



**(Un-)Sustainability of Public Finances in  
German Laender  
A Panel Time Series Approach**

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# (UN-)SUSTAINABILITY OF PUBLIC FINANCES IN GERMAN LAENDER

## A PANEL TIME SERIES APPROACH

### Abstract

This paper provides evidence that most German states (Laender) have unsustainable public finances by exploiting a newly compiled database covering the years 1950-2011. Although the Laender are closely intertwined we are the first to apply “second generation” panel techniques that control for correlation among the Laender. A unique identification strategy for the selection of relevant sub-panels improves the robustness of the tests.

**JEL Classification:** E62, H62, H77, H72

**Keywords:** Fiscal Sustainability, Federalism, Panel Cointegration, Cross Dependence

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*Things that can't go on forever -  
eventually come to an end.*

*Herbert Stein (1916-1999)*

## **1. Introduction**

The recent solvency crisis has visualized potential consequences of unsustainable public finances. The issue is relevant on all levels of government in federal states. In Germany, most public debt has accrued on the federal and state (Laender) level. The fiscal situation of the 16 German Laender is particularly interesting since an extensive fiscal equalization scheme and a field-tested bailout rule imply low incentives for sound finances. In addition, the fiscal constraints have been unable to alleviate excessive deficits. Only recently, the fiscal rules have been tightened. The German constitution now prohibits (almost) all structural deficits on the federal level by 2016 and on the Laender level by 2020. However, attempts to water down this so-called debt brake are already under way.

Against this background, we investigate the hypothesis that Laender finances have not been sustainable. Our analysis stands out from previous studies as it comprises a considerable long time span. To the best of our knowledge, the 1950's and 1960's, when economic growth rates were advantageous for public finances, have not been included so far. In addition, we are the first to conduct "second generation" panel tests that allow for cross-dependence in German Laender data. It seems essential to consider cross-dependence since the Laender are closely intertwined – economically, politically and fiscally. Moreover, we increase the robustness of panel cointegration tests by estimating relevant sub-panels that have been selected by means of a unique identification strategy.

Our results show that public finances have been unsustainable in most German Laender during the period 1950-2011. However, we find abundant evidence for, at least, weak sustainability in Baden-Wuerttemberg, Bavaria, Hamburg, Hesse, Lower-Saxony, North Rhine-Westphalia and Schleswig-Holstein. As practical implication, the findings suggest that the space for fiscal discretion is limited in most Laender and that an effective fiscal constraint is badly needed. These insights are particularly interesting in light of the upcoming renegotiation of the German fiscal equalization scheme and the recent discussion on alleged investment gaps in Germany.

The paper is organized as follows: In section 2, we briefly review the empirical literature on fiscal sustainability and related theoretical assumptions. The dataset and the empirical test

strategy are presented in section 3. Empirical evidence is provided in section 4 for a panel of all West German Laender, and in section 5 for West German sub-panels. Section 6 sums up our key findings. Section 7 draws some conclusions.

## 2. Literature Review

Most empirical studies on fiscal sustainability of German public finances focus on the general or federal government (e.g., Afonso 2005; Artis and Marcellino 2001; Bravo and Silvestre 2002; Fève and Hénin 2000; Garcia and Hénin 1999; Greiner and Kauermann 2007, 2008; Greiner and Semmler 1999; Greiner et al. 2005, 2006; Grilli 1988; Payne 1997; Polito and Wickens 2011; Vanhorebeek and van Rompuy 1995). While the results are ambiguous, fiscal sustainability seems to be rejected when Wagner's Law is taken into account (Koester and Priesmeier 2013) or long time series are considered (Burret et al. 2013).<sup>1</sup>

By contrast, fiscal sustainability of German Laender has, to the best of our knowledge, only been examined by five studies so far (Table 1). Kitterer (2007) estimates unit root tests of the debt to GDP ratio in West German Laender (1971-2004) and East German Laender (1992-2004). He rejects fiscal sustainability of all Laender but Hesse, North Rhine-Westphalia and Saxony.<sup>2</sup> Claeys et al. (2008) conduct Model-Based Sustainability (MBS<sup>3</sup>) tests and find evidence that politicians do not significantly react to an increase of public debt by increasing budget surplus for the periods 1970-2005 (West German Laender) and 1991-2005 (East German Laender). Claeys et al. (2008) conclude that public finances on the German state level are not sustainable. Herzog (2010) conducts both MBS and unit root tests. The results reject fiscal sustainability in the case of Berlin and provide mixed evidence for Baden-Wuerttemberg. Fincke and Greiner (2011) follow the same test strategy. While MBS tests suggest that the reaction of primary surpluses to changes in public debt was positive over the period 1975-2006 in all West German Laender (except for Berlin), fiscal sustainability is questioned by unit root tests. A recent study by Potrafke and Reischmann (2015) estimates the Bohn-model for the West German Laender during the period 1980-2010 using OLS. While the study suggests that fiscal policy is unsustainable if fiscal transfers are excluded and sustainable otherwise, it fails to address cross-

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<sup>1</sup> Literature on fiscal sustainability is briefly reviewed by, e.g., Afonso and Rault (2015) and Chen (2014).

<sup>2</sup> The study builds upon an earlier working paper by Kitterer and Finken (2006).

<sup>3</sup> The MBS test is also known as the "Bohn-model" (Bohn 2008).

sectional dependence that is likely to be present since the German Laender are closely intertwined – economically, fiscally and politically.

Table 1 Studies on the Sustainability of German Laender Finances

	Laender and period	Econometrics	Empirical tests and variables	Key findings	Fiscal sustainability?*
Kitterer (2007)	West Laender (1971-2004) East Laender (1992-2004)	Time series (Univariate)	Unit root tests (debt)	Fiscal sustainability not met in most Laender.	YES [HE, NW, SN] NO [all other Laender]
Claeys et al. (2008)	West Laender (1970-2005) East Laender (1991-2005)	Time series (Univariate)	MBS-tests (debt and surplus)	Laender governments do not sufficiently react to increasing debt levels and curb consolidation requirements.	Rather NO [depends on time period under consideration]
Herzog (2010)	BE and BW: (1970-2005)	Time series (Univariate)	Unit root tests, MBS-tests (debt and surplus)	For BE sustainability is rejected by both tests. For BW sustainability is rejected by unit root tests but not by MBS-tests.	NO [BE] Mixed [BW]
Fincke and Greiner (2011)	West Laender (1975-2006)	Time series (Univariate)	Unit root tests, MBS-tests (debt and surplus)	All but Bavaria account for rising “debt to GDP ratios which is not compatible with sustainability in the long run” (p. 248) For HE, RP, NI, NW and SH sustainability is rejected by neither test, but budget deficits are only stationary at the 10% level in each state.	YES [BW, BY, HH] Rather YES [HE, RP, NI, NW, SH] NO [SL, HB, BE]
Potrafke and Reischmann (2015)	West Laender (1980-2010)	Panel analysis (Multivariate)	MBS-tests applied to panel using OLS (debt and surplus)	Including/excluding fiscal equalization transfers in the primary surplus changes the results	YES [if transfers included ] NO [if transfers are excluded]

\* “YES” indicates that the empirical results suggest that fiscal sustainability is detected. Studies listed above may focus on further issues. East German Laender include Brandenburg (BB), Berlin (BE), Saxony (SN), Saxony-Anhalt (ST), Thuringia (TH), Mecklenburg Western-Pomerania (MW) and West German Laender include Baden-Wuerttemberg (BW), Bavaria (BY), Bremen (HB), Hesse (HE), Hamburg (HH), North Rhine-Westphalia (NW), Lower Saxony (NI), Rhineland-Palatinate (RP), Schleswig Holstein (SH) and Saarland (SL).

To sum up, studies on the sustainability of German Laender finances are rare and provide ambiguous evidence. All results are based on datasets of a limited time range with starting points hardly reaching back to the beginning of the 1970s. This is surely a shortcoming since the economically vibrant years are dismissed from the analysis. In addition, the recent economic crisis is not included in all but one study (Potrafke and Reischmann 2015). More importantly, cointegration methods have so far not been applied. Especially the recently developed “second generation” panel cointegration tests which consider cross-sectional dependence could provide valuable insights on fiscal sustainability in federal systems (e.g., Westerlund and Prohl 2010; Mahdavi and Westerlund 2011).

### 3. Data and Empirical Test Strategy

#### 3.1. Data

The dataset comprises annual expenditure and revenue of each German Land for the years 1950-2011. Since Germany's territorial delineation changed in the past 60 years, data for the Saarland, the five East German Laender and Berlin is not available before 1960 or 1992, respectively. Instead of applying levels, the variables are measured in relation to GDP<sup>4</sup> to obtain a more natural definition of sustainability that keeps pace with economic development (Afonso 2005; Kirchgässner and Prohl 2008) and to achieve similarly scaled series that offer easily and intuitively interpretable information (Bohn 2008). Assuming rational choice in multi-level jurisdictions and rationality of the individuals involved in the budget process, we are urged to assess fiscal sustainability after the horizontal and vertical German fiscal equalization scheme that harmonizes tax revenue across the Laender (for a recent overview see: Burret and Feld 2013; Feld and Schnellenbach 2013).

Figure 1 Development of Laender Expenditure and Revenue

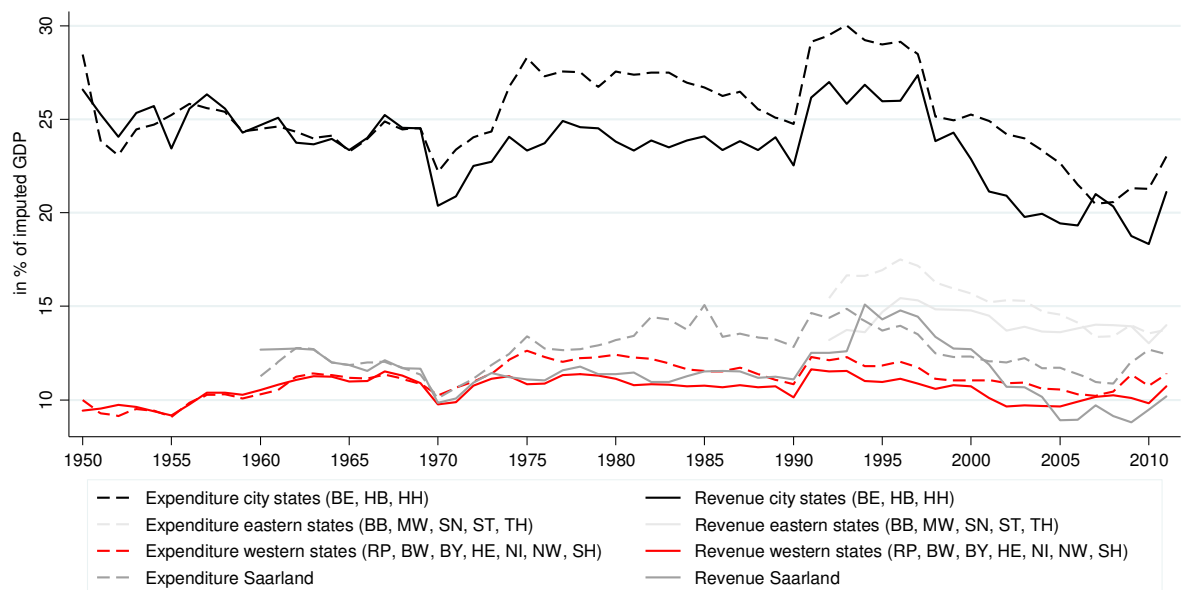


Figure 1 reveals that Laender spending exceeds Laender revenue in most of the years. While the gap seems to have diminished in the East German Laender on average, the three city states (Hamburg, Bremen and Berlin) show notably large fiscal deficits. In addition, the spending and

<sup>4</sup> Since GDP data on the German state level is not reliable we use imputed GDP. This is derived by multiplication of national GDP per capita with the population of the respective Land in the same year.

revenue ratios of the city states are substantially larger than in any other state. Descriptive statistics, definitions and sources of the variables are provided in Table A.1 and A.2.

### **3.2. Panel Identification and Empirical Test Strategy**

The core idea is to discuss fiscal sustainability among German Laender rather than within single Laender. Unlike previous studies on fiscal sustainability of German Laender, we estimate “second generation” panel tests. Panel tests are known to be more powerful than time series tests since the cross-sectional dimension is additionally exploited. Moreover, “second generation” tests allow for cross-sectional variation among Laender. As an innovative element, we contribute an identification strategy for the selection of relevant sub-panels.

#### **Panel Identification Strategy**

We follow two methods to identify the sub-panels. First, the panels are selected in accordance to their territorial delineation: This method leads to three sub-panels: (I) all Laender of the Federal Republic of Germany, (II) East German Laender and (III) West German Laender. Since the few available observations of the East German Laender restrict a meaningful interpretation, we report results only for the West German Laender panel.<sup>5</sup>

The second method identifies sub-panels with similar time series properties and sustainability characteristics. The univariate time series results are taken from a companion study (Burret et al. 2014).<sup>6</sup> We exclude the East German Laender from conditional selection since the limited time dimension leads to ambiguous time series evidence.<sup>7</sup> This leaves us with the West German Laender, which are grouped into four panels (see Figure 2): Panel 1 comprises each West German Land with a significant cointegration of expenditure and revenue. Panel 1a and Panel 1b are sub-panels of Panel 1. Panel 1a includes each West German Land that shows a cointegration vector of  $[1,-1]$ , i.e., strictly sustainable according to univariate time series results. Panel 1b includes each West German Land that rejects such a vector, i.e., weakly sustainable according to univariate time series results. Panel 2 comprises each West German Land with no significant cointegration, i.e., not sustainable according to univariate time series results.

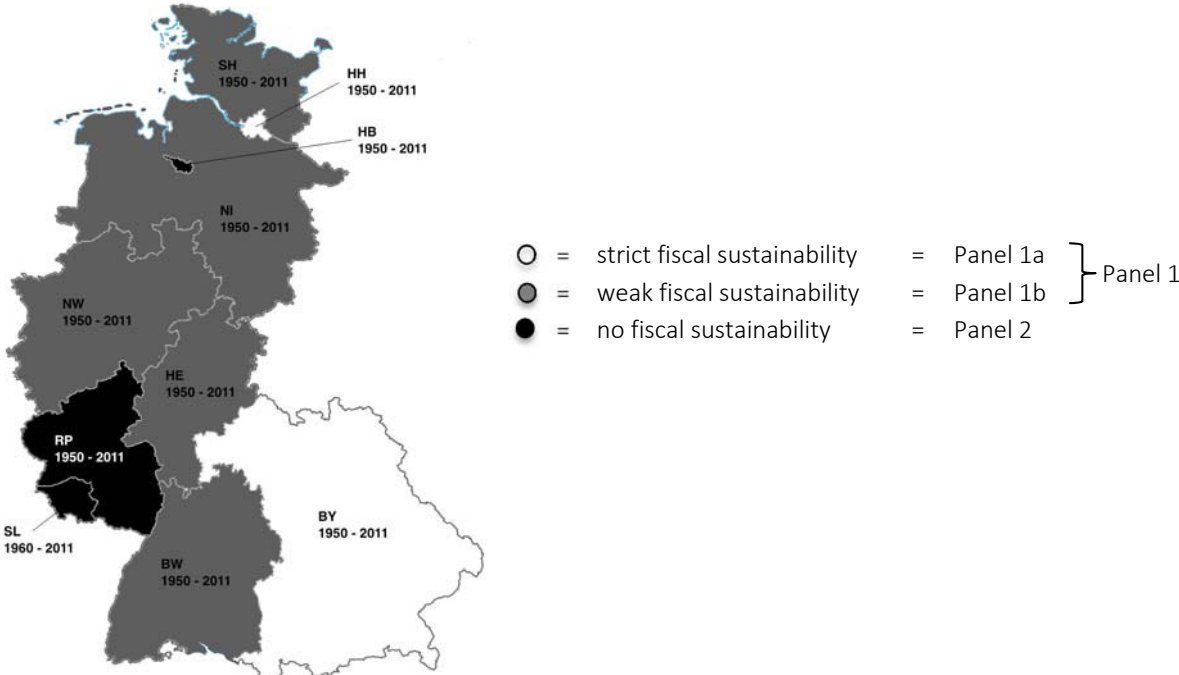
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<sup>5</sup> The results for East Germany (including Berlin) and all German states are available upon request.

<sup>6</sup> For a summary of the results of Burret et al. (2014) see Box A.1.

<sup>7</sup> The results for East Germany reveal that cointegration is rejected for all East German states except for Brandenburg. The stationarity properties of the time series are also not without ambiguity.

Figure 2 Graphical Representation of Identified West German Laender Sub-panels



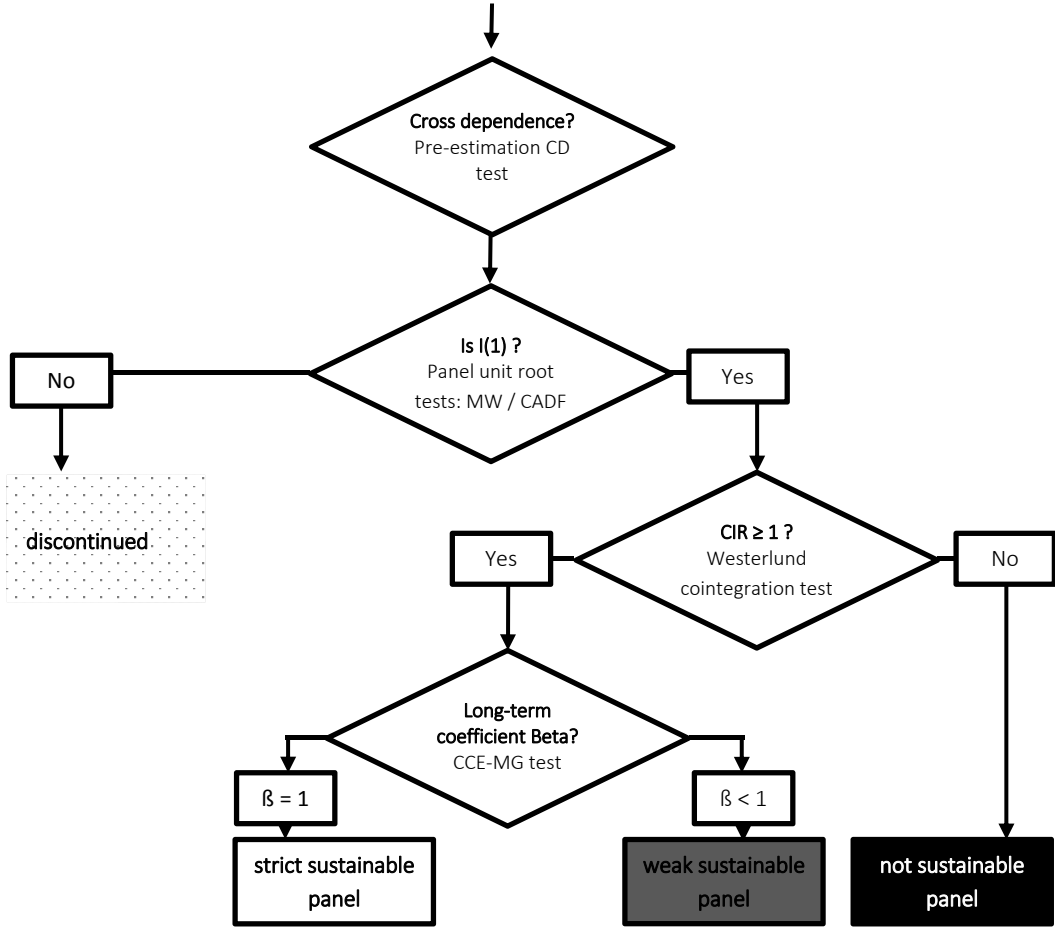
Note: The years indicate the start and end date of the time series.

**Empirical Test Strategy**

Public expenditure and revenue of each sub-panel are analysed in four steps (Figure 3). First, we test for cross-dependence (CD) of each variable. The results are used in order to employ the appropriate panel unit root test in a second step: In case CD is rejected, we use the MW test (Maddala and Wu 1999). In the presence of cross-section dependence, “first generation” panel unit root tests tend to reject the null hypothesis of a unit root excessively. Therefore, we apply the CADF test suggested by Pesaran (2007) that controls for cross-dependence if we find evidence for CD. If the panel is  $I(0)$ , i.e., the variables follow a non-stationary process, the panel analysis is discontinued because we do not have indication for cointegration. Otherwise we continue with panel cointegration tests on expenditure and revenue as a third step. If the panel is not cointegrated we have evidence for fiscal unsustainability because there is no significant long-term relation between expenditure and revenue, i.e., government expenditure and revenue follow no similar trend. If the panel is cointegrated we estimate the magnitude of the cointegration coefficient  $\beta$  in cross-section cointegration regressions for each Land and for different panels as a fourth step.



Figure 3 Empirical Test Procedure: Four Step Panel Analysis for Each Panel



Strict sustainability is assumed if  $\beta$  is equal to one, i.e., a one-percentage point increase in revenue leads to a one-percentage point increase in expenditure (and vice versa). A smaller  $\beta$  still provides evidence for weak fiscal sustainability since expenditure and revenue are cointegrated. The empirical tests applied in each step are briefly explained when discussing the results in section 4.<sup>8</sup>

A principal component analysis could help to distinguish between common factors and idiosyncratic components and to determine whether national or sub-national developments drive the long run relation between expenditure and revenue as suggested by Banerjee et al. (2004), Beckmann et al. (2012) and Belke et al. (2011). However, such a testing would not change our inference regarding fiscal sustainability and is, thus, beyond the scope of our paper.

<sup>8</sup> Another way to determine fiscal sustainability would be the estimation of the Bohn-Model that tests whether the reaction of primary surplus is sufficient to offset an increase in public debt (Bohn 1995, 1998, 2008).

## 4. Empirical Evidence for Panels Identified by Geographical Patterns

### 4.1. Cross-dependence Tests in West German Panel

To assess whether the cross-section independence assumption of “first generation” tests is valid, we start testing for error cross-sectional dependence (CD) as suggested by Pesaran (2004).<sup>9</sup> This test is useful for German Laender as they are economically, fiscally and politically integrated. The test works with unbalanced panels and is robust to single and multiple structural breaks in the slope coefficients and the error variances of the individual regressions. Econometrically speaking, the CD test is based on an average of pairwise correlation coefficients of OLS residuals from individual regressions, i.e., for each panel member (Pesaran 2015; Baltagi 2013, 287ff.). If the dataset contains N units (in our case N=10) the test estimates  $N*(N-1)$  correlations between state  $i=1$  and all other states (N-1). Table 2 indicates that the null hypothesis of cross-section independence is strongly rejected for both time series.

Table 2 Pre-estimation Test on Cross-section Correlation

	CD test	p-value	Average correlation coefficient	Absolute correlation coefficient
Revenue	23.00	0.00	0.444	0.461
Expenditure	31.43	0.00	0.606	0.606

Note: We report the average and absolute correlation coefficient across  $N \times (N-1)$  pairs of correlation. CD presents the Pesaran (2004) cross-section dependence statistic which is distributed standard normal and tests the null hypothesis of cross-section independence. We use the Stata routine xtcd.

### 4.2. Panel Unit Root Tests in West German Panel

As cross-section independence is strongly rejected, we apply the “second generation” CADF panel unit root test. It is based on the mean of individual ADF t-statistics of each unit in the panel. It eliminates cross-sectional dependence by augmenting the ADF regression with the lagged cross-sectional mean and its first differences of the individual series (CADF statistics) to capture CD by a single factor model. Since the lag length frequently influences the test results we carefully determine the number of lags using two approaches: First, the “ideal” lag length is separately selected for each Land using the Akaike Information Criterion (AIC). The resulting average number of lags is then used in the CADF test. Second, we alternatively report evidence for the lag bandwidth 0-4. Thereby we try to address the issue that too few lags fail to capture the system’s dynamics leading to omitted variable bias, and that too many lags cause a loss of degrees of freedom resulting in over-parameterization. Following Hoechle (2007), we select the ideal lag length by using Newey and West’s (1994) plug-in procedure at  $(4*(T/100)^{2/9} \approx 3)$ .

<sup>9</sup> CD tests have received great attention in macro- and microeconomic panel analysis (Moscone and Tosetti 2009; Sarafidis and Wansbeek 2012).

The unit root test results for the panel of West German Laender depend on the number of lags included. If we apply the average number of state-specific lags, the number of lags is 1.7 for revenue and 1.5 for expenditure (Table 3). While the test results suggest that the series are I(0) at least at the 10% level with and without trend, it seems reasonable to assume a lag length of at least two given the non-integer number of lags. If we allow for two or more lags, we have evidence that the series are I(1) (Table A.3). In compliance with this finding, univariate time series properties indicate I(1) in seven out of the ten West German Laender (Box A.1). Thus, we conclude that expenditure and revenue in the West German Laender are I(1).

Table 3 Pesaran Panel Unit Root Test of the West German Laender

	Levels				First differences			
	without trend		with trend		without trend		with trend	
	Z[t-bar]	p-value	Z[t-bar]	p-value	Z[t-bar]	p-value	Z[t-bar]	p-value
Revenue								
Lag average: 1.7	-2.150**	0.016	-1.859**	0.031	-10.889***	0.000	-10.342***	0.000
Expenditure								
Lag average: 1.5	-1.845**	0.033	-1.501*	0.067	-12.226***	0.000	-11.821***	0.000

Note: The null hypothesis for all tests is that the variables are I(1). We use Stata routine pescadf.

### 4.3. Panel Cointegration Tests in West German Panel

Panel cointegration tests reveal whether there is a linear combination of expenditure and revenue in our panel. If the variables share a conjoint long-run relation within the corresponding group we have first evidence for weak sustainability. We apply the error correction based cointegration test for (unbalanced) panels developed by Westerlund (2007). The test is meaningful for application in our case for the following reasons: First, it is general enough to allow for a large degree of heterogeneity, both in the long-run cointegration relation and in the short-run dynamics (Persyn and Westerlund 2008). Second, it is developed to cope with cross-sectionally dependent data. Third, the test comes along with an optional bootstrap procedure that allows for multiple repetitions of the cointegration tests which is meaningful since we have indications for cointegration in the panel. The Westerlund test has the null hypothesis of no cointegration by “inferring whether the error-correction term in a conditional panel error-correction model is equal to zero” (Persyn and Westerlund 2008: 232). The alternative hypothesis depends on the specific test. While, the group-mean tests (Gt and Ga) examine the alternative hypothesis that at least one unit is cointegrated, the panel tests (Pt and Pa) have the alternative hypothesis that the panel is cointegrated as a whole.<sup>10</sup>

<sup>10</sup> ‘a’ refers to the estimation of the error correction estimate, while ‘t’ refers to the estimation for the standard error of ‘a’. For further information see Persyn and Westerlund (2008: 233-235).

Since the test results may be sensitive to the choice of lags, leads and kernel width, we estimate different specifications of each cointegration test: In the unrestricted case we use AIC to determine the optimal lag and lead length with 3 at most and with the Bartlett kernel window width set in accordance to the plug-in procedure  $4*(T/100)^{2/9} \approx 3$ . In the restricted case we assume the same short-run dynamics for all series (with a single lag and lead) and, thus, hold the short-term dynamics fixed. Both cases are estimated with a constant and with a constant and trend in the error correction relation. Bootstrap resampling procedures are applied at 800 re-estimations for each Westerlund panel cointegration test and provide us with robust-p-values. This is required to avoid misleading inference in case of cross-member correlation.

Table 4 Westerlund Panel Cointegration Test of West German Laender Panel

	Constant				Constant and trend			
	Value	Z-value	p-value	Robust p-value	Value	Z-value	p-value	Robust p-value
Unrestricted (average lag length 0.1)					Unrestricted (average lag length 0.0)			
Gt	-3.420	-5.780	0.000	0.000	-4.439	-8.066	0.000	0.000
Ga	-17.458	-5.993	0.000	0.000	-25.807	-6.415	0.000	0.000
Pt	-9.965	-5.419	0.000	0.003	-12.465	-6.614	0.000	0.000
Pa	-14.372	-7.224	0.000	0.001	-20.335	-5.881	0.000	0.000
Fixed short-term dynamics					Fixed short-term dynamics			
Gt	-3.137	-4.786	0.000	0.000	-3.959	-6.197	0.000	0.000
Ga	-17.552	-6.047	0.000	0.000	-26.230	-6.612	0.000	0.000
Pt	-6.740	-2.175	0.015	0.094	-8.756	-2.374	0.009	0.088
Pa	-9.551	-3.790	0.000	0.035	-14.561	-2.903	0.002	0.037

Note: We use Stata routines xtwest written by Persyn and Westerlund (2008). Gt and Ga are group mean tests, while Pt and Pa are panel mean tests. See footnote 9.

In the unrestricted case the null hypothesis of no cointegration is rejected at all meaningful significant levels by the simple and by the robust p-values (Table 4). This also holds if a deterministic trend is included additionally to a constant in the cointegration relation and to the inclusion of a lead. If we restrict the short-term dynamics, the robust p-values still reject the null hypothesis of the group-mean tests (Ga and Gt). However, the null hypothesis of the panel tests (Pt and Pa) can only be rejected at a 10% significance level. This provides evidence that the panel is rather not cointegrated as a whole, but expenditure and revenue of at least some Laender are cointegrated. These results match with state-specific time series evidence which rejects cointegration in the case of Bremen, Rhineland-Palatinate and Saarland ( Box A.1). Thus, we conclude that expenditure and revenue are not cointegrated in the West German panel as a whole and refrain from estimating the magnitude of the cointegration coefficient  $\beta$ . The overall findings indicate that it might be meaningful to test sub-panels with similar sustainability patterns based on time series results.

## 5. Empirical Evidence for Panels Identified by Time Series Test Results

Due to the lacking evidence for cointegration in the West German panel as a whole, we proceed with the examination of West German sub-panels that share similar sustainability patterns based on time series results. In section 3.2 we have identified the following groups: Panel 1 comprises Laender with cointegrated public finances in the sense of a significant long-term relation between expenditure and revenue (BY, BW, HE, HH, NI, NW, SH). Panel 1a comprises Laender with a cointegration vector [1,-1] (BY, HH) and panel 1b comprises Laender without such a cointegration vector (BW, HE, NI, NW, SH). Panel 2 comprises Laender that have none or more than one cointegration relation (HB, RP, SL).

### 5.1. Cross-dependence Tests in West German Sub-panels

Table 5 shows the results for the CD test. The estimations yield CD test statistics that allow for rejecting the null hypothesis of no cross-dependence in all panels except for panel 1a. The rejection of cross-dependence in this panel is econometrically not surprising, since  $N*(N-1)$  dimensions are tested. We estimate stationarity patterns of panel 1a using the Maddala and Wu (1999) panel unit root test and refrain from estimating the long-run equilibrium with “second generation” panel cointegration tests. In all other panels we subsequently apply “second generation” panel unit root and cointegration tests.

Table 5 Cross-dependence Tests of West German Sub-Panels

	Panel 1		Panel 1a		Panel 1b		Panel 2	
	BW,BY, HH, HE, NI, NW, SH		BY, HH		BW, HE, NI, NW, SH		HB, RP, SL	
	CD test	p-value	CD test	p-value	CD test	p-value	CD test	p-value
Revenue	17.12	0.000	-1.59	0.111	13.73	0.00	5.77	0.00
Expenditure	22.63	0.000	1.01	0.313	17.33	0.00	7.42	0.00

Note: For reasons of clarity we do not report the average and absolute correlation coefficient across  $N \times (N-1)$  pairs of correlation. CD presents the Pesaran (2004) cross-section dependence statistic which is distributed standard normal and tests the null hypothesis of cross-section independence. We use the Stata routine `xtcd` written by Markus Eberhardt.

### 5.2. Panel Unit Root Tests in West German Sub-panels

In Table 6 we report the results of the Pesaran panel unit root test for **panel 1**, when the non-integer average number of lags is applied (1.6 for revenue and 1.7 for expenditure). The null of non-stationarity of revenue is retained without a trend and rejected if we allow for a trend or if we consider first differences. The results of expenditure indicate  $I(0)$  at the 10% level without and  $I(1)$  with a trend. If we use a length of two and more lags expenditure and revenue are clearly non-stationary in levels and stationary in first differences (Table A.4).

Table 6 Pesaran Panel Unit Root Test of Panel 1 (BY, BW, HE, HH, NI, NW, SH)

	Levels				First differences			
	without trend		with trend		without trend		with trend	
	Z[t-bar]	p-value	Z[t-bar]	p-value	Z[t-bar]	p-value	Z[t-bar]	p-value
Revenue								
Lag average: 1.6	-0.485	0.314	-1.679**	0.047	-10.126***	0.000	-9.550***	0.000
Expenditure								
Lag average: 1.7	-1.331*	0.092	-2.028	0.021	-10.242***	0.000	-9.774***	0.000

Note: The null hypothesis for all tests is that the variables are I(1). We use Stata routine pescadf.

The CADF test for **panel 2** applies an average lag length of 2 in case of revenue and 1 in case of expenditure (Table 7). While the results indicate that the revenue are stationary without a trend and non-stationary with a trend, expenditure seem to be stationary in both cases. If we consider the ideal number of lags determined by the plug-in procedure, i.e. three lags, I(0) for expenditure is confirmed and revenue seems to be I(1) (Table A.5). Thus, the results for panel 2 are ambiguous. Nevertheless, revenue and expenditure can still be cointegrated.

Table 7 Pesaran Panel Unit Root Test of Panel 2 (HB, RP, SL)

	Levels				First differences			
	without trend		with trend		without trend		with trend	
	Z[t-bar]	p-value	Z[t-bar]	p-value	Z[t-bar]	p-value	Z[t-bar]	p-value
Revenue								
Lag average: 2.0	-1.293*	0.098	-1.249	0.106	-5.175***	0.000	-5.172***	0.000
Expenditure								
Lag average: 1.0	-2.415***	0.008	-1.526*	0.064	-6.387***	0.000	-6.366***	0.000

Note: The null hypothesis for all tests is that the variables are I(1). We use Stata routine pescadf.

For **panel 1a** we present the results of the Maddala and Wu (1999) unit root test since cross-dependence is rejected by the CD-test. Non-stationarity is only rejected for revenue in case of zero and one lag if a trend is included (Table 8). If we follow the rule of thumb and determine an ideal lag length of three, we find strong evidence that revenue and expenditure are I(1).

Table 8 Maddala and Wu Panel Unit Root Test of Panel 1a (BY, HH)

	Levels				First differences			
	without trend		with trend		without trend		with trend	
	Chi-square	p-value	Chi-square	p-value	Chi-square	p-value	Chi-square	p-value
Revenue								
Lag 0	7.332	0.119	16.103***	0.003	144.217***	0.000	124.966***	0.000
Lag 1	5.395	0.249	10.214**	0.037	79.380***	0.000	66.971***	0.000
Lag 2	2.900	0.575	7.111	0.130	71.967***	0.000	60.789***	0.000
Lag 3	2.608	0.625	4.471	0.346	43.048***	0.000	35.002***	0.000
Lag 4	3.634	0.458	4.294	0.368	25.088***	0.000	19.757***	0.000
Expenditure								
Lag 0	6.277	0.179	6.403	0.171	115.170***	0.000	100.827***	0.000
Lag 1	6.943	0.139	7.909	0.095	87.698***	0.000	75.662***	0.000
Lag 2	3.371	0.498	3.446	0.486	45.513***	0.000	37.157***	0.000
Lag 3	3.621	0.460	3.708	0.447	34.280***	0.000	28.859***	0.000
Lag 4	3.152	0.533	3.108	0.528	25.276***	0.000	20.930***	0.000

Note: The null hypothesis for all tests is that the variables are I(1). We use Stata routine multipurt.

In **panel 1b** Laender specific lag lengths suggest to use an average lag length of 1.2 for revenue and 1.6 for expenditure. The results of the CADF test with average lags are reported in Table 9.

We cannot reject  $I(1)$  in revenue and expenditure at the 5% level if we allow for a trend. Note however that expenditure are  $I(0)$  at the 10% significance level with a trend. At the ideal lag length of three determined by the plug-in procedure, the series are  $I(1)$  with a trend (Table A.6). The same holds for revenue if no trend is included. Thus, we conclude that both series are  $I(1)$  with a trend in the cointegration relation.

Table 9 Pesaran Panel Unit Root Test of Panel 1b (BW, HE, NI, NW, SH)

	Levels				First differences			
	without trend		with trend		without trend		with trend	
	Z[t-bar]	p-value	Z[t-bar]	p-value	Z[t-bar]	p-value	Z[t-bar]	p-value
Revenue								
Lag average: 1.2	-1.180	0.119	-0.741	0.229	-9.684***	0.000	-9.526***	0.000
Expenditure								
Lag average: 1.6	-2.952***	0.002	-1.570*	0.058	-8.685***	0.000	-8.408***	0.000

Note: The null hypothesis for all tests is that the variables are  $I(1)$ . We use Stata routine pescadf.

To sum up, the results of the panel unit root tests indicate that sub-panels 1, 1a and 1b are  $I(1)$ . This holds in particular if we estimate with trends and assume an “ideal” lag length of three as determined by the plug-in procedure and the rule of thumb. Similar findings are obtained for the full panel of West German Laender in section 4.2. Since our results are, at least partially, sensitive to the number of lags included and evidence of  $I(1)$  is ambiguous in panel 2, we apply cointegration tests for every sub-panel to further explore fiscal sustainability characteristics.

### 5.3. Panel Cointegration Tests in West German Sub-panels

The Westerlund error correction based cointegration tests for **panel 1** indicate that the null hypothesis of no cointegration is rejected at least at the 1% significance level in each specification, even if we hold the short-term dynamics fixed (Table 10). Similar results are obtained if we consider the robust p-values. This is clear evidence that expenditure and revenue are cointegrated in panel 1 as a whole and that these Laender share a conjoint long-run relation.

Table 10 Westerlund Panel Cointegration Test of Panel 1 (BY, BW, HE, HH, NI, NW, SH)

	Constant				Constant and trend			
	Value	Z-value	p-value	Robust p-value	Value	Z-value	p-value	Robust p-value
Unrestricted (average lag length 0.14)					Unrestricted (average lag length 0)			
Gt	-3.701	-5.664	0.000	0.000	-4.933	-8.357	0.000	0.000
Ga	-19.518	-6.015	0.000	0.000	-29.683	-6.875	0.000	0.000
Pt	-10.031	-6.237	0.000	0.000	-15.195	-10.983	0.000	0.000
Pa	-18.351	-8.416	0.000	0.000	-35.483	-11.457	0.000	0.000
Fixed short-term dynamics					Fixed short-term dynamics			
Gt	-3.564	-5.262	0.000	0.000	-4.501	-6.950	0.000	0.000
Ga	-20.377	-6.432	0.000	0.000	-30.650	-7.252	0.000	0.000
Pt	-8.082	-4.277	0.000	0.006	-11.707	-6.996	0.000	0.001
Pa	-15.484	-6.707	0.000	0.001	-32.671	-10.243	0.000	0.000

Note: Null: No cointegration. Average AIC selected lag length for the unrestricted test. We apply xtwest command by Joakim Westerlund.

The results for **panel 2** are somewhat contrary to the findings above. In the unrestricted case the null hypothesis of no cointegration within the cross-section can be rejected at least at the 5% significance level if we do not allow for a trend (Table 11). Adding a trend leads to retaining the null hypothesis of no cointegration – particularly if the robust p-values of the panel tests (Pt and Pa) are considered. The finding of no cointegration is confirmed in the case of fixed short-term dynamics. Here the null hypothesis cannot be rejected in any test specification, neither by the simple p-values nor by the robust p-values.

Table 11 Westerlund Panel Cointegration Test of Panel 2 (HB, RP, SL)

	Constant				Constant and trend			
	Value	Z-value	p-value	Robust p-value	Value	Z-value	p-value	Robust p-value
Unrestricted (average lag length: 0.14)					Unrestricted (average lag length: 0)			
Gt	-2.764	-1.901	0.029	0.037	-3.286	-1.960	0.025	0.045
Ga	-12.379	-1.666	0.048	0.031	-16.248	-1.079	0.140	0.036
Pt	-4.815	-2.321	0.010	0.059	-5.342	-1.924	0.027	0.108
Pa	-12.105	-3.072	0.001	0.039	-14.366	-1.535	0.062	0.108
Fixed short-term dynamics					Fixed short-term dynamics			
Gt	-2.141	-0.700	0.242	0.238	-2.694	-0.698	0.243	0.251
Ga	-10.588	-1.096	0.137	0.106	-15.332	-0.846	0.199	0.136
Pt	-2.803	-0.298	0.383	0.478	-3.643	0.018	0.507	0.599
Pa	-6.670	-0.952	0.171	0.306	-9.327	-0.111	0.456	0.558

Note: Null: No cointegration. Average AIC selected lag length for the unrestricted test. We apply xtwest command by Joakim Westerlund.

Thus, the restricted case largely suggests that there is a cointegration vector neither in panel 2 as a whole (Pt and Pa tests) nor between single Laender (Gt and Ga tests). The finding is supported by univariate time series evidence that suggests no cointegration of expenditure and revenue in Bremen, Saarland and Rhineland-Palatinate (Box A.1). In sum, our results for panel 2 depend on the trend assumption and the restriction of short-term dynamics but evidence tends to retain the null hypothesis of no cointegration.

Table 12 Westerlund Panel Cointegration Test of Panel 1b (BW, HE, NI, NW, SH)

	Constant				Constant and trend			
	Value	Z-value	p-value	Robust p-value	Value	Z-value	p-value	Robust p-value
Unrestricted (average lag length: 0.14)					Unrestricted (average lag length: 0)			
Gt	-3.693	-4.767	0.000	0.000	-4.643	-6.265	0.000	0.000
Ga	-18.998	-4.870	0.000	0.000	-27.442	-5.074	0.000	0.000
Pt	-7.768	-4.557	0.000	0.000	-10.541	-6.652	0.000	0.000
Pa	-16.727	-6.294	0.000	0.000	-27.689	-6.840	0.000	0.000
Fixed short-term dynamics					Fixed short-term dynamics			
Gt	-3.412	-4.068	0.000	0.000	-4.358	-5.481	0.000	0.000
Ga	-19.361	-5.019	0.000	0.000	-28.742	-5.501	0.000	0.000
Pt	-6.914	-3.698	0.000	0.003	-9.603	-5.579	0.000	0.000
Pa	-16.130	-5.994	0.000	0.001	-28.427	-7.109	0.000	0.000

Note: Null: No cointegration. Average AIC selected lag length for the unrestricted test. We apply xtwest command by Joakim Westerlund.

The Westerlund cointegration test results for **panel 1b** are similar to the findings for panel 1 (Table 12). No cointegration can be rejected for the panel as a whole (Pt and Pa test) and for cointegration of at least one cross-section on the 1% significance level (Gt and Ga test). If short-



term dynamics are fixed, the null hypothesis can still be rejected at the 1% level. Thus, we have conclusive evidence that expenditure and revenue are cointegrated in panel 1b as a whole and between single Laender.

#### 5.4. Magnitude of Cointegration Coefficient $\beta$

Empirical evidence suggests that expenditure and revenue are cointegrated in the sub-panels 1 and 1a and rather not in sub-panel 2. To further explore the sustainability condition, we estimate the magnitude of the cross-section  $\beta$  coefficient in the cointegration relation of each panel using the Cross Correlated Effects (CEE) and the Common Correlated Effects Mean Group (CCE-MG) estimation procedures developed by Pesaran (2006). We choose this estimation approach for the following reasons: First, it allows for cross-section dependence which is required according to our CD-test results. Second, it is robust to the presence of a limited number of ‘strong’ factors and an infinite number of ‘weak’ factors. According to Eberhardt (2012: 65), the latter can be “associated with local spillovers effects”, whereas the former can represent global shocks “such as the recent financial crisis”. Third, it accounts for the presence of unobserved heterogeneity (Eberhardt and Presbitero 2013: 10). Since we examine post fiscal equalization data, we have indication for spillovers as well as shocks that affect the panel as a whole. Therefore this test seems to be more appropriate as compared to other “first generation” panel cointegration tests that neither allow for unobserved common factors with heterogeneous impact nor for cross-sectional dependence.

The cointegration regression is augmented with cross-section means of the dependent variable and observed regressors. In analogy to Afonso and Rault (2015), we estimate cross-section averages of the dependent variable for revenue and expenditure.

$$(5) \quad Rev_{it} = \alpha_i + \beta_i Exp_{it} + \mu_1 \overline{Rev}_t + \mu_2 \overline{Exp}_t + \mu_{it}$$

Let  $Rev_{it}$  and  $Exp_{it}$  be the revenue and expenditure in state  $i$  at time  $t$ , respectively, while  $\overline{Rev}_t$  and  $\overline{Exp}_t$  denote the cross-section averages of expenditure and revenue in time  $t$ , respectively.

Table 13 depicts the results for each sub-panel and the full West German panel. However, the estimates for the full panel need to be taken with a great deal of caution since panel cointegration cannot be assumed for the panel as a whole (see section 4). Thus, these results

are only reported for reasons of comprehensibility and completeness and are not discussed in detail.

Table 13 Panel CCE-MG and Laender CCE Estimates, West German Panel and Sub-panels

	$\beta$	t-Stat	$\mu_1$	t-Stat	$\mu^2$	t-Stat	$\alpha$	t-Stat
West German panel, excluding Berlin (N=10)	0.818	13.02	0.991	3.70	-0.852	-3.72	0.002	0.14
Baden-Wuerttemberg	0.636	6.23	0.353	6.98	-0.216	-2.34	0.022	4.15
Bavaria	0.815	9.76	0.303	3.33	-0.270	-2.49	0.015	1.87
Bremen	1.061	15.66	3.147	14.98	-2.701	-11.58	-0.074	-3.45
Hamburg	0.927	10.54	1.148	4.78	-1.370	-8.12	0.047	2.37
Hesse	0.866	18.87	0.611	10.44	-0.558	-9.27	0.008	1.24
Lower Saxony	0.954	10.98	0.553	8.69	-0.646	-5.50	0.016	2.65
North Rhine-Westphalia	0.739	8.06	0.718	11.55	-0.651	-9.08	0.018	2.59
Rhineland-Palatinate	0.933	25.01	0.646	11.73	-0.602	-8.93	-0.001	-0.08
Saarland	0.363	2.17	1.581	9.88	-0.689	-2.92	-0.043	-2.74
Schleswig-Holstein	0.887	10.27	0.850	13.71	-0.809	-10.54	0.006	1.05
Panel 1: BY, BW, HE, HH, NI, NW, SH (N=7)	0.741	15.87	0.999	4.13	-0.746	-3.80	0.000	0.06
Baden-Wuerttemberg	0.517	5.81	0.485	8.67	-0.185	-1.97	0.016	3.42
Bavaria	0.849	10.44	0.448	3.84	-0.401	-3.12	0.011	1.24
Hamburg	0.774	11.18	2.328	11.10	-1.774	-11.64	-0.013	-0.85
Hesse	0.863	20.55	0.873	14.42	-0.720	-11.29	-0.004	-0.87
Lower Saxony	0.698	8.52	0.721	10.24	-0.441	-3.44	-0.006	-1.08
North Rhine-Westphalia	0.668	8.03	0.959	12.46	-0.755	-9.40	0.008	1.16
Schleswig-Holstein	0.821	8.86	1.177	17.23	-0.949	-10.00	-0.010	-1.74
Panel 2: HB, SL, RP (N=3)	0.664	3.61	0.991	2.29	-0.703	-2.18	0.002	0.16
Bremen	0.820	10.77	1.753	38.13	-1.345	-8.49	-0.021	-2.53
Rhine-Palatinate	0.875	25.97	0.252	7.03	-0.328	-7.56	0.023	4.23
Saarland	0.280	3.39	0.967	25.59	-0.437	-6.03	0.005	0.091
Panel 1b: BW, HE, NI, NW, SH (N= 5)	0.757	12.71	0.991	8.65	-0.756	-5.18	0.001	0.02
Baden-Wuerttemberg	0.525	6.13	0.628	11.09	-0.257	-2.71	0.013	3.14
Hesse	0.826	18.06	0.997	14.71	-0.770	-11.04	-0.005	-1.04
Lower Saxony	0.790	7.34	0.904	13.49	-0.681	-3.97	-0.003	-0.54
North Rhine-Westphalia	0.783	10.20	1.101	13.21	-0.952	-11.71	0.007	0.98
Schleswig-Holstein	0.860	11.56	1.324	17.23	-1.118	-13.80	-0.007	-1.30

Note: We use the Stata routine xtmg.

The results for **panel 1** indicate a panel cointegration coefficient below one (0.741). Cross-section  $\beta$  coefficients are in a bandwidth between 0.517 and 0.863. This provides evidence, that the long-run relation is smaller than one in the cross-sections. While strict fiscal sustainability can be rejected, a significant and stable long-run relation exists. The results for Hamburg show a negative constant ( $\alpha$ ) and high magnitude of the means for revenue ( $\mu_1$ ) and expenditure ( $\mu_2$ ). The finding suggests to exclude Hamburg from panel 1.

The cointegration coefficient for **panel 2** (0.664) is smaller than for panel 1 (0.741). Excluding the Laender in panel 2 from the full West German panel was a meaningful step. We refrain from a further interpretation of the results because of evidence against cointegration of panel 2 (Table 11.)

Results in **panel 1b** reaffirm the importance of the identification strategy that allows for estimating sub-panels with similar time series test results: Significance levels are increased in most cross-sections while the coefficients' magnitudes are slightly changed. We refrain from interpreting these results by ranking them. Instead, we conclude that the West German Laender can be divided into two panel groups: Panel 1 includes a group of at least "weakly sustainable" Laender such as Bavaria, Baden-Wuerttemberg, Hesse, Hamburg, Lower Saxony, North Rhine-Westphalia and Schleswig-Holstein. Panel 2 comprises Laender (HB, RP and SL) that are not sustainable since they do not share a long-term equilibrium relation.

## 6. Summary of Empirical Findings

The results of the panel time series analysis are briefly summarized in Table 14. We have analyzed fiscal sustainability of West German Laender with a post fiscal equalization database that comprises expenditure and revenue. In a first step, we have found evidence for cross-sectional dependence (CD) in the West German Laender and in the sub-panels that are selected conditional on their time series properties. This evidence suggests to apply "second generation" tests. In a second step, we have estimated panel unit root and panel cointegration tests in the West German Laender panel and corresponding sub-panels. Third, we have estimated panel and cross-section cointegration coefficients for each panel and explored common correlation effects.

Table 14 Summary of "Second Generation" Panel Time Series Analysis

	CD	I(1)	Panel cointegration of expenditure and revenue with fixed short term dynamics of...		Cointegration coefficient $\beta$ of...		Verdict
			...the whole panel	...at least one cross-section	...the whole panel	...each cross-section	
Panel 1	Yes	Yes	Yes	Yes	0.741	$\beta < 1$	Weak sustainability
Panel 1a	No	Yes	n.a.	n.a.	n.a.	n.a.	n.a.
Panel 1b	Yes	Yes	Yes	Yes	0.757	$\beta < 1$	Weak sustainability
Panel 2	Yes	(Yes)	No	No	(0.664)	$(\beta < 1)$	No sustainability
West German panel	Yes	Yes	No	Yes	(0.818)	$(\beta < 1)^*$	Ambiguous results

Note: 'n.a.' indicates that no cointegration test is applied due to lack of indication for cointegration. Results in parentheses have to be taken with a great deal of caution and are, thus, reported for reason of comparison, only. \*For Bremen  $\beta$  is 1.061.

We have evidence that expenditure and revenue of the West German Laender as a whole (excluding Berlin) are not cointegrated, while cointegration can be assumed for sub-panel 1 (BY, BW, HE, HH, NI, NW, SH) and sub-panel 1b (BW, HE, NI, NW, SH). Panel 2 (HB, SL, RP) fails in the panel cointegration analysis and is, thus, considered to have unsustainable public finances. For panel 1 and 1b our estimations indicate that the cointegration coefficients are

between 0.517 and 0.863. This is evidence that the strict condition for fiscal sustainability (i.e., the coefficient is equal to one) is not met in any panel. Instead we have abundant evidence for weak sustainability in panel 1 and panel 1b. These two panels pass every step of the panel cointegration analysis.

While Potrafke and Reischmann (2015) also use post fiscal equalization data, they estimate the Bohn-Model using OLS regression and find evidence for “fiscal sustainability” in ten West German Laender between 1975 and 2010.<sup>11</sup> We, however, find evidence for systematically overshooting expenditure in (panel) time series from 1950 until 2011, allowing for cross-dependence and cross-section heterogeneity. In fact, we do not have evidence for a long-term relation among all (West German) Laender. This evidence questions the efficacy of the German fiscal equalization scheme: It has not significantly contributed to the harmonization of Laender finances such that a conjoint fiscal equilibrium is significant among the (West German) Laender.

## 7. Conclusion

The study contributes to the existing literature in two ways: First, we introduce a new identification strategy for panel cointegration tests that connects evidence from univariate time series analysis with panel time series analysis. We show that the robustness of panel cointegration tests can be increased if sub-panels are selected conditional on univariate time series results. This holds particularly if evidence suggest that the panel as a whole is not cointegrated but that at least one unit is cointegrated.

Second, we use a unique dataset that covers a period of up to 62 years to provide new evidence for the fiscal sustainability of German Laender. As expected, we find evidence of cross-dependence among Laender in almost all panels. It is, thus, essential to apply “second generation” panel techniques that control for cross-dependencies. This, however, has not been applied to sub-national public finance datasets so far. The existing empirical literature on fiscal sustainability in multi-level jurisdictions has to be reviewed in this regard.

The economic upshot is that all West German Laender fail to obtain strict fiscal sustainability. In particular, we provide empirical evidence that public finances in Bremen, Rhineland-

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<sup>11</sup> In addition, we cast doubt on the robustness of their OLS regression since we have found abundant evidence for I(1) of public debt in all West German states (See also Burret et al. 2014), cross-dependence among German Laender finances, and evidence for the application of Laender specific lag lengths in panel regressions. Potrafke and Reischmann (2015) do not control for any of these panel characteristics.

Palatinate and Saarland are not sustainable. This comes as no surprise since Bremen and Saarland already received a bailout in 1992. The other West German Laender (BY, BW, HE, NI, NW, SH) meet the requirements for weak fiscal sustainability. As practical implication, the findings suggest that the space for fiscal discretion is limited in most Laender and that an effective fiscal constraint is badly needed. These insights are particular interesting in light of the upcoming renegotiation of the German fiscal equalization scheme and the recent discussion on alleged investment gaps in Germany. While a principal component analysis would allow separate national and sub-national drivers of fiscal sustainability, such a testing is beyond the scope of our paper and could be subject to future research.

## References

- Afonso, A. (2005), 'Fiscal Sustainability: The Unpleasant European Case', *Public Finance Analysis* 61, 19–44.
- Afonso, A. and C. Rault (2015), 'Multi-step Analysis of Public Finances Sustainability', *Economic Modelling* 48, 199–20.
- Artis, M. and M. Marcellino (2001), 'Fiscal Forecasting: the Track Record of the IMF, OECD, and EC', *Econometrics Journal* 4, 20–36.
- Baltagi, B. H. (2013), *Econometric Analysis of Panel Data*, John Wiley and Sons, Chichester.
- Banerjee, A., M. Marcellino and C. Osbat (2004), 'Some Cautions on the Use of Panel Methods for Integrated Series of Macroeconomic Data', *Econometrics Journal* 7, 322–340.
- Belke, A., F. Dobnik and C. Dreger (2011), 'Energy Consumption and Economic Growth - New Insights into the Cointegration Relationship', *Energy Economics* 33, 782–789.
- Beckmann, J., A. Belke and F. Dobnik (2012), 'Cross-section Dependence and the Monetary Exchange Rate Model - A Panel Analysis', *North American Journal of Economics* 23, 38–53.
- Bohn, H. (1995), 'The Sustainability of Budget Deficits in a Stochastic Economy', *Journal of Money, Credit and Banking* 27, 257–271.
- Bohn, H. (1998), 'The Behaviour of U.S. Public Debt and Deficits', *Quarterly Journal of Economics* 113, 949–963.
- Bohn, H. (2008), 'The Sustainability of Fiscal Policy in the United States', in: R. Neck and J. Sturm (eds.), *Sustainability of Public Debt*, MIT Press, Cambridge/London, 15–49.
- Bravo, A. and A. Silvestre (2002), 'Intertemporal Sustainability of Fiscal Policies: Some Tests for European Countries', *European Journal of Political Economy* 18, 517–528.
- Burret, H. T. and L. P. Feld (2013), 'Fiscal Institutions in Germany', *Swiss Journal of Economics and Statistics* 149, 249–290.
- Burret, H. T., L. P. Feld and E. A. Köhler (2013), 'Sustainability of Public Debt in Germany - Historical Considerations and Time Series Evidence', *Journal of Economics and Statistics* 233, 291–335.

- Burret, H. T., L. P. Feld and E. A. Köhler (2014), 'Fiscal Sustainability of the German Laender - Time Series Evidence', CESifo Working Paper Series No. 4928.
- Chen, S.-W. (2014), 'Testing for Fiscal Sustainability: New Evidence from the G-7 and some European Countries', *Economic Modelling* 37, 1-15.
- Claeys, P., R. Ramos and J. Suriñach (2008), 'Fiscal Sustainability across Government Tiers', *International Economics and Economic Policy* 5, 139–163.
- Eberhardt, M. (2012), 'Estimating Panel Time-Series Models with Heterogeneous Slopes', *The Stata Journal* 12, 61–71.
- Eberhardt, M. and A. Presbitero (2013), 'This Time They Are Different: Heterogeneity and Nonlinearity in the Relationship Between Debt and Growth', *IMF Working Paper* 13/248.
- Feld, L. P. and J. Schnellenbach (2013), 'Verzerrungen im bundesstaatlichen Finanzausgleich', *Gutachten im Auftrag des Freistaats Bayern und des Landes Hessen*, Freiburg.
- Fève, P. and P. Hénin (2000), 'Assessing Effective Sustainability of Fiscal Policy within the G-7', *Oxford Bulletin of Economic Research* 62, 175–195.
- Fincke, B. and A. Greiner (2011), 'Debt Sustainability in Germany: Empirical Evidence for Federal States', *International Journal of Sustainable Economy* 3, 235–254.
- Garcia S. and P. Hénin (1999), 'Balancing Budget Through Tax Increases or Expenditure Cuts: Is It Neutral?', *Economic Modelling* 16, 591–612.
- Greiner, A. and G. Kauermann (2007), 'Sustainability of US Public Debt: Estimating Smoothing Spline Regressions', *Economic Modelling* 24, 350–364.
- Greiner, A. and G. Kauermann (2008), 'Evidence for Germany and Italy Using Penalized Spline Smoothing', *Economic Modelling* 25, 1144–1154.
- Greiner, A. and W. Semmler (1999), 'An Endogenous Growth Model with Public Capital and Government Borrowing', *Annals of Operations Research* 88, 65–79.
- Greiner, A., W. Semmler and W. Zhang (2005), '*Monetary and Fiscal Policies in the Euro-Area: Macro Modelling, Learning and Empirics*', Elsevier, Amsterdam.
- Greiner A., U. Köller and W. Semmler (2006), 'Testing the Sustainability of German Fiscal Policy: Evidence for the Period 1960-2003', *Empirica* 33, 127–140.
- Grilli, V. (1988), 'Seigniorage in Europe', in: M. De Cecco and A. Giovannini (eds.), *A European Central Bank? Perspectives on Monetary Unification After Ten Years of the EMS*, Cambridge University Press, Cambridge/London, 53–79.
- Herzog, B. (2010), 'Anwendung des Nachhaltigkeitsansatzes von Bohn zur Etablierung eines Frühindikators in den öffentlichen Finanzen', *Kredit und Kapital* 42, 183–206.
- Hoechle, D. (2007), 'Robust Standard Errors for Panel Regressions with Cross-Sectional Dependence', *The Stata Journal* 7, 281–312.
- Kirchgässner, G. and S. Prohl (2008), 'Sustainability of Swiss Fiscal Policy', *Swiss Journal of Economics and Statistics* 144, 57–83.
- Kitterer, W. (2007), 'Nachhaltige Finanz- und Investitionspolitik der Bundesländer', *Perspektiven der Wirtschaftspolitik* 8, 53–83.

- Kitterer, W. and J. Finken (2006), 'Zur Nachhaltigkeit der Länderhaushalte – Eine empirische Analyse', *Finanzwissenschaftliche Diskussionsbeiträge 7*, Finanzwissenschaftliches Forschungsinstitut an der Universität zu Köln.
- Koester, G. B. and C. Priesmeier (2013), 'Does Wagner's Law Ruin the Sustainability of German Public Finance?', *Public Finance Analysis* 69, 256–288.
- Maddala, G. S and S. Wu (1999), 'A Comparative Study of Unit Root Tests with Panel Data and New Simple Test', *Oxford Bulletin of Economics and Statistics* 61, 631–652.
- Mahdavi, S. and J. Westerlund (2011), 'Fiscal Stringency and Fiscal Sustainability: Panel Evidence from the American State and Local Governments', *Journal of Policy Modeling* 33, 953–969.
- Moscone, F. and E. Tosetti (2009), 'A Review and Comparisons of Tests of Cross-Section Independence in Panels', *Journal of Economic Surveys* 23, 528–561.
- Newey, W. and K. West (1994), 'Automatic Lag Selection in Covariance Matrix Estimation', *Review of Economic Studies* 61, 631–653.
- Payne, J. (1997), 'International Evidence on the Sustainability of Budget Deficits', *Applied Economics Letters* 12, 775–779.
- Persyn, D. and J. Westerlund (2008), 'Error-Correction–Based Cointegration Tests for Panel Data', *The Stata Journal* 8, 232–241.
- Pesaran, M. H. (2004), 'General Diagnostic Tests for Cross Section Dependence in Panels', *CESifo Working Paper* 1229.
- Pesaran, M. H. (2006), 'Estimation and Inference in Large Heterogeneous Panels with a Multifactor Error Structure', *Econometrica* 74, 967–1012.
- Pesaran, M. H. (2007), 'A Simple Panel Unit Root Test in the Presence of Cross Section Dependence', *Journal of Applied Econometrics* 22, 265–312.
- Pesaran, M. H. (2015), 'Testing Weak Cross-Sectional Dependence in Large Panels', *Econometrics Reviews* 34, 1089–1117.
- Polito, V. and M. Wickens (2011), 'Assessing the Fiscal Stance in the European Union and the United States 1970-2011', *Economic Policy* 26, 599–647.
- Potrafke, N. and M. Reischmann (2015), 'Fiscal Transfers and Fiscal Sustainability', *Journal of Money, Credit and Banking* 47, 975–1005.
- Sarafidis, V. and T. Wansbeek (2012), 'Cross-Sectional Dependence in Panel Data Analysis', *Econometric Reviews* 31, 483–531.
- Vanhorebeek, F. and P. van Rompuy (1995), 'Solvency and Sustainability of Fiscal Policies in the EU', *De Economist* 143, 457–473.
- Westerlund, J. (2007), 'Testing for Error Correction in Panel Data', *Oxford Bulletin of Economics and Statistics* 69, 709–748.
- Westerlund, J. and S. Prohl (2010), 'Panel Cointegration Tests of the Sustainability Hypothesis in Rich OECD Countries', *Applied Economics* 42, 1355–1364.

## Appendix

### Box A.1 Summary of Univariate Time Series Results

The companion paper by Burret et al. (2014) conducts “first generation” unit root and cointegration tests separately for each Land. It should be noted that we are reluctant to overestimate evidence from the East German Laender including Berlin due to the limited time series. The results from the univariate analysis are the following (see Table below):

Public debt is not sustainable in most German Laender according to unit root tests. This finding largely supports cointegration tests as we find no significant cointegration of expenditure and revenue in most East German Laender and in Bremen, Rhineland-Palatinate and Saarland. The majority of the other Laender show a significant cointegration relation and are, thus, assumed to be weakly sustainable. In Bavaria and Hamburg expenditure and revenue are even cointegrated with a vector of [1,-1] and, therefore, meet the requirements for strict sustainability.

**Summary of “First Generation” Time Series Analysis**

	Stationarity of			Cointegration of expenditure and revenue			Verdict	
	debt	expenditure	revenue	Cointegration relation	Cointegration vector [1,-1]	Significant trend	Sustainability	Panel
Baden-Wuerttemberg	No	~	~	✓	No	No	Weak	1b
Bavaria	~	No	No	✓	✓	No	Strict	1a
Bremen	~	No	~	No	n.a.	n.a.	No	2
Hamburg	~	No	~	✓	✓	✓	Strict	1a
Hesse	~	No	~	✓	No	✓	Weak	1b
Lower Saxony	~	No	No	✓	No	✓	Weak	1b
North Rhine-Westphalia	No	~	~	✓	No	✓	Weak	1b
Rhineland-Palatinate	No	No	No	No	No	n.a.	No	2
Saarland	No	No	~	No	n.a.	n.a.	No	2
Schleswig-Holstein	No	No	~	✓	No	✓	Weak	1b
Brandenburg	~	~	No	✓	No	✓	Weak	-
Mecklenburg-W. Pomerania	No	~	~	No	n.a.	n.a.	No	-
Saxony	No	~	~	n.a.	n.a.	n.a.	~	-
Saxony-Anhalt	~	~	~	No	n.a.	n.a.	No	-
Thuringia	~	~	~	No	n.a.	n.a.	No	-
Berlin	No	~	No	n.a.	n.a.	n.a.	No	-



Table A.1 Descriptive Statistics of Various Sub-Panels

	Obs	Mean	Std. Dev.	Min	Max
All German Laender					
Expenditure	730	0.1458	0.0573	0.0680	0.3226
Revenue	730	0.1367	0.0523	0.0705	0.3144
West German Laender					
Expenditure	610	0.1411	0.0585	0.0680	0.3044
Revenue	610	0.1330	0.0544	0.0705	0.3144
East German Laender					
Expenditure	120	0.1701	0.0443	0.1245	0.3226
Revenue	120	0.1555	0.0350	0.1265	0.2842

Table A.2 Definition and Source of Data

Variable	Level	Period*	Definition	Source
Expenditure and revenue**	Federal Laender (without municipalities)	1950-1969 1970-2011	Total revenue and total expenditure Total revenue and total expenditure adjusted for payments from the same level. Data in accordance with cash statistics for 2011 and in accordance with final annual accounting otherwise.	Federal Statistical Office
Population	Federal Laender	1950-2011	End of each year	Federal Statistical Office
GDP per capita	Federal level	1950-2011	GDP in current prices	Federal Statistical Office

Note: \*Data for Saarland is not available before 1960. Data for East German Laender and whole of Berlin starts in 1992. \*\*1960 is a short fiscal year spanning from April to December. Therefore data has been derived by interpolation and in the case of Saarland by extrapolation. Data is derived by a search request at Germany's Federal Statistical Office.

Table A.3 Pesaran Panel Unit Root Test of West German Laender with Lag Bandwidth [0,4]

	Levels				First differences			
	without trend		with trend		without trend		with trend	
	Chi-square	p-value	Chi-square	p-value	Chi-square	p-value	Chi-square	p-value
Revenue								
Lag 0	-4.081***	0.000	-4.391***	0.000	-15.158***	0.000	-14.966***	0.000
Lag 1	-2.286**	0.011	-2.006	0.022	-13.774***	0.000	-13.420***	0.000
Lag 2	-1.765	0.039	-1.703	0.044	-9.584***	0.000	-8.738***	0.000
Lag 3	-1.219	0.111	-1.237	0.108	-7.420***	0.000	-6.369***	0.000
Lag 4	-1.531	0.063	-1.621	0.053	-6.070***	0.000	-4.921***	0.000
Expenditure								
Lag 0	-3.926***	0.000	-3.881***	0.000	-15.158***	0.000	-14.910***	0.000
Lag 1	-2.676***	0.004	-2.615***	0.040	-13.788***	0.000	-13.458***	0.000
Lag 2	-1.059	0.145	-0.795	0.213	-10.076***	0.000	-9.275***	0.000
Lag 3	-1.264	0.103	-0.995	0.160	-7.950***	0.000	-6.991***	0.000
Lag 4	-0.669	0.252	-0.731	0.232	-5.030***	0.000	-3.889***	0.000

Note: The null hypothesis of all test is I(1).

Table A.4 Pesaran Panel Unit Root Test of Panel 1 with Lag Bandwidth [0,4]

	Levels				First differences			
	without trend		with trend		without trend		with trend	
	Chi-square	p-value	Chi-square	p-value	Chi-square	p-value	Chi-square	p-value
Revenue								
Lag 0	-3.168***	0.001	-3.645***	0.000	-12.682***	0.000	-12.521***	0.000
Lag 1	-0.757	0.225	-2.184**	0.011	-11.888***	0.000	-11.542***	0.000
Lag 2	0.459	0.677	-0.694	0.187	-8.999***	0.000	-8.194***	0.000
Lag 3	-0.290	0.386	-0.679	0.111	-8.193***	0.000	-7.273***	0.000
Lag 4	-0.113	0.455	0.495	0.463	-6.279***	0.000	-5.191***	0.000
Expenditure								
Lag 0	-6.880***	0.000	-5.015***	0.000	-12.682***	0.000	-12.521***	0.000
Lag 1	-2.291**	0.014	-3.456***	0.000	-11.963***	0.000	-11.546***	0.000
Lag 2	-0.888	0.244	-1.724*	0.042	-9.028***	0.000	-8.288***	0.000
Lag 3	-1.221	0.249	-1.565	0.059	-7.984***	0.000	-7.175***	0.000
Lag 4	-0.094	0.690	-0.201	0.420	-5.901***	0.000	-4.929***	0.000

Note: The null hypothesis of all test is I(1).

Table A.5 Pesaran Panel Unit Root Test of Panel 2 with Lag Bandwidth [0,4]

	Levels				First differences			
	without trend		with trend		without trend		with trend	
	Chi-square	p-value	Chi-square	p-value	Chi-square	p-value	Chi-square	p-value
Revenue								
Lag 0	-2.762***	0.003	-2.618***	0.004	-8.303***	0.000	-8.197***	0.000
Lag 1	-1.840**	0.033	-1.717**	0.043	-7.451***	0.000	-7.560***	0.000
Lag 2	-1.650*	0.049	-1.417*	0.078	-5.259***	0.000	-5.451***	0.000
Lag 3	-1.489	0.068	-0.840	0.201	-2.232**	0.013	-2.417***	0.008
Lag 4	-2.344	0.010	-2.164	0.015	-2.024**	0.021	-2.256**	0.012
Expenditure								
Lag 0	-2.946***	0.002	-1.892**	0.029	-8.303***	0.000	-8.197***	0.000
Lag 1	-2.415***	0.008	-1.526*	0.064	-6.387***	0.000	-6.366***	0.000
Lag 2	-1.798**	0.036	-0.893	0.186	-3.349***	0.000	-3.114***	0.001
Lag 3	-2.202**	0.014	-1.534*	0.062	-1.485*	0.069	-0.906	0.182
Lag 4	-3.429***	0.000	-3.180***	0.001	-1.014	0.155	-0.642	0.260

Note: The null hypothesis of all test is I(1).

Table A.6 Pesaran Panel Unit Root Test of Panel 1b with Lag Bandwidth [0,4]

	Levels				First differences			
	without trend		with trend		without trend		with trend	
	Chi-square	p-value	Chi-square	p-value	Chi-square	p-value	Chi-square	p-value
Revenue								
Lag 0	-3.666***	0.000	-5.002***	0.000	-10.719***	0.000	-10.582***	0.000
Lag 1	-1.332*	0.091	-0.887	0.188	-10.423***	0.000	-10.312***	0.000
Lag 2	-0.160	0.436	1.055	0.854	-7.224***	0.000	-6.673***	0.000
Lag 3	-0.686	0.246	0.401	0.656	-5.505***	0.000	-4.892***	0.000
Lag 4	-0.945	0.172	0.497	0.689	-4.517***	0.000	-3.765***	0.000
Expenditure								
Lag 0	-4.365***	0.000	-3.905***	0.000	-10.719***	0.000	-10.582***	0.000
Lag 1	-3.058***	0.001	-1.877**	0.030	-9.967***	0.000	-9.595***	0.000
Lag 2	-1.756**	0.036	-0.480	0.316	-7.337***	0.000	-6.930***	0.000
Lag 3	-2.110**	0.017	-0.526	0.299	-6.065***	0.000	-5.672***	0.000
Lag 4	-1.351*	0.088	0.235	0.593	-4.601***	0.000	-4.163***	0.000

Note: The null hypothesis of all test is I(1).

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Reformpolitik. Strategische Kommunikation zwischen verschiedenen Welten, Marburg: Metropolis 2005, S. 51-70.

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