

Gawellek, Bastian; Sunder, Marco

Working Paper

The German excellence initiative and efficiency change among universities, 2001-2011

Working Paper, No. 142

Provided in Cooperation with:

University of Leipzig, Faculty of Economics and Management Science

Suggested Citation: Gawellek, Bastian; Sunder, Marco (2016) : The German excellence initiative and efficiency change among universities, 2001-2011, Working Paper, No. 142, Universität Leipzig, Wirtschaftswissenschaftliche Fakultät, Leipzig

This Version is available at:

<https://hdl.handle.net/10419/126581>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

UNIVERSITÄT LEIPZIG

Wirtschaftswissenschaftliche Fakultät
Faculty of Economics and Management Science

Working Paper, No. 142

Bastian Gawellek / Marco Sunder

**The German Excellence Initiative and
Efficiency Change among Universities,
2001-2011**

Januar 2016

The German Excellence Initiative and Efficiency Change among Universities, 2001–2011

Bastian Gawellek Marco Sunder

*University of Leipzig**

Abstract: The “Excellence Initiative” is a prestigious third-party funding program for German universities, organized as a research contest. We investigate whether universities in this program (or that prepared an application) had different trends in terms of productivity and technical efficiency than universities that did not apply for the program, albeit these dimensions were not the target of the program. While universities became more efficient if the extra funding through the program is included, we do not find a substantially positive effect that extends beyond this funding. The evidence even suggests that applicants suffered a drop in efficiency at the time of applying. All this does not rule out, however, that research-oriented universities jointly gained productivity through increased competition between them.

Keywords: Efficiency, Malmquist index, German Research Foundation, DFG

JEL classification: I23

*Correspondence: Institute for Empirical Research in Economics (IEW), University of Leipzig, Grimmaische Straße 12, 04109 Leipzig, Germany; E-Mail: gawellek@wifa.uni-leipzig.de, sunder@wifa.uni-leipzig.de

1 Background

Most tertiary education in Germany is provided in public universities. With a relatively homogenous funding scheme, (perceived) quality differences used to be modest. While the shotgun approach may have advantages—e.g., for the student who then may not have to move (or commute) far—it may not be very successful in stimulating top-level research. In 2004, the federal government decided to increase competition among universities by introducing a research contest: the *Exzellenzinitiative* (Excellence Initiative, ExIn). Universities were invited to apply in 2006, and the winners of the first round were announced in late 2006 with funding through 2011 (Kehm and Pasternack, 2009). The purpose of the present study is not to evaluate the program as such but to investigate time trends of the productivity/efficiency dimensions that do not only take into account growth in output but also growth in input.¹

While the first phase of the ExIn is already finished, a second phase is currently ongoing (2012–2017). However, we only consider a time frame from 2001 to 2011, i.e. before the ExIn up to the end of phase 1. In 2011, universities also applied for the second phase of the program, which we will have to take into account. The ExIn provides funding of research clusters (“clusters of excellence”, CE), graduate schools (GS), and university-wide development plans (“institutional strategies”, IS). The latter category is associated with the greatest prize in monetary terms (and involved also at least one CE and one GS): according to our data, ExIn-related funding constituted 7% of the budget of IS universities in 2011. There is probably also a branding aspect to a successful IS application, inasmuch as the winners would henceforth be referred to as “elite universities” in the media. Only three universities received this branding in late 2006, but in 2007 six more universities joined the club in a second round within the first phase of the program. ExIn funding is administered by the German Research Foundation (DFG). The ExIn program has also stirred some criticism (Hartmann, 2010): e.g., excellence in teaching is not rewarded and students may hardly benefit from the program.²

¹As of writing this paper, an official evaluation report is being prepared.

²The German constitution basically prohibits the federal government from interfering in teaching, as the responsibility for all public education lies with the *Bundesländer* (states).

Our choice of benchmark years 2001, 2006, and 2011 includes the year 2006 when some universities were invited to provide full applications based on previous drafts. We consider the preparation of these documents—that would allow the university to enter the research tournament—to be costly (Taylor, 1995). This may not apply so much to the CE tier, as such a cluster is more or less the brainchild of researchers from one discipline or closely related disciplines. These researchers may find it easy to cooperate, or they may even have had a similar proposal in mind irrespective of the ExIn program. The IS tier, though, requests collaboration across the boundaries of disciplines, and this may be a new mode of operation within the university that is associated with opportunity costs in the form of foregone other grant proposals. Theoretically, efficiency of the institution may suffer from preparing such an interdisciplinary grant proposal, whereas efficiency may gain afterwards if the “best” researchers from the institution were able to assemble a proposal with more potential than is usually the case in the institution. To be sure, successful realization of the project may require hiring similarly-talented researchers, on short notice, and without tenure (as funding is not permanent); this may prove difficult in some cases. Hartmann (2010) points out that the best institutions in the US hire on a world-wide basis, which may prove difficult in Germany if the German language is a requirement for teaching.

The remainder of the paper is organized as follows: section 2 provides a quick introduction to the related literature, section 3 discusses the method of Malmquist productivity index and our regression model, section 4 introduces the data. The results are presented in section 5, and section 6 provides some discussion of our results and concludes.

2 Related literature

Given the public (co-)financing of higher education, there has been considerable interest in the efficiency of universities, once the tools for efficiency analysis had become available. Tomkins and Green (1988) is an early example involving data envelopment analysis applied at the accounting department level in England. Johnes (2006) conducts a cross-sectional DEA with 109

universities in England and finds a narrow distribution of efficiency scores, which may seem remarkable as efficiency was not really a goal of the university system. Outputs considered in this analysis are numbers of graduates and research grants by the Higher Education Funding Council for England. Flegg et al. (2004) and Johnes (2008) provide applications to English data with a longitudinal perspective involving the Malmquist index of productivity change. Decomposing the positive productivity growth in the period 1996–2004, Johnes (2008) documents an outward shift of the production possibility frontier but at the same time a decline in average efficiency. Abbott and Doucouliagos (2009), too, employ a longitudinal perspective, but for Australia and New Zealand. They find that increasing competition for foreign students—as a revenue source—contributed to higher efficiency only in Australia.

German universities have also attracted some attention in the literature. Warning (2004) conducts a cross-sectional DEA, whereas Kempkes and Pohl (2010) apply a longitudinal perspective for the period 1998–2003 and find that East-German universities were catching up in terms of productivity to the West-German counterparts. Both studies have in common that they are confined to research-oriented universities, i.e. they exclude a second, more teaching-oriented branch of the German higher education system, the so-called “Universities of Applied Sciences”. These studies differ somewhat with respect to inputs and outputs considered for DEA. While they both have the number of graduates as an output, Warning (2004) also considers publication data for the natural sciences and social sciences whereas Kempkes and Pohl (2010) have research grants as an additional output. In terms of input variables, Warning (2004) considers staff expenditure and other expenditure, and Kempkes and Pohl (2010) use technical staff, research staff, and expenditure minus wages. While our approach is closely related to the one of Kempkes and Pohl (2010), we do not provide an update of their results (that involve several techniques for productivity analysis) but focus only on the distinction of universities according to their role in the first phase of the ExIn program.

3 Method

We obtain information on change in efficiency within the framework of data envelopment analysis (DEA), particularly the Malmquist index and its decomposition. We provide a short exposition of the technique before discussing the actual data involved.

This concept assumes that various decision making units (DMUs) translate inputs into outputs according to some production function, but with varying degrees of (technical) efficiency. An efficient DMU would be one that could not increase output further at its combination of input factors, i.e. it operates on the frontier of the production possibility set.³ In order to illustrate the main concept, consider that decision making units (DMU) produce one type of output (y) from one type of input (x), see Figure 1. Assume that in period t , some DMU i produces at point A. The average productivity with which DMU i produces its output is y_i^t/x_i^t , reflected by the slope of the black dotted line in the figure. Consider that in period $t + 1$, DMU i shifted its production to point B. Our goal is now to trace the development over time, so we might relate productivity in period $t + 1$ to productivity in t :

$$\frac{y_i^{t+1}/x_i^{t+1}}{y_i^t/x_i^t}$$

In terms of Figure 1, this quantity would be the ratio of slopes of the gray and the black dotted lines.

However, we also want to trace the change in efficiency, which is not possible without information on other DMUs. We therefore have to consider the production possibility set of each period. The frontier of the production possibility set is constructed as a convex hull from the observed (x, y) pairs of all DMUs. The hulls for both periods are plotted in the figure as black ($f_v^t(x)$) and gray ($f_v^{t+1}(x)$) broken lines, respectively, where the v stands for the implicit assumption of variable (non-increasing) returns to scale (VRS). Production is only possible on or below these frontiers. The frontiers are not estimated—as would be the case with stochastic

³Notice that this concept takes the combination of input factors as given without regard to their relative prices, whereas a concept of allocative efficiency would stipulate an appropriate mix of inputs.

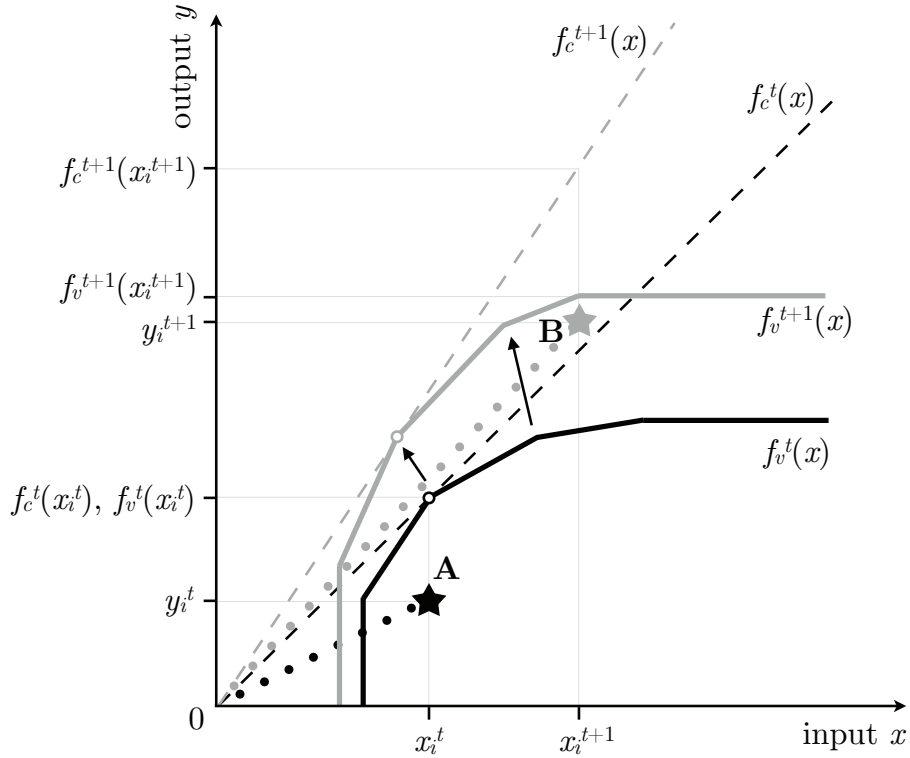


Figure 1: Production possibility sets of two periods, one input/one output case.

frontier analysis (SFA)—but they are calculated by means of linear programming (Charnes et al., 1978).⁴ With the assumption of constant returns to scale (CRS), the corresponding frontier f_c^t (or f_c^{t+1}) is defined by the DMU with the steepest ray towards the origin in period t (or $t + 1$), as indicated by the circle on the frontier in the figure.

Figure 1 also suggests that DMU i produces (in period t) only half of the output that would be possible on the frontier with the input x_i^t (in this case irrespective of the assumption with respect to returns to scale). This relative “efficiency” can be expressed by the **distance function** $D_c^t(x_i^t, y_i^t) \equiv \frac{y_i^t}{f_c^t(x_i^t)}$ for CRS or $D_v^t(x_i^t, y_i^t) \equiv \frac{y_i^t}{f_v^t(x_i^t)}$ for VRS. A value of 1 would indicate a DMU is fully efficient, whereas smaller values indicate inefficiencies.

While the distance function itself is a (static) measure of efficiency, the ratio $\frac{D_c^t(x_i^{t+1})}{D_c^t(x_i^t)}$ gives an account of productivity change. One might as well use the $t + 1$ period as a reference

⁴To be sure, this approach does not account for an “error term”. Ignoring statistical error could be a problem inasmuch as a random sampling scheme does not ensure that the most efficient DMUs (that would define the frontier) are included in the sample. In the present case, the inclusion of almost all universities partially alleviates this concern.

for technology, and the *Malmquist index* of productivity change is actually a (geometrically weighted) average of the productivity comparison with either period as reference (Caves et al., 1982; Färe et al., 1994):

$$m_i^{t+1} = \left(\frac{D_c^t(x_i^{t+1})}{D_c^t(x_i^t)} \cdot \frac{D_c^{t+1}(x_i^{t+1})}{D_c^{t+1}(x_i^t)} \right)^{1/2} \quad [\text{Malmquist index}] \quad (1)$$

An index value above unity indicates productivity growth. Notice that this formula only involves the CRS assumption. This does not mean, however, that we ignore the possibility of a VRS type of frontier for actual production, as will soon become clear.

In Figure 1, the productivity change of DMU i associated with the move from point A to point B could be thought of as a combination of three factors: first, the production technology changed and resulted in an outward shift in the frontier (**technical change**); second, DMU i became more efficient in the sense that point B is relatively closer to the VRS frontier of period $t + 1$ than point A was to the VRS frontier of period t (**pure efficiency change**); third, the scale of production changed and is no longer efficient in terms of economies of scale inasmuch as the gray circle could not be reached at an input level of x_i^{t+1} (**scale efficiency change**). While the second and third aspect are related to efficiency, our analysis focuses on “pure efficiency change”. In the case of DMU i , technical change and pure efficiency change had a positive effect on productivity change, while scale efficiency change exerted a negative effect. Ray and Desli (1997) propose that the Malmquist index should be decomposed (by means of expansion and re-arrangement of terms) such as to reflect all three changes over time:

$$\underbrace{m_i^{t+1}}_{\text{productivity change}} = \underbrace{\left(\frac{D_v^t(x_i^t, y_i^t)}{D_v^{t+1}(x_i^t, y_i^t)} \cdot \frac{D_v^t(x_i^{t+1}, y_i^{t+1})}{D_v^{t+1}(x_i^{t+1}, y_i^{t+1})} \right)^{1/2}}_{\text{technical change}} \times \underbrace{\frac{D_v^{t+1}(x_i^{t+1}, y_i^{t+1})}{D_v^t(x_i^t, y_i^t)}}_{\text{pure efficiency change}} \times \underbrace{\left(\frac{D_c^t(x_i^{t+1}, y_i^{t+1})/D_v^t(x_i^{t+1}, y_i^{t+1})}{D_c^t(x_i^t, y_i^t)/D_v^t(x_i^t, y_i^t)} \cdot \frac{D_c^{t+1}(x_i^{t+1}, y_i^{t+1})/D_v^{t+1}(x_i^{t+1}, y_i^{t+1})}{D_c^{t+1}(x_i^t, y_i^t)/D_v^{t+1}(x_i^t, y_i^t)} \right)^{1/2}}_{\text{scale efficiency change}} \quad (2)$$

Note that this decomposition does consider the VRS assumption for the production technology.

Linear programming can also be used to construct the convex hull (and thus compute the Malmquist index and its decomposition) in the case of several inputs and several outputs, whereas the researcher would have to resort to one output with (output-oriented) SFA.

With data for three separate years (2001, 2006, 2011), we calculate the Malmquist index and its constituents for the year pairs 2001/2006 (“ $t=1$ ”) and 2006/2011 (“ $t=2$ ”) at the level of the university ($i = 1, \dots, n$).⁵ The resulting balanced panel is used to estimate—by least squares—models of the form

$$\begin{aligned} \ln y_{it} = & \alpha_0 + \alpha_1 UAS_i + \beta_1 D06_i + \beta_2 A06_i + \beta_3 D11_i + \beta_4 A11_i + \beta_5 W_i \\ & + \alpha_2 T_t + \alpha_3 (T_t \cdot UAS_i) + \beta_6 (T_t \times D06_i) + \beta_7 (T_t \times A06_i) \\ & + \beta_8 (T_t \times D11_i) + \beta_9 (T_t \times A11_i) + \beta_{10} (T_t \times W_i) + \varepsilon_{it} . \end{aligned} \quad (3)$$

Definitions of the regressor variables are given in Table 1; ε constitutes an error term, and we calculate clustered standard errors at the university level.⁶ For the dependent variable $\ln y$, we define y either as the Malmquist index (productivity change) or its component, pure efficiency change.

In order to reduce the complexity of the actual ExIn application process somewhat, we consider only part of the program within a model. In particular, the dummies related to the

Table 1: Definitions of explanatory variables and means for the sample of 164 universities

T	dummy for the second year pair, 2006/11	0.500	
UAS	dummy for University of Applied Sciences	0.537	
		cluster of excellence	institutional strategies
$D06$	dummy for draft in 2006	0.335	0.152
$A06$	dummy for application in 2006	0.165	0.061
$D11$	dummy for draft in 2011	0.329	0.140
$A11$	dummy for application in 2011	0.213	0.098
W	dummy for winner in first phase	0.165	0.055

⁵Computations of the Malmquist numbers and decomposition are conducted with the program package *FEAR: Frontier Efficiency Analysis with R version 2.0* (Wilson, 2008), and the rest of the empirical analysis is conducted with *Stata* (StataCorp., 2013).

⁶In the present setting, a fixed effects model would yield the same results for the coefficients $\beta_6, \dots, \beta_{10}$.

ExIn reflect either only clusters of excellence (CE) or the institutional strategies (IS), but we do not distinguish “CE without IS” from “CE with IS”.⁷ Furthermore, these dummies do not distinguish if a university submitted only one application for a cluster of excellence or several applications. Of course, more applications may have been associated with more workload in the application process, so our approach is a simplification.⁸

To be sure, many variables influencing productivity are omitted in this regression model; e.g., one could imagine that cultural amenities in a region attract productive researchers (Falck et al., 2011). To the extent that the variables only affect the *level* of productivity (or efficiency), we feel their omission is not a concern inasmuch as our outcome measures already reflect change over time. This and the fact that the dependent variable is expressed in logarithmic form implies that, e.g., coefficient α_1 approximates the difference in the five-year *growth rate* from 2001 to 2006 of productivity (or efficiency) between Universities of Applied Sciences and “full”, i.e. research-oriented, universities; the respective growth rate for the 2006 to 2011 period is calculated as $(\alpha_1 + \alpha_3)$, as α_3 measures the change in the growth rate from the first to the second year pair. If winning the “excellence” status was associated with a boost in productivity and if the program had no other effects, we would expect:

$$\beta_1, \dots, \beta_9 = 0 \quad , \quad \beta_{10} > 0 \quad \text{[Hypothesis 1]}$$

Another hypothesis would be that observation of the program exerted a productivity boost among full universities in general as departments realized that their eligibility for related programs in the *future* will increasingly depend on a successful track record. Assuming that this argument applies more to full universities than to Universities of Applied Sciences (which may have remained at their previous growth rate), we would expect:

$$\alpha_2 > 0 \quad , \quad \alpha_3 < 0 \quad \text{[Hypothesis 2]}$$

⁷We do not consider the graduate schools part of the program. While they may constitute a re-arrangement of teaching activities, they do not require the design of new research agendas at the time of application.

⁸We also considered the raw numbers of applications instead of the dummy, but did not obtain superior results.

It is not difficult to imagine a combination of the two hypotheses such that full universities gained productivity relative to Universities of Applied Sciences, and that winners had the largest gains. Notice that these hypotheses paint a relatively optimistic picture with regard to the ExIn program.

When it comes to pure efficiency change, the interpretation of results may become less clear-cut if the winners were on (or very close to) the frontier to begin with—which received some support by preliminary static DEA results (results not shown). If they then shifted the frontier further outward than would have been the case without winning, and if other institutions could not keep pace with them, the result would be that those institutions lost efficiency, i.e. $\alpha_2 < 0$. Nonetheless, we might again use the Universities of Applied Sciences as benchmark by checking if $\alpha_3 < 0$, which would indicate that the non-participating full universities fared at least better than this group.

4 Productivity data

The Federal Statistical Office in Germany publishes data on tertiary education institutions on a regular basis, including the number of students or graduations, number of professors, and funding. Some additional information on the composition of funding was obtained through personal communication. While we sought to cover most universities, we exclude small institutions with less than 300 students as they may easily constitute outliers. Furthermore, some universities with missing information or with a major reorganization are excluded. In case hospitals were associated with the university in the official statistics, we took care to isolate only the core university for our analysis. Where this was not possible, we dropped the institution from the analysis, and we also dropped a few independent institutions that consist only of a hospital or medical faculty.

Table 2 lists the input and output variables that we employ in the construction of Malmquist index value and the pure efficiency change component. Funding by the German Research Foundation (*Deutsche Forschungsgemeinschaft, DFG*) is usually directed towards promising

Table 2: Input and output variables for Malmquist index calculations

Input variables	Output variables
number of professors	number of students
basic funding (minus estimated salary of professors)*	third-party funding by DFG (including <i>or</i> excluding ExIn funding)*
	third-party funding other than DFG*

* EURO values converted to real figures with the consumer price index

projects of basic research, whereas “third-party funding other than DFG” also includes funding by companies. We split the two apart because it is not obvious how to treat the money that winners of the ExIn received through the DFG. While this money is included in the third-party funding figures, it is somewhat obvious that a winner tends to have more from this pool, so that winners pass the “efficiency gain” perhaps all too easily. Then again, even though we are indeed interested in the effect of winning on *further* success, one has to acknowledge that the winners have to realize the projects they applied for in the first place. So we decided to present results in which the funding from the ExIn is included (broad definition of DFG funding) and results in which this funding is excluded (narrow definition).

We have experimented with other combinations of inputs and outputs, in particular we used the number of graduates instead of students as output, or graduates per student. Admittedly, both the number of students and graduates do not come without flaws for our purposes. On the one hand, students may include individuals who are enrolled but do not actually pursue studies or write exams.⁹ On the other hand, the Bologna process replaced the diploma degrees by degrees in bachelor and master, which likely had a sophisticated effect over time on the number of graduates during the period under study. In this case we opted for the number of students as the less problematic variable. It would be desirable to have other output measures related to scientific success, in particular the number of publications or publications weighted by some sort of impact. Unfortunately, official statistics do not publish bibliometric accounts at the university level, and an attempt at constructing such indices across all disciplines may

⁹This may be related to the fact that there are virtually no study fees at public institutions and that the student status warrants some amenities. However, a few states had mild study fees in effect in 2011.

be questionable due to differences in publication habits not only by location but by discipline (and different “weights” of disciplines across universities).

We distinguish two kinds of tertiary education institutions, Universities of Applied Sciences (UAS) and traditional universities. Traditionally, UAS are more teaching-oriented with higher teaching workloads for professors. In turn, these institutions are not the target of the ExIn program; they are even not entitled to apply. We consider these institutions as a benchmark insofar as they were not directly affected by the program but underwent other developments in a similar way, in particular the implementation of the “Bologna process” with which the new study programs were introduced.

Sample means for the Malmquist index and its components are presented in Table 3. These are simply unweighted arithmetic means in our sample of universities and not calculated for the aggregate. We notice, however, that universities typically experienced substantial increase in productivity—the Malmquist value of 1.2988 would imply a 30% increase in productivity for the typical university between 2001 and 2006; technical change and efficiency change were both important in this development, whereas changes in the size of the universities contributed to comparatively negligible scale efficiency change. For the second period, technical change was much larger, whereas efficiency declined for the typical university. The next section then takes the logarithms of the values from the “productivity change” or “pure efficiency change” columns as dependent variable for regression analysis.

Table 3: Malmquist index and its decomposition for 164 universities, sample arithmetic means

Period	Productivity change	Technical change	Pure efficiency change	Scale efficiency change
2001/06	1.2988	1.1523	1.1114	1.0160
2006/11 (incl. ExIn)	1.3535	1.4825	0.8959	1.0159
2006/11 (excl. ExIn)	1.3056	1.4167	0.9057	1.0133

5 Results

We first consider results from a model in which the dummy variables for draft, application, and winning are coded according to “cluster of excellence”. There is a strong correlation between application in 2006 and obtaining a grant, but we treat these variables as separate nonetheless.¹⁰ The results from regression models of the form of equation 3 are presented in Table 4, with the logarithm of productivity change or the logarithm of efficiency change as the dependent variable. In columns 3 and 4, the funding received through the ExIn is subtracted from the original data on third-party funding. However, this only makes a difference for the second period, i.e. all coefficients for the first period are the same between columns 1 and 3 or 2 and 4. The reference category in these models is a full university (in the period 2001/06) that did not submit a draft for a cluster of excellence in 2006 or 2011. The (statistically significant) intercept term α_0 indicates an increase in both productivity and efficiency for such an institution.¹¹ In the second period, productivity growth was slightly (but not statistically significantly) larger, whereas efficiency growth turned negative, as $\alpha_0 + \alpha_2 < 0$ suggests.

How did universities that applied for the program in 2006 differ from this group? As an application requires a prior draft, the effect in question is measured by $\beta_1 + \beta_2$, which is positive for both productivity and efficiency growth, albeit not statistically significantly positive. Here we abstract away from application in 2011, which has a puzzling negative effect for the first period. The group of institutions that would later receive funding for a cluster of excellence had an even larger productivity growth, which differed significantly from the group without draft in 2006 ($\beta_1 + \beta_2 + \beta_5$), whereas differences in efficiency were less pronounced. In the second period, the results in column 1 indicate that institutions that received funding in the CE part of the program experienced more rapid productivity growth compared to the non-applicants (+0.253) and to the non-winning applicants ($0.253 - 0.037 = 0.216$). These figures are smaller

¹⁰While Table 1 gives the impression of a perfect correlation (with the same means for $A06$ and W), the correlation coefficient between these variables is 0.82, with a few projects rejected and a few projects from the second round being granted.

¹¹We refer to the concept of statistical significance here, but the reader should consider that the analysis is based on almost the entire population of universities so that the concept of significance is not all that relevant here.

Table 4: “Cluster of excellence” regression results

		incl. funding from ExIn		excl. funding from ExIn	
		Productivity	Efficiency	Productivity	Efficiency
		(1)	(2)	(3)	(4)
constant	α_0	0.2607 *** (0.0682)	0.1505 ** (0.0684)	0.2607 *** (0.0682)	0.1505 ** (0.0684)
<i>UAS</i>	α_1	0.0010 (0.0762)	-0.0667 (0.0762)	0.0010 (0.0762)	-0.0667 (0.0762)
<i>D06</i>	β_1	0.0442 (0.0781)	0.0425 (0.0643)	0.0442 (0.0781)	0.0425 (0.0643)
<i>A06</i>	β_2	0.0721 (0.0590)	0.0214 (0.0580)	0.0721 (0.0590)	0.0214 (0.0580)
<i>D11</i>	β_3	-0.1727 ** (0.0771)	-0.1573 ** (0.0632)	-0.1727 ** (0.0771)	-0.1573 ** (0.0632)
<i>A11</i>	β_4	-0.1408 * (0.0790)	-0.1327 * (0.0702)	-0.1408 * (0.0790)	-0.1327 * (0.0702)
<i>W</i>	β_5	0.0761 (0.0718)	0.0746 (0.0671)	0.0761 (0.0718)	0.0746 (0.0671)
<i>T</i>	α_2	0.0702 (0.1050)	-0.2517 ** (0.1025)	0.0791 (0.1044)	-0.2181 ** (0.1036)
<i>T</i> × <i>UAS</i>	α_3	-0.2347 * (0.1267)	-0.0465 (0.1230)	-0.2451 * (0.1263)	-0.0800 (0.1239)
<i>T</i> × <i>D06</i>	β_6	0.0010 (0.1605)	-0.0591 (0.1372)	-0.0089 (0.1592)	-0.0480 (0.1334)
<i>T</i> × <i>A06</i>	β_7	-0.0804 (0.0997)	-0.0002 (0.0741)	-0.1243 (0.1080)	-0.0063 (0.0823)
<i>T</i> × <i>D11</i>	β_8	0.1391 (0.1713)	0.0814 (0.1410)	0.1403 (0.1700)	0.1276 (0.1372)
<i>T</i> × <i>A11</i>	β_9	0.0703 (0.1551)	0.1352 (0.1280)	0.0592 (0.1634)	0.1149 (0.1402)
<i>T</i> × <i>W</i>	β_{10}	0.1399 (0.1367)	0.0509 (0.1096)	-0.0163 (0.1524)	-0.0613 (0.1282)
R^2		0.127	0.165	0.081	0.153
$\beta_1 + \beta_2$		0.116	0.064	0.116	0.064
$\beta_1 + \beta_2 + \beta_6 + \beta_7$		0.037	0.005	-0.017	0.010
$\beta_1 + \beta_2 + \beta_5$		0.192 *	0.138	0.192 *	0.138
$\beta_1 + \beta_2 + \beta_5 + \beta_6 + \beta_7 + \beta_{10}$		0.253	0.130	0.043	0.023
p-values of hyp. tests:					
$\beta_1 = \dots = \beta_9 = 0$		0.172	0.026	0.119	0.049
$\beta_{10} \geq 0$		0.846	0.679	0.458	0.317
Hypothesis 1 (approx.) ^{a)}		0.426	0.088	0.213	0.080
Hypothesis 2 (approx.) ^{a)}		0.958	0.031	0.967	0.072

Remarks: standard errors are given in parentheses, clustered at the university level; ***/**/* indicates statistical significance at the 1/5/10 % level. Each model is estimated with 328 observations. ^{a)} p-value derived from Fisher’s method.

for efficiency growth, and they almost melt away if the third-party funding is calculated net of the contribution through the ExIn, which arguably constitutes a more relevant comparison (columns 3 and 4).

The table also provides clues with respect to our two hypotheses, at least if we formulate the null in congruence with the respective hypothesis. Both hypotheses are composites of two tests, and we combine them due to Fisher’s method.¹² This is approximate at best and should therefore be interpreted cautiously because this method would require independence of the constituent tests. While the productivity specifications are indeed consistent with our hypotheses—which obviously does not prove them true—, we have to reject both hypotheses at the 10% level for efficiency change. As argued before, we should still be able to treat the Universities of Applied Sciences as a benchmark in the efficiency change equation, to the extent that the ExIn did not appeal to them. While α_3 is indeed negative and thus the benchmark group experienced worse efficiency change than the full universities without grant proposal, this effect is quite modest and not statistically significant both in column 2 and column 4. In other words, support for the notion that the ExIn brought about an efficiency increase in the system of full universities as a whole, is quite limited here.

Yet, a clearer pattern may emerge if we focus specifically on the large-scale funding scheme, “institutional strategies”. Table 5 repeats the exercise with the dummies defined according to this part of the program. Remarkably, some of the findings are reversed. Application—irrespective of success—for the program in 2006 was associated with lower productivity and efficiency growth in the first period than was the case among universities that did not apply. This time we find a stronger positive effect of winning for the winners on both productivity and efficiency in the second period (β_{10} in columns 1 and 2), and winners experienced significantly larger growth than universities that did not apply. Of course, the greater strength of the association (compared to the respective results in Table 4) may simply be due to the fact that the amount of funding for “institutional strategies” is relatively large. Interestingly, if we

¹²Fisher’s method combines the p-values of k individual (independent) tests according to $\tau = -2 \sum_{j=1}^k \ln p_j$. If all null hypotheses are true, $\tau \sim \chi_{2k}^2$. We report as p-value the area in the tail of the respective χ^2 distribution.

Table 5: “Institutional strategies” regression results

		incl. funding from ExIn		excl. funding from ExIn	
		Productivity	Efficiency	Productivity	Efficiency
		(1)	(2)	(3)	(4)
constant	α_0	0.1568 *** (0.0410)	0.0559 (0.0394)	0.1568 *** (0.0410)	0.0559 (0.0394)
<i>UAS</i>	α_1	0.1048 * (0.0533)	0.0279 (0.0517)	0.1048 * (0.0533)	0.0279 (0.0517)
<i>D06</i>	β_1	0.0326 (0.1265)	0.0413 (0.0920)	0.0326 (0.1265)	0.0413 (0.0920)
<i>A06</i>	β_2	-0.1819 * (0.0967)	-0.1655 *** (0.0437)	-0.1819 * (0.0967)	-0.1655 *** (0.0437)
<i>D11</i>	β_3	-0.0526 (0.0909)	-0.0619 (0.0684)	-0.0526 (0.0909)	-0.0619 (0.0684)
<i>A11</i>	β_4	0.1632 (0.1247)	0.0751 (0.0622)	0.1632 (0.1247)	0.0751 (0.0622)
<i>W</i>	β_5	-0.0356 (0.1169)	-0.0192 (0.0670)	-0.0356 (0.1169)	-0.0192 (0.0670)
<i>T</i>	α_2	0.1896 *** (0.0684)	-0.1909 *** (0.0606)	0.1878 *** (0.0687)	-0.1327 ** (0.0620)
<i>T</i> × <i>UAS</i>	α_3	-0.3542 *** (0.0985)	-0.1073 (0.0911)	-0.3538 *** (0.0989)	-0.1654 * (0.0920)
<i>T</i> × <i>D06</i>	β_6	0.0104 (0.1992)	-0.0265 (0.1551)	0.0340 (0.2066)	-0.0075 (0.1431)
<i>T</i> × <i>A06</i>	β_7	0.1075 (0.1094)	0.0731 (0.0680)	0.2612 (0.1853)	0.2295 ** (0.1017)
<i>T</i> × <i>D11</i>	β_8	0.0758 (0.1523)	0.0533 (0.1173)	-0.0602 (0.1492)	-0.0143 (0.1124)
<i>T</i> × <i>A11</i>	β_9	-0.2288 * (0.1204)	-0.0710 (0.0974)	-0.2230 (0.1375)	-0.0573 (0.0949)
<i>T</i> × <i>W</i>	β_{10}	0.3488 ** (0.1530)	0.2741 ** (0.1074)	-0.1567 (0.2147)	-0.1010 (0.1368)
R^2		0.117	0.156	0.076	0.143
$\beta_1 + \beta_2$		-0.149	-0.124 *	-0.149	-0.124 *
$\beta_1 + \beta_2 + \beta_6 + \beta_7$		-0.031	-0.078	0.146	0.098
$\beta_1 + \beta_2 + \beta_5$		-0.185	-0.143 *	-0.185	-0.143 *
$\beta_1 + \beta_2 + \beta_5 + \beta_6 + \beta_7 + \beta_{10}$		0.282 **	0.177 **	-0.046	-0.022
p-values of hyp. tests					
$\beta_1 = \dots = \beta_9 = 0$		0.276	0.000	0.260	0.000
$\beta_{10} \geq 0$		0.988	0.994	0.233	0.231
Hypothesis 1 ^{a)}		0.627	0.003	0.231	0.000
Hypothesis 2 ^{a)}		1.000	0.007	1.000	0.083

Remarks: standard errors are given in parentheses, clustered at the university level; ***/**/* indicates statistical significance at the 1/5/10 % level. Each model is estimated with 328 observations. ^{a)} p-value derived from Fisher's method.

subtract this part of the funding (in columns 3 and 4), winning is associated with *lower* (though not statistically significantly lower) growth in productivity and efficiency when compared to applicants that did not win or full universities that did not apply. Again, our two hypotheses are not rejected for productivity growth, with hypothesis 2 receiving even more support than before. However, we again reject both hypotheses for efficiency growth. This time, the more pronounced and negative time trend for Universities of Applied Sciences (α_3) relative to full universities without grant proposal provides some more evidence in favor of the notion that full universities as a whole may have benefited from the program.

6 Discussion and conclusion

The goal of the ExIn program is to pick the best institutions and help them catch up towards the world leaders. This could be seen as an output-oriented goal, whereas our analysis, through the lens of efficiency, addresses the relationship between output and input. Admittedly, this is not the intention of the program, but then again this relationship should not be ignored entirely in a publicly funded program. While the program is not tailored for the more teaching-oriented universities, we include them in the analysis as a “benchmark”. Our results suggest that the label “excellence” was costly to obtain. Institutions that prepared an application in 2006 lost considerably in terms of efficiency along the way. The costs may have been relatively large because the proposal had to be prepared as a joint effort of researchers of various disciplines (from the same university) who may not have been accustomed to working together.¹³

According to our results, universities with an unsuccessful application recuperated almost fully in terms of productivity *growth* to those universities that did not apply (but a level effect may have remained). In contrast, winners experienced more rapid productivity growth in the second period under study than what they lost in the first period, and this also translated into more efficiency growth. However, this is only true as long as we include the funding received

¹³In an alternative specification (not shown here) that did not consider any third-party funding by DFG, we did not find the pronounced negative effect of application. This could imply that fewer “regular” DFG grant proposals were submitted as researchers were busy preparing the “institutional strategies” proposal.

through the ExIn program; efficiency declined and remained lower if we subtract these funds from the third-party funding by DFG. In other words, the program may not help winners to be more efficient in the future once funding from the program comes to an end.¹⁴ However, if one subscribes to the idea that full universities and teaching-oriented universities should have followed the same efficiency growth pattern in the absence of the ExIn program, then our results provide some hint to the possibility that the system of full universities as a whole gained from the program in terms of productivity (hypothesis 2) and efficiency (negative α_3).

As Kempkes and Pohl (2010) we see the need to track changes in efficiency over time. A fortiori, a purely cross-sectional perspective in which the most efficient institution is sought may even be misleading against the background of a very heterogenous set-up of universities with respect to their relative sizes of individual departments (some of which are closer to industrial applications than others) or their relative focus on teaching. Instead, the Malmquist approach inherently allows for a “fixed effect” at the level of the university in that only changes are quantified. However, this study clearly has some limitations. First and foremost, input and output variables have to be chosen, and results depend, to some degree, on this somewhat arbitrary choice. While our variables are in line with an earlier study by Kempkes and Pohl (2010) on German tertiary education, several studies from other countries (especially those focused on certain academic fields) have considered publication-based figures from bibliometric accounting exercises as an additional or alternative dimension of output. We believe that our study does not entirely miss out on scientific accolades inasmuch as research grants reflect not only a proposal’s potential in the eyes of the donor but also a recent track record of the applicant. A further limitation is the disregard of a stochastic component in the data envelopment framework, which in turn demands a high level of precision from the data that may not be met in practice. This may not jeopardize the productivity analysis, especially as we only look at groups of universities rather than individual ones. Yet, errors in the data may lead to an erro-

¹⁴One might worry that DFG reduced the funding of “regular” projects at universities that already benefited from “institutional strategies” in the sense that they raised the bar for applications from such institutions. In a specification of the Malmquist index that disregarded any third-party funding by DFG, we did not find a significant effect on efficiency change in the second period, which suggests that universities with “institutional strategies” did not become more efficient with respect to other sources of third-party funding.

neous accounting of the components of productivity change—and thus efficiency change—as the definition of the frontier may be affected by extreme data points. We also do not trace the development from year to year but used only three years as the basis of our calculations, at the risk of missing out on some interesting fluctuations in between. In addition, some effects of the program (and the “excellence” label) may only materialize in a longer perspective, and potentially have a lasting imprint even after the end of the program. That is to say, our estimates may be lower-bound estimates. We also do not take the international perspective into account and the question, whether universities were on a route to catch up to some international frontier.¹⁵ Finally, our regression-based approach does not necessarily tease out the causal effect of the program. Apart from measurement error, one may worry that a good efficiency record in the past supported a positive grant decision, or that “excellent” universities would have gained efficiency compared to the rest of the institutions even without the program. As far as *changes* in efficiency are concerned, though, our results (Table 5, col. 4) do not corroborate such a concern.

Acknowledgements

The initial idea of analyzing the efficiency aspect of the Excellence Initiative was proposed to us in a discussion with Bernd Süßmuth, and we benefited from input at a seminar at Leipzig University on June 19, 2013. We thank Carsten Hubert of the Federal Statistical Office (Destatis) for providing data necessary to construct estimates of the salaries of professors at all universities. In the process of preparing this manuscript a related study came to our attention: see the dissertation by Daniel Singh (2013) for an alternative view on the effect of the program.

¹⁵In general, it may be difficult to come up with internationally compatible input and output variables, but see Agasisti and Pohl (2012) for a two-country application.

References

- Abbott, M., Doucouliagos, C., 2009. Competition and efficiency: overseas students and technical efficiency in Australian and New Zealand universities. *Education Economics* 17, 31–57.
- Agasisti, T., Pohl, C., 2012. Comparing German and Italian public universities: convergence or divergence in the higher education landscape? *Managerial and Decision Economics* 33, 71–85.
- Caves, D., Christensen, L., Diewert, W., 1982. The economic theory of index numbers and the measurement of input, output and productivity. *Econometrica* 50, 1393–1414.
- Charnes, A., Cooper, W., Rhodes, E., 1978. Measuring the efficiency of decision-making units. *European Journal of Operational Research* 2, 429–444.
- Falck, O., Fritsch, M., Heblich, S., 2011. The phantom of the opera: Cultural amenities, human capital, and regional economic growth. *Labour Economics* 18, 755–766.
- Färe, R., Grosskopf, S., Lindgren, B., Roos, P., 1994. Productivity developments in Swedish hospitals: a Malmquist output index approach, in: Charnes, A., Cooper, W., Lewin, A., Seiford, L. (Eds.), *Data envelopment analysis: theory, methodology and applications*. Boston: Kluwer Academic Publishers, 253–272.
- Flegg, A., Allen, D., Field, K., Thurlow, T., 2004. Measuring the efficiency of British universities: A multi-period data envelopment analysis. *Education Economics* 12, 231–249.
- Hartmann, M., 2010. Die Exzellenzinitiative und ihre Folgen. *Leviathan* 38, 369–387.
- Johnes, J., 2006. Data envelopment analysis and its application to the measurement of efficiency in higher education. *Economics of Education Review* 25, 273–288.
- Johnes, J., 2008. Efficiency and productivity change in the English higher education sector from 1996/97 to 2004/5. *The Manchester School* 76, 653–674.
- Kehm, B., Pasternack, P., 2009. The German “Excellence Initiative” and its role in restructuring the national higher education landscape, in: Palfreyman, D., Tapper, T. (Eds.), *Structuring mass higher education: the role of elite institutions*. New York: Routledge, 113–128.
- Kempkes, G., Pohl, C., 2010. The efficiency of German universities—some evidence from nonparametric and parametric methods. *Applied Economics* 42, 2063–2079.
- Ray, S., Desli, E., 1997. Productivity growth, technical progress, and efficiency change in industrialized countries: Comment. *American Economic Review* 87, 1033–1039.
- Singh, D., 2013. From ABC to PhD: a theoretical and empirical analysis of education policy. Ph.D. thesis. Ludwig-Maximilians-Universität München.
- StataCorp., 2013. *Stata statistical software: release 13*. College Station, TX: StataCorp LP.
- Taylor, C.R., 1995. Digging for golden carrots: an analysis of research tournaments. *American Economic Review* 85, 872–890.

- Tomkins, C., Green, R., 1988. An experiment in the use of data envelopment analysis for evaluating the efficiency of UK university departments of accounting. *Financial Accountability and Management* 4, 147–164.
- Warning, S., 2004. Performance differences in German higher education: empirical analysis of strategic groups. *Review of Industrial Organization* 24, 393–408.
- Wilson, P.W., 2008. FEAR 1.0: a software package for Frontier Efficiency Analysis with R. *Socio-Economic Planning Sciences* 42, 247–254.

Universität Leipzig

Wirtschaftswissenschaftliche Fakultät

Nr. 1	Wolfgang Bernhardt	Stock Options wegen oder gegen Shareholder Value? Vergütungsmodelle für Vorstände und Führungskräfte 04/1998
Nr. 2	Thomas Lenk / Volkmar Teichmann	Bei der Reform der Finanzverfassung die neuen Bundesländer nicht vergessen! 10/1998
Nr. 3	Wolfgang Bernhardt	Gedanken über Führen – Dienen – Verantworten 11/1998
Nr. 4	Kristin Wellner	Möglichkeiten und Grenzen kooperativer Standortgestaltung zur Revitalisierung von Innenstädten 12/1998
Nr. 5	Gerhardt Wolff	Brauchen wir eine weitere Internationalisierung der Betriebswirtschaftslehre? 01/1999
Nr. 6	Thomas Lenk / Friedrich Schneider	Zurück zu mehr Föderalismus: Ein Vorschlag zur Neugestaltung des Finanzausgleichs in der Bundesrepublik Deutschland unter besonderer Berücksichtigung der neuen Bundesländer 12/1998
Nr. 7	Thomas Lenk	Kooperativer Föderalismus – Wettbewerbsorientierter Föderalismus 03/1999
Nr. 8	Thomas Lenk / Andreas Mathes	EU – Osterweiterung – Finanzierbar? 03/1999
Nr. 9	Thomas Lenk / Volkmar Teichmann	Die fiskalischen Wirkungen verschiedener Forderungen zur Neugestaltung des Länderfinanzausgleichs in der Bundesrepublik Deutschland: Eine empirische Analyse unter Einbeziehung der Normenkontrollanträge der Länder Baden-Württemberg, Bayern und Hessen sowie der Stellungnahmen verschiedener Bundesländer 09/1999
Nr. 10	Kai-Uwe Graw	Gedanken zur Entwicklung der Strukturen im Bereich der Wasserversorgung unter besonderer Berücksichtigung kleiner und mittlerer Unternehmen 10/1999
Nr. 11	Adolf Wagner	Materialien zur Konjunkturforschung 12/1999
Nr. 12	Anja Birke	Die Übertragung westdeutscher Institutionen auf die ostdeutsche Wirklichkeit – ein erfolg-versprechendes Zusammenspiel oder Aufdeckung systematischer Mängel? Ein empirischer Bericht für den kommunalen Finanzausgleich am Beispiel Sachsen 02/2000
Nr. 13	Rolf H. Hasse	Internationaler Kapitalverkehr in den letzten 40 Jahren – Wohlstandsmotor oder Krisenursache? 03/2000
Nr. 14	Wolfgang Bernhardt	Unternehmensführung (Corporate Governance) und Hauptversammlung 04/2000
Nr. 15	Adolf Wagner	Materialien zur Wachstumsforschung 03/2000
Nr. 16	Thomas Lenk / Anja Birke	Determinanten des kommunalen Gebührenaufkommens unter besonderer Berücksichtigung der neuen Bundesländer 04/2000
Nr. 17	Thomas Lenk	Finanzwirtschaftliche Auswirkungen des Bundesverfassungsgerichtsurteils zum Länderfinanzausgleich vom 11.11.1999 04/2000
Nr. 18	Dirk Büttel	Continuous linear utility for preferences on convex sets in normal real vector spaces 05/2000
Nr. 19	Stefan Dierkes / Stephanie Hanrath	Steuerung dezentraler Investitionsentscheidungen bei nutzungsabhängigem und nutzungsunabhängigem Verschleiß des Anlagenvermögens 06/2000
Nr. 20	Thomas Lenk / Andreas Mathes / Olaf Hirschfeld	Zur Trennung von Bundes- und Landeskompetenzen in der Finanzverfassung Deutschlands 07/2000
Nr. 21	Stefan Dierkes	Marktwerte, Kapitalkosten und Betafaktoren bei wertabhängiger Finanzierung 10/2000
Nr. 22	Thomas Lenk	Intergovernmental Fiscal Relationships in Germany: Requirement for New Regulations? 03/2001
Nr. 23	Wolfgang Bernhardt	Stock Options – Aktuelle Fragen Besteuerung, Bewertung, Offenlegung 03/2001

Nr. 24	Thomas Lenk	Die „kleine Reform“ des Länderfinanzausgleichs als Nukleus für die „große Finanzverfassungs-reform“? 10/2001
Nr. 25	Wolfgang Bernhardt	Biotechnologie im Spannungsfeld von Menschenwürde, Forschung, Markt und Moral Wirtschaftsethik zwischen Beredsamkeit und Schweigen 11/2001
Nr. 26	Thomas Lenk	Finanzwirtschaftliche Bedeutung der Neuregelung des bundestaatlichen Finanzausgleichs – Eine allokoative und distributive Wirkungsanalyse für das Jahr 2005 11/2001
Nr. 27	Sören Bär	Grundzüge eines Tourismusmarketing, untersucht für den Südraum Leipzig 05/2002
Nr. 28	Wolfgang Bernhardt	Der Deutsche Corporate Governance Kodex: Zuwahl (comply) oder Abwahl (explain)? 06/2002
Nr. 29	Adolf Wagner	Konjunkturtheorie, Globalisierung und Evolutionsökonomik 08/2002
Nr. 30	Adolf Wagner	Zur Profilbildung der Universitäten 08/2002
Nr. 31	Sabine Klinger / Jens Ulrich / Hans-Joachim Rudolph	Konjunktur als Determinante des Erdgasverbrauchs in der ostdeutschen Industrie? 10/2002
Nr. 32	Thomas Lenk / Anja Birke	The Measurement of Expenditure Needs in the Fiscal Equalization at the Local Level Empirical Evidence from German Municipalities 10/2002
Nr. 33	Wolfgang Bernhardt	Die Lust am Fliegen Eine Parabel auf viel Corporate Governance und wenig Unternehmensführung 11/2002
Nr. 34	Udo Hielscher	Wie reich waren die reichsten Amerikaner wirklich? (US-Vermögensbewertungsindex 1800 – 2000) 12/2002
Nr. 35	Uwe Haubold / Michael Nowak	Risikoanalyse für Langfrist-Investments Eine simulationsbasierte Studie 12/2002
Nr. 36	Thomas Lenk	Die Neuregelung des bundesstaatlichen Finanzausgleichs auf Basis der Steuerschätzung Mai 2002 und einer aktualisierten Bevölkerungsstatistik 12/2002
Nr. 37	Uwe Haubold / Michael Nowak	Auswirkungen der Renditeverteilungsannahme auf Anlageentscheidungen Eine simulationsbasierte Studie 02/2003
Nr. 38	Wolfgang Bernhard	Corporate Governance Kodex für den Mittel-Stand? 06/2003
Nr. 39	Hermut Kormann	Familienunternehmen: Grundfragen mit finanzwirtschaftlichen Bezug 10/2003
Nr. 40	Matthias Folk	Launhardt'sche Trichter 11/2003
Nr. 41	Wolfgang Bernhardt	Corporate Governance statt Unternehmensführung 11/2003
Nr. 42	Thomas Lenk / Karolina Kaiser	Das Prämienmodell im Länderfinanzausgleich – Anreiz- und Verteilungsmittlungen 11/2003
Nr. 43	Sabine Klinger	Die Volkswirtschaftliche Gesamtrechnung des Haushaltsektors in einer Matrix 03/2004
Nr. 44	Thomas Lenk / Heide Köpping	Strategien zur Armutsbekämpfung und –vermeidung in Ostdeutschland: 05/2004
Nr. 45	Wolfgang Bernhardt	Sommernachtsfantasien Corporate Governance im Land der Träume. 07/2004
Nr. 46	Thomas Lenk / Karolina Kaiser	The Premium Model in the German Fiscal Equalization System 12/2004
Nr. 47	Thomas Lenk / Christine Falken	Komparative Analyse ausgewählter Indikatoren des Kommunalwirtschaftlichen Gesamtergebnisses 05/2005
Nr. 48	Michael Nowak / Stephan Barth	Immobilienanlagen im Portfolio institutioneller Investoren am Beispiel von Versicherungsunternehmen Auswirkungen auf die Risikosituation 08/2005

Nr. 49	Wolfgang Bernhardt	Familiengesellschaften – Quo Vadis? Vorsicht vor zu viel „Professionalisierung“ und Ver-Fremdung 11/2005
Nr. 50	Christian Milow	Der Griff des Staates nach dem Währungsgold 12/2005
Nr. 51	Anja Eichhorst / Karolina Kaiser	The Institutional Design of Bailouts and Its Role in Hardening Budget Constraints in Federations 03/2006
Nr. 52	Ullrich Heilemann / Nancy Beck	Die Mühen der Ebene – Regionale Wirtschaftsförderung in Leipzig 1991 bis 2004 08/2006
Nr. 53	Gunther Schnabl	Die Grenzen der monetären Integration in Europa 08/2006
Nr. 54	Hermut Kormann	Gibt es so etwas wie typisch mittelständige Strategien? 11/2006
Nr. 55	Wolfgang Bernhardt	(Miss-)Stimmung, Bestimmung und Mitbestimmung Zwischen Juristentag und Biedenkopf-Kommission 11/2006
Nr. 56	Ullrich Heilemann / Annika Blaschzik	Indicators and the German Business Cycle A Multivariate Perspective on Indicators of Ifo, OECD, and ZEW 01/2007
Nr. 57	Ullrich Heilemann	“The Soul of a new Machine” zu den Anfängen des RWI-Konjunkturmodells 12/2006
Nr. 58	Ullrich Heilemann / Roland Schuhr / Annika Blaschzik	Zur Evolution des deutschen Konjunkturzyklus 1958 bis 2004 Ergebnisse einer dynamischen Diskriminanzanalyse 01/2007
Nr. 59	Christine Falken / Mario Schmidt	Kameralistik versus Doppik Zur Informationsfunktion des alten und neuen Rechnungswesens der Kommunen Teil I: Einführende und Erläuternde Betrachtungen zum Systemwechsel im kommunalen Rechnungswesen 01/2007
Nr. 60	Christine Falken / Mario Schmidt	Kameralistik versus Doppik Zur Informationsfunktion des alten und neuen Rechnungswesens der Kommunen Teil II Bewertung der Informationsfunktion im Vergleich 01/2007
Nr. 61	Udo Hielscher	Monti della città di firenze Innovative Finanzierungen im Zeitalter Der Medici. Wurzeln der modernen Finanzmärkte 03/2007
Nr. 62	Ullrich Heilemann / Stefan Wappler	Sachsen wächst anders Konjunkturelle, sektorale und regionale Bestimmungsgründe der Entwicklung der Bruttowertschöpfung 1992 bis 2006 07/2007
Nr. 63	Adolf Wagner	Regionalökonomik: Konvergierende oder divergierende Regionalentwicklungen 08/2007
Nr. 64	Ullrich Heilemann / Jens Ulrich	Good bye, Professir Phillips? Zum Wandel der Tariflohndeterminanten in der Bundesrepublik 1952 – 2004 08/2007
Nr. 65	Gunther Schnabl / Franziska Schobert	Monetary Policy Operations of Debtor Central Banks in MENA Countries 10/2007
Nr. 66	Andreas Schäfer / Simone Valente	Habit Formation, Dynastic Altruism, and Population Dynamics 11/2007
Nr. 67	Wolfgang Bernhardt	5 Jahre Deutscher Corporate Governance Kodex Eine Erfolgsgeschichte? 01/2008
Nr. 68	Ullrich Heilemann / Jens Ulrich	Viel Lärm um wenig? Zur Empirie von Lohnformeln in der Bundesrepublik 01/2008
Nr. 69	Christian Groth / Karl-Josef Koch / Thomas M. Steger	When economic growth is less than exponential 02/2008
Nr. 70	Andreas Bohne / Linda Kochmann	Ökonomische Umweltbewertung und endogene Entwicklung peripherer Regionen Synthese einer Methodik und einer Theorie 02/2008
Nr. 71	Andreas Bohne / Linda Kochmann / Jan Slavík / Lenka Slavíková	Deutsch-tschechische Bibliographie Studien der kontingenten Bewertung in Mittel- und Osteuropa 06/2008

Nr. 72	Paul Lehmann / Christoph Schröter-Schlaack	Regulating Land Development with Tradable Permits: What Can We Learn from Air Pollution Control? 08/2008
Nr. 73	Ronald McKinnon / Gunther Schnabl	China's Exchange Rate Impasse and the Weak U.S. Dollar 10/2008
Nr. 74	Wolfgang Bernhardt	Managervergütungen in der Finanz- und Wirtschaftskrise Rückkehr zu (guter) Ordnung, (klugem) Maß und (vernünftigem) Ziel? 12/2008
Nr. 75	Moritz Schularick / Thomas M. Steger	Financial Integration, Investment, and Economic Growth: Evidence From Two Eras of Financial Globalization 12/2008
Nr. 76	Gunther Schnabl / Stephan Freitag	An Asymmetry Matrix in Global Current Accounts 01/2009
Nr. 77	Christina Ziegler	Testing Predictive Ability of Business Cycle Indicators for the Euro Area 01/2009
Nr. 78	Thomas Lenk / Oliver Rottmann / Florian F. Woitek	Public Corporate Governance in Public Enterprises Transparency in the Face of Divergent Positions of Interest 02/2009
Nr. 79	Thomas Steger / Lucas Bretschger	Globalization, the Volatility of Intermediate Goods Prices, and Economic Growth 02/2009
Nr. 80	Marcela Munoz Escobar / Robert Holländer	Institutional Sustainability of Payment for Watershed Ecosystem Services. Enabling conditions of institutional arrangement in watersheds 04/2009
Nr. 81	Robert Holländer / WU Chunyou / DUAN Ning	Sustainable Development of Industrial Parks 07/2009
Nr. 82	Georg Quaas	Realgrößen und Preisindizes im alten und im neuen VGR-System 10/2009
Nr. 83	Ulrich Heilemann / Hagen Findeis	Empirical Determination of Aggregate Demand and Supply Curves: The Example of the RWI Business Cycle Model 12/2009
Nr. 84	Gunther Schnabl / Andreas Hoffmann	The Theory of Optimum Currency Areas and Growth in Emerging Markets 03/2010
Nr. 85	Georg Quaas	Does the macroeconomic policy of the global economy's leader cause the worldwide asymmetry in current accounts? 03/2010
Nr. 86	Volker Grossmann / Thomas M. Steger / Timo Trimborn	Quantifying Optimal Growth Policy 06/2010
Nr. 87	Wolfgang Bernhardt	Corporate Governance Kodex für Familienunternehmen? Eine Widerrede 06/2010
Nr. 88	Philipp Mandel / Bernd Süßmuth	A Re-Examination of the Role of Gender in Determining Digital Piracy Behavior 07/2010
Nr. 89	Philipp Mandel / Bernd Süßmuth	Size Matters. The Relevance and Hicksian Surplus of Agreeable College Class Size 07/2010
Nr. 90	Thomas Kohstall / Bernd Süßmuth	Cyclic Dynamics of Prevention Spending and Occupational Injuries in Germany: 1886-2009 07/2010
Nr. 91	Martina Padmanabhan	Gender and Institutional Analysis. A Feminist Approach to Economic and Social Norms 08/2010
Nr. 92	Gunther Schnabl / Ansgar Belke	Finanzkrise, globale Liquidität und makroökonomischer Exit 09/2010
Nr. 93	Ulrich Heilemann / Roland Schuhr / Heinz Josef Münch	A "perfect storm"? The present crisis and German crisis patterns 12/2010
Nr. 94	Gunther Schnabl / Holger Zemanek	Die Deutsche Wiedervereinigung und die europäische Schuldenkrise im Lichte der Theorie optimaler Währungsräume 06/2011
Nr. 95	Andreas Hoffmann / Gunther Schnabl	Symmetrische Regeln und asymmetrisches Handeln in der Geld- und Finanzpolitik 07/2011
Nr. 96	Andreas Schäfer / Maik T. Schneider	Endogenous Enforcement of Intellectual Property, North-South Trade, and Growth 08/2011
Nr. 97	Volker Grossmann / Thomas M. Steger / Timo Trimborn	Dynamically Optimal R&D Subsidization 08/2011

Nr. 98	Erik Gawel	Political drivers of and barriers to Public-Private Partnerships: The role of political involvement 09/2011
Nr. 99	André Casajus	Collusion, symmetry, and the Banzhaf value 09/2011
Nr. 100	Frank Hüttner / Marco Sunder	Decomposing R^2 with the Owen value 10/2011
Nr. 101	Volker Grossmann / Thomas M. Steger / Timo Trimborn	The Macroeconomics of TANSTAAFL 11/2011
Nr. 102	Andreas Hoffmann	Determinants of Carry Trades in Central and Eastern Europe 11/2011
Nr. 103	Andreas Hoffmann	Did the Fed and ECB react asymmetrically with respect to asset market developments? 01/2012
Nr. 104	Christina Ziegler	Monetary Policy under Alternative Exchange Rate Regimes in Central and Eastern Europe 02/2012
Nr. 105	José Abad / Axel Löffler / Gunther Schnabl / Holger Zemanek	Fiscal Divergence, Current Account and TARGET2 Imbalances in the EMU 03/2012
Nr. 106	Georg Quaas / Robert Köster	Ein Modell für die Wirtschaftszweige der deutschen Volkswirtschaft: Das "MOGBOT" (Model of Germany's Branches of Trade)
Nr. 107	Andreas Schäfer / Thomas Steger	Journey into the Unknown? Economic Consequences of Factor Market Integration under Increasing Returns to Scale 04/2012
Nr. 108	Andreas Hoffmann / Björn Urbansky	Order, Displacements and Recurring Financial Crises 06/2012
Nr. 109	Finn Marten Körner / Holger Zemanek	On the Brink? Intra-euro area imbalances and the sustainability of foreign debt 07/2012
Nr. 110	André Casajus / Frank Hüttner	Nullifying vs. dummifying players or nullified vs. dummified players: The difference between the equal division value and the equal surplus division value 07/2012
Nr. 111	André Casajus	Solidarity and fair taxation in TU games 07/2012
Nr. 112	Georg Quaas	Ein Nelson-Winter-Modell der deutschen Volkswirtschaft 08/2012
Nr. 113	André Casajus / Frank Hüttner	Null players, solidarity, and the egalitarian Shapley values 08/2012
Nr. 114	André Casajus	The Shapley value without efficiency and additivity 11/2012
Nr. 115	Erik Gawel	Neuordnung der W-Besoldung: Ausgestaltung und verfassungsrechtliche Probleme der Konsumtionsregeln zur Anrechnung von Leistungsbezügen 02/2013
Nr. 116	Volker Grossmann / Andreas Schäfer / Thomas M. Steger	Migration, Capital Formation, and House Prices 02/2013
Nr. 117	Volker Grossmann / Thomas M. Steger	Optimal Growth Policy: the Role of Skill Heterogeneity 03/2013
Nr. 118	Guido Heineck / Bernd Süßmuth	A Different Look at Lenin's Legacy: Social Capital and Risk Taking in the Two Germanies 03/2013
Nr. 119	Andreas Hoffmann	The Euro as a Proxy for the Classical Gold Standard? Government Debt Financing and Political Commitment in Historical Perspective 05/2013
Nr. 120	Andreas Hoffmann / Axel Loeffler	Low Interest Rate Policy and the Use of Reserve Requirements in Emerging Markets 05/2013
Nr. 121	Gunther Schnabl	The Global Move into the Zero Interest Rate and High Debt Trap 07/2013
Nr. 122	Axel Loeffler / Gunther Schnabl / Franziska Schobert	Limits of Monetary Policy Autonomy and Exchange Rate Flexibility by East Asian Central Banks 08/2013
Nr. 123	Burkhard Heer / Bernd Süßmuth	Tax Bracket Creep and its Effects on Income Distribution 08/2013
Nr. 124	Hans Fricke / Bernd Süßmuth	Growth and Volatility of Tax Revenues in Latin America 08/2013
Nr. 125	Ulrich Volz	RMB Internationalisation and Currency Co-operation in East Asia 09/2013

Nr. 126	André Casajus / Helfried Labrenz	A property rights based consolidation approach 02/2014
Nr. 127	Pablo Duarte	The Relationship between GDP and the Size of the Informal Economy: Empirical Evidence for Spain 02/2014
Nr. 128	Erik Gawel	Neuordnung der Professorenbesoldung in Sachsen 03/2014
Nr. 129	Friedrun Quaas	Orthodoxer Mainstream und Heterodoxe Alternativen Eine Analyse der ökonomischen Wissenschaftslandschaft 04/2014
Nr. 130	Gene Callahan / Andreas Hoffmann	The Idea of a Social Cycle 05/2014
Nr. 131	Karl Trela	Klimaanpassung als wirtschaftspolitisches Handlungsfeld 06/2014
Nr. 132	Erik Gawel / Miquel Aguado	Neuregelungen der W-Besoldung auf dem verfassungsrechtlichen Prüfstand 08/2014
Nr. 133	Ulf Papenfuß / Matthias Redlich / Lars Steinhauer	Forschend und engagiert lernen im Public Management: Befunde und Gestaltungsanregungen eines Service Learning Lehrforschungsprojektes 10/2014
Nr. 134	Karl Trela	Political climate adaptation decisions in Germany - shortcomings and applications for decision support systems 11/2014
Nr. 135	Ulf Papenfuß / Lars Steinhauer / Benjamin Friedländer	Beteiligungsberichterstattung der öffentlichen Hand im 13-Länder-Vergleich: Erfordernisse für mehr Transparenz über die Governance und Performance öffentlicher Unternehmen 02/2015
Nr. 136	Gunther Schnabl	Japans Lehren für das Schweizer Wechselkursdilemma 02/2015
Nr. 137	Ulf Papenfuß / Christian Schmidt	Determinants of Manager Pay in German State-Owned Enterprises and International Public Policy Implications: 3-Year Study for Sectors, Performance and Gender 02/2015
Nr. 138	Philipp Mandel / Bernd Süßmuth	Public education, accountability, and yardstick competition in a federal system 05/2015
Nr. 139	Gunther Schnabl	Wege zu einer stabilitäts- und wachstumsorientierten Geldpolitik aus österreichischer Perspektive 06/2015
Nr. 140	Ulf Papenfuß / Matthias Redlich / Lars Steinhauer / Benjamin Friedländer	Forschend und engagiert lernen im Public Management: Befunde und Gestaltungsanregungen eines Service Learning Lehrforschungsprojektes – 2. aktualisierte Auflage 08/2015
Nr. 141	Friedrun Quaas / Georg Quaas	Hayeks Überinvestitionstheorie 10/2015
Nr. 142	Bastian Gawellek / Marco Sunder	The German Excellence Initiative and Efficiency Change among Universities, 2001-2011 01/2016