

# Do gains in test scores explain labor market outcomes?

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## Abstract

Using data from the National Education Longitudinal Study of 1988, this article investigates whether students who made relatively large test score gains during high school had larger earnings 7 years after high school compared to students whose scores improved little. In models that control for pre-high school test scores, family background, and demographic characteristics, employed women who gain one standard deviation more than average are predicted to earn 9 percent more than average. These effects are even larger unconditional on employment status, indicating that test score gains influence both the employment status and earnings once employed. For men, however, test score gains are not significantly related to employment status or earnings, except for those men who have low initial test scores.

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## 1. Introduction

Test-based accountability programs have been the driving force of recent school reform policies. The federal No Child Left Behind Act (NCLB) of 2001 requires that students be tested in reading and math every year from grades 3–8 and at least once during grades 10–12. Furthermore, when measuring progress, high schools must consider graduation rates. Schools whose students fail to make adequate yearly progress on these measures risk losing their federal Title 1 funding. Prior to this federal legislation, systems of rewards and sanctions based on test scores were widespread at the state level. Izumi and Evers (2002) detail the elaborate systems

in California, Texas, and Florida. Goertz, Duffy, and Floch (2001) provide profiles of accountability systems in all 50 states. They report that testing programs in many states extend through high school. In 1999–2000, over half the states tested students in grade 11. In addition, 18 states required students to pass a state-administered test to graduate from high school in 1996–1997, and by 2008, 28 states expect to have high school exit exams in place.

Despite the emphasis on improving test scores, there is a question about whether accountability programs merely lead to strategic responses to the programs (such as removing certain students from the test-taking pool), whether they lead to improvements in test-specific skills, or whether they generate broad-based improvements in student skills. Jacob (2005) reviews the literature in this field. He also

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uses data from Chicago public schools to show that in higher grades, tests with high stakes (e.g., tests required to advance to high school) did lead to broad-based improvements in student skills.

Even if accountability programs can improve student test scores and student skills, there is a larger question about the long-term benefits of these improvements. Relying on test scores as the ultimate yardstick of student and school success means that test score gains may come at the expense of other important educational programs aimed at improving labor market success, such as vocational education programs and school-to-career programs. Therefore, it is important to understand how higher test scores translate into productive skills valued in the labor market.

One measure of labor productivity is a student's earnings once in the work force. Numerous studies provide evidence that higher test scores are related to higher earnings. However, earnings may be related to test scores not because the scores measure student skill, but because they reflect differences in other student characteristics, such as natural ability, that really affect earnings. If the relationship between a student's ability and test scores is constant over time, then changes in test scores are unrelated to ability and more accurately reflect the acquisition of skills. In this sense, the relationship between test score gains and earnings is more informative about the effect of school accountability policies than is the relationship between test score levels and earnings. However, little empirical work relates gains in test scores to earnings.

To gauge the potential effectiveness of policies aimed at improving test scores, this article estimates the effect of acquired skill on future earnings. Using data from the National Education Longitudinal Study of 1988 (NELS), I find that students who made relatively large math test score gains during high school had higher earnings 7 years after high school compared to students whose test scores did not improve as much. This relationship holds even after controlling for a pre-high school test score as well as family background and demographic characteristics. Conditional on being employed, women who gain one standard deviation more than average are predicted to earn 9 percent more than average. These effects are even larger unconditional on employment status, indicating that test score gains influence both the employment status and earnings once employed. For men, however, test score gains are not related to employment status or earnings

either conditional or unconditional on employment. Despite these insignificant overall effects, my results provide some evidence that test score gains may be important for men who have low initial test scores.

Because the NELS survey occurred before the recent spate of legislative accountability activity, the NELS test score gains are unlikely to be the direct result of accountability programs. Nonetheless, my results provide a baseline for what we can expect from accountability programs that improve broad-based skill. Furthermore, the results help mitigate concerns that focusing on test scores crowds out vocational and work-experience skills that are perceived to be beneficial for improving socioeconomic status. Although these work-oriented programs may also be beneficial, academic skills do appear to be an important path to better socioeconomic status.

The next section of this article describes the empirical strategy for this study and demonstrates why test score gains are a better indicator of skill acquisition than are test score levels. It also briefly reviews the literature linking test scores to earnings. Section 3 describes the NELS data and the measures of earnings and test scores used in this study. Section 4 presents the results for the models of earnings and employment, and it shows how the results differ for students with low initial test scores. Two issues arise when estimating test score effects. Even though the initial test score should control for ability, the gain may still contain an element of ability if more able students learn faster. Second, measurement error may comprise a large component of the observed test score gain. Section 4 also addresses both of these issues. Conclusions follow in Section 5.

## 2. The relationship between test scores and earnings

To study the effect of acquired skills on earnings, I model the log of annual earnings as a function of both the gain in test scores from grade 8 to 12 and the test score level in grade 8. Eq. (1) summarizes this model for student  $i$ :

$$\ln y_i = \beta_0 + \beta_1 \text{Gain}_i^{8-12} + \beta_2 \text{TS}_i^8 + \varepsilon_i, \quad (1)$$

where  $\text{Gain}_i^{8-12}$  is the gain in test scores from grade 8 to 12,  $\text{TS}_i^8$  denotes the student's test score in grade 8, and  $\varepsilon_i$  is an i.i.d. error term.

The gain in test scores best measures the acquired skill, because it is less likely than a test score level to contain a component of unobserved ability.

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