate coefficient estimates for both

Table 5: Deficit-Driven Spending Adjustments

	Dependent variable: Aggr. Spending per capita	
	High debt level	Low debt level
$\Delta\tau_t^x$	-0.155 (0.233)	-0.189 (0.263)
$\Delta\tau_{t-1}^x$	-0.239 (0.231)	-0.075 (0.213)
$\Delta\tau_{t-2}^x$	0.534* (0.297)	0.478* (0.258)
$\Delta\tau_{t-3}^x$	0.529* (0.269)	0.448* (0.230)
$\Delta\tau_{t-4}^x$	-0.298 (0.256)	-0.091 (0.204)
AR(4)	✓	✓
linear trend	✓	✓
quadr. trend	✓	✓
Observations	218	218
R^2	0.278	0.278

Notes: Results are based on OLS estimation. We use heteroskedasticity robust standard errors which are displayed in brackets below. The coefficient of the constant is omitted to ease readability.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

types of government. Our results do not support the ‘war of attrition’ hypothesis since the coefficients are virtually identical (see Table 6).

8.1.4 DIFFERENCES BETWEEN LEFT-WING AND RIGHT-WING GOVERNMENTS

Finally, we investigate whether left (for example, governments led by the Social Democratic Party; SPD) and right-wing (such as governments led by the Christian Democratic Union; CDU) governments react differently to tax shocks. We do so by interacting the tax shock variable with a dummy for left-wing governments. A first glance at the coefficients presented in Table 7 suggests that left-wing and right-wing governments differ with regard to the timing of spending adjustments. Two years after a tax cut, left-wing governments appear to have fully adjusted public spending (in other words the decrease in tax revenues is mitigated by a decrease in public spending of the same amount). Right-wing governments, however, seem to require three years to reduce public spending by the amount necessary to balance the budget. It is worth noting, though, that despite the differences in their

Table 6: Coalition-Driven Adjustments

	Dependent variable: Aggr. Spending per capita	
	No Coalition	Coalition
$\Delta\tau_t^x$	0.101 (0.250)	-0.175 (0.296)
$\Delta\tau_{t-1}^x$	-0.271 (0.229)	0.280 (0.245)
$\Delta\tau_{t-2}^x$	0.675** (0.272)	0.758** (0.307)
$\Delta\tau_{t-3}^x$	0.651*** (0.245)	0.563** (0.257)
$\Delta\tau_{t-4}^x$	-0.031 (0.251)	-0.148 (0.231)
AR(4)	✓	✓
linear trend	✓	✓
quadr. trend	✓	✓
Observations	218	218
R^2	0.209	0.209

Notes: Results are based on OLS estimation. We use heteroskedasticity robust standard errors which are displayed in brackets below. The coefficient of the constant is omitted to ease readability.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

magnitudes, the coefficients do not significantly differ from one another at conventional levels of significance.¹³

8.2 Spending on Sub-Categories

Until now, we have focused on the effects of legislated tax changes on aggregate public spending. Our findings provide strong support for the *starving the beast* hypothesis. They suggest that tax cuts are associated with reductions in public spending of a similar amount. However, the pending question is in which policy areas public spending is reduced in response to a tax cut. To answer this question, we re-estimate Equation 1 using per capita spending in different policy areas as the dependent variable. We focus on eight different policy areas: public administration, education, public safety and legal protection, health,

¹³ The p-value for a test of the null that the coefficient of the second lag of the tax shock variable is the same for left and right-wing governments is 0.193.

Table 7: Ideology-Driven Adjustments

	Dependent variable: Aggr. Spending per capita	
	Left-wing Party	Right-wing Party
$\Delta\tau_t^x$	0.006 (0.334)	-0.169 (0.225)
$\Delta\tau_{t-1}^x$	0.299 (0.292)	-0.126 (0.222)
$\Delta\tau_{t-2}^x$	0.994*** (0.323)	0.481* (0.285)
$\Delta\tau_{t-3}^x$	0.515* (0.307)	0.618*** (0.208)
$\Delta\tau_{t-4}^x$	-0.108 (0.305)	-0.028 (0.233)
AR(4)	✓	✓
linear trend	✓	✓
quadr. trend	✓	✓
Observations	218	218
R^2	0.220	0.220

Notes: Results are based on OLS estimation. We use heteroskedasticity robust standard errors which are displayed in brackets below. The coefficient of the constant is omitted to ease readability.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

infrastructure, social security, science, and culture. These are the largest spending items in German state government budgets.

The results are shown in Table 8. To economise on space, we only report the results for those policy areas for which we find robust significant effects.¹⁴ Our findings indicate that both the timing as well as magnitude of the adjustment in public spending varies considerably across the different policy areas. We see particularly large adjustments to tax shocks in public spending for administration and social security. Depending on the specification, the estimates suggest that an increase (a decrease) in tax revenues by one Euro triggers an increase (a reduction) in spending on administration by 0.30 Euro to 0.45 Euro in total. The adjustment in social security spending is of a similar amount. However, while spending on public administration is already reduced the year after a tax change is realised, the change in social security spending only occurs two to three years after the tax

¹⁴ All additional results are available on request.

Table 8: Spending on Sub-Categories

	Dependent variable: Spending per Capita on ...							
	Administration		Health		Infrastructure		Social Security	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
$\Delta\tau_t^x$	0.135** (0.059)	0.088 (0.058)	0.020 (0.025)	0.024 (0.026)	0.091** (0.046)	0.097 (0.062)	0.061 (0.102)	-0.022 (0.098)
$\Delta\tau_{t-1}^x$	0.315*** (0.077)	0.297*** (0.065)	0.018 (0.031)	0.022 (0.033)	0.090** (0.051)	0.094 (0.070)	-0.003 (0.112)	-0.111 (0.120)
$\Delta\tau_{t-2}^x$	0.038 (0.078)	-0.003 (0.073)	0.104*** (0.031)	0.103*** (0.032)	0.083 (0.054)	0.086 (0.238)	0.153* (0.081)	0.043 (0.088)
$\Delta\tau_{t-3}^x$	-0.005 (0.055)	-0.037 (0.051)	0.083*** (0.029)	0.082*** (0.029)	0.024 (0.055)	0.027 (0.065)	0.348*** (0.098)	0.251*** (0.095)
$\Delta\tau_{t-4}^x$	-0.007 (0.059)	-0.036 (0.057)	0.019 (0.018)	0.014 (0.018)	0.104** (0.041)	0.101** (0.043)	0.110 (0.068)	0.076 (0.064)
AR(4)	✓	✓	✓	✓	✓	✓	✓	✓
Controls	✗	✓	✗	✓	✗	✓	✗	✓
linear trend	✓	✓	✓	✓	✓	✓	✓	✓
quadr. trend	✓	✓	✓	✓	✓	✓	✓	✓
Observations	160	160	160	160	160	160	160	160
R^2	0.480	0.551	0.227	0.254	0.178	0.206	0.255	0.292

Notes: Results are based on OLS estimation. We use heteroskedasticity robust standard errors which are displayed in brackets below. The coefficient of the constant is omitted to ease readability.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

shock. Arguably, the difference with regard to the timing of the adjustment indicates that spending on social security is more prevalent than spending on public administration.

Aggregate spending on infrastructure features smaller spending increases in the beginning, and slightly more generous spending over the longer-term. This is not surprising since many construction projects require considerable time for planning. Spending increases in the longer run, for example after four years by around 0.10 Euro per capita.

We conducted the same exercise for additional expenditure categories. These include spending on education, science, legal protection and public safety as well as culture. Point estimates for the impact of exogenous revenue changes for spending on these categories, were not statistically significantly different from zero at the 5 per cent level.

9. A Note on External Validity

Does a decline in tax revenue lead to a decline in public spending, as implied by the *starving the beast* hypothesis? Or does it cause higher deficits and subsequently higher

taxes but no change in spending, as suggested by [Romer and Romer \(2009\)](#)? Our analysis of the fiscal consequences of tax shocks at the state level in Germany supports the *starving the beast* hypothesis. It is important, though, to interpret our findings in light of the specific institutional framework of German fiscal federalism. German states have little tax autonomy. They cannot react to today's tax cuts by borrowing more and raising taxes tomorrow. Yet, they have other margins of adjustment. They could borrow more and lobby for higher taxes at the federal level. Or they could rely on future bailouts by the federal government. We can see that they prefer to cut spending. There are some federal states whose tax autonomy is also limited and tax sharing arrangements dominate. Examples include Austria and Belgium. In other federations like the US, Canada, and Switzerland, the states have more tax autonomy, and federal bailouts are less likely. In this type of institutional environment, the revenue shocks may result in different spending reactions. To shed some light on this issue, it is interesting to look at the literature on the so-called 'flypaper effect' ([Courant et al. \(1979\)](#) and [Hines and Thaler \(1995\)](#)), which observes that unconditional federal grants received by US states usually lead to higher spending but not to tax cuts. Standard theory would predict a combination of both. This observation could be interpreted as an indirect confirmation of the *starving the beast* hypothesis – provided that the reaction to changes in grants is symmetric.

10. Conclusions

The present paper empirically tests the validity of the *starving the beast* hypothesis. According to this hypothesis, government spending can be restrained by limiting tax revenues. This conjecture relies on the argument that tax cuts commit the government to enact spending cuts in order to ensure that fiscal policy remains sustainable over the long-run.

In our empirical analysis, we use data from the German states covering the period from 1992 to 2011. We take advantage of the fact that the institutional setting of German fiscal federalism is ideally suited to study the consequences of tax changes for public spending. While the German states have full discretion about the level and priorities of public spending as well as the level of debt financing, they have an almost complete lack of tax setting autonomy. Both tax rates and tax bases are determined at the federal level. We use official governmental publications to compile a list of almost 130 legislated tax changes in Germany each of them carefully classified by motivation in order to identify those that are unambiguously exogenous with respect to other economic or political fluctuations – together with the corresponding projected tax revenue changes for the states. We then use these projected tax revenue changes to study the causal influence of tax cuts on aggregate public spending, as well as spending in eight different policy areas.

We find that legislated tax changes have a strong and positive impact on state governments' aggregate expenditures. Our results suggest that a one *Euro* decrease in tax revenues leads to a decrease in public spending of about the same amount. However, it takes up to two or three years until the spending cut occurs. Our findings thus support the *starving the beast* hypothesis. Moreover, our results stand up against the inclusion of a range of important state level control variables. Furthermore, with regard to the timing or size of the fiscal adjustment, we do not identify notable differences between unified and divided

governments, left-wing and right-wing governments as well as across states with high versus low levels of debt.

When focusing on the structure of public spending, we find substantial differences across spending categories. While spending on public administration decreases immediately and substantially in response to a tax cut, health, social security and infrastructure-related expenditure appears to decline only in the longer term, and in the case of spending on health and infrastructure to a minor extent. Education spending is largely unaffected. That undermines the widespread view that pressures to cut spending are counter-productive because governments respond by reducing public investment.

These results should be interpreted in light of the specific institutional setting of German fiscal federalism. German states have very limited tax autonomy and cannot react to revenue shocks by changing tax rates individually. They can only try to push for collective tax changes at federal level or increase debt financing. In other federations with more tax autonomy at the state level, state governments may behave differently.

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Appendix

Table 9: Descriptive Statistics

Variable	Mean	Std. Dev.	Min.	Max.
Public expenditure (p.c.)	3873.52	1544.48	2433.78	8853.63
Public revenue (p.c.)	3568.58	1400.97	2158.02	9260.81
Tax shock (p.c.)	-61.19	62.02	-202.11	20.74
Per capita spending on ...				
... administration	171.03	110.50	43.35	572.60
... education	740.48	203.81	309.86	1406.64
... public safety	303.99	120.87	192.60	620.36
... health	115.44	150.58	27.47	1063.15
... infrastructure	89.20	56.95	0.00	0.27
... social security	17.21	5.76	1.73	333.04
... science	36.28	17.77	12.90	93.73
... culture	81.51	72.83	9.21	316.41
Net income (p.c.)	18 122.14	9523.02	9484.88	53 190.04
Unemployment (in %)	12.73	4.60	4.10	22.10
Public debt (p.c.)	5.90	4.40	0.47	25.42
Left-wing party (0/1)	0.50	0.50	0.00	1.00
Coalition (0/1)	0.64	0.48	0.00	1.00
Election year (0/1)	0.23	0.42	0.00	1.00
Dependency ratio (in %)	44.93	1.49	40.27	47.87

Notes: All fiscal variables and net income per capita are inflation adjusted using the national CPI (base year: 2000).