

Central exit exams improve student outcomes

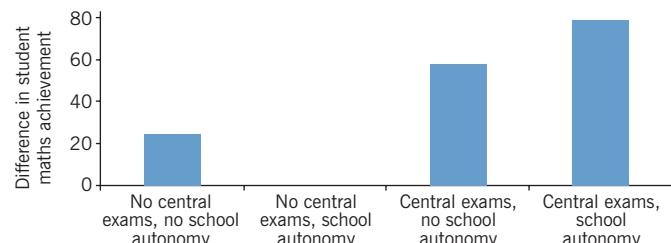
External school leaving exams raise student achievement and improve how grades are understood in the labor market

Keywords: schools, education, exams, accountability, student achievement, earnings

ELEVATOR PITCH

Reaching the policy goal of improving student achievement by adding resources to the school system has often proven elusive. By contrast, ample evidence indicates that central exit exams constitute an important feature of a school system's institutional framework, which can hold students, teachers, schools, and administrators accountable for student outcomes. While critics point to issues such as teaching test-only skills, which may leave students ill-prepared for the real world, the evidence does not bear this out. Overall, central exams are related to better student achievement, favorable labor market outcomes, and higher economic growth.

Central exit exams are associated with better achievement, particularly in autonomous schools



Note: Difference in TIMSS mathematics achievement measured as a percentage of a standard deviation compared with "No central exams, school autonomy." School autonomy refers to autonomy over teacher salaries.

Source: Author's own compilation based on Woessmann, L. "The effect heterogeneity of central exams: Evidence from TIMSS, TIMSS-Repeat and PISA." *Education Economics* 13:2 (2005): 143–169.

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KEY FINDINGS

Pros

- ⊕ Central exams are associated with substantially higher student achievement across national and regional school systems.
- ⊕ Central exams are a requirement for decentralized systems with autonomous schools to achieve high student achievement.
- ⊕ Central exams are related to higher earnings, lower unemployment, and greater informational content of grades in the labor market.
- ⊕ Improved skills stimulated by central exams are related to higher long-term economic growth of countries.

Cons

- ⊖ Central exams raise tested curriculum-based skills, but not necessarily other skill dimensions.
- ⊖ Emphasis on higher academic performance in a subject may come at the expense of enjoyment of it.
- ⊖ Mere minimum competency exams or course graduation requirements are not enough to deliver the effects of curriculum-based central exit exam systems.
- ⊖ Many details of how to best implement central exams and which elements are crucial remain poorly understood.

AUTHOR'S MAIN MESSAGE

Central exams act as an accountability device that reveals the overall outcome of the efforts of students and schools. Central exams can increase external rewards for learning, enhance monitoring of teachers and schools, and decrease peer pressure against learning. They improve the learning outcomes of students and their subsequent labor market performance and raise the understanding of grades—their information value—in the labor market. As such, implementing central exams at the end of secondary school may prove much more effective at improving student outcomes than many other resource-intensive educational initiatives.

MOTIVATION

Educational achievement is a major determinant of individual success in the labor market and for overall economic growth. However, it has proven difficult to devise policy initiatives that succeed in improving students' educational achievement in school systems. In particular, the evidence on the effects of adding resources to a school system by increasing spending or reducing class sizes is generally disappointing. By contrast, there is growing evidence that the institutional structures of school systems that provide incentives for stakeholders to focus on improving student outcomes are highly relevant in shaping student achievement [1]. One important aspect of the institutional framework is whether—and if so, how—the performance of students is examined in the school system. In particular, a broad array of evidence suggests that central exams may be an effective means to focus attention on student outcomes.

DISCUSSION OF PROS AND CONS

Defining central exams

A key institutional feature that distinguishes school systems is whether students' learning outcomes are assessed by central or local exams when they finish secondary school. The defining feature of central exit exam systems—or central exams for short—is that all students must take the same final assessments, which are externally developed for all schools in the system, thereby increasing the comparability of grades and degrees across the country or state.

In greater detail, six features have been highlighted as key aspects of such systems (also known as curriculum-based external exit exam systems) [2]: First, they produce signals of student achievement that have real consequences for the students. Second, they define achievement relative to an external standard, not just compared with other students in the classroom or school. Third, they are organized by discipline and relate to the content of specific course sequences. Fourth, they signal several levels of achievement, rather than giving just a pass/fail signal. Fifth, they cover almost all students in secondary school. Finally, they examine a major portion of the knowledge that is expected from the students who study the subject.

While central exams use standardized tests, these six features indicate that these systems go beyond the mere execution of such tests, and that, conversely, not all standardized tests constitute central exit exams in the sense employed here. The content material tested in central exams refers to the material that is meant to be taught by the school curriculum. Basing the exams on the curriculum means that incentives are created for students to study hard during school. This is in contrast to university entrance exams, such as the US SAT, which are closer to capturing aptitude rather than actual learning at school. Examples of countries that have central exams include England, France, Japan, South Korea, and the Netherlands, whereas Belgium, Spain, and Sweden are examples of countries without such exams. In Canada and Germany, some provinces/states have central exams, while others do not. In the US, New York State is the only state whose exit exams have been classified as such.

Theoretical framework

From a theoretical perspective, central exams may affect students' learning outcomes and labor market performance through at least three mechanisms: increased external rewards

for learning, enhanced monitoring of teachers and schools, and decreased peer pressure against learning [3]. These mechanisms ultimately rely on the point that central exams provide information about the learning outcomes of students that would otherwise not be available. In this way, they serve as an accountability device that uncovers the overall outcome of both students' and schools' efforts. So-called principal-agent models of educational production predict that setting clear performance standards and providing performance information can tilt incentives in favor of superior student performance.

Referring to the first of these three mechanisms, central exams allow potential employers and higher education institutions to better recognize students' educational achievement. This is done by making academic certificates a more precise signal of what has been learned and of achievement levels, so that employers are willing to pay higher wages for better grades. Because students and their parents know this, central exams increase students' external rewards for learning and thus create stronger incentives for students to increase their learning effort.

Second, by providing information on educational outcomes, central exams can improve the monitoring of teachers' and schools' behavior. Improved monitoring can reduce inefficiencies in the educational process and raise educational outcomes. In particular, the accountability introduced by central exams can help to create incentives that encourage school personnel to behave in ways that promote student learning that are not necessarily in their own interests. For instance, without the right incentives teachers use the teaching techniques they find most convenient, even where these may not be the most impactful on students. However, in countries where the achievement information from central exams is used as a monitoring tool, teachers are likely to focus mainly on raising student achievement, thereby putting aside their other, less productive interests.

Third, central exams may also decrease collective peer pressure against learning. When grades are assigned relative to the class average, the optimal collective strategy for students is to lower the class's standards. This means that students have an incentive to apply peer pressure on others in the class not to be too studious and to distract teachers from teaching to a high standard as this means that it will require less effort to receive the same grade. Central exams render this collective strategy futile: peer incentives to denigrate studiousness dissipate because inferior classwork leads only to lower marks for all. Again, this mechanism increases learning outcomes. In sum, central exams can make students and educational providers accountable for what they learn and teach, thereby improving student achievement and ultimately labor market outcomes.

Evidence on the role of central exams for student achievement

An extensive empirical literature studies how central exams affect students' educational achievement. Evidence from several international student achievement tests such as the Programme for International Student Assessment (PISA) and Trends in International Mathematics and Science Study (TIMSS) reveals consistent positive associations between central exams and student achievement across countries [1]. The existing cross-country evidence, such as that depicted by the illustration on page 1, suggests that the association between central exams and student achievement may be as large as a whole grade-level equivalent. Early studies used aggregate country-level data to study the country-level association of central exams with achievement scores [2]. Subsequent studies have used microdata on individual students [4], which allows them to compare observationally

equivalent students across countries taking into account the effects of a large number of students' and schools' background factors.

The student-level variation within each country provided by this microdata can also be used to analyze whether the association of central exams with student achievement differs with certain characteristics [1]. Accordingly, these results suggest that the effect tends to increase with student ability, that it does not differ with most measures of family background, that it increases during the course of secondary education, and that it increases with the regular use of standardized exams. Furthermore, as will be discussed below, the effects of central exams are complementary to various aspects of school autonomy.

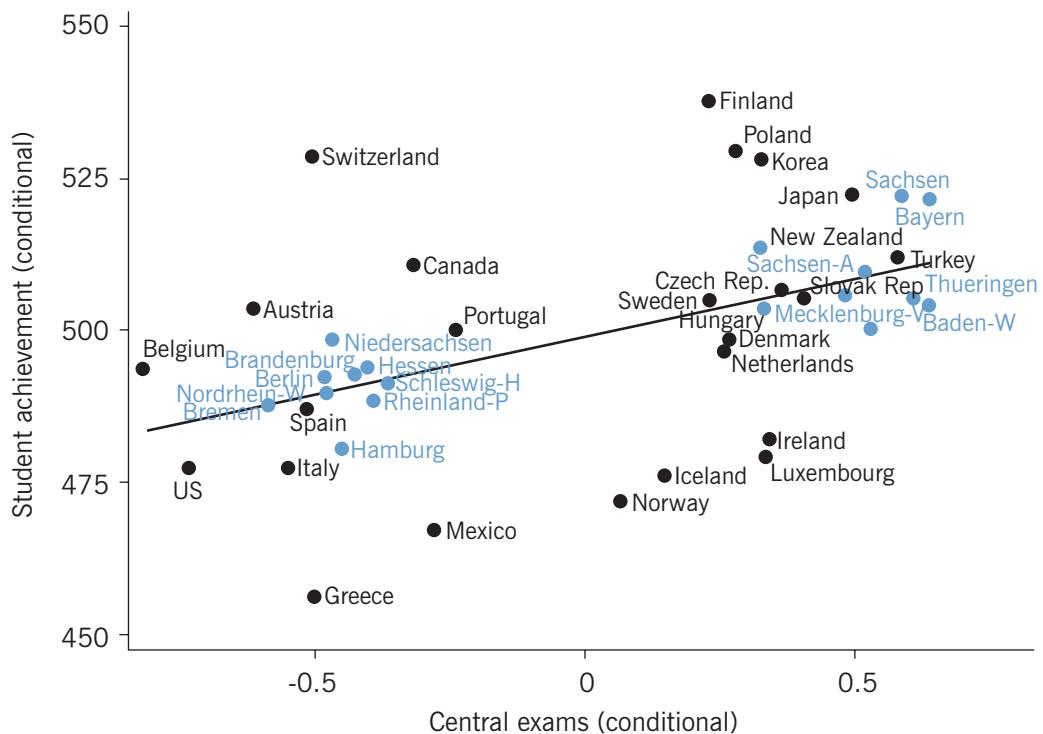
A limiting factor in interpreting cross-country associations is that unobserved country characteristics, such as specific cultures, may introduce bias [1]. For example, a society might introduce central exams while also prompting students to study in other productive ways. Consequently, a positive correlation between central exams and student achievement does not necessarily reflect a causal effect.

There are a number of ways to investigate whether such cultural effects are important for the association between central exams and test scores [1]. One approach is to restrict the study of variation among test scores and exams to the continent level. If the variation in international test scores were biased by features that are more relevant in certain continents—say, if countries in Asia placed a higher value on educational success than elsewhere—then the coefficient on central exams would decline in a model that accounts for this with continental fixed effects. However, the association between central exams and student achievement has been found to be robust to including continental fixed effects, thus casting doubt on this particular theory.

Another approach compares variation across German states with variation across OECD countries. This tactic is useful because until the early 2000s only seven of the 16 German states had central exams. Otherwise, however, German states are much more similar than OECD countries. This approach reveals that students in systems with central exams have significantly higher achievement levels (Figure 1). Furthermore, this association is statistically indistinguishable between the OECD and the German sample [5], which suggests that the international association seen in the OECD data is not likely to be driven by differences in culture, language, or other institutional settings that do not vary within Germany. Similar cross-regional associations of central exams with test score outcomes have been found for Canadian provinces and US states.

A further method employs a difference-in-differences approach using German data that exploit variation between school subjects [6]. Specifically, most German states that have central exams have them in mathematics but not in science (for relevant subject tracks). The key assumption here is that there would be no variation in cross-state achievement differences between subjects in the absence of central exams. The estimates from this approach are significant and substantial, suggesting that central exams do improve subject-specific test scores. Furthermore, these estimates offer a lower bound for the full potential effect of central exams in cases where there are spillovers between subjects—for example, because improved mathematics knowledge due to the existence of central exams facilitates students' learning in science.

Figure 1. Central exams and student achievement across German states and OECD countries



Note: Added variable plot of PISA-E 2003 mathematics scores against central exams for German states (blue) and OECD countries (black). An added variable plot means that both variables are first regressed on control variables, namely an index of socio-economic background, fathers' employment status, private school enrollment, a Germany dummy, and its interaction with the index of socio-economic background. The residuals of these regressions are plotted in the graph, thus depicting the equivalent of a multivariate regression of scores on central exams conditional on the control variables.

Source: Author's own compilation based on Woessmann, L. "Institutional determinants of school efficiency and equity: German states as a microcosm for OECD countries." *Journal of Economics and Statistics* 230:2 (2010): 234–270 [5], Table 5, column (6).

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While fewer than half of the German states had central exams prior to 2001, all but one have introduced them since then. A 2011 study exploits the different timings of their introduction across states and school types in a difference-in-differences approach using the German extended PISA waves from 2000 to 2006 [7]. The identifying assumption is that there would not have been a differing trend in achievement without the introduction of central exams. The results indicate that their introduction has had positive effects, even in the short term.

Evidence on the role of central exams for labor markets

There is ample evidence that the effects of central exams extend beyond the school system to long-term economic performance. At the macroeconomic level, one study uses the existence of central exams as an instrument for average student achievement of a country to compare economic growth across countries. The study finds that there is a significantly positive relation between variation in student achievement stemming from the existence of central exams and the long-term growth of real GDP per capita of countries.

At the individual level, better academic test results have been found to be related to significantly higher labor market earnings. Given the considerable evidence on the positive effects of central exams on such test scores, this provides indirect evidence that central exams may positively impact earnings by raising educational achievement.

However, there are those who urge caution, arguing that external testing may also bring negative effects. For instance, test-based accountability systems may only raise test-taking skills, but not genuine educational achievement; or, even further, these systems may induce fraudulent behavior such as outright cheating. Somewhat dissipating such concerns, a recent study uses within-country variation in the existence of central exams over time and finds that people who were subject to central exams do in fact have higher skill levels as adults [8].

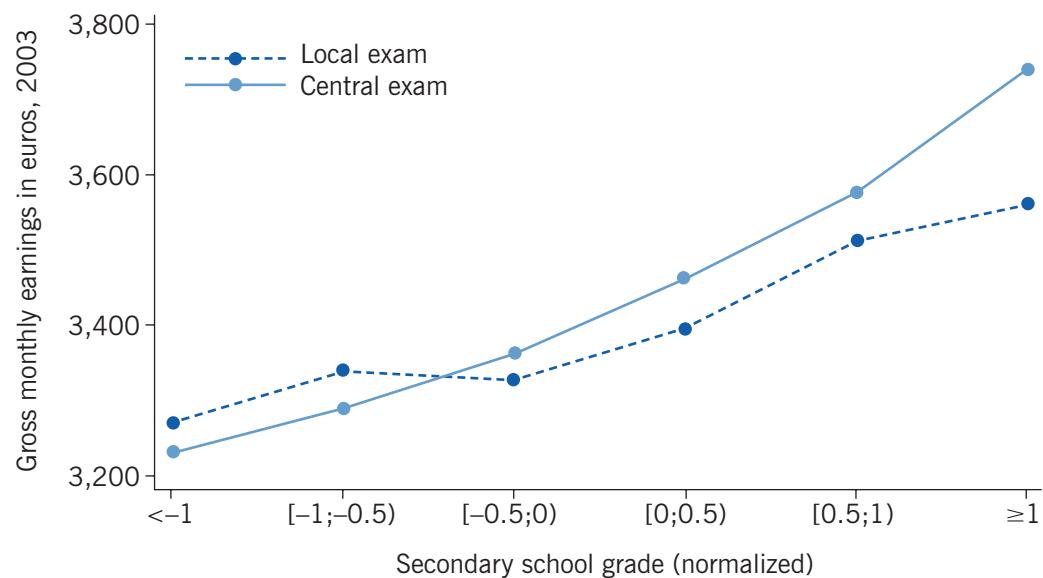
Still, one study suggests that while central exams do improve students' academic performance, they negatively affect their attitudes toward learning, as indicated by students' self-reported enjoyment of mathematics [9]. Another study on Germany indicates that the positive effect of central exams on curriculum-based knowledge does not extend to a positive effect on an alternative measure of mathematics literacy, implying that the skills gained as a result of central exams may be specific to the curriculum that is tested as opposed to more generally applicable [10].

To provide direct evidence on whether improved test scores stimulated by central exams do indeed translate into better labor market outcomes, another study again exploits the fact that German states had (until recently) been nearly evenly divided on their use of central exams [11]. Using a data set linking the exam type (i.e. central or local) of individual students to their later labor market outcomes, the study compares outcomes for workers from the two different types of schooling systems within the same German labor market.

The study finds that students from the lowest school track, who tend to enter the labor market directly after secondary school, indeed have higher earnings if they hold a secondary school certificate from a state with central exams. In addition, given that the German labor market is quite rigid, with earnings structures mostly determined by central bargaining, graduates from both low- and high-track schools are found to have lower rates of unemployment if they took a central exit exam. On average, low-track school graduates who took central exams have roughly 12% higher earnings and four percentage points lower unemployment probability than those who did not, and high-track school graduates who took central exams have 2.5 percentage points lower unemployment probability than those who did not. While these results have to be viewed as descriptive patterns, rather than necessarily causal findings, they are consistent with theoretical predictions that central exams have considerable labor market consequences, particularly when graduates leave school directly for the labor market.

Exploiting the same German setting, another study aims to directly test whether grades obtained in central exams are indeed associated with higher external rewards in the labor market, which is a necessary condition for one of the potential mechanisms of the central exam effects discussed above [12]. The investigation compares the earnings of individuals with high and low secondary school grades, depending on whether they achieved their grades in states that administered central or local exams. The main result is depicted in Figure 2, which plots average monthly earnings against grades separately for central and

Figure 2. The higher information value of central exams



Note: Gross monthly earnings by exam type and secondary school grades (normalized to have a sample mean of zero and a standard deviation of one, with higher values indicating better grades) in Germany.

Source: Schwerdt, G., and L. Woessmann. "The information value of central school exams." *Economics of Education Review* 56 (2017): 65–79 [12].

local exam states. Only a slight positive relationship between better grades and earnings is apparent among graduates from states that administered local exams. By contrast, the earnings reward for graduates obtaining good grades from central exam states is high. More specifically, the study finds that a grade improvement of one standard deviation translates into approximately 6% higher earnings when grades are obtained in central exam states, compared with less than 2% when grades are obtained in local exam states. Interpreting these results using a model in which grades are error-prone proxies for actual productivity, local exam grades appear to provide a noisier measure of productivity compared to central exam grades. The difference in earnings of more than four percentage points for grade improvements indicates the higher information value of central exams compared with local exams in the labor market.

This finding is consistent with the argument that a better signal provided by central exams raises the extrinsic rewards of learning. According to this line of reasoning, this is due to the fact that central exams create comparability to an external standard, which better communicates academic achievement to higher education institutions and potential employers. They will thus put more emphasis on educational achievement when deciding on admissions and hiring. Consequently, their decisions become less sensitive to other factors such as family connections, specific settings of short job interviews, performance relative to a class mean, or aptitude tests that measure innate ability more than overall educational achievement. Students then respond to the higher rewards for learning by increasing their learning efforts. In sum, the fact that secondary school leaving grades obtained in central exams have a stronger association with earnings increases students' incentives to learn.

How central exams interact with school autonomy

Cross-country evidence based on international student achievement tests highlights one important dimension by which the effect of central exams differs: the extent to which schools have autonomy in striving for the best way to improve student outcomes [1]. On the one hand, school autonomy may affect student outcomes positively because local decision makers tend to be better informed. On the other hand, local decision makers may act opportunistically, particularly in decision making areas where their interests are not strictly aligned with improving student achievement—unless, that is, they are held accountable for the achievement of their students. Thus, local autonomy may lead to worse student outcomes if schools do not face incentives to focus attention on improving them. By contrast, when central exams hold schools accountable for student achievement by providing comparative information on ultimate performance, the negative aspects associated with school autonomy should be eased, and greater autonomy may then lead to better outcomes.

Consistent with this line of reasoning, the international evidence points to a significant interaction between the effects of school autonomy and central exams. In several decision making areas, autonomy is negatively associated with student achievement in systems that do not have central exams, but positively so in systems that do. One such example, referring to school autonomy over teacher salaries, is depicted in the illustration on page 1. Similar positive interactions associated with the use of central exams have been found in other decision making areas, such as school autonomy in the setting of course content and teacher influence on resource funding.

When considering the prevailing economic theory, this pattern of results is intuitively appealing. However, the empirical evidence on school autonomy is only descriptive, and does not necessarily capture a causal effect. A study from 2013 has made progress toward this end by constructing a panel data set of 42 countries observed in four waves of international PISA tests spanning the period 2000–2009 [13]. The study identifies the effect of school autonomy on student outcomes by examining within-country changes in the average share of schools with autonomy over key elements of school operations. The results indicate that autonomy affects student achievement negatively in developing and low-performing countries, but positively in developed and high-performing countries. Moreover, the study confirms that the effect of school autonomy is significantly more positive in countries with central exams, indicating that local decision making may indeed work better when there is sufficient external accountability to limit the opportunistic behavior of schools.

LIMITATIONS AND GAPS

As central exams are, by definition, a feature of an entire school system, the variation on which any analysis can be based is limited. While the cross-national and cross-regional analyses provide a rather consistent pattern of results, the impacts of system features are intrinsically hard to identify econometrically. In addition, exam systems are not randomly assigned to individuals, schools, or countries, meaning that effects have to be identified from observational data. Difference-in-differences models confirm cross-sectional results, but precise identification of causal effects remains a challenge.

More needs to be understood about the most important ingredients of effective central exam systems. Evidence suggests that curriculum-based central exit exam systems

are substantially more effective than mere minimum competency exams and course graduation requirements. However, researchers' understanding of the importance of exams being based on the curriculum as opposed to testing aptitude could benefit from additional analysis.

Due to the limited degrees of freedom available in system-level analyses, they can mostly reveal broad patterns. This means that many details of specific implementation issues remain open. As such, very little is known about which exact details of a central exam system are most important to ensure beneficial effects. For example, countries differ in the breadth of subjects covered, in the mix of central and teacher-based assessments in determining the school-leaving grade, in the stakes associated with exam outcomes, and in the extent to which central exams are combined with centralized testing already in earlier grades. The extent to which these differences matter for student outcomes is an important direction for future research.

SUMMARY AND POLICY ADVICE

Evidence from regional variation within countries as well as cross-country evidence from international student achievement tests show that students perform better on achievement tests when there are central exams in the school system. While critics claim that central exams may focus teaching and learning efforts on the material tested in the exam at the expense of other subjects and skills, recent evidence suggests that central exams are also associated with better labor market outcomes. In addition, grades on central exams have higher information value on the labor market than grades on local exams. Furthermore, central exams interact positively with school autonomy.

Central exams can thus constitute an important policy instrument to ascertain high achievement in school systems, not least against the background of the proven ineffectiveness of many other policy initiatives. At the same time, policymakers should ensure that exam formats are creative and flexible enough not to be driven by test-taking skills. Also, the content of the exams should be broad enough to cover the range of skills expected from students when entering the labor market. Mixing central exam components with teacher-based grading in the final school-leaving grade may balance external validity with teacher assessments based on longer-term observation. Based on the available evidence, central exams appear to be a highly effective means of raising students' educational achievement throughout the system.

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Competing interests

The IZA World of Labor project is committed to the *IZA Guiding Principles of Research Integrity*. The author declares to have observed these principles.

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