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Article

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G8 High School Reform Results in Higher Grade Repetition Rates and Lower Graduate Age, but Does Not Affect Graduation Rates

By Mathias Huebener, Jan Marcus

The G8 high school reform to reduce the total number of years spent at *Gymnasium* (Germany's academic-track secondary school) has been more controversial than almost any other education reform in recent years. Although there are few reliable empirical findings on the effects of the G8 reform, several federal states are already considering a return to the old system, which required 13 years – rather than 12 under the G8 system – for graduation from *Gymnasium*. A new study by DIW Berlin examines the different effects of the G8 reform using administrative data on all students who graduated from *Gymnasium* between 2002 and 2013. The study shows, among other things, that the G8 reform has reduced the age of graduation from *Gymnasium* by an average of ten months – and not the twelve months *Gymnasium* schooling was reduced by. One reason for this is that the share of students who repeated a grade during their time at *Gymnasium* rose by three percentage points – approximately a fifth – as a result of the reform. The sharpest rise in grade repetitions was seen in the final years (*Oberstufe*), with boys being more strongly affected on average than girls. The share of students who graduated from *Gymnasium* (thereby earning their university entrance qualification or *Abitur*), however, was unaffected by the G8 high school reform.

Between 2001 and 2007, most federal states passed laws that reduced the number of school years required for graduation from *Gymnasium* from 13 to 12 (“G8 reform”).¹ Their primary goal was to lower the graduation age, which was higher in Germany than in many other countries, in order to enable students to enter the labor market earlier.² It was also intended to mitigate the effects of demographic changes, since earlier entry into the labour market increases the number of years people pay into social security systems and expands the pool of skilled workers. The reform also aimed to improve the international competitiveness of Germany's high school graduates.

While the total number of years was cut, the minimum number of units required for graduation remained the same.³ By spreading the lessons over fewer grades, the G8 reform ultimately increased student workload by an average of 3.7 hours a week, or 12.5 percent. Many students, parents, and teachers fear that the resultant higher learning intensity has a negative impact on quality of education and severely limits students' leisure time activities. Some federal states have already announced that they will return to the 13-year system or will leave the decision on whether to require 12 or 13 years for graduation up to the schools themselves (see Figure 1). A look at current regulations governing the number of years required for graduation from *Gymnasium* shows that students in 14 of the 16 German federal states now graduate after completing 12 years of school.

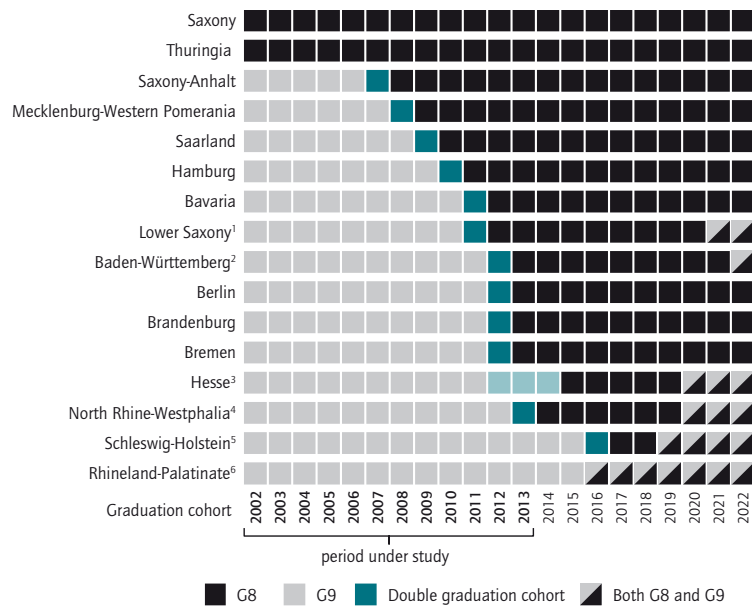
¹ S. M. Kühn et al., “Wie viele Schuljahre bis zum Abitur?,” *Zeitschrift für Erziehungswissenschaft* 16, no. 1 (2013): 115–136; C. Anger et al., “Bildungsmonitor 2014: Die richtigen Prioritäten setzen,” (Cologne: Initiative Neue Soziale Marktwirtschaft (INSM), 2014).

² OECD, *Education at a Glance 2000*, Education at a Glance (Paris: OECD Publishing, 2000).

³ Sekretariat der Ständigen Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland, “Vereinbarung zur Gestaltung der gymnasialen Oberstufe in der Sekundarstufe II. Beschluss der Kultusministerkonferenz vom 07.07.1972” (Bonn/Berlin: republished June 6, 2013).

Figure 1

Federal state regulations of required number of school years to earn the Abitur



1 Return to G9 with first G9-students graduating in 2021. High-performing students can opt for G8.
 2 44 Gymnasiums return to G9, with first G9-students graduating in 2022.
 3 The G8-reform was implemented over a period of 3 years, with first G8-students graduating in 2012. Schools can chose to return to G9, with first G9-students graduating in 2020.
 4 13 Gymnasiums return to G9, with first G9-students graduating in 2020.
 5 11 Gymnasiums returned to G9, 4 more Gymnasiums offer students to choose between G8 and G9. The first G9-students are graduating in 2019.
 6 19 selected Gymnasiums offer G8, with first G8-students graduating in 2016.

Source: The authors' own compilation based on information from www.kmk.org/bildung-schule/allgemeine-bildung/sekundarstufe-ii-gymnasiale-oberstufe.html.

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Several states return partially to the previous G9 system.

Lack of Reliable Empirical Findings to Date

These decisions of the federal states to return to the G9 system were made despite the fact that, to date, there have been few reliable empirical findings on the effects of the G8 reform. Most recent studies compare students from the last G9 cohort with students of the first G8 cohort, who graduated together as part of what is referred to as the “double graduation cohort.” These studies identify very few differences between G8 and G9 students as regards their final grades, their leisure activities, their health, and their ability to study.⁴ Findings based on the double graduation cohort, however, are not necessarily representative of the impact of the G8 reform on subsequent cohorts, since the double graduation cohort was

4 For a summary and discussion of existing empirical findings on the G8 high school reform, see M. Huebener and J. Marcus, “Empirische Befunde zu Auswirkungen der G8-Schulzeitverkürzung,” *DIW Roundup*, no. 57 (2015).

twice as large and there was strong competition for after-school resources. In addition, the way in which the studies were designed means that many other factors may be responsible for the findings. Estimates of the causal effects of the G8 reform could be distorted, for example, by other education reforms or by general changes over and above the scope of the birth cohorts. A study analyzing data from multiple federal states and multiple cohorts across a single time period, on the other hand, can take many of the potentially distorting factors into account. To date, however, only a small number of studies like this have been conducted.

The present study⁵ by DIW Berlin expands the empirical basis for studies into the effects of the G8 reform. This study does not constitute a definitive and comprehensive assessment of the G8 reform, but the empirical findings it provides can help put the debate on the advantages and disadvantages of the controversial G8 reform on a more solid, evidence-based footing. To this end, the study examines three important indicators of educational success: First, it analyses the extent to which the G8 reform has met its immediate goal of lowering the graduation age of Gymnasium students. Second, it examines whether the number of students repeating grades in Gymnasium has increased as a result of the G8 high school reform. Grade repetition is relevant not only because of its cost to the educational system, but also because it may act as an indicator of how well students are coping with the increased learning intensity of the G8 system. Third, the study analyses whether the reform has an impact on the percentage of students who graduate from *Gymnasium* with the general university-entrance qualification Abitur.

The study is based on administrative data from the German Federal Statistical Office (*Statistisches Bundesamt*). This data comprises information on all students of the 2000 to 2013 graduation cohorts (see Box 1). The federal states of Hesse and Lower Saxony cannot be included due to the limitations of the available data.

G8 Reform Lowers Graduation Age

The study will first present a purely descriptive picture of how the outcomes graduation age, grade repetition rates, and graduation rates developed over time. The federal states that did not alter the length of *Gymnasium* schooling during the period under study will be used as a control group and compared with the five

5 The study is based on M. Huebener and J. Marcus, “Moving up a gear: The impact of compressing instructional time into fewer years of schooling,” *DIW Discussion Papers*, no. 1450 (2015).

Box 1

Description of Data

This study is based on data from the German Federal Statistical Office (*Statistisches Bundesamt*), taken from the records on "Allgemeinbildende Schulen, Fachserie 11, Reihe 1", for the school years 1994/95 to 2012/13.¹ These statistics contain data for every school year on the number of Gymnasium graduates, their year of birth, the number of students in every grade and school track, and the number of grade repetitions in every grade and school track. All data are also listed separately by gender.

The analysis conducted for the study uses data on 12 cohorts (2002 to 2013) for 14 federal states. The 168 data points contain data on more than 2.3 million Gymnasium graduates.² It was not possible to include Hesse and Lower Saxony in the analysis. The data for Hesse, which introduced the G8 reform over a period of three years, do not allow a distinction to be made between students attending a G8 Gymnasium and those attending a G9 Gymnasium. Lower Saxony likewise could not be included in the study since for a large part of the period under observation there are no grade repetition data for the final years at Gymnasium. With regard to average age, however, very similar results are achieved if Lower Saxony is included in the analyses. There is therefore no reason to assume that the effects of the G8 reform in Lower Saxony are substantially different from those in other federal states.

¹ Data for the school year 2002/2003 and onward are available in electronic form. Information on earlier periods is available in printed form only.

² The number of data points in the grade-specific analyses rise from 168 to 1008 since, for each of the 12 cohorts in the 14 federal states, information on grade repetition rates for six different grades is considered separately in the calculations.

A description of the way in which the three outcomes were calculated is given below³:

- The average cohort graduation age is calculated from data on the number of Gymnasium graduates, broken down by year of birth.
- The grade repetition rates are calculated from data on the number of grade repetitions in every grade in Gymnasium. This number is counted at the beginning of every school year for the previous year. The grade repetitions are thus allocated to the previous cohort, to which the student who repeated the grade originally belonged. The grade repetitions for all the grades attended by the cohort, from seventh grade until graduation, are summed up. It should be noted that the total number of G9 grade repetitions is calculated from grades 7 through 13, while the total number of G8 grade repetitions is calculated from grades 7 through 12. The study counts grade repetitions beginning with the seventh grade, because Gymnasium begins in this grade in some federal states, and because, in some cases, the grade in which students start Gymnasium was changed during the period under observation. For the purpose of normalization, for a given cohort the total number of grade repetitions is divided by the number of students in seventh grade of the same cohort.
- For a given federal state, the Gymnasium graduation rate is calculated from the ratio of Gymnasium graduates to the average cohort size for the population of 18-to-20-year-olds in that state in the year of graduation.

³ For more detailed information on the dataset and the variables used, see M. Huebener and J. Marcus, "Moving up a gear: The impact of compressing instructional time into fewer years of schooling," *DIW Discussion Papers*, no. 1450 (2015).

federal states that first implemented the reform.⁶ This descriptive approach can provide a first impression of whether the G8 reform had any effect on the outcomes without using complex statistical methods. It also serves to establish the plausibility of the multivariate analysis that will be used later in the study. This is important because the calculation of causal G8 reform effects is based on the assumption that the out-

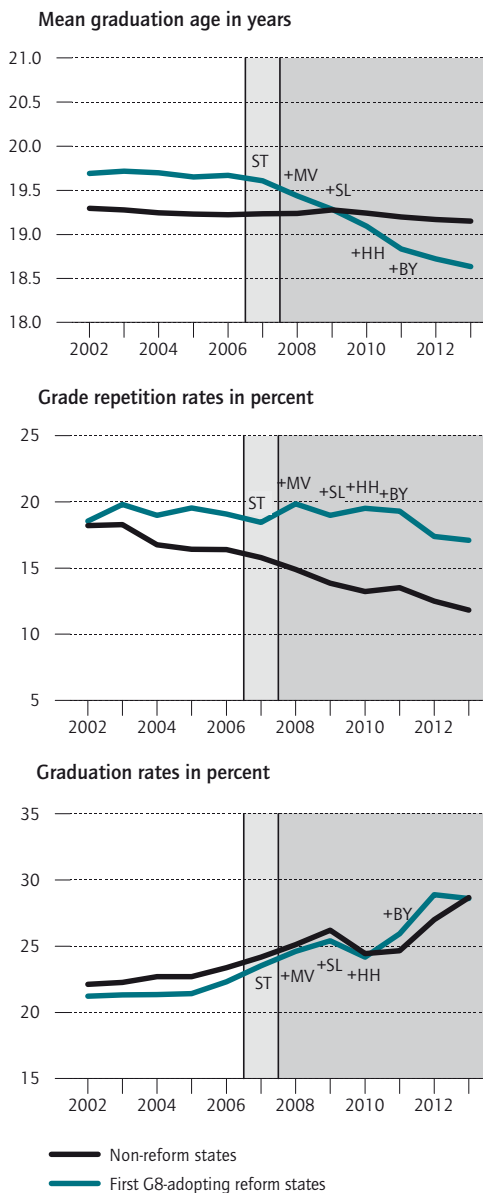
⁶ Among the first federal states to implement the reform were Saxony-Anhalt (ST), Mecklenburg-Western Pomerania (MV), Saarland (SL), Hamburg (HH), and Bavaria (BY). The federal states that did not change the number of years of Gymnasium schooling in the period under observation include Saxony and Thuringia (always G8), and Rhineland-Palatinate and Schleswig-Holstein (always G9).

comes for the federal states that introduced the G8 reform would have shown the same changes over time had they not implemented the reform as the outcomes for those federal states that chose not to implement the reform. This assumption of parallel time trends cannot be tested directly, but it is lent some plausibility by the fact that trends over time in the G8 reform states paralleled those of the non-reform states in the period before the reform was introduced.

Developments in average graduation age in the non-reform states mirrored those in the first G8 reform states until 2007, when Saxony-Anhalt, the first of the federal states to switch to G8, saw its first G8 cohort graduate

Figure 2

Trends in graduation age, grade repetitions and graduation rates in states with and without G8 high school reform



1 Saxony, Thuringia, Schleswig-Holstein, Rhineland-Palatinate.

2 Saxony-Anhalt, Mecklenburg-Western Pomerania, Saarland, Hamburg, Bavaria.

Source: The authors' own calculations based on data from the German Federal Statistical Office, Fachserie 11, Reihe 1, Allgemeinbildende Schulen.

(see Figure 2).⁷ This indicates that the crucial assumption of parallel trends over time made in the following analyses can be justified. The first data point relevant to the reform is for the double graduation cohort in Saxony-Anhalt in 2007, which does not distinguish between G8 and G9 students. Gradually other federal states introduced the fast-track G8 system, significantly lowering the average graduation age.

The assumption of parallel trends over time also appears plausible with regard to the grade repetition rates in Gymnasium, i.e., from seventh grade to graduation. With the exception of 2002, grade repetition rates in the first G8 reform states paralleled those in the non-reform states prior to the introduction of the G8 reform in the first state of Saxony-Anhalt. As the first federal states had introduced the G8 reform, the two groups began to diverge. This fact indicates that the G8 reform led to an increase in grade repetitions.

A comparison of graduation rates in the two groups also shows parallel trends over time in the period preceding the introduction of the G8 reform. Graduation rates were not found to decrease compared to the control group for the period following the G8 reform. In addition, a simple comparison of graduation rates before and after a state has introduced the G8 reform can be misleading, since any effects the G8 reform may be obscured by the general rise in the number of high school graduates in recent years. For this reason, a control group comprising federal states that did not implement the reform is essential if the long-term trend of rising high school graduation shares—a phenomenon that is independent of the G8 reform—is to be accounted for.

Increase in Grade Repetition Rates Due to G8 Reform

The descriptive approach taken thus far merely shows the development of the three outcomes over time. To determine the causal effects of the G8 reform on the outcomes, the present study uses a regression-based difference-in-differences approach (see Box 2). This method focuses on the changes in graduation age, grade repetitions, and graduation rates that occurred in a given federal state following the introduction of the G8 reform, while at the same time taking into account general, non-G8-specific changes to these outcomes. This method also makes it possible to remove effects that other education reforms may have had on the outcomes. The reforms mentioned above include reforms that reduced

⁷ Average graduation age in non-reform states is initially lower than that in the first reform states because the group of non-reform states comprises two federal states that required 12 years for graduation and two federal states that required 13 years.

Box 2

Methodology

The multivariate estimates are based on a difference-in-differences approach. The idea behind this estimation method rests on a comparison of the outcomes before and after the introduction on the G8 reform within federal states. This type of before-and-after comparison, however, is subject to distortions due to general changes in the outcome variables over time (such as the general, G8-independent rise in the number of Gymnasium graduates, or the general decline in grade repetition rates). The difference-in-differences approach removes the effects of these general trends. It compares changes in outcomes occurring over a defined time period in the federal states that introduced the G8 reform with those occurring in the same time period in the federal states in which there was no change in the number of years of schooling.

The central assumption underlying this estimation technique is that the outcomes in G8-reform states would have undergone the same changes over time as the outcomes in non-reform states if the reform had not happened. This central assumption cannot be tested empirically. The assumption becomes more plausible, however, if the outcomes are found to develop along similar paths in both groups before the introduction of the G8 reform. The regression model used in this difference-in-differences approach removes the effect of general differences between the federal states and takes into account general changes in the outcomes over time (in both cases via *fixed effects*).

The approach is flexible enough to take into account other changes in the federal states that could have an impact on the outcomes, including, for example, economic and demographic changes specific to federal states.¹ The regres-

¹ For details on this methodology, a more precise description of the control parameters, and more extensive robustness testing, see M. Huebener and J. Marcus, "Moving up a gear: The impact of compressing instructional time into fewer years of schooling," *DIW Discussion Papers*, no. 1450 (2015).

sions also take into account the impact of other reforms implemented during the period under study. Reforms that affect all federal states equally (such as the abolition of compulsory military service), as well as institutional settings of the individual federal states, which did not change during the period under study, were removed by fixed effects for graduation cohorts and federal states. The impact of several education reforms that only affected certain cohorts in specific federal states was also taken into account. These reforms include the introduction of centralized school-leaving examinations in some federal states, reforms that reduced subject choice options in the final years of Gymnasium, reforms affecting the orientation stage (the period during which students are observed with an eye to tracking them into one of three secondary school types or can switch to another school), and the merger of non-Gymnasium school types. A number of education reforms that were only passed in certain federal states (for example, reforms ending the policy of grade repetition, changes to cutoff dates for enrollment in first grade, or the return to the G9 system) do not affect the 2002 to 2013 cohorts that are subject to this study and therefore cannot distort the analysis results. Double graduation cohorts are accounted for with a separate indicator variable, as the administrative data do not permit a distinction to be made between students of the G8 and G9 cohorts for double graduation cohort years. Thus, the double graduation cohorts belong neither to the treatment group nor to the control group. Moreover, findings based on the double graduation cohorts are not necessarily representative of the effect the G8 reform had on subsequent cohorts, since the double graduation cohort was twice as large and there was strong competition for post-schooling resources.

Standard error calculations account for serial correlations across the observations for a given federal state.

subject choice options in the final years of Gymnasium; the introduction of centralized school-leaving exams; reforms affecting the orientation stage (the period during which students are observed with an eye to tracking them into one of three secondary school types); and the merger of non-Gymnasium school tracks.

In view of many studies documenting differences between boys and girls with respect to a broad range of school success indicators, this study investigates the effects of the G8 reform both overall and by gender. The effects of the G8 reform can be expected to display gender differences. Since boys perform on average some-

what less well in school than girls,⁸ it is conceivable that the G8 reform caused a greater increase in grade repetition rates for boys.

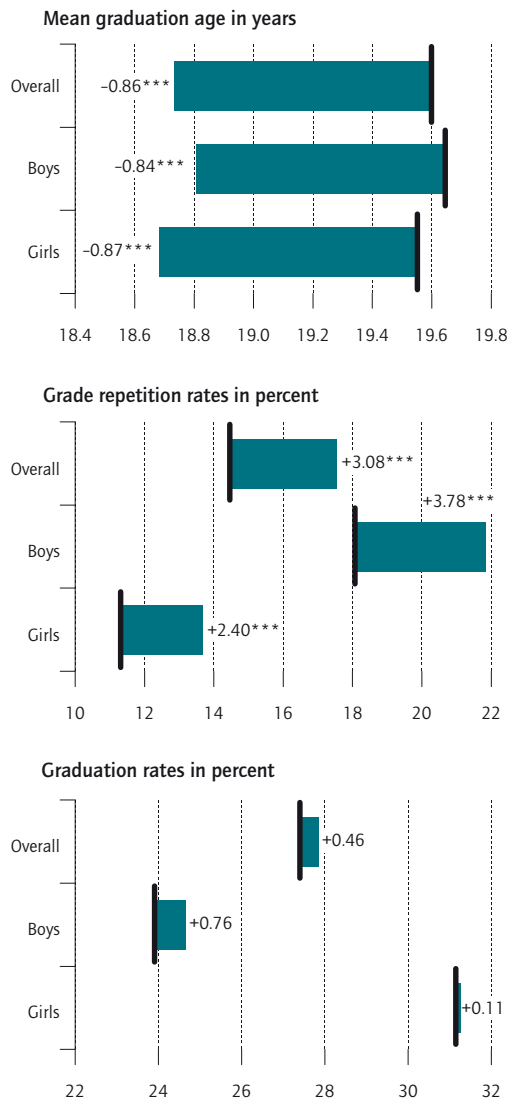
An analysis of the data using the regression-based approach shows that the G8 reform lowered graduation age by an average of 0.86 years, or 10.3 months (see Figure 3). Consequently, the estimated average age of graduates fell to 18.74 years under the G8 system; had the

⁸ See, for example, Spinath, "The roles of intelligence, personality and motivation in girls' outperforming boys at school," *Personality and Individual Differences* 60 (Supplement), no. 45 (2014).

Figure 3

Effects of the G8 reform overall and by gender

Results based on multivariate regressions¹



¹ Under consideration of state effects, cohort effects, double graduation cohort effects and economic and demographic control variables and other education reforms. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: The authors' own calculations based on data from the German Federal Statistical Office, Fachserie 11, Reihe 1, Allgemeinbildende Schulen.

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The increase in grade repetitions was greater for boys than for girls.

G8 states retained the G9 system, it would have been 19.6 years of age. This effect is statistically significantly lower than the 12 months (corresponding to the intended reduction in school years in the G8 reform) by

which graduation age could have been lowered.⁹ One explanation for this might be that a large share of students repeated a grade; the probability of a student repeating a grade in the course of their time at Gymnasium rose by 3.1 percentage points. Under the G9 system, an average of 14.5 percent of the students of a given cohort would have repeated a grade in the course of their time at Gymnasium. This percentage rose by 3.1 percentage points under G8, amounting to a 21-percent increase in the grade repetition rate.

Regression analyses confirm the hypothesis that the G8 reform resulted in a higher incidence of grade repetitions among boys than among girls. The probability of repeating a grade at Gymnasium rose by 3.8 percentage points for boys, while the probability for girls rose by 2.4 percentage points, resulting in a bigger gap between the repetition rates for boys and girls, which went from 6.8 to 8.2 percentage points as a result of the G8 reform.¹⁰ Gender differences can be taken as the first reference point for judging the size of the G8 effect. The rise in the grade repetition rate by a total of 3.1 percentage points is roughly equal to half the gender difference before the G8 reform, which was 6.8 percentage points.

The increase in the grade repetition rate, however, did not result in a lower share of high school graduates. The change in graduation rates following the G8 reform was not only statistically insignificant; it was also very low in terms of the effect size. The G8 reform led to no appreciable changes for girls or boys. It is also evident that G8 had no impact on the percentage of seventh-graders that attended Gymnasium.¹¹

Increase in Grade Repetition Rates Highest in Final Years

To be able to appoint appropriate remedial programs and take more targeted countermeasures, it is important to know whether the increase in grade repetition rates is distributed evenly across all grades. The effect of the G8 reform on grade repetitions was therefore examined separately for each grade — this was done by comparing grades 7-10 under G8 and G9, as well as qualification

⁹ This effect is independent of any potential impact of the G8 reform on the age at which children start school because the G8 reform was passed between 2001 and 2007, and the students represented in the data sample started school before 2001.

¹⁰ Calculations of grade repetition rates for the hypothetical scenario in which the G8 reform had not been implemented yield figures of 18.1 percent on average for boys and 11.3 percent on average for girls. The grade repetition rate for the period following the G8 reform was 21.9 percent on average for boys and 13.7 percent on average for girls.

¹¹ For this analysis and further calculations, see M. Huebener and J. Marcus, "Moving up a gear: The impact of compressing instructional time into fewer years of schooling," *DIW Discussion Papers*, no. 1450 (2015).

phase I (12th grade under G9, 11th grade under G8) and qualification phase II (13th grade under G9, 12th grade under G8). The academic grades earned in the last two years of school count toward the final grade point average, so that the performance incentive for students attending these grades is comparable.¹²

A breakdown of the effect on grade repetitions into individual grades shows that the G8 reform had almost no impact on repetition rates in grades 7-9 (see Figure 4). The increase in grade repetitions is particularly high in 10th grade and in the last two years of Gymnasium. This effect was observed for both girls and boys in these grades, although it was greater for boys.

The study will now turn from examining the average effects of the G8 reform as a whole to investigating whether there were differences among individual federal states (see Table). Of particular interest is whether there were differences among the federal states regarding the effect of the G8 reform on grade repetitions. The reason for this interest is twofold. Due to the breakdown by grade levels, the greatest amount of data is available for this variable. Also, grade repetitions are a direct indicator for changes in graduation age.

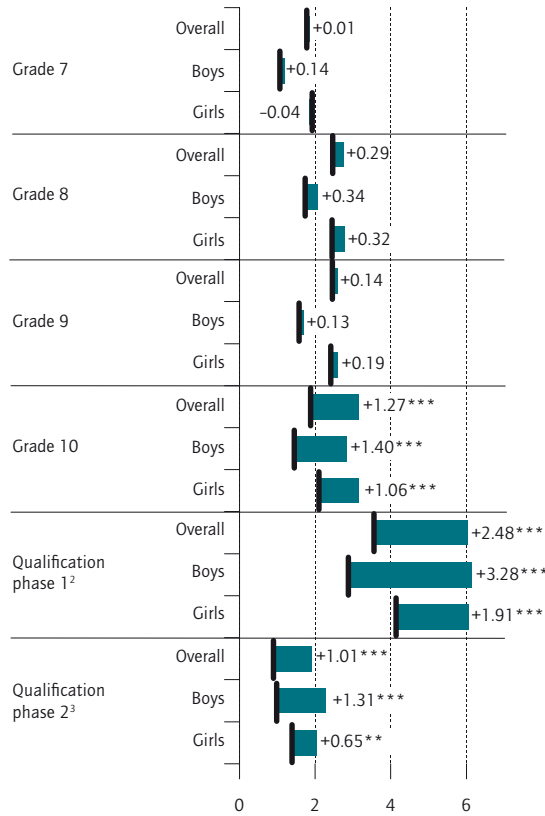
In Saxony-Anhalt, the first of the federal states to switch to G8, grade repetitions have increased in all grades as a result of the reform. A similar picture can be seen in the data for Mecklenburg-Western Pomerania. Here, however, the statistically significant effects were observed in the 8th grade and in both qualification phases (i.e., in the last two grades). Hamburg is within the national average, while Bavaria only shows a significant increase in the second qualification phase (similar to Saarland). The results for Saxony-Anhalt and Mecklenburg-Western Pomerania are based on six or five G8 cohorts, respectively, while Bavaria has only two G8 cohorts. This may explain why the effects are not statistically significant for many grades. Caution is recommended in interpreting results for Baden-Wuerttemberg, Berlin, and Bremen, as the calculations for these federal states are based solely on the first cohort to graduate after the double graduation cohort. There is some indication, however, that for these federal states, too, the G8-related increase in grade repetition rates is particularly high in the final years of Gymnasium. Overall, the analysis shows that the G8-related increase in grade repetition rates is a widespread phenomenon affecting most federal states.

¹² An alternative analysis comparing the 10th grade under G8 with the 11th grade under G9 shows very similar qualitative results. Another alternative would be to compare grades 11 under G8 and G9 and grades 12 under G8 and G9. However, there are structural differences between these grades, as in G9 schools the 11th grade functions as the transition to the qualification phases, while in G8 schools the 11th grade is already the first year of the qualification phase.

Figure 4

Effects of the G8 reform on grade repetition rates by grade

Results based on multivariate regressions¹



¹ Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

² 12th grade under G9, 11th grade under G8.

³ 13th grade under G9, 12th grade under G8.

Source: The authors' own calculations based on data from the German Federal Statistical Office, Fachserie 11, Reihe 1, Allgemeinbildende Schulen.

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The sharpest rise in grade repetitions was seen in the final years of high school.

Differences in the impact of the G8 reform among the federal states may be attributable to the different ways in which the reform was implemented, differing political circumstances in the federal states, or a lack of precision in the estimates.

G8 Effects Also Felt Several Years after the Reform

Another relevant question regarding the G8 reform is whether the average effects calculated for graduation age, grade repetition, and graduation rates will change as schools become more experienced in dealing with

Table

Effects of the G8 reform on grade repetition rates by federal stateIn percentage points¹

	Saxony-Anhalt	Mecklenburg-Western Pomerania	Saarland	Hamburg	Bavaria	Baden-Württemberg	Berlin	Brandenburg	Bremen
Grade 7	1.23**	0.73	-0.95	0.11	-0.8	0.27	-0.23	-0.02	-0.29
Grade 8	1.52***	1.07***	-0.51	0.08	0.26	-0.31	0.50	0.02	-0.37
Grade 9	1.30***	0.54	-1.14	0.26	-0.28	0.69*	0.17	0.19	0.53
Grade 10	1.86***	0.25	-0.21	3.10***	0.05	0.31	1.00*	0.26	6.10***
Qualification phase 1 ²	3.98***	4.95***	0.49	4.28***	0.78	1.83**	1.68	0.62	1.98**
Qualification phase 2 ³	1.10**	1.07***	1.08**	1.38***	2.62***	0.23	0.03	-0.04	2.63*
N	1 008								

¹ Results based on multivariate regressions. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

² 12th grade under G9, 11th grade under G8.

³ 13th grade under G9, 12th grade under G8.

Source: The authors' own calculations based on data from the German Federal Statistical Office, Fachserie 11, Reihe 1, Allgemeinbildende Schulen.

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Increases in grade repetition rates affected most federal states.

the reduced number of school years—in other words, whether these effects are only temporary. Data from Saxony-Anhalt and Mecklenburg-Western Pomerania, i.e., the federal states that first introduced the reform, was used for this analysis. Both of these federal states can provide data not only for five cohorts *preceding* the reform but also for five cohorts *following* it.

The first result that the analysis provides is that a sustained reduction in graduation age was indeed seen with the introduction of the reform—and not before (see Figure 5). But even five years after the double graduation cohort, the reduction in graduation age had still not reached a full year. The changes seen in the effect of the G8 reform on grade repetitions over time do not suggest that it will quickly diminish with the passing of time. The increase in grade repetition rates therefore does not appear to be solely a result of the transition from G9 to G8, but seems more permanent in nature. The effects of the G8 reform on graduation rates fluctuated around zero for all cohorts both before and after the reform. Owing to considerable variation in the size of birth cohorts over time as a result of a drop in the birth rate in eastern Germany after reunification, the effects of G8 reform were also examined with a view to an alternative normalization of graduation rates. This analysis produced similar results, with the effect of the reform on graduation rates displaying no obvious trend.

Conclusion

The present study by DIW Berlin shows that the G8 high school reform cannot yet be considered a clear success

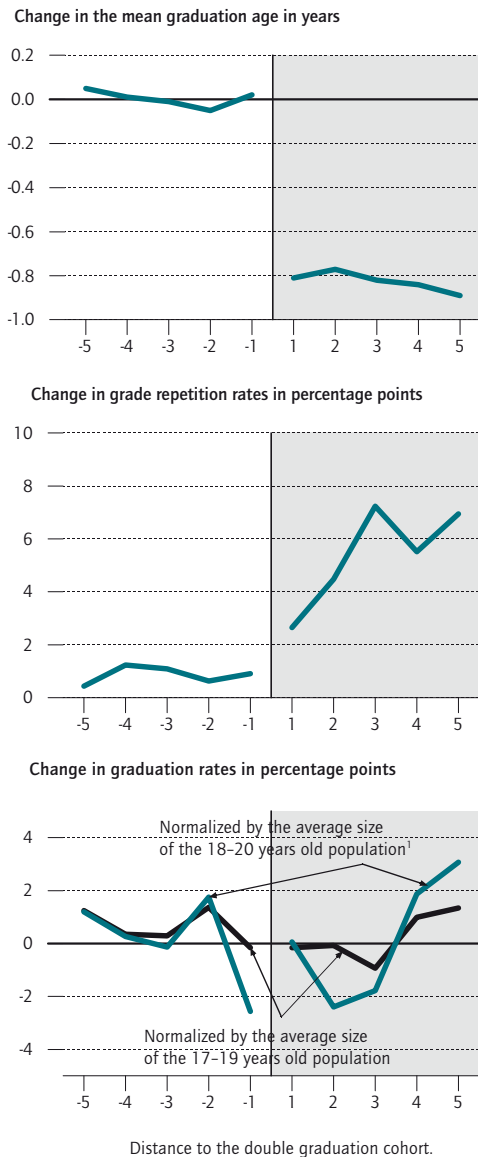
nor failure. The results of this DIW Berlin study, which examines Gymnasium cohorts from 2002 to 2013, provides findings that both supporters and opponents of the reform will be able to use to substantiate their arguments. One of the first findings is that the G8 reform has not had any impact on the percentage of seventh-graders attending Gymnasium or on the number of Gymnasium graduates. Fears that the G8 reform would deter students from taking their school-leaving examinations *Abitur* cannot be substantiated; nor can hopes that decreasing the number of years required for graduation would encourage more young people to opt for Gymnasium.

Further, the study shows that graduates of the G8 system are clearly younger—approximately ten months on average. It can thus be concluded that most students were able to graduate and qualify for university entrance more quickly. This was not true of all students, however, because the number of students who had repeated a grade increased: of every 100 students in a given cohort, an additional three students repeated a grade at some point in their time at Gymnasium as a result of the changeover to the G8 system. Boys were affected by this to a greater extent than girls.

The increase in the number of repeaters was not distributed evenly across all grades, but was most common toward the end of Gymnasium. In most federal states, however, the additional instructional time was redistributed primarily across grades 7 to 10. Different conclusions can be drawn from the fact that the increase in grade repetitions did not occur in the grades with the greatest amount of additional instructional time. It is conceiva-

Figure 5

Effects of the G8 reform over time
Results based on multivariate regressions



Source: The authors' own calculations based on data from the German Federal Statistical Office, Fachserie 11, Reihe 1, Allgemeinbildende Schulen.

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G8 reform effects are not only temporary.

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ble that students were able to pass lower grades despite potential gaps in knowledge and that these gaps grew as they progressed from year to year, ultimately resulting in grade repetitions in the last three years. On the other hand, it is also possible that the increase in grade repetition rates does not automatically indicate that students are unable to cope with the new learning environment; it may reflect a considered decision to voluntarily repeat a grade in order to be able to take certain classes or to improve Abitur results.¹³ What is clear, however, is that no single conclusion can be drawn on the relative merits of either interpretation. Regardless of the cause, grade repetitions reduce the potential of the G8 reform to lower graduation age and, owing to the repeated use of school resources, create additional costs for the educational system.

This study is not intended to provide a definitive assessment of the G8 reform, but it does offer further insight into the impact of the G8 reform. It is hoped that the results provided here will help put the debate on the advantages and disadvantages of the G8 reform on a more evidence-based footing. Further research is needed, however, to gain a more comprehensive picture of the effects of the G8 reform. For example, it is important to find out how much younger G8 students actually are when they enter the job market and whether the G8 reform has brought about changes with respect to university attendance and professional careers, success in the labor market, and many other factors, including social and civic engagement, leisure activities, fertility, and health. Only by examining many different aspects will it be possible to make a comprehensive assessment and provide indications of whether, in the end, this reform is creating additional costs or yielding additional benefits. To improve the credibility of empirical findings and enable generalizations to be made, it is important to design studies that cover multiple federal states and multiple cohorts, using variations in the way that the G8 reform was implemented, both over time and across regions, to establish the causal effects of the G8 reform.

¹³ Students participating in exchange programs abroad may be required to repeat a grade under the G8 system, while under the G9 system, eleventh-grade students were able to study abroad without repeating a grade.

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