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Does accrual accounting alter fiscal policy decisions? - Evidence from Germany[☆]

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ABSTRACT

Many governments have replaced traditional cash-based accounting with some form of accrual-based accounting system. However, empirical evidence on the effects of the public accounting system on fiscal policy is scarce. Following rules by the federal states, municipalities in Germany have adopted accrual-based accounting systems gradually. By exploiting variations over time and across states I find no evidence for an impact on the overall financial balance. However, my findings suggest that accrual accounting has altered the structure of the budget. Revenues from the sales of non-financial assets have decreased significantly. This supports the hypothesis that municipalities had used these one-off measures before to meet fiscal constraints. Using data on entities controlled by the municipalities, the analysis provides no evidence for repercussions on these public funds, institutions or enterprises.

1. Introduction

Traditionally, the budget and accounting information of governments have been based on the cash principle. Starting in the 1980s, public sector accounting has experienced some fundamental changes. Private sector-style management instruments have been implemented, and in many countries a move towards accrual accounting has taken place (OECD/IFAC, 2017). Primarily, these reforms aspire to reveal the long-term budgetary impact of policy decisions and to capture public assets and liabilities. With the intention to improve fiscal monitoring, the discussion about accrual standards for public sector accounting has gained renewed interest after the sovereign debt crisis. The European Commission currently intends to introduce harmonized, compulsory accrual-based European Public Sector Accounting Standards (EPSAS) for all member states (European Commission, 2013). The voluntary switch to accrual accounting has already been actively encouraged and sponsored by the Commission.

Despite the relevance of the topic and the prominent political debate, empirical evidence on the effects of the public accounting system is scarce. In particular, there has been little research on the costs and benefits of such reform. There are some studies, mainly from the accounting literature, that primarily analyze the effect of accrual-based accounting on the efficiency of the public sector. They are predominantly based on questionnaires or case studies; see Burth and Hilgers (2014) as well as Kuhlmann et al. (2008) who study perceived benefits and consequences for German municipalities, Paulsson (2006) for experiences of the central government in Sweden, Christiaens and Van Peteghem (2007) for the local level in Flanders, and Carlin (2005) for a case study on Australia,

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among others. A study by [van der Hoek \(2005\)](#) summarizes experiences from the Netherlands. By using expenditure data, [Lampe et al. \(2015\)](#) quantitatively assess the impact on cost efficiency of local governments in the German state of North Rhine-Westphalia in the very short run. [Dorn et al. \(2019\)](#) conduct an empirical analysis on counties in the German state of Bavaria.

Apart from the objective of getting more transparent and comparable fiscal data, the main achievements expected from this kind of reform are to increase efficiency and inter-generational equity by systematically recording assets and liabilities and revealing the long-term budgetary impact of a policy decision. Moreover, to get a more comprehensive picture, consolidated financial statements have been implemented, including controlled entities that already used accrual business accounting standards. These aspects are especially relevant when considering the effects of fiscal rules on policy decisions. There is a strand of literature showing that governments find ways to circumvent fiscal constraints as they target specific budgetary positions or data. Governments can do this, for example, by engaging in off-budget activities ([von Hagen, 1991](#)), hiding fiscal policies in less transparent budgets ([Milesi-Ferretti, 2004](#)) or by using accounting tricks ([Buti et al., 2007](#)). Evidence for such creative accounting behavior has been found in Europe during the run-up to the monetary union ([Milesi-Ferretti and Moriyama, 2006](#)) as well as after the introduction of the stability and growth pact and the excessive deficit procedure ([von Hagen and Wolff, 2006](#)).¹

On a related note, the analysis adds to the literature studying how different budgetary institutions affect fiscal outcomes. For example, a higher degree of budget transparency seems to promote the effectiveness of fiscal rules ([Bergman et al., 2016](#)) and government effectiveness ([Blume and Voigt, 2013](#)). Also multiyear budgeting as a tool to reduce short-sightedness has been identified to increase fiscal discipline ([Vlaicu et al., 2014](#)).

This paper studies the effect of the accounting system on (i) the overall effect on the financial balance of the core budget, and (ii) the structure of revenues and expenditures as well as (iii) repercussions on entities controlled by the core budget. I exploit the fact that municipalities in Germany have switched gradually and only partially to accrual-based accounting systems. Therefore, I can use variations over time and across German states in a fixed effects panel model with the share of municipalities using accrual accounting as a continuous treatment variable. Additionally, I estimate generalized difference-in-differences models using a proxy for the length of the treatment. The study is conducted using municipal financial data that is added up at the state level because data on the switching date are not available for all municipalities in Germany. As explained in Section 3.1, the use of such aggregated information also addresses some concerns regarding the comparability of municipal data.²

The empirical results indicate no impact of the switch to the accrual-based accounting system on the overall financial balance of the municipal core budget. This suggests that the new model has only a limited impact on overall fiscal discipline. However, the findings imply that the structure of the municipal budget changes. I find a significant decline in revenues from the sales of non-financial assets, which is robust across different specifications. One explanation for this finding is the fact that under cash accounting, it is, in principle, easier to meet the balanced budget rule by selling non-financial assets, see Section 2.1 for more details on the mechanism. The new accounting system therefore seems to have closed a loophole. However, this has not found expression in an improved financial balance. Using data on entities controlled by the municipalities, I find no evidence for repercussions on these public firms.

The study is structured as follows. Section 2 describes the institutional setting and the data. Section 3 explains the identification strategies and the econometric framework. Section 4 presents the results for municipal revenues and expenditures as well as for entities controlled by the municipalities. Finally, Section 5 discusses the findings and concludes.

2. Institutional setting and data

2.1. Cash-based accounting versus accrual-based accounting

In principle, there are two different methods used to record accounting transactions, in the private sector as well as in the public sector: cash accounting and accrual accounting. Traditionally, cash-based accounting systems were used in public administration until a few decades ago. Since then, public sector accounting has experienced some fundamental changes. By and large, traditional concepts have changed to more private sector-style management instruments, see Section A in [Appendix](#). In the private sector cash accounting is commonly used only by small businesses. One main difference between the two systems lies in the time at which transactions are recorded. In a cash-based (cameralistic) accounting system, revenues are recorded when cash is received and expenditures are recorded when cash is paid out. The use of resources is difficult to determine, because assets and liabilities are not recorded systematically. In contrast to this, in accrual-based accounting systems revenues are recorded when they are earned, and expenditures are recorded when incurred, independent of whether cash was received or paid out in this period. This system requires the valuation of assets and liabilities and the depreciation of assets has to be taken into account. It may offer a more comprehensive picture of a government's financial situation. However, it is also more complex, requires estimations, and therefore offers room for discretion. Additionally, extended cameralistic accounting systems exist, which complement the cash-based system by adding elements such as the development of assets and debt, captured often at the end of each year; see [Cavanagh et al. \(2016\)](#) for different nuances between pure cash accounting and full accrual accounting.

¹ See [Burret and Feld \(2018\)](#) for more literature on the relation between fiscal rules and evasive reactions.

² Other studies using panel data from the German states include [Baretti et al. \(2002\)](#), [Baskaran \(2012\)](#), [Buettner \(2002\)](#), or [Stegarescu \(2013\)](#), among others. The approach of [Foremny \(2014\)](#) is related inasmuch as he also uses aggregated data for sub-national sectors.

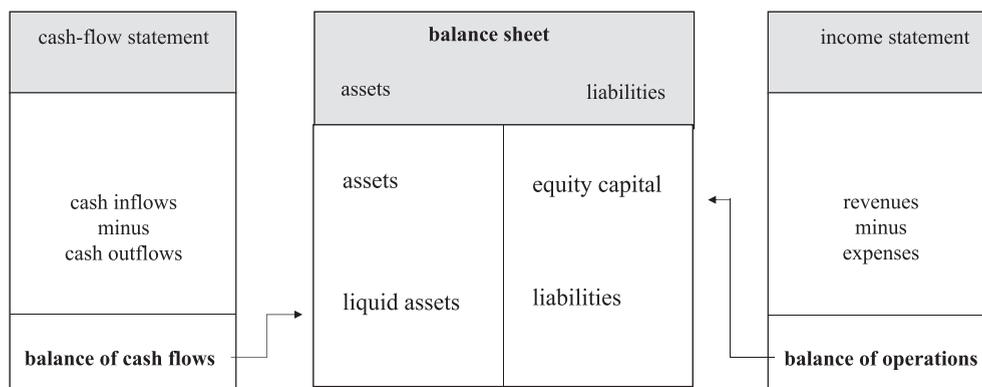


Fig. 1. Simplified representation of the three-component system of accrual accounting in Germany.

The aim to better capture resource consumption is addressed by linking the different statements resulting in a balance sheet revealing assets and liabilities. In Germany, the guidelines for the new framework have been developed in close resemblance with the German Commercial Code (HGB) and the principles of orderly bookkeeping and accounting, but have been adjusted for the requirements of the public sector. In the traditional cash-based accounting system, the cash-flow statement is at the center of accounting (Ridder et al., 2005). In the new accounting system with double-entry bookkeeping, this element is complemented by an income statement similar to the one in business accounting. Both the receipts and payments as well as the revenues and expenses are recorded and enter the balance sheet, which reveals the assets and liabilities at year-end. As illustrated in Fig. 1 the balance of operations affects equity at the liabilities side of the balance sheet. The balance of cash flows increases liquid assets in case of a surplus or increases short-term debt in case of a deficit (Schwartz, 2010). The resulting changes in fiscal restraints and the different treatment of certain transactions are described in Section 2.3.

In Europe, the discussion about accrual standards for public sector accounting has gained renewed interest after the sovereign debt crisis. As a consequence of the crisis, a new set of rules for economic and fiscal surveillance has been adopted by the European Parliament and the Council (the so-called Six-Pack). One part of these measures was a directive dealing with the budgetary framework of member states (Council Directive 2011/85/EU, 2011). Aside from the recommendation that public sector accounting in the member states should be designed in a way that the necessary accrual data can be generated, it committed the Commission to assess the suitability of the accrual IPSAS for the member states (Bundesrechnungshof, 2017).

The result was an assessment report which the Commission delivered in 2013 (European Commission, 2013). The key conclusion of this report is that there is a strong need for harmonized, accrual-based public sector accounting systems in the member states and that IPSAS would make a suitable reference framework for developing European Public Sector Accounting Standards (EPSAS). Accordingly, the Commission plans to make such standards obligatory at all levels of government in the European Union member states. In Germany, the Federal Council as well as the Federal Parliament have expressed doubts on the suitability of this plan (Federation/Länder EPSAS Working Group, 2017). The main points of criticism are the unclear benefit-cost ratio, the vague legal basis for the legislative proposal, and the inconclusive suitability of the international business accounting rules for public sector accounting. The German Federal Audit Office states that alternative, potentially less extensive and costly ways to improve transparency and comparability among the member states have not been considered by Eurostat and the European Commission. Moreover, it fears additional scope for discretion, even reducing transparency. Additionally, the fact that the voluntary switch to accrual accounting is encouraged and sponsored by the Commission before member states have made a decision has been criticized, as well as the prominent role of private sector audit firms during the decision making process (Bundesrechnungshof, 2017).

2.2. Phasing-in of accrual accounting in German municipalities

The German federal system comprises three tiers. Aside from the federal level and sixteen states (*Länder*), the local level is subdivided into over 11,000 municipalities and municipal associations, as of 2016.³ Three of the sixteen states are commonly known as city-states: Berlin, Hamburg, and Bremen, which is in fact an association of two cities. Those three states were excluded from the analysis. In the remaining 13 states, the state parliaments can decide on the accounting system for the respective local level. However, municipalities have a constitutionally guaranteed right of self-government, see Christofzik and Kessing (2018).

In 1999, the Interior Ministers of the German states agreed to reform communal budget law. For the Federal Government and the states, the option to either use cash-based or accrual-based systems was enacted into law (*Haushaltsgrundsätzemodernisierungsgesetz*)

³ Four large states (Baden-Wuerttemberg, Bavaria, Hesse and North Rhine-Westphalia) feature administrative districts (*Regierungsbezirke*), an additional mid-level division between states and counties mostly concerned with administrative tasks on a regional level. Some states, especially those with relatively small municipalities (e.g. Rhineland-Palatinate, Baden-Wuerttemberg, Bavaria, among others) exhibit additional municipal associations between the county and the municipal level.

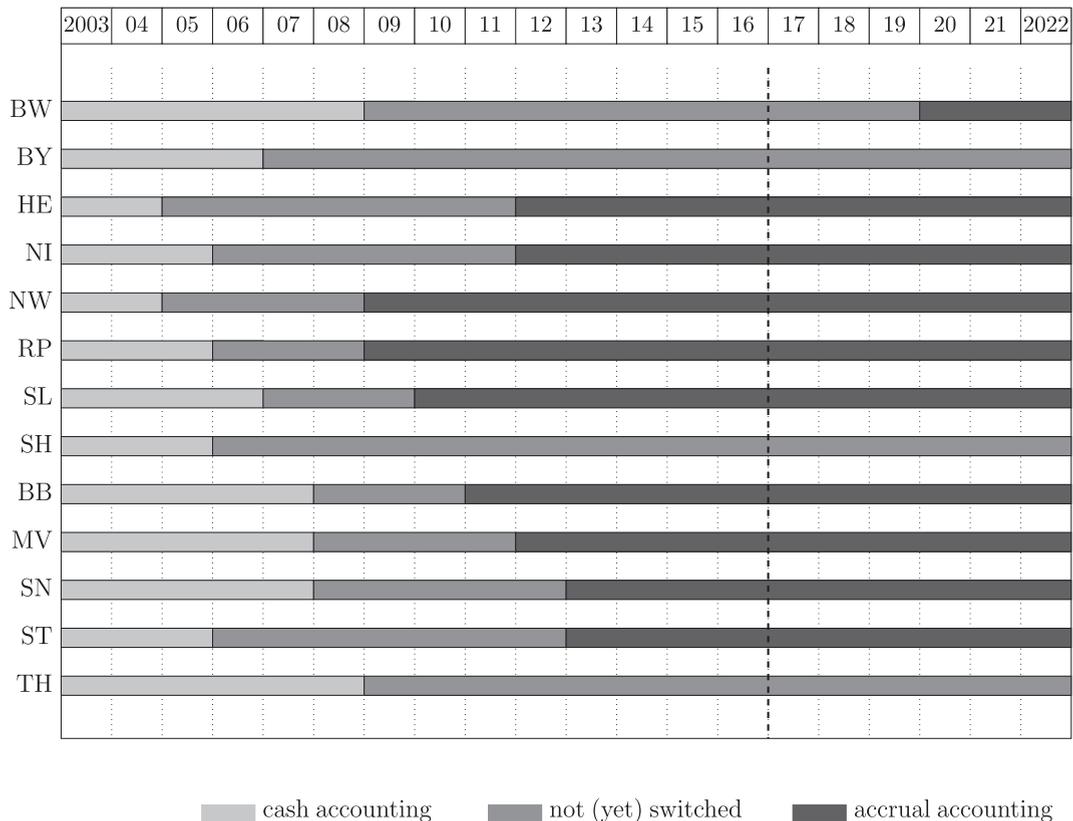


Fig. 2. Phasing-in of accrual accounting in German municipalities between the years 2003 and 2022. BW-Baden-Wuerttemberg, BY-Bavaria, HE-Hesse, NI-Lower Saxony, NW-North Rhine-Westphalia, RP-Rhineland-Palatinate, SL-Saarland, SH-Schleswig-Holstein, BB-Brandenburg, MV-Mecklenburg-Vorpommern, SN-Saxony, ST-Saxony-Anhalt, TH-Thuringia.

in 2010. Previously, accrual principles could only be used as a complement. Apart from the city-states, only the state government of Hesse implemented accrual accounting and presented an opening balance sheet in 2009. North Rhine-Westphalia plans to switch to accrual accounting. The federal level plans to adhere to an extended cash-accounting system.

While the Federal Government and most of the states are sticking to an extended cash-based accounting system, almost two thirds of municipalities had adopted accrual accounting by 2016, following regulations by their respective state. One explanation for the seemingly incongruent behavior that the states mandated their municipalities to implement accrual accounting, while they did not implement it for themselves, is the fact that states are responsible for local government fiscal oversight. They are even assumed to be liable at least implicitly for municipal debt. With increasing indebtedness, this liability might have become a more serious threat. Along this line of argument, states with weak municipal finances mandated their municipalities to implement the reform first. The decisions to reform the public accounting system was made just after short-term debt began to increase. This could reflect a perceived need to better control those municipalities or to provide them with better management tools. Arguably, such need was less urgent in states with financially strong municipalities such as Bavaria. For their own budgets, the Federal Government as well as most states have not yet implemented accrual accounting. However, reasoning behind fostering transparency and monitoring performance might be completely different when the own administration is affected. [Asatryan et al. \(2017\)](#) provide explanations for such resistance against efficiency enhancing reforms.

In 2000, the German states agreed on some basic points for a municipal accounting system and published a proposal for an outline of the regulations in 2003. Subsequently, each of the states enacted its own rules for its municipalities to reform the cash-based (cameralistic) accounting system. The regulations that are set out in the respective local government codes (*Gemeindeordnung*) vary between states but do not differ between municipalities within the same state. In particular, the rules differ with respect to the transition period or the extent to which accrual accounting was instructed.⁴ Fig. 2 summarizes the phasing-in periods for the different states.

For example, the most populous state, North Rhine-Westphalia, was one of the first states to enact these reforms by law. All its local governments had to introduce the new budgetary control and reporting framework between 2005 and 2009. In contrast, Bavaria,

⁴ Additionally, for example, rules differ with respect to the valuation of assets.

the second most populous state, enacted the reforms in 2007 and allowed its municipalities to either keep a cash-based accounting system, complemented by some accrual elements, or to fully implement accrual accounting. Up to now, most Bavarian municipalities opted for the extended version of cash-based accounting. Fewer than 5% of them have implemented accrual accounting. Only in the state of Thuringia is the percentage of municipalities which decided against cameralistic accounting lower. Municipalities in nine of the thirteen non-city states had completely switched to accrual accounting by 2016.

One can roughly distinguish between three groups of states: (i) the early switchers, (ii) the late switchers, and (iii) the states in which municipalities have not (yet) switched completely to accrual accounting. Fig. 3 shows the share of municipalities which

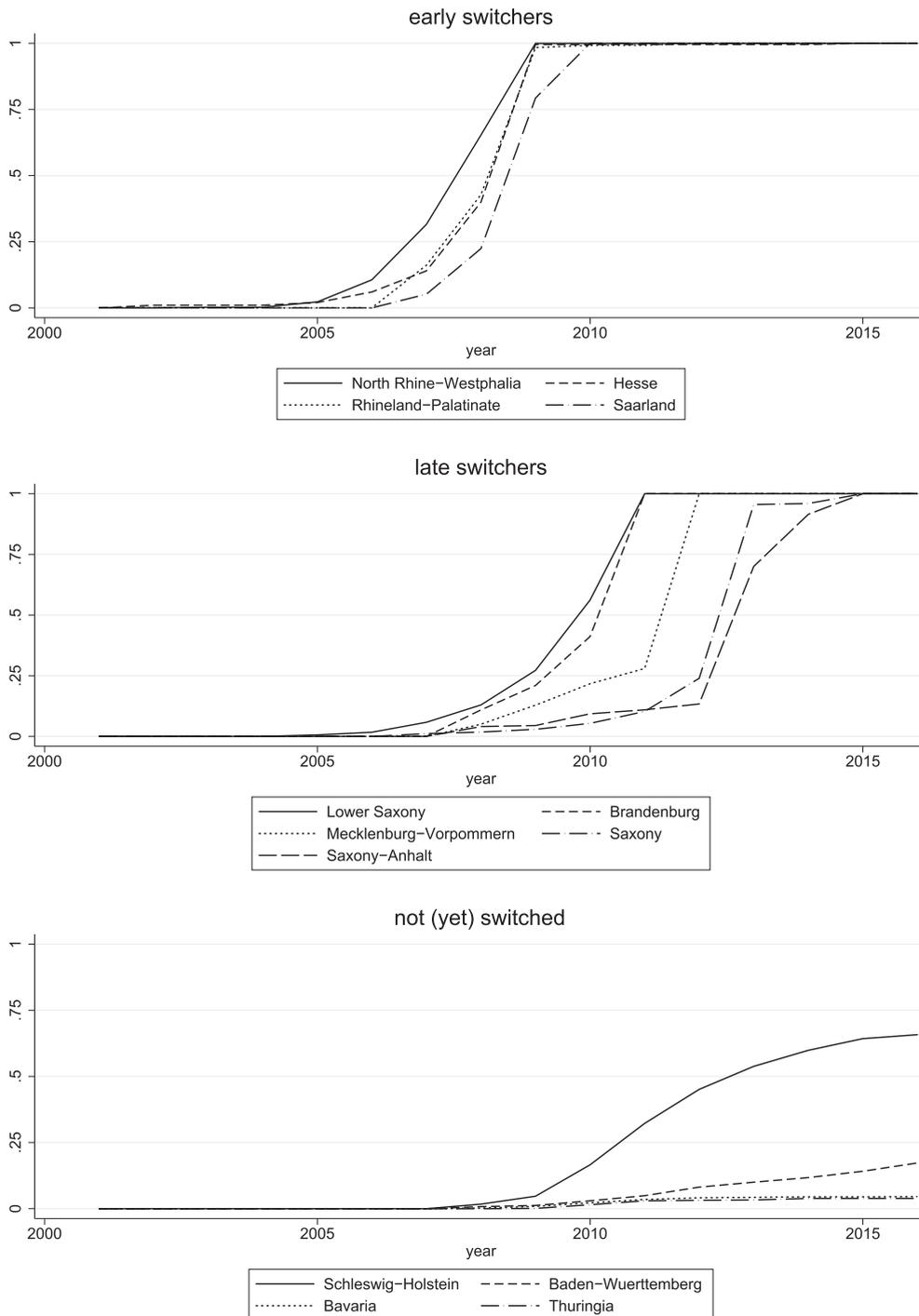


Fig. 3. Share of municipalities with accrual accounting (2000–2016).

implemented accrual accounting.⁵

In North Rhine-Westphalia, Hesse, Rhineland-Palatinate, and Saarland, the vast majority of municipalities had switched to accrual accounting before 2010.⁶ Municipalities in five more states had completed the switch by 2015 (late switchers). The other states either opted for a very long transition period (Baden-Wuerttemberg) or decided against a mandatory switch to accrual accounting (Schleswig-Holstein, Bavaria, Thuringia).⁷ Fig. A3 in Appendix C shows the regional dispersion across states. While the early switchers are all located in the Western part of Germany, the third group is based for the most part in the south. Most of the states in East Germany are late switchers. This is, however, not the only systematic difference between the groups (see Section 3.1).

2.3. Potential effects on fiscal policy decisions

To assess potential effects of the switch it is important to note that the state government is responsible for supervising local government finances.⁸ With cash accounting, compliance with the balanced budget rule is achieved, in principle, if current inflows exceed current outflows and this difference suffices to cover the scheduled acquittance of investment debt. With the new accrual-based system, the balance of operations comes into focus. High or persistent deficits in the income statement can lead to a negative equity capital. In other words, assets are smaller than liabilities in such situation, see Fig. 1.⁹

One motive of the EPSAS initiative is to increase transparency. Empirical evidence shows that transparent budgets increase fiscal discipline, see Bergman et al. (2016) or Blume and Voigt (2013). Also budgetary institutions that foster long-term decisions should work into this direction, see Vlaicu et al. (2014), among other. However, it is far from certain that accrual-based accounting standards increase transparency as multiple assumptions need to be made (Bundesrechnungshof, 2017). In addition, also under cash accounting a system of fiscal constraints and strict fiscal oversight was in place (Christofzik and Kessing, 2018). This is in line with the findings by Heinemann et al. (2018) that fiscal rules are more binding at the sub-national level compared to the national or supranational level. Whether accrual accounting exerts an additional effect on fiscal discipline that is reflected in the financial balance is therefore unclear.

One example for which the difference between the accounting systems becomes obvious is how sales of non-financial assets are treated. Revenues from the sales of these assets are one-off revenues, for example from the sale of land, buildings or machinery. With cash-based accounting, the revenues from the sale of an asset reduce the deficit by the sale price (Schwartzing, 2010). Therefore, such sales can be used to balance the budget regardless of whether the price is higher or lower than the value of the asset. This can create fiscal illusions in the sense that the sale reduces this year's reported deficit, but only at the expense of a decline in net worth; see Easterly (1999), Irwin (2012) or Irwin (2016). With accrual accounting, the sale of an asset is partially offset by the removal of that asset from the balance sheet at the time of sale. Only gains or losses alter the deficit. As a consequence, it should be less attractive to sell assets. The revenues from the sale of non-financial assets should decrease. However, if accrual accounting increases transparency by showing the whole costs associated with an asset, the switch could also increase incentives to sell assets as depreciations are no longer shown on the balance sheet.

Another intention of accrual accounting is that the long-term consequences of budgetary decisions become visible to a higher extent. This is especially true for investment decisions. On the one hand, the switch to accrual accounting could make it more attractive to invest as this results in higher assets in the balance sheet. On the other hand, an investment also triggers non-cash expenses over the following years as capital assets need to be depreciated. This makes it more difficult to balance the income statement. If local decision makers are unsure whether depreciation can be covered in the future, they might abstain from investing. This should especially be the case because of the limited marketability of many public assets. Because of these counterbalancing forces, I do not have a clear sign expectation on the impact on investment spending.

Based on these theoretical considerations, I assess the effects on the financial balance as well as on budgetary items empirically in Section 4.1.

Finally, the reform includes the consolidation of financial statements including publicly owned enterprises. If outsourcing was used before in order to avoid restrictions in connection with fiscal constraint (von Hagen, 1991), this feature should limit outsourcing activities. The respective analysis using data on publicly owned firms is summarized in Section 4.2.

⁵ Some municipalities had already implemented accrual accounting before the official transition period, during a test phase.

⁶ In Hesse, it was first optional for the municipalities to switch to accrual accounting. However, until 2009 only two municipalities opted for keeping cash-based accounting. The state then decided to make the switch mandatory for the remaining two municipalities by 2015.

⁷ In the estimations where I use the intensity of accrual accounting as treatment variable, I exclude this group of not (yet) switchers.

⁸ The consequences of non-compliance with fiscal rules can be severe. The municipality can be put under direct fiscal supervision. This can limit fiscal actions substantially. Possible consequences are that municipalities need approvals for certain expenditures and are not allowed to reduce taxes. Even a complete takeover of fiscal affairs is not ruled out, see Christofzik and Kessing (2018). Consequently, local decision makers have incentives to avoid such situation.

⁹ Because of the nonexistence of insolvency procedures for municipalities and the principle of communality (*Bündisches Prinzip*), it is often assumed that states are ultimately liable for municipal debt. In two states, North Rhine-Westphalia and Saarland, the state granted municipalities a one-time possibility to create a buffer in the opening balance. This buffer was not backed by any assets and was intended to avoid severe problems after capital depreciation became visible for the first time. In a robustness check, I exclude data from these two states.

2.4. Data and descriptive statistics

The balanced panel data set covers data on municipalities in all 13 non-city states in Germany over 26 years (1991–2016) since the German reunification.¹⁰ The share of municipalities that has implemented accrual accounting was extracted from *Statistische Ämter des Bundes und der Länder (2016)* and completed by own investigations, especially for the early switchers in North Rhine-Westphalia, Hesse, Saarland, and Rhineland-Palatinate. Aggregated municipal revenues and expenditures on state level were derived from a special evaluation provided by the Federal Statistical Office (*Jahresrechnungsstatistik*). They refer to the municipal core budgets without extra budgets and were deflated using the GDP deflator (2016 = 100). For 2016, municipal financial data was extracted from the financial cash statistics (*Kassenstatistik*).

Nominal and real GDP on state level were provided by the Working Group on National Accounting by the German States (*Arbeitskreis Volkswirtschaftliche Gesamtrechnung der Länder*). The unemployment rate was obtained from the Federal Employment Agency. Data on debt and population were derived from the Federal Statistical Office. The census in 2011 translated into a break in the population data. Therefore, I circumvent the structural break by prolonging the population series backwards using growth rates. In addition, I collected information on public funds, institutions and enterprises with commercial accounting owned or controlled by municipalities from the annual balance sheet statistics (*Jahresabschlussstatistik der kaufmännisch buchenden öffentlichen Fonds, Einrichtungen und Unternehmen*) provided by the Federal Statistical Office for the shorter time frame of 2000–2015. [Table A2 in Appendix B](#) provides descriptive statistics of the data set.

3. Econometric framework

3.1. Identification strategy

To study the effect of the accounting system on the decisions of municipalities, I use variation over time and across states. The study is conducted using municipal data that were added up for each state due to the lack of appropriate data for individual municipalities. On the one hand, data on municipal revenues and expenditures are not available for all German municipalities over a longer time period. On the other hand, comparing data from different accounting systems can be problematic. The Federal Statistical Office, however, provides aggregate data that reclassifies municipal data reported by the states in order to enhance comparability. A further drawback of the lack of data is the fact that the only information available is the number of municipalities which have already implemented accrual accounting. If the phasing-in varies, for example, between small and large municipalities, this distorts the explanatory power of the treatment variable. I address these challenges by using different estimation strategies: (i) a fixed effects panel model with the share of municipalities using accrual accounting as a continuous treatment variable, and (ii) a strategy based on a generalized difference-in-differences approach with a proxy for the intensity of accrual accounting as continuous treatment variable.

As a first approach, I estimate a fixed effects panel model with the share of municipalities in state i using accrual accounting in year t as a continuous treatment variable. The dependent variable $y_{i,t}$ is either the financial balance of the core budget¹¹ or different revenue and expenditure categories per capita in prices of 2016. Additionally, I estimate the same specification with setting the budget balance and the expenditure and revenue in relation to nominal GDP to test for functional form sensitivity. When using data from entities controlled by the municipalities, the dependent variables in Section 4.2 are the number of funds, institutions and enterprises per 100.000 inhabitants as well as the equity capital, the liabilities and the additions to tangible fixed assets per capita (in prices of 2016).

I allow for different time fixed effects for the East German states. The different development between West and East German states is illustrated in [Figs. A4 and A5](#) and in [Appendix C](#). The different trends in the 1990s are especially obvious. Additionally, I add state-specific time trends. Hence, the model includes state-specific intercepts, separate year fixed effects for East and West Germany, state-specific time trends as well as the predetermined covariate interacted with time fixed effects. Accordingly, I estimate models of the following form for revenues and expenditures in state i :

$$y_{i,t} = \alpha_i + \gamma_t \times east + \chi trend_i + \beta share_{i,t} + \delta X_{i,t} + \epsilon_{i,t}, \quad (1)$$

where α_i are state fixed effects, $\gamma_t \times east$ are separate year fixed effects for East and West German municipalities, $\chi trend_i$ are state-specific time trends, $share_{i,t}$ is the share of municipalities with accrual accounting in year t ; β is my parameter of interest. I extend this estimation by including the growth rate of real GDP as well as the level of debt at the state level as control variables which are unlikely to be directly influenced by municipal decisions. In a further step I add the (predetermined) mean level of municipal short-term debt in the years 2000–2002, i.e. before the decision to implement accrual accounting was made, together with year fixed effects. $X_{i,t}$ is a vector of the control variables as well as the predetermined variable interacted with time fixed effects, and δ the corresponding parameter vector to be estimated.

The identifying assumption in the fixed effects estimation is that no time- and East-West-variant factors simultaneously affect the right-hand and the left-hand side of the regression. When looking at the developments of different key variables before the decision to implement accrual accounting, as summarized in [Fig. 4](#) and [Tables A3–A5 in Appendix B](#), this may be a problematic assumption.

¹⁰ Revenue and expenditure data for municipalities in one state, Saxony, are incomplete for the year 1991.

¹¹ The financial balance is defined as the difference between revenues and expenditures adjusted for internal offsetting items.

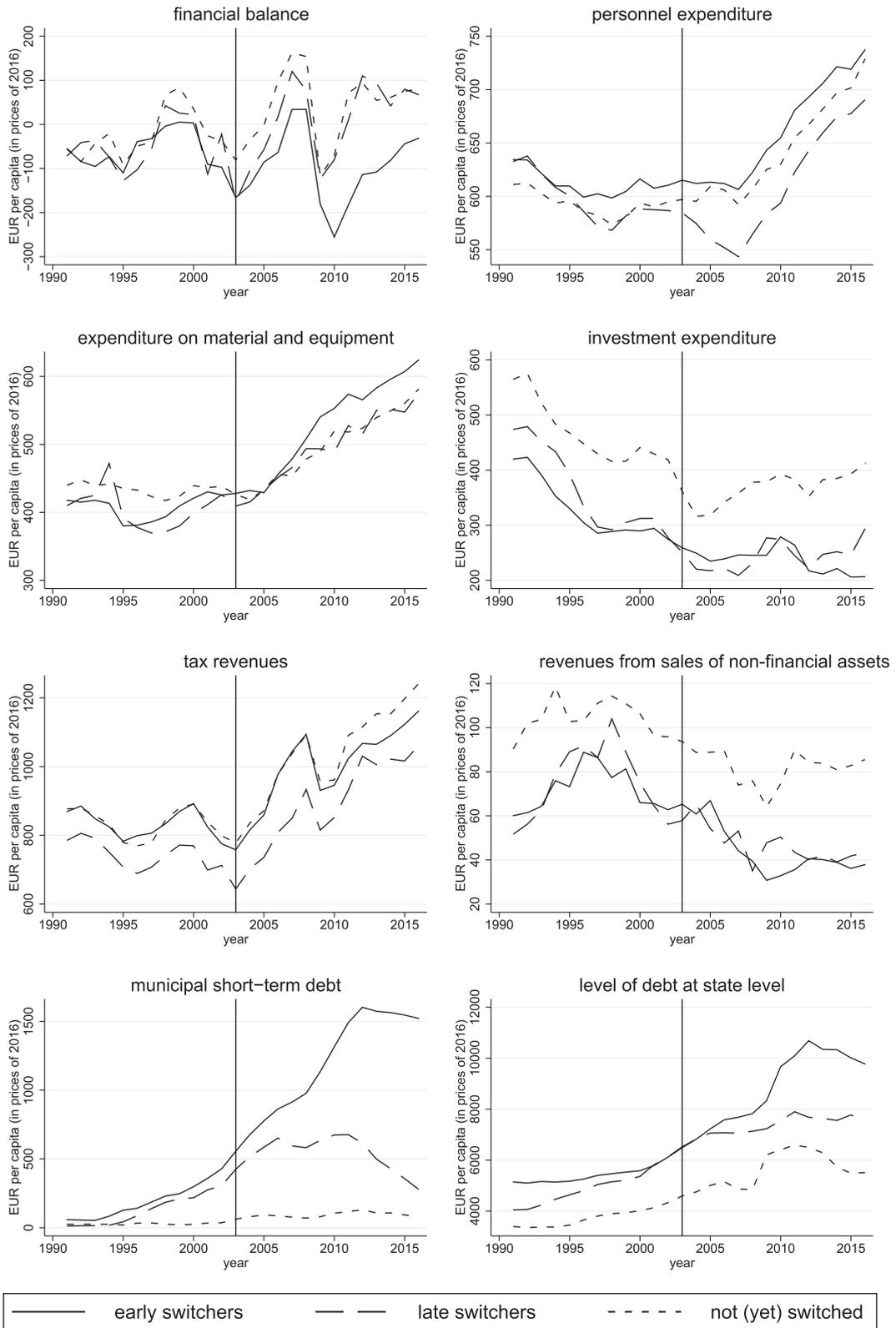


Fig. 4. Development of key variables (1992–2016).

While the developments of particular expenditure and revenue categories show no systematic differences, this is not the case for municipal debt. Early switchers incurred a comparatively high level of short-term debt. The tense fiscal situation may have guided the decision of the states to oblige their municipalities to switch to the new accounting system earlier, while this probably had no priority for states with municipalities with low levels of debt. To address this, I include the predetermined level of municipal short-term debt together with year fixed effects into my estimations.¹² In the absence of manipulative sorting, point estimates should remain similar and accuracy should increase (Grembi et al., 2016).

A potential problem could be that the data is not fully comparable during the transition period. To study whether I find only statistical artifacts by comparing states which predominantly report data in accordance with cash-based accounting systems with states reporting data mainly in accordance with accrual-based systems, I conduct a complementary, second analysis. In these estimations, I only include states in which the municipalities have completely switched to accrual accounting. Variation between those states is obtained by constructing a measure for the intensity or length of the treatment. Using this measure for intensity, I run generalized difference-in-differences models similar to the approach used by Acemoglu et al. (2004). The proxy for intensity is obtained by summing up all shares between the years 2006 and 2014. By doing so I end up with an index ranging from 2.04 to 7.08 for all nine states which had completed the switch by 2015. This index is interacted with 1 for the years 2015 and 2016, and with 0 for the years 2006 and earlier.¹³ I exclude all states that had not completed the switch by 2015. This reduces my degrees of freedom, but I circumvent potential data problems. The approach rests on the quite strong identifying assumption that states would have evolved identically in the absence of the switch to accrual accounting, and that the effect of accrual accounting intensifies over time. As I have to rely mostly on flow data, the assumption is that the effect on inflows and outflows in 2015 and 2016, i.e. after all municipalities implemented accrual accounting, is stronger for those states in which municipalities used accrual accounting for a longer time-span. The benefit is that I do not have to compare data from different accounting systems and re-classifications should therefore be less of a concern.

For all years excluding the time span between 2007 and 2014 I estimate models of the following form for revenues and expenditures including the 9 states where municipalities completed the switch by 2015:

$$y_{i,t} = \alpha_i + \gamma_t \times east + \chi trend_i + \beta intensity_{i,t} + \delta X_{i,t} + \epsilon_{i,t}. \quad (2)$$

4. Results

4.1. Effects on municipal revenues and expenditures

Table 1 presents the main results from the fixed effects panel model with the share of municipalities that implemented accrual accounting as treatment variable. The dependent variable in Panel I is the financial balance. The effect is statistically insignificant across all specifications, regardless of whether the per capita values in Columns (1)–(3) or the relation to nominal GDP in Columns (4)–(6) are chosen as functional form. Panel II summarizes the results in case the revenues from sales of non-financial assets is the dependent variable. The estimations yield an effect which is statistically significantly different from zero at the 0.01 level. The estimated average treatment effects on yearly revenues in case of a full implementation of accrual accounting range between €19.35 and €24.11 per capita, or 0.08% and 0.09% of nominal GDP. This corresponds to a share of about 0.3–0.4 of the average revenues from sales of non-financial assets in the years 2003–2005.

The results of Panel III and Panel IV indicate reverse effects. On the one hand there is a negative impact on investment expenditure, although results are only at most statistically significantly different from zero at the 0.10 level. On the other hand, expenditure on material and equipment increases. Part of this may also be due to a reclassification of what type of expenditure is recorded as investment. The positive effect of the implementation on expenditure on material and equipment could also be driven at least partly by the cost of the switch itself.

As a first robustness check I exclude groups of states from the estimations. First, the implementation of accrual accounting was accompanied by special rules changing the oversight procedures for municipalities in North Rhine-Westphalia and Saarland; see Christofzik and Kessing (2018). Results also hold when excluding those two states, see Fig. 5. Additionally, I exclude the different switching groups, respectively, as well as East German states. The direction of effects is unaffected. It is remarkable that in case of the revenues from the sales of non-financial assets, with €13.8 to €23.0 point estimates are quite similar across these tests.

Table A6 in Appendix B includes regression results for further revenue and expenditure data as well as for municipal debt. Neither of the estimations for total revenue or for total expenditure yield significant results. Compatible with the insignificant results for the financial balance, the level of short-term debt seems to be unaffected. The empirical evidence suggests a positive effect on personnel expenditure which is, however, not robust with regard to the functional form. In the specifications with the different revenue categories (tax revenues, revenues from fees, revenues from economic activities) all coefficients are statistically insignificant.

¹² In general, local governments are solely allowed to incur debt to finance investment. Apart from that, municipalities can assume short-term debt to ensure liquidity. A persistently high or increasing level of this type of debt is commonly used as an indicator for a tight budgetary position, see Heinemann et al. (2009), GCEE (2017), and Christofzik and Kessing (2018).

¹³ The results are qualitatively similar when additionally excluding the years 2004 and 2005, in which a few municipalities had already implemented accrual accounting.

Table 1
Main Results: Fixed effects panel model.

	Specification					
	Euro per capita in prices of 2016			In % of nominal GDP		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel I: financial balance	-8.777 (-0.21)	-1.674 (-0.05)	-39.57 (-0.83)	0.0257 (0.23)	0.0257 (0.22)	-0.100 (-0.65)
Panel II: revenues from sale of non-financial assets	-20.45*** (-3.18)	-19.39*** (-3.20)	-24.11*** (-5.03)	-0.0762*** (-3.32)	-0.0752*** (-3.36)	-0.0942*** (-4.95)
Panel III: investment expenditure	-52.30* (-1.97)	-44.35 (-1.62)	-43.26 (-1.69)	-0.238** (-2.35)	-0.218* (-2.05)	-0.215* (-2.16)
Panel IV: expenditure on material and equipment	46.17* (2.13)	44.60** (2.55)	65.32*** (3.28)	0.142* (1.82)	0.120* (1.96)	0.194** (2.61)
observations	337	337	337	337	337	337
state f.e.	yes	yes	yes	yes	yes	yes
year f.e. × east	yes	yes	yes	yes	yes	yes
state-specific time trends	yes	yes	yes	yes	yes	yes
controls	no	yes	yes	no	yes	yes
pre-determined short-term debt × year f.e.	no	no	yes	no	no	yes

Notes: The table reports results from panel OLS regressions with the share of municipalities with accrual accounting as treatment variable. The dependent variables are the financial balance, revenues or expenditures per capita in prices of 2016 in Specifications (1)–(3), and the financial balance, revenues or expenditures in percentage of nominal GDP in Specifications (4)–(6). The control variables included in Specifications (2), (3), (5), and (6) are the growth rate of real GDP and the level of debt at the state level. In Specifications (3) and (6) the mean level of municipal short-term debt in the years 2000–2002 is included as pre-determined variables and interacted with year fixed effects. Standard errors are clustered at the state level. Period: 1991–2016.

* p < 0.10, ** p < 0.05, *** p < 0.01.

Table 2 summarizes the effects of the approach based on the difference-in-differences strategy. The treatment variable is a score for the intensity or length of accrual accounting. The continuous treatment variable is obtained by summing up all shares between 2006 and 2014. In this approach, I exclude all observations between the years 2006 and 2015, and the four states that had not switched by 2015. The advantage of this approach is that I do not have to compare data between the two accounting systems. Despite the quite severe assumption in this approach that the effect intensifies over time, the fundamental results still hold. The empirical evidence suggests no impact on the financial balance, and the effect on the revenues from the sale of non-financial assets is negative. It is statistically different from zero in the per capita specifications. If the index increases by one, which is the case if all municipalities in one state implement accrual accounting in one additional year, the annual revenues from the sale of non-financial assets decrease by about €8 per capita. The sign of the point estimate for investment expenditure is still negative, but insignificant. The result for expenditure on material and equipment from the first approach cannot be confirmed. Especially for this expenditure category, the assumption that treatment intensifies over time is questionable. Costs associated with the switch itself, e.g. for software, should occur early on instead of becoming larger.¹⁴

In addition to the data on cash inflows and cash outflows, I estimate models with the level of municipal debt as dependent variable. I do not find statistically significant effects, neither for municipal investment loans nor for short-term debt. This supports the findings which I obtain for the financial balance. Because I have a much longer pre- than post-treatment period, I perform a robustness check with a symmetric number of years around the treatment period. Table A7 in Appendix B shows that in this case, estimations reveal a positive effect on debt and also on expenditure on material and equipment.

4.2. Consequences for enterprises controlled by municipalities

One aim of the reform was to create consolidated statements that also include entities controlled by the municipalities. Beginning in the 1980s a considerable share of public activity by German municipalities has been outsourced. A widespread fear is that governments use such entities to avoid restrictions in connection with fiscal rules (von Hagen, 1991). In some Ger-

¹⁴ The coefficients in Tables 1 and 2 refer to different situations. In Table 1 the coefficients reveal the effect if all municipalities in one state implemented accrual accounting, i.e. the share increases from 0 to 1. Coefficients in Table 2 refer to the years 2015 and 2016, and reflect the effect of one additional year of full accrual accounting between 2006 and 2014, i.e. the index increases by 1 compared to the other states in which municipalities have completed the switch. The sign change in Panel IV could therefore also reflect that the impact does not increase over time. For example, if expenditures on material and equipment increases in all municipalities directly after the switch but only temporarily, this would result in a positive effect in Table 1 but would have an opposite effect when considering the intensity measure.

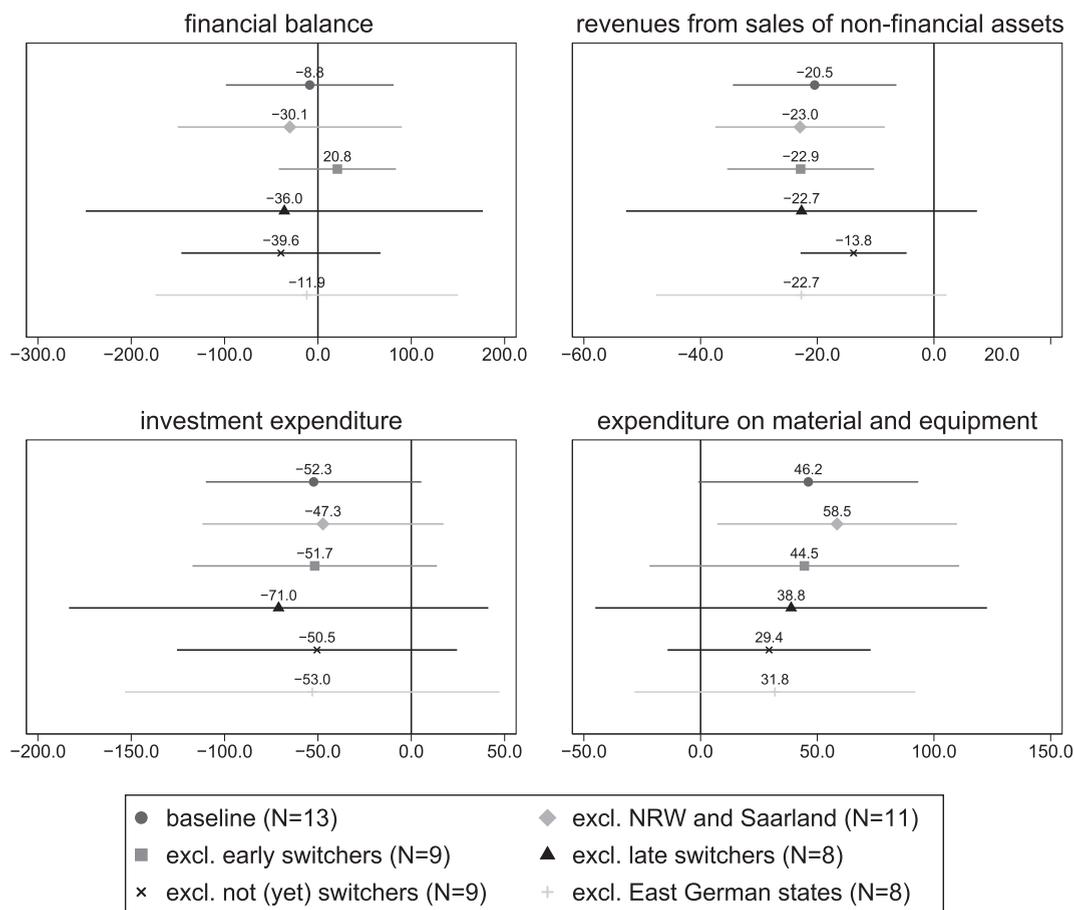


Fig. 5. Robustness check: Exclusion of states. The panels show coefficients and 95% confidence intervals of estimations with state fixed effects, separate year fixed effects for West and East Germany, and state-specific time trends.

man states, more than half of municipal debt is accounted for by municipal funds, institutions and enterprises. They are recognized as such if municipalities are direct or indirect shareholders with more than 50% of the capital or voting rights. Most of these enterprises operate in the sectors of real estate and housing, water supply, waste and water disposal, and energy supply, see GCEE (2017) in Chapter 6. With consolidated statements, outsourcing becomes more visible and could, therefore, be less attractive.

I consider data on the number of funds, institutions and enterprises per 100,000 inhabitants, the equity capital of these firms, the liabilities and the “additions to tangible fixed assets”. The latter are used to approximate investment of these enterprises (GCEE, 2017). Fig. A6 in Appendix C plots the development of these variables exposing the positive trend.

Results are consolidated in Table 3. Only one of these specifications yields statistically significant estimates. In the estimations with the intensity of accrual accounting as treatment variable, there is a positive effect on the equity capital. As data is only available until 2015 this result, however, rests on only one post-treatment observation. In total, these findings suggest that there are no systematic repercussions of the switch on these publicly owned firms. Another explanation is that there is only a long-term impact as the consolidated statements have to be prepared a few years after the switch of the core budget.

5. Discussion and conclusion

The analysis provides first empirical evidence on the impact of accrual accounting on fiscal policy decisions. By using data on German municipalities that implemented accrual-based accounting systems gradually and only partially, I find no evidence for an effect on the financial balance of the core budget. While transparency and measures to reduce short-sightedness in policy-making are generally supposed to increase fiscal discipline, this finding suggests that overall, the new steering model had only a limited impact on the overall financial balance. One explanation is that fiscal constraints accompanied by fiscal oversight existed also under the cash accounting system. Another explanation is that accrual accounting is not necessarily more transparent. Estimations are crucial in such accounting systems. This holds true for the valuation of assets, e.g. for buildings or streets for which market-prices are hardly

Table 2
Main Results: Intensity of the treatment.

	Specification					
	Euro per capita in prices of 2016			In % of nominal GDP		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel I: financial balance	47.46 (0.68)	49.15 (0.69)	44.42 (0.71)	0.285 (0.76)	0.282 (0.76)	0.259 (0.79)
Panel II: revenues from sale of non-financial assets	-8.125** (-2.71)	-7.305** (-2.73)	-7.693* (-2.28)	-0.0319 (-1.29)	-0.0305 (-1.27)	-0.0321 (-1.17)
Panel III: investment expenditure	-55.80 (-1.58)	-50.81 (-1.85)	-47.02* (-2.02)	-0.343 (-1.65)	-0.322 (-1.82)	-0.301* (-2.24)
Panel IV: expenditure on material and equipment	-6.060 (-0.28)	-10.62 (-0.45)	-10.75 (-0.41)	-0.0866 (-1.02)	-0.105 (-1.19)	-0.105 (-1.15)
Panel D1: municipal investment loans	165.3 (0.82)	145.2 (0.63)	143.3 (0.74)	0.792 (0.90)	0.718 (0.71)	0.718 (0.81)
Panel D2: municipal short-term debt	145.4 (0.83)	138.5 (0.88)	141.0 (0.95)	0.385 (0.69)	0.354 (0.68)	0.365 (0.77)
observations	161	161	161	161	161	161
state f.e.	yes	yes	yes	yes	yes	yes
year f.e. × east	yes	yes	yes	yes	yes	yes
state-specific time trends	yes	yes	yes	yes	yes	yes
controls	no	yes	yes	no	yes	yes
pre-determined short-term debt × year f.e.	no	no	yes	no	no	yes

Notes: The table reports results from panel OLS regressions with the intensity of accrual accounting as treatment variable. The dependent variables are the financial balance, revenues or expenditures, and the level of municipal debt per capita in prices of 2016 in Specifications (1)–(3), and the financial balance, revenues or expenditures, and the level of municipal debt in percentage of nominal GDP in Specifications (4)–(6). The control variables included in Specifications (2), (3), (5), and (6) are the growth rate of real GDP and the level of debt at the state level. In Specifications (3) and (6) the mean level of municipal short-term debt in the years 2000–2002 is included as pre-determined variables and interacted with year fixed effects. Standard errors are clustered at the state level. Period: 1991–2016, without the transition period 2007–2014. *p < 0.10, **p < 0.05***p < 0.01.

identifiable, but also for long-term liabilities such as pensions, for which many assumptions need to be made. These assumptions, e.g. about the discount rate that is used to calculate the present value of these liabilities, are directly reflected in the financial situation of the government as specified on the balance sheet. Finally, it could be that the effect is underestimated because also the “not (yet) switchers” decided to implement at least some accrual elements. My results, however, also hold when excluding these states. As the data lack information about the switching date of individual municipalities, I cannot exclude the possibility of measurement error. In particular, given these data constraints, heterogeneous behavior of municipalities cannot be analyzed. A natural refinement would be to use municipal data to study the mechanisms in more detail.

I find a robust and statistically significant effect on the revenues from sales of non-financial assets. This may be due to the fact that municipalities could use these revenues to balance their budget under the old regulations, and this possibility was used to escape sanctions associated with breaking the balanced budget rule. With accrual accounting, it is harder to circumvent fiscal restraints in this way. This explanation is in line with the findings of Costello et al. (2016) that U.S. states with strict balanced budget rules use asset sales when facing deficits. In addition, higher expenditure on material and equipment as well as higher personnel expenditure seem to have been compensated by lowering investment and, partly, by spending less on transfers.

Appendix A. International comparison of public sector accounting

Over the past 25 years, a move towards accrual accounting has taken place in many countries. This development started with the New Public Management (NPM) reforms in the 1980s. Among OECD countries, the forerunners were New Zealand, the United States, Poland, Finland, and Australia. They completed the transition at the national government level as early as the 1990s; see OECD/IFAC (2017) for detailed country profiles. The United Kingdom and Canada established accrual accounting in the early 2000s. The main motives stated were to better measure the financial performance of departments, agencies or public entities; to increase efficiency, accountability, and transparency; and to evaluate the complete costs of government activities. The transition to accrual budgeting and accounting was often linked to wider financial management reforms. Fig. A1 shows that the majority of European countries has already implemented accrual accounting at the central level.

Table 3
Results: Municipal public funds, institutions and enterprises.

	Specification					
	Share of municipalities			Intensity of treatment		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel I: number	28.75 (0.85)	12.33 (0.38)	19.65 (0.54)	-68.36 (-0.71)	-47.53 (-0.62)	-15.29 (-0.24)
Panel II: equity capital	364.2 (1.08)	513.1 (1.40)	519.8 (1.35)	514.2** (2.82)	424.0** (3.22)	519.8*** (4.19)
Panel III: liabilities	36.39 (0.17)	47.53 (0.23)	109.1 (0.46)	-52.30 (-0.32)	-99.25 (-0.49)	29.52 (0.16)
Panel IV: additions to tangible fixed assets	25.46 (0.65)	29.08 (0.73)	25.19 (0.54)	-6.757 (-0.12)	-43.95 (-0.70)	-16.45 (-0.18)
observations	208	208	208	208	208	208
state f.e.	yes	yes	yes	yes	yes	yes
year f.e. × east	yes	yes	yes	yes	yes	yes
state-specific time trends	yes	yes	yes	yes	yes	yes
controls	no	yes	yes	no	yes	yes
pre-determined short-term debt × year f.e.	no	no	yes	no	no	yes

Notes: The table reports results from panel OLS regressions with the share of municipalities with accrual accounting as treatment variable in Columns (1)–(3), and the intensity of accrual accounting as treatment variable in Columns (4)–(6). The dependent variables are the number of funds, institutions and enterprises per 100.000 inhabitants, and the equity capital, the liabilities and the ‘additions to tangible fixed assets’ per capita in prices of 2016. The control variables included in Specifications (2), (3), (5), and (6) are the growth rate of real GDP and the level of debt at the state level. In Specifications (3) and (6) the mean level of municipal short-term debt in the years 2000–2002 is included as pre-determined variables and interacted with year fixed effects. Standard errors are clustered at the state level. Period: 2000–2015. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.



Fig. A1 Public sector accounting at the central level. Data sources: OECD/IFAC (2017) and Cavanagh et al. (2016).

The implementation process, however, differed not only with respect to the timing of its adoption, but also its administrative level. In some countries such as Sweden, accrual accounting reforms have been implemented primarily at the municipal level; other countries such as New Zealand imposed them in a more centralist way (Christiaens et al., 2015). This explains why accounting systems also differ within countries, as depicted in Fig. A2.

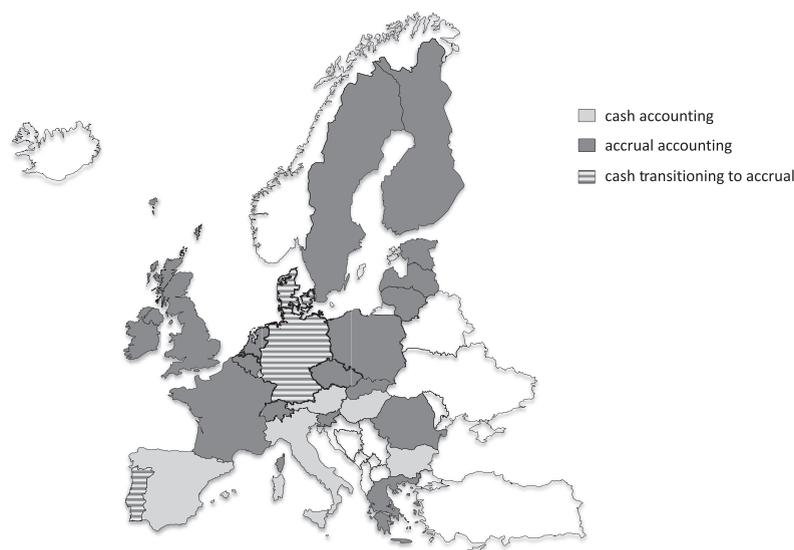


Fig. A2 Public sector accounting at the local level. Data sources: [Bellanca et al. \(2015\)](#) and [Ernst and Young \(2012\)](#).

There is a great diversity of bookkeeping systems used by different levels of government within a country. Among the European countries the type of the bookkeeping systems also varies between the different sub-sectors of government ([Ernst and Young, 2012](#)). [Table A1](#) depicts an accounting maturity score reflecting how close the different levels are to the accrual International Public Sector Accounting Standards (IPSAS). The IPSAS are based on IFRS/IAS, which are international business accounting rules. A survey conducted by [PwC \(2014\)](#) on behalf of Eurostat shows that for example in France, the UK and Sweden, the different governmental sectors use public sector accounting systems that are very close to IPSAS. The cash-based system used at the federal level in Germany differs substantially from these general business accounting standards. The proximity to a hypothetical IPSAS-based (accrual) accounting benchmark was substantially higher for the local level in Germany. On the one hand, the fact that the score was still much lower than in other countries is due to the fact that the local level implemented accrual accounting gradually (see [Section 2.2](#)). For those municipalities which have already switched to accrual accounting, the study finds a score of 0.78. On the other hand, the standards for accrual accounting in Germany are based on the German Commercial Code and not the international business accounting rules resulting, for example, in different valuation provisions; see [Adam \(2014\)](#) or [Federal Ministry of Finance \(2016\)](#) for differences between the two systems.

Table A1
Accounting maturity by country and government sector.

Country	Government sector			
	Central	State	Local	Social fund
Austria	0.73	0.12	0.12	0.61
Belgium	0.67	0.67	0.73	0.60
Bulgaria	0.56	–	0.56	0.63
Croatia	0.34	–	0.34	0.55
Cyprus	0.14	–	0.75	0.17
Czech Republic	0.75	–	0.75	0.77
Denmark	0.72	–	0.65	0.58
Estonia	0.92	–	0.92	0.86
Finland	0.72	–	0.90	0.92
France	0.89	–	0.84	0.92
Germany	0.22	0.29	0.58	0.42
Greece	0.12	–	0.12	0.12
Hungary	0.66	–	0.66	0.55
Ireland	0.54	–	0.71	0.57
Italy	0.31	–	0.30	0.14
Latvia	0.73	–	0.73	0.55
Lithuania	0.88	–	0.88	0.72
Luxembourg	0.19	–	0.31	0.15
Malta	0.22	–	0.94	–
Netherlands	0.31	–	0.58	0.78
Poland	0.66	–	0.66	0.68

(continued on next page)

Table A1 (continued)

Country	Government sector			
	Central	State	Local	Social fund
Portugal	0.55	–	0.80	0.70
Romania	0.63	–	0.63	0.38
Slovakia	0.75	–	0.75	0.34
Slovenia	0.62	–	0.62	0.19
Spain	0.70	0.61	0.68	0.58
Sweden	0.81	–	0.81	0.71
UK	0.96	–	0.95	–

Data source: PwC (2014, Table 4). The accounting maturity score reflects an estimated proximity to a hypothetical IPSAS-based (accrual) accounting benchmark derived from responses to a questionnaire. Government sectors that have already implemented accrual accounting should obtain a high score.

Appendix B. Additional tables

Table A2

Summary Statistics (1991–2016).

Variable		Mean	Std. Dev.	Min.	Max.
Population	Metric	5,842,895.19	4,830,984.5	989,035	18,079,686
Share of municipalities w/accrual accounting	Metric	0.2	0.37	0	1
Intensity/length of accrual accounting ^a	Metric	3.616	2.467	0.15	7.075
State located in East Germany	Binary	0.38	0.49	0	1
<i>Economic development^b</i>					
Nominal GDP	EUR per capita	24,735.37	7,484.68	6,581.11	43,924.12
Real GDP	Index (2010 = 100)	93.42	10.79	52.32	114.7
Unemployment rate	%	11.14	4.67	3.7	22.1
<i>Municipal expenditures^c</i>					
Total expenditure	EUR per capita	2,412.67	300.69	1,745.98	3,313.69
Personnel expenditure	EUR per capita	657.47	91.13	511.78	1,017.60
Expenditure on material and equipment	EUR per capita	470.18	88.85	291.91	750.58
Interest expenditure	EUR per capita	69.24	28.56	7.44	142.32
Transfer expenditure	EUR per capita	756.82	222	240.36	1444.40
Investment expenditure	EUR per capita	383.45	164.52	140.96	954.65
Purchase of assets	EUR per capita	14.45	17.84	0.23	146.83
<i>Municipal revenues^c</i>					
Total revenues	EUR per capita	2,381.88	312.51	1,634.76	3,369.30
Tax revenues	EUR per capita	735.31	294.43	91.38	1,476.09
Revenues from fees	EUR per capita	225.34	80.41	78.90	437.49
Revenues from economic activities	EUR per capita	118.53	24.17	49.26	289.97
Other current revenues (esp. grants from the state)	EUR per capita	982.39	270.44	539.67	1,625.92
Revenues from sales of non-financial assets	EUR per capita	67.95	35.32	10.84	164.34
<i>Debt^c</i>					
Municipal investment loans	EUR per capita	1,309.73	407.73	248.8	2,295.90
Municipal short-term debt	EUR per capita	318.66	458.59	8.09	2,168.54
Level of debt at state level	EUR per capita	5,819.38	2,891.53	29.96	14,471.06
<i>Municipal public funds, institutions and enterprises^d</i>					
Number of funds, institutions and enterprises	Metric	979.13	666.71	229	2967
Equity capital ^b	EUR per capita	2,569.93	886.89	783.72	5,824.26
Liabilities ^b	3,300.8	EUR per capita	987.24	1,098.11	5,921.71
Additions to tangible fixed assets (investments) ^b	EUR per capita	400.66	189	128.37	1,239.2

Notes:

^a Sum of shares of municipalities with accrual accounting between 2006 and 2014.^b Reported at the state level.^c In prices of 2016.^d Data for 2000–2015.

Table A3
Pretreatment characteristics of the switching groups (1).

	Specification					
	Pretreatment characteristics			Pretreatment trends		
	Means	Differences between groups		Linear trend	Differences between groups	
	early switchers (1)	late switchers <i>minus</i> early switchers (2)	not (yet) switchers <i>minus</i> early switchers (3)	early switchers (4)	late switchers <i>minus</i> early switchers (5)	not (yet) switchers <i>minus</i> early switchers (6)
<i>A. Population and economic development</i>						
population	7,309,783.00 [3,497,521.69]	1,045,531.559 (3,657,921.27)	1,128,174.258 (4,164,508.61)	11,327.50 [6,011.03]	24,447.792* (11,770.31)	36,303.434* (17,730.92)
nominal GDP per capita	26,759.99 [1,998.438]	-1,516.754 (2,629.565)	448.503 (2,719.162)	521.04 [98.696]	-111.670 (146.197)	29.239 (177.036)
unemployment rate	8.94 [0.603]	1.207 (0.746)	-1.658 (1.078)	-0.59 [0.066]	0.145 (0.132)	0.105 (0.090)
<i>B. Expenditure</i>						
total expenditure	2,201.35 [178.131]	130.188 (232.397)	48.021 (198.810)	13.51 [7.276]	4.249 (10.758)	11.253 (18.012)
personnel expenditure	611.48 [28.631]	0.083 (36.868)	-26.509 (31.156)	2.672 [3.279]	-0.210 (3.906)	3.162 (3.606)
expenditure on material and equipment	425.62 [43.714]	21.173 (52.534)	0.941 (46.367)	8.52 [2.851]	3.833 (3.659)	-2.471 (3.703)
investment expenditure	286.18 [39.174]	67.629 (61.401)	125.986** (62.290)	-2.516 [4.678]	-3.858 (7.906)	5.907 (10.478)
transfer expenditures	725.93 [80.813]	32.829 (91.847)	-63.745 (95.997)	7.067 [5.922]	4.169 (9.552)	2.008 (7.410)
purchase of assets	13.30 [3.590]	4.095 (10.779)	12.103 (9.016)	0.444 [1.088]	0.259 (1.473)	1.667 (1.975)
number of states	4	5	4	4	5	4

Notes: This table describes characteristics and trends of the different switching groups before the implementation of accrual accounting was made. Pretreatment levels refer to the three years 2000–2002. Column (1) shows the average for the early switchers. Columns (2)–(3) compare means in the other switching groups with the average in column (1). Pretreatment trends refer to the five years 1998–2002. Column (4) shows the mean linear trend for the early switchers. Columns (5)–(6) compare trends in the other switching groups with the average trend in column (4). A dummy variable for whether the state is located in East Germany is included. Standard errors are reported in parentheses and clustered at the state level; standard deviations are reported in brackets. All financial data are in prices of 2016 and per capita. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A4
Pretreatment characteristics of the switching groups (2).

	Specification					
	Pretreatment characteristics			Pretreatment trends		
	Means	Differences between groups		Linear trend	Differences between groups	
	early switchers (1)	late switchers <i>minus</i> early switchers (2)	not (yet) switchers <i>minus</i> early switchers (3)	early switchers (4)	late switchers <i>minus</i> early switchers (5)	not (yet) switchers <i>minus</i> early switchers (6)
<i>C. Revenue</i>						
total revenues	2,139.87 [199.061]	155.047 (249.611)	100.019 (222.110)	-14.71 [2.907]	3.581 (6.323)	8.493 (11.684)
tax revenues	830.63 [91.374]	-41.676 (106.297)	-8.699 (106.176)	-16.17 [3.206]	2.386 (3.355)	3.197 (3.356)
revenues from fees	235.57 [59.872]	40.710 (64.030)	6.586 (61.339)	-6.63 [2.908]	-1.876 (3.450)	-1.951 (3.207)
revenues from economic activities	120.35 [11.529]	10.248 (19.078)	24.644 (24.629)	3.58 [1.832]	6.756* (3.739)	5.300 (7.334)
transfer revenues	702.92 [29.115]	88.253** (43.446)	7.065 (57.536)	8.85 [0.929]	4.812 (2.842)	-4.919 (2.920)
revenues from sales of non-financial assets	64.79 [9.893]	21.942 (20.298)	27.604* (16.145)	-4.50 [1.719]	-4.924 (3.335)	-1.503 (3.415)
number of states	4	5	4	4	5	4

Notes: This table describes characteristics and trends of the different switching groups before the implementation of accrual accounting was made. Pretreatment levels refer to the three years 2000–2002. Column (1) shows the average for the early switchers. Columns (2)–(3) compare means in the other switching groups with the average in column (1). Pretreatment trends refer to the five years 1998–2002. Column (4) shows the mean linear trend for the early switchers. Columns (5)–(6) compare trends in the other switching groups with the average trend in column (4). A dummy variable for whether the state is located in East Germany is included. Standard errors are reported in parentheses and clustered at the state level; standard deviations are reported in brackets. All financial data are in prices of 2016 and per capita. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A5
Pretreatment characteristics of the switching groups (3).

	Specification					
	Pretreatment characteristics			Pretreatment trends		
	Means	Differences between groups		Linear trend	Differences between groups	
	early switchers (1)	late switchers <i>minus</i> early switchers (2)	not (yet) switchers <i>minus</i> early switchers (3)	early switchers (4)	late switchers <i>minus</i> early switchers (5)	not (yet) switchers <i>minus</i> early switchers (6)
<i>D. Debt</i>						
municipal short-term debt	361.90 [118.271]	-177.288 (134.867)	-303.376** (120.348)	50.94 [20.433]	-30.184 (22.249)	-44.205* (20.661)
level of debt at state level	5,829.36 [470.467]	-893.093 (1,022.440)	-1,391.494 (1,302.494)	155.87 [57.961]	-16.238 (125.151)	-10.156 (87.845)
<i>E. Municipal public funds, institutions and enterprises</i>						
number of firms	950.667 [311.814]	141.817 (378.464)	149.172 (496.998)	39.875 [19.083]	-19.746 (23.636)	-12.085 (22.663)
equity capital	1,903.06 [72.715]	-629.863*** (193.199)	-356.375 (366.538)	47.934 [61.720]	74.516 (65.561)	39.161 (73.462)
liabilities	3,062.05 [189.570]	-814.114 (594.044)	-898.467 (593.613)	74.940 [43.837]	24.480 (107.847)	38.358 (127.655)
additions to tangible fixed assets	434.457 [82.148]	-181.143** (86.182)	-157.443* (92.266)	4.980 [16.022]	-9.777 (18.504)	-21.505 (16.664)
number of states	4	5	4	4	5	4

Notes: This table describes characteristics and trends of the different switching groups before the implementation of accrual accounting was made. Pretreatment levels refer to the three years 2000–2002. Column (1) shows the average for the early switchers. Columns (2)–(3) compare means in the other switching groups with the average in column (1). Pretreatment trends refer to the five years 1998–2002. Column (4) shows the mean linear trend for the early switchers. Columns (5)–(6) compare trends in the other switching groups with the average trend in column (4). A dummy variable for whether the state is located in East Germany is included. Standard errors are reported in parentheses and clustered at the state level; standard deviations are reported in brackets. All financial data are in prices of 2016 and per capita. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A6
Effects on revenues, expenditure, and debt.

	Specification					
	Euro per capita in prices of 2016			In % of nominal GDP		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel R1: total revenues	-27.04 (-0.54)	-8.442 (-0.18)	27.09 (0.48)	-0.0739 (-0.52)	-0.124 (-0.74)	0.0164 (0.08)
Panel R2: tax revenues	-15.77 (-0.77)	-3.982 (-0.30)	-12.58 (-0.86)	-0.0113 (-0.24)	-0.00448 (-0.11)	-0.0291 (-0.69)
Panel R3: revenues from fees	-18.67 (-1.56)	-18.10 (-1.43)	-6.160 (-0.43)	-0.0859 (-1.75)	-0.0924 (-1.74)	-0.0552 (-0.85)
Panel R4: revenues from economic activities	7.127 (0.70)	5.982 (0.54)	0.0735 (0.01)	0.00547 (0.16)	-0.00236 (-0.06)	-0.0184 (-0.52)
Panel E1: total expenditure	-18.27 (-0.37)	-6.768 (-0.13)	66.66 (1.03)	-0.0995 (-0.58)	-0.149 (-0.75)	0.117 (0.41)
Panel E2: personnel expenditure	18.07* (1.98)	18.45* (1.82)	27.08** (2.61)	0.0405 (0.96)	0.0120 (0.21)	0.0555 (0.91)
Panel E3: transfer expenditures	-48.35* (-1.83)	-46.08* (-1.84)	-8.681 (-0.35)	-0.0996 (-0.87)	-0.127 (-1.18)	0.000340 (0.00)
Panel D1: municipal investment loans	190.9 (0.90)	139.1 (0.72)	-22.24 (-0.11)	0.516 (0.72)	0.316 (0.49)	-0.249 (-0.35)

(continued on next page)

Table A6 (continued)

	Specification					
	Euro per capita in prices of 2016			In % of nominal GDP		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel D2: municipal short-term debt	116.8	96.80	59.14	0.169	0.110	0.0502
	(1.07)	(0.83)	(0.53)	(0.50)	(0.30)	(0.14)
observations	337	337	337	337	337	337
state f.e.	yes	yes	yes	yes	yes	yes
year f.e. × east	yes	yes	yes	yes	yes	yes
state-specific time trends	yes	yes	yes	yes	yes	yes
controls	no	yes	yes	no	yes	yes
pre-determined short-term debt × year f.e.	no	no	yes	no	no	yes

Notes: The table reports results from panel OLS regressions with the share of municipalities with accrual accounting as treatment variable. The dependent variables are revenue or expenditure categories or the level of municipal debt per capita in prices of 2016 in Specifications (1)–(3), and revenue or expenditure categories or the level of municipal debt in percentage of nominal GDP in Specifications (4)–(6). The control variables included in Specifications (2), (3), (5), and (6) are the growth rate of real GDP and the level of debt at the state level. In Specifications (3) and (6) the mean level of municipal short-term debt in the years 2000–2002 is included as pre-determined variables and interacted with year fixed effects. Standard errors are clustered at the state level. Period: 1991–2016. * p < 0.10, ** p < 0.05, *** p < 0.01.

Table A7

Robustness check: Intensity of the treatment with symmetric time span.

	Specification					
	Euro per capita in prices of 2016			In % of nominal GDP		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel I: financial balance	12.31	24.79	17.32	0.0478	0.0743	0.0743
	(0.60)	(0.67)	(0.49)	(0.58)	(0.53)	(0.53)
Panel II: revenues from sale of non-financial assets	-2.505	-10.56**	-10.39**	-0.00000261	-0.0221***	-0.0221***
	(-1.07)	(-2.72)	(-2.59)	(-0.00)	(-4.87)	(-4.87)
Panel III: investment expenditure	19.05***	-3.990	-2.457	0.122***	0.0512	0.0512
	(5.30)	(-0.61)	(-0.41)	(7.86)	(1.45)	(1.45)
Panel IV: expenditure on material and equipment	3.244	38.80***	39.27***	0.00854	0.108***	0.108***
	(0.39)	(3.84)	(4.69)	(0.37)	(5.34)	(5.34)
Panel D1: municipal investment loans	201.5***	175.6**	202.9**	0.834***	0.791**	0.791**
	(3.97)	(2.53)	(3.01)	(4.46)	(2.95)	(2.95)
Panel D2: municipal short-term debt	141.1***	81.73	82.14	0.341**	0.213	0.213
	(3.46)	(1.54)	(1.60)	(3.10)	(1.28)	(1.28)
observations	36	36	36	36	36	36
state f.e.	yes	yes	yes	yes	yes	yes
year f.e.	yes	yes	yes	yes	yes	yes
state-specific time trends	no	no	no	no	no	no
controls	no	yes	yes	no	yes	yes
pre-determined short-term debt × year f.e.	no	no	yes	no	no	yes

Notes: The table reports results from panel OLS regressions with the intensity of accrual accounting as treatment variable. The dependent variables are the financial balance, revenues or expenditures, and the level of municipal debt per capita in prices of 2016 in Specifications (1)–(3), and the financial balance, revenues or expenditures, and the level of municipal debt in percentage of nominal GDP in Specifications (4)–(6). The control variables included in Specifications (2), (3), (5), and (6) are the growth rate of real GDP and the level of debt at the state level. In Specifications (3) and (6) the mean level of municipal short-term debt in the years 2000–2002 is included as pre-determined variables and interacted with year fixed effects. Standard errors are clustered at the state level. Period: 2005–2016, without the transition period 2007–2014. * p < 0.10, ** p < 0.05, *** p < 0.01.

Appendix C. Additional figures

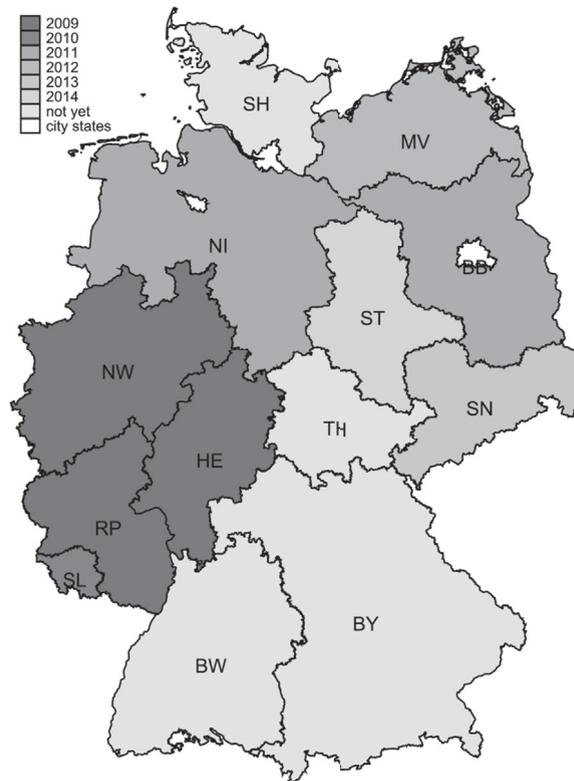


Fig. A3 Regional dispersion of accrual accounting in German municipalities. The map indicates the year in which at least 90% of municipalities located in the respective state finished the switch to accrual accounting. BW-Baden-Wuerttemberg, BY-Bavaria, HE-Hesse, NI-Lower Saxony, NW-North Rhine-Westphalia, RP-Rhineland-Palatinate, SL-Saarland, SH-Schleswig-Holstein, BB-Brandenburg, MV-Mecklenburg-Vorpommern, SN-Saxony, ST-Saxony-Anhalt, TH-Thuringia.

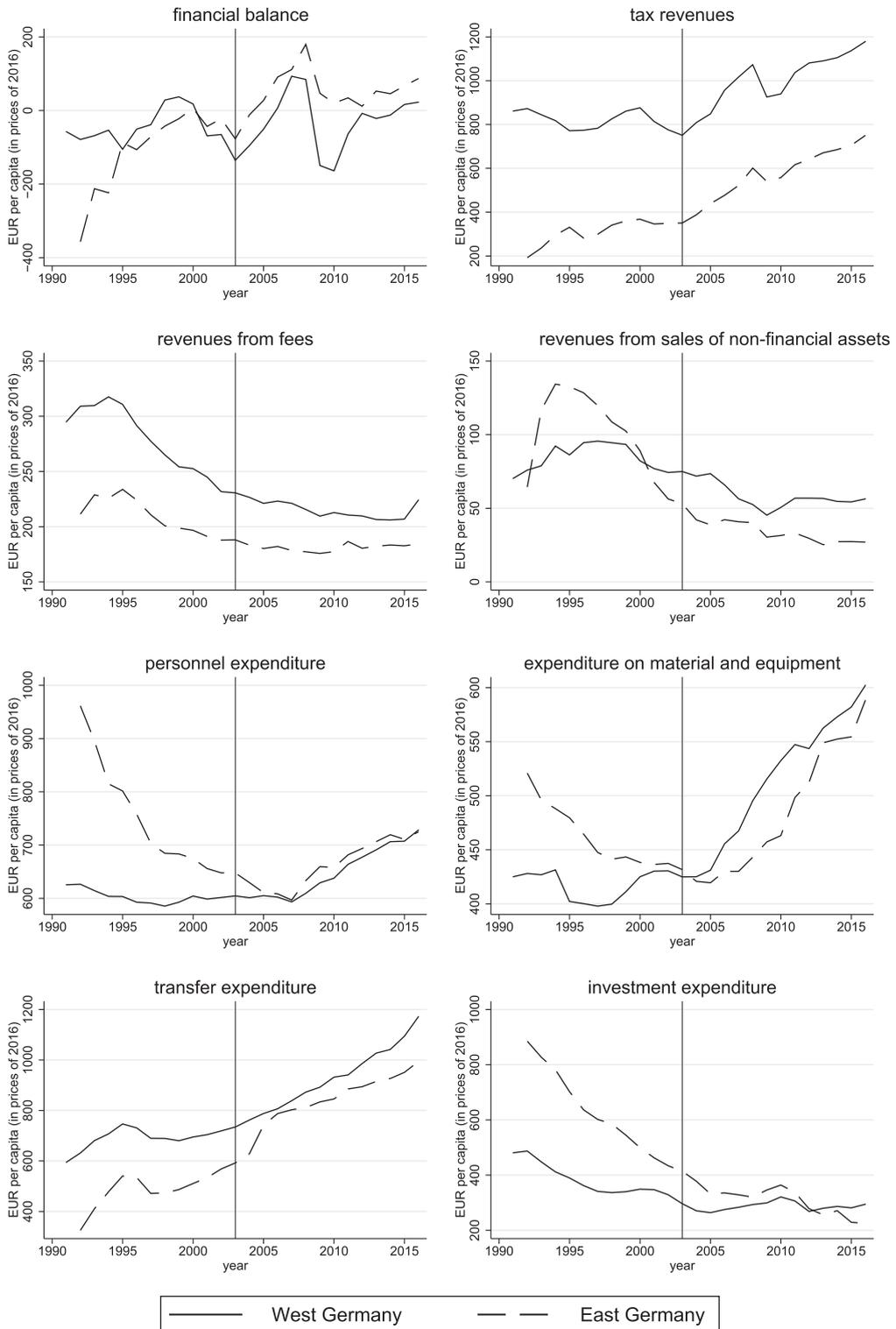


Fig. A4 Municipal revenues and expenditures in East and West Germany (1992–2016).

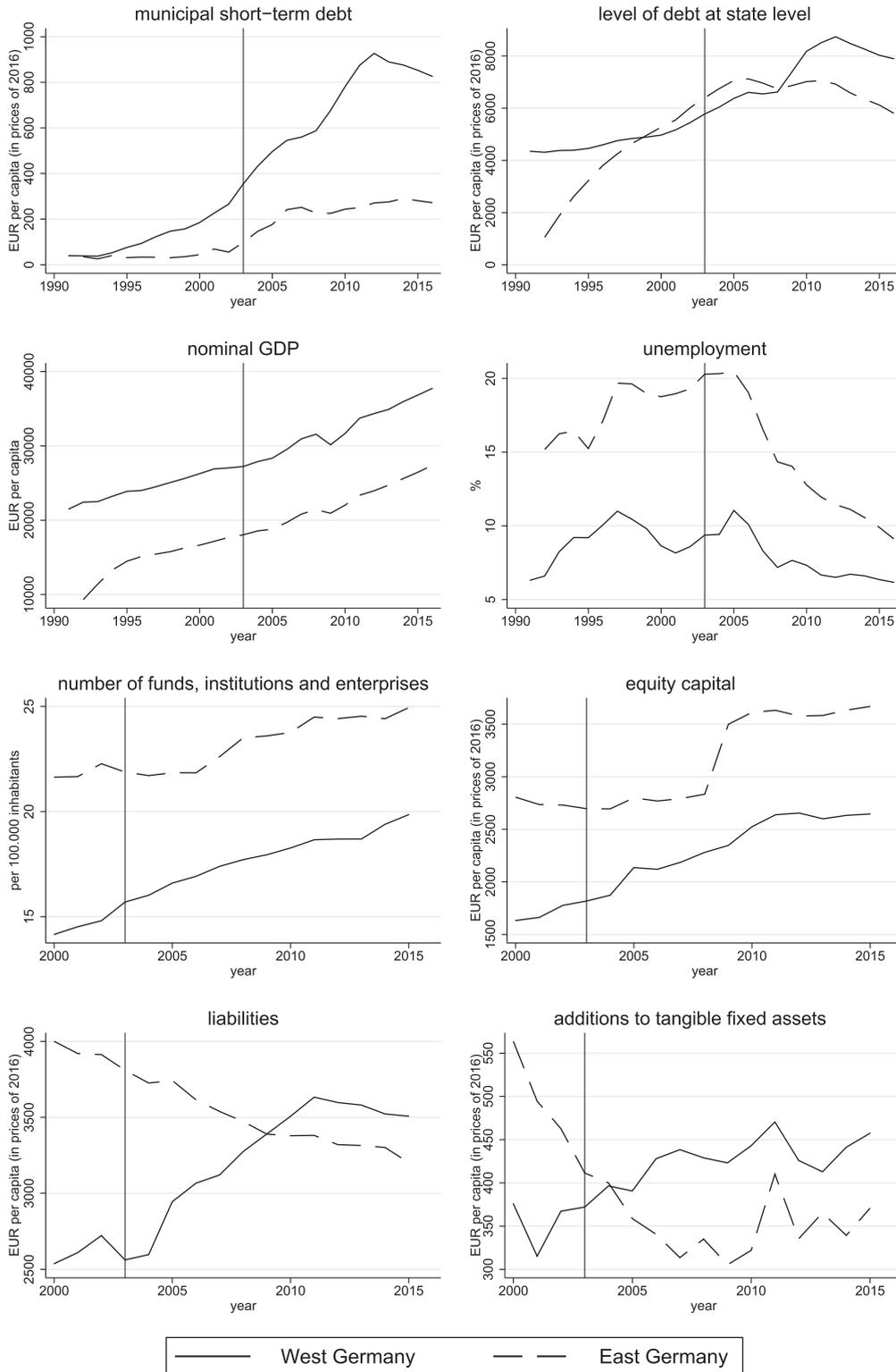


Fig. A5 Key economic variables in East and West Germany (1992–2016).

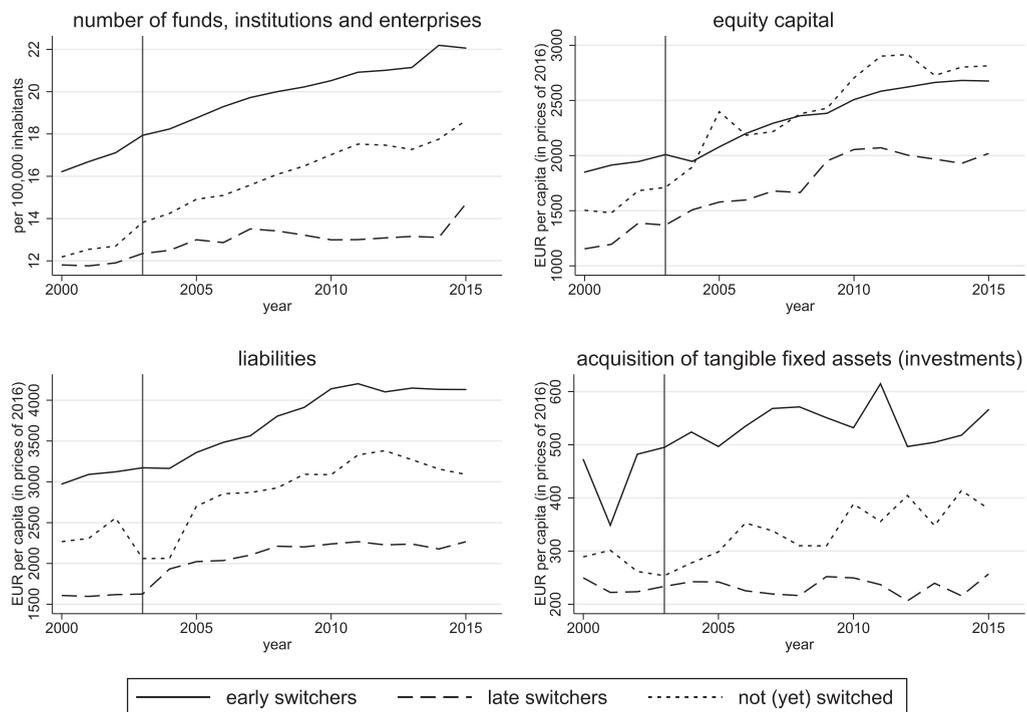


Fig. A6 Development in publicly controlled firms (2000–2015).

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