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Remedial Placement Testing in Community Colleges: What Resources Are Required, and What Does It Cost?

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Abstract

In this paper, we estimate the costs to colleges and students of remedial placement systems at community college. Using the ingredients method, we catalog the inputs required to perform placement tests and price these inputs out to derive the total cost of assigning students to either college-level or remedial courses. We use detailed data from three community colleges for our costs analysis. We find that colleges spend $30–$44 per student per subject (English or math) on assessing students for placement into remediation. We find that student time represents a substantial proportion of the total burden of placement testing; when this time is included, the total costs rise to $54–$71 per student per subject. These amounts appear low compared with the costs of "treatment" (remediation) and compared with the costs of misplacement of students into remediation instead of college-level courses.

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1. Introduction

Each fall, more than one million new students enter community colleges across the United States (U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics [NCES], 2014, Table 305.10). These institutions typically require entering students to take placement exams in math and reading/writing to determine whether they can proceed directly to college-level coursework or whether they will be required to take remedial courses first. Most community college students are assigned to remedial coursework as a result of this testing process: 70 percent take at least one remedial course, and those assigned to remediation take an average of 2.6 remedial courses during their time in college (NCES, 2012).

Remediation is an expensive exercise, even just accounting for the courses provided. With over three million new students entering college each year, the national cost of providing remedial courses is approximately $7 billion annually (Scott-Clayton, Crosta, & Belfield, 2014). Moreover, the evidence that assignment to remediation improves student outcomes is not compelling. Many students assigned to remediation never progress to take college-level courses (Bailey, Jeong, & Cho, 2010; Horn & Nevill, 2006, Table 6.2), and only one third of students who take a remedial course ever earn any postsecondary degree or credential (Adelman, 2004). Research comparing students just above and below remedial test score cutoffs has generally found null to negative impacts of assignment to remediation (Calcagno & Long, 2008; Martorell & McFarlin, 2011; Scott-Clayton & Rodriguez, 2012).[1]

The limited impact of assignment to remediation may be due to the fact that some students are misclassified by the testing process as needing remediation (Scott-Clayton, Crosta, & Belfield, 2014). Students who are college-ready but assigned to remediation incur unnecessary extra tuition and time costs and progress more slowly toward completion; they are likely to be discouraged by their experiences, without any corresponding gains in credits earned or degrees completed. Conversely, assigning unprepared students to college-level coursework generates a different set of potential

[1] We are careful to draw a distinction here between the impact of assignment to remediation and the impact of actually completing a remedial course. The studies cited here focus on the former, since it is the margin over which policymakers have direct control.

costs. These students are much more likely to drop out and lose their investment of time and money in a college education, which they might have completed if they had first taken remedial courses (Bettinger & Long, 2009, Boatman & Long, 2010). Also, underprepared students in college-level courses may impose negative peer effects on students who are ready for college-level work (Carrell, Fullerton, & West, 2009).

Hence, recent research has focused greater attention on the placement testing process by which students are assigned to remedial courses. While placement testing itself is ubiquitous at community colleges, there is variation in the types of tests that are used, the rules for exemption, and the cutoff scores for college-level placement; it is not always clear what drives differences in these policies from institution to institution (Fields & Parsad, 2012; Hughes & Scott-Clayton, 2011). Qualitative research has documented that students are often uninformed about the significance of placement tests (Venezia, Bracco, & Nodine, 2010) and that administrators face trade-offs between efficiency and effectiveness when deciding upon placement testing policies (Jaggars & Hodara, 2011). Scott-Clayton et al. (2014) highlight the imperfect accuracy of test-based placement decisions. Using detailed information on both test scores and high school performance, they estimate that roughly one third of test takers in English and one quarter of test takers in math are severely misassigned (either to college-level courses when they are predicted to fail, or to remedial coursework when predicted to do well without it). Scott-Clayton et al. found that in many cases, the placement tests add little predictive value beyond that which could be obtained from using high school performance measures (grades and units completed by subject) alone. Another recent study found that increasing access to college-level math courses via the introduction of a new placement test and placement policy resulted in significant increases in the number of test takers successfully completing college-level math; under the prior placement policy, a substantial number of these test takers would have been assigned to remedial math (Rodríguez, 2014). It is possible that if colleges devoted more resources to their systems for remedial assignment, they could improve the accuracy of placement.

These findings have generated much policy discussion, and some states have recently made significant changes to their remedial assignment processes. For example, Florida has moved to align remedial assignments with its statewide high school

graduation exam rather than using a separate test; Connecticut has moved to limit remedial coursework itself (Bailey, Hughes, & Jaggars, 2012). North Carolina and Virginia have transitioned to using new diagnostic exams in math that place students into remedial modules to allow remediation to more precisely address individual students' needs (Asera, 2011; North Carolina Community College System, 2014). In addition, North Carolina's multiple-measures policy allows recent high school graduates to be exempted from taking the placement test if they meet a minimum high school grade point average (Morrissey, 2013).

Yet, to our knowledge, there has been no investigation into the steady-state costs of remedial testing.[2] Little is known about how much colleges currently spend on processes to assign students to remediation, or whether this spending is optimal. In this paper, we attempt to partially address this gap in the literature by calculating the resource cost of administering remedial placement tests. That is, we estimate how much colleges spend and what other resources are applied in the process of assigning some students to remediation (not in providing remedial courses). We use detailed information from case studies of three community colleges, which use two different kinds of placement tests, to calculate these resource costs.

A costs analysis provides insights into college practices and how resources are used. The first step is to identify the inputs colleges use, the main factors driving costs, and who bears these costs. By accurately describing costs, we identify how and what resources are used to operate a system of remedial assignment. This information can then be used to inform policy discussions: What are the main inputs into remedial assignment? Are the costs large enough to be a major factor in institutional decisions about whether and how to test students? Or are they so trivial as to be unimportant? Are the costs that students face, in terms of their own time, significant enough to undermine the accuracy of the tests (for example, if time-constrained students rush through the exams), or even to become a barrier to the enrollment process? Without information on how much remedial testing costs, colleges cannot determine the budgetary consequences of changes to the

[2] Note that the current study examines only the steady-state costs of placement testing, not the cost of reforming or reallocating resources that results from transitioning to a new placement test system.

testing process, nor can policymakers accurately estimate the burden such exams place on students.

A costs analysis can also help policymakers weigh whether colleges are spending too little or too much on remedial testing. Analogous to diagnostic approaches in pharmacoeconomics, colleges' spending on remedial testing can be expressed as a proportion of total college expenditures on remediation (how much is spent on diagnosis relative to treatment) or in relation to the consequences of inaccurate placement (how much is spent on diagnosis relative to the cost consequences of misdiagnosis). Fundamentally, the costs of a "diagnosis" of remediation should be commensurate with the benefits of such a "treatment." That these tests may not be perfectly accurate raises a second diagnostic issue. If the benefits of remediation (or the costs of being misplaced into it) are large, colleges should devote more resources to ensuring that students who need remediation receive it. Yet, although colleges have paid attention to the potential benefits of remediation and made efforts to improve remedial instruction, no study has previously investigated the costs of remedial testing. This study represents the first investigation into how much colleges spend on remedial testing and what resources are used in the process.

Our paper is structured as follows. First, we describe the ingredients method for costing educational processes and policies and contrast it with shortcut methods in which costs are estimated from budgetary data. Second, we provide contextual information about each of the three case study colleges (labeled Alpha, Beta, and Gamma Community College) and their testing processes. Third, we present our estimates of the average and total costs of remedial testing from the ingredients method and consider whether these amounts are too high or too low. Finally, we draw implications from our findings for remediation policy.

2. Ingredients Method for Cost Estimation

The ingredients method for costing educational interventions is well established (Levin & McEwan, 2001). The method defines costs in terms of opportunity cost—that is, the value of a resource in its best alternative use. For example, student time spent

taking the placement test is valued using the minimum wage, as undertaking this activity results in forgone earnings. The ingredients approach identifies all the resource components required for implementation of a specific activity. Here, the activity is all placement testing undertaken by the college for remedial assignment within a single calendar year. Our cost measurement captures total resource use compared with a college where there is no placement testing used for remedial assignment.[3] To emphasize, we are only costing the placement testing used for remedial assignment and not the delivery of remedial courses or the testing used to exit remediation (or any activities that occur after placement testing, such as counseling by non–testing center staff to ensure that students who take the exam enroll in the appropriate courses).

The ingredients method involves three stages. First, the quantities of all the required ingredients must be identified, regardless of who finances them (e.g., testing center director, proctors, computer labs, student time). Second, national prices for each of these ingredients, for the given calendar year, must be specified. It is important to distinguish the quantities of ingredients from their prices to account for differences in price levels across colleges and to allow for meaningful comparisons between the colleges, as well as for applicability across the sector. Finally, quantities and prices are multiplied to calculate the total and average costs of the policy. In an additional stage, cost estimates may be disaggregated across different constituencies or agents. For example, the resources needed for remedial testing may be provided by the college or the state system. Also, students must make time to take the tests, and this time has an opportunity cost (such as earnings forgone). Disaggregating the cost estimates enables the calculation of the net costs per constituency and shows where the resource burden is heaviest.

Critically, reliance on budgetary data from colleges will not yield accurate cost estimates. Budgetary information is typically incomplete and potentially misleading. The principles on which budgets are based were not designed to give accurate calculations of opportunity costs. Budgetary data is designed to satisfy accounting practices, such that resource use is not linked to specific activities within a college. For example, personnel

[3] In this paper we use the terms *placement exam*, *placement test*, and *remedial testing* interchangeably to denote the exam used to assign students to remedial or college-level courses.

time is measured in overall hours worked, not in time spent on each specific task. Because resources are applied from various sources and personnel, there is no single budgetary document that captures all resources used for a specific activity. Finally, it is not typically possible with budgets to separate out the quantity of an ingredient from its price. In contrast, cost estimation using the ingredients method accounts for all the resources needed and applies consistent prices for each ingredient.

Costs data for this study were collected from two sources. For the ingredients, we interviewed testing center staff at each college to ascertain all the inputs used for placement testing during the 2012 calendar year. The hour-long, in-person interviews took place at a college conference room or testing center; these were supplemented by follow-up emails and/or phone calls.[4] Input price data was retrieved from national databases of prices (e.g., National Compensation Survey, Bureau of Labor Statistics), documentary evidence from the colleges (e.g., for the costs of the test booklets), and the Center for Benefit-Cost Studies of Education's education price indices (http://cbcse.org/cost-resources/). Where possible, market prices were used to establish the value of each ingredient. For personnel, which is the largest ingredient, information regarding time commitments, qualifications, and experience was used to find appropriate market prices in the form of salaries and benefits. Where market prices were unavailable, shadow prices were applied (e.g., facilities space was priced using commercial rental rates). For this costing exercise, most of the ingredients were for operations, so it was not necessary to amortize the value of physical assets over multiple years. Finally, all values are reported in 2012 dollars, using the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W) as an inflation index.

3. College Context

3.1 Alpha Community College

Alpha Community College is a large, urban college that is part of a large college system with several campuses. Over 19,000 full-time equivalent (FTE) students were

[4] See the appendix for details of the interview questionnaires and schedule.

enrolled in Alpha Community College in fall 2012; approximately 4,600 new students enrolled during the 2012 calendar year. The placement testing policy at the college is largely set by the system's central office, which determines who is required to take the placement tests, which tests are to be used, and what the minimum cutoffs are for college-level placement.

Subject to exemptions for those with high scores on the SAT/ACT or the statewide high school exit exam, new students at Alpha are required to take placement tests in math, reading, and writing. Like the placement tests at the majority of community colleges nationwide, Alpha's math and reading tests are computer-based standardized exams that are licensed from one of the dominant placement test vendors, which charges a unit cost per test per student, plus an additional per-student charge for a module collecting student demographic information. In contrast, Alpha's writing test is a paper-and-pencil essay exam, developed internally by a committee of faculty and administrators from across the college system. The development of the writing test is not a one-time event but rather an ongoing process; the system develops approximately 20 versions of the test annually to limit the likelihood that students will be able to discover and prepare for the essay question in advance. Exams are then field-tested within the system before they are implemented system-wide.

At Alpha, all three placement tests are administered at the campus testing center. If needed, overflow classrooms are used during peak testing periods. The testing center is dedicated primarily to placement tests and includes two computer labs dedicated solely to the administration of these tests. Tests to determine whether students may exit from remediation are also administered at this center. Our analyses exclude exit tests, as they pertain to the completion of remediation (the treatment) rather than to the assessment of the need for remediation (diagnosis).[5]

Entering students are notified of their appointment for the three subject tests and typically take all required exams in one sitting, minimizing the need for multiple commutes to campus. The computer-adaptive math test, which includes modules in pre-

[5] At Alpha Community College, one third of reading and half of writing tests are tests to determine exit from remediation. To enable us in making comparisons across the college sites solely based on exams administered for placement purposes, these proportions were used to exclude the cost of exit tests from our analysis of Alpha Community College.

algebra and algebra, is untimed, but the testing center director noted that students complete both modules in an average of 90 minutes; the computer-adaptive reading test is untimed but averages 90 minutes for completion; and the paper-and-pencil writing test is fixed at 90 minutes (students are not allowed to leave early). Thus, altogether, students who are required to take all placement exams typically spend about 4.5 hours at the testing center in a single day.

The math and reading tests are computer-graded, and students' scores are available immediately to personnel via the college student information system; however, students do not obtain a score report until their writing exam scores are available as well. When all scores are available, students are directed to meet with a counselor for assistance with interpreting the scores, selecting their courses, and registering for courses; testing center staff do not play an active role in helping students understand the test results.

Writing exams from Alpha (and other community colleges in the same system) are physically transported to an external site to be scored by two trained readers, who are faculty or adjunct faculty members from any of the system's colleges. A third reader scores a subset of exams for quality control purposes, as well as exams given discrepant scores by the first two readers. Within approximately one to two weeks, the writing test scores are entered into students' electronic records, and the written exams are then physically transported back to Alpha.[6] Writing exams with scores below the remedial cutoff are then reread by an additional reader at Alpha's campus to determine whether the student should be enrolled in English as a second language (ESL) coursework or which remedial writing course would be the most appropriate.[7] Finally, the paper exams are archived (as required by law).

[6] The use of paper exams means that, in contrast with the math and reading scores, the writing exam results are not as easily transferrable from college to college within the system. If students take the writing test at another college but then want to enroll at Alpha, their scores can be accessed electronically, but because the writing exam is archived in hard copy at the original testing site, students with failing writing scores are required to take an additional 60-minute "local" writing exam at Alpha to determine whether they should be placed into ESL courses.

[7] Note that students may actually be referred to courses in the continuing education program, adult basic education, or a community based education program if their skills are below the high school level.

3.2 Beta Community College

Beta Community College is located in a midsize city and is part of a large community college district that has an annual enrollment of over 30,000 students across the state. Beta has approximately 6,600 FTE students overall; during the 2012 calendar year, approximately 2,500 new degree-seeking students enrolled. The district in which Beta is located also includes our third site, Gamma Community College. Although the two colleges utilize similar assessment systems for incoming students, they differ in the resources used to implement the policy, so we address each college separately.

Subject to exemptions for those with SAT/ACT scores above a threshold, new students are required to take placement tests in math and English. All subject tests are purchased from a private test company but are customized to reflect state standards. Practice materials and exams are offered on the system office website. A unique feature of the Beta math placement test is that it includes both computer-adaptive and diagnostic components. The diagnostic component is intended to improve placement accuracy by better matching students with developmental math modules or traditional college math courses based on their proficiency in competencies required for specific programs of study. The exam assesses competency in nine quantitative reasoning areas, ranging from operations with positive fractions in module 1 to functions, quadratic equations, and their graphical representations in module 9. A score printout is generated immediately upon completion of the exam and provides students with a list of the developmental modules in which they demonstrated competency via the exam, a list of the modules they need to complete before enrolling in a college-level math course (if applicable), and a list of the college math courses they placed into (if applicable). Unlike Alpha, which uses separate reading and writing exams, Beta assesses college-level English skills using a single computerized exam. College-level reading skills are assessed via multiple-choice questions, and college-level writing skills via a typed essay. The English test is designed to be fully computer-graded, and English score reports, like those in math, are generated immediately upon completion of the exam and provide students with information about their performance and offer a list of English courses they qualify for; the exception is that nearly 8 percent of writing exams are deemed unscorable and are hand-graded by test-vendor personnel (performed off-site).

Placement testing practices at Beta Community College are mainly computerized and web-based. The college operates a testing center on campus in facilities that have a computer lab and paper-and-pencil stations. The center has access to two additional labs during weekends and spring break to expand capacity. In contrast to the testing center at Alpha, the Beta testing center is also heavily engaged in other types of student testing, including exams for online courses, certification tests, and proctored make-up tests for regular courses. The testing center director at Beta estimates that approximately 30 percent of their testing center services are placement tests. In addition, some placement tests are administered through a web-based portal in local county high schools to determine eligibility for dual enrollment (these tests and associated costs are not included in our analysis).

Students are not given appointments for tests. Students come to the testing center on a walk-in basis and generally do not have to wait to take the placement test because the peak-times for placement testing do not overlap with use of the testing center for other purposes (e.g., proctoring of online final exams). Registration and check-in for testing at Beta Community College is computerized and takes place on-site; administrative and proctoring staff supervise testing. Both the English and math exams are untimed. Administrators from the state system office reported that on average, it takes students 90 minutes to complete the English exam and 90 minutes to complete the diagnostic math exam.[8] Testing center directors reported that both exams can take much longer, though, and that they have seen some students take over 3 hours on a single exam. Students do not have to complete an entire test in a single sitting, although test center directors noted that most students do complete each individual test within a single day. Because it can take students a considerable amount of time to complete a single exam, students who need to take both the English and math tests are encouraged to take them on separate days—implying the need to commute to campus on two separate occasions.[9] Thus, on average, a student needing to take both English and math exams would typically

[8] Interestingly, Beta's math placement exam, with its diagnostic component, does not appear to take students more time to complete than a traditional computer-adaptive math exam, such as that used at Alpha.
[9] While students are encouraged to take the English and math placement exams on separate days, some students might choose to take the exams in a single day. Doing so would result in a one-hour reduction in students' commute time. This is equivalent to a unit cost per-test savings of approximately $3.50 (e.g., half of the estimated minimum wage in forgone earnings).

spend a total of 3 hours at the testing center split over two days, in contrast with Alpha's average of 4.5 hours in a single day.

Once students complete the exam, they receive a printout with their scores, as described above. Testing center staff at Beta noted that they generally review the printout with students to give them an overview of what the test results mean and what courses they qualify for. Students are also referred to the counseling office, located in a building adjacent to the testing center, for further assistance with course selection and registration. Thus, at Beta, both counselors and testing center staff play a role in helping students understand test results and remedial placements. Students at Beta Community College are eligible to retest after one year if they have not enrolled in a developmental education course, but according to the testing directors, retests are rare.

3.3 Gamma Community College

As noted above, Gamma Community College is located in a suburban city and is part of the same college district and statewide system as Beta, so it has some similar features. However, Gamma is smaller, with approximately 3,200 FTE students overall; during the 2012 calendar year, approximately 1,900 first-time freshman enrolled.

All freshman students at Gamma, except those with SAT/ACT scores above a threshold, are required to take the same English and diagnostic math placement tests as those used at Beta. In addition to the practice test materials available online from the system office, the college makes materials available for students through Gamma's website and campus library.

At Gamma, the placement tests are proctored at an on-campus testing center with two computer labs—one of which is devoted entirely to the administration of placement tests. As at Beta, the testing center also offers other services, and the Gamma testing center also houses the tutoring center. Overall, approximately 20 percent of services provided at the Gamma testing center are related to placement testing.

The intake and test-taking process at Gamma is similar to that at Beta, where testing services are available on a walk-in basis and tests are proctored by the center staff. As at Beta, students can complete a single exam in more than one sitting, and students who need to take both exams are encouraged to take the math and English tests on different days. System administrators estimate that it takes students about 90 minutes to

complete the untimed English exam and 90 minutes to compete the untimed diagnostic math exam. The testing center director at Gamma, however, noted that the actual time students take to complete a test can range from 30 minutes to over 3 hours.

As at Beta, once students complete an exam, they immediately receive a printout with their scores. Testing center staff then direct students across the hall to the counseling office for assistance with course selection and registration. The counselors determine appropriate coursework for students based on their placement results. Unlike at Beta, where testing center staff members also play a role in helping students understand the test results, at Gamma, this role is primarily left to the counselors. It is likely that the locations of the counseling offices at the two colleges influence their roles—the counseling office is directly across the hall at Gamma and in an adjacent building at Beta.[10] As at Beta, if students do not enroll in a developmental education course, they are eligible to retake the tests after one year. The testing center directors reported that retests are uncommon.

3.4 Variation in Test-Taking Procedures

The three colleges differ in several distinct ways in their remedial testing processes, although in each case the colleges are subject to system-wide ordinances—at the college system level for Alpha and at the state level for Beta and Gamma. The testing centers at the three colleges have somewhat different facilities and functions: At Alpha, the remedial testing center is run using two computer labs and is primarily devoted to placement/exit testing, whereas at Beta and Gamma, these centers function also as sites for proctored exams for online courses and certification; Gamma's center also offers student tutoring. Beta has one large computer lab that serves multiple functions, and Gamma has a smaller computer lab within the testing center that is specifically devoted to placement testing. The scale of testing also differs: Alpha administers many more tests across multiple fields (e.g., pre-algebra, algebra, reading, and writing), whereas Beta and Gamma only administer two types of placement exams (math and English). The tests

[10] This study only examines the cost of administering placement tests for remedial assignment and does not consider the cost of counseling/advising to interpret the placement results. It is anticipated that the counseling/advising sessions during which this assistance is provided would take place regardless of the placement testing. Research on counseling indicates that the traditional post-assessment and advisement process—which may include discussions of test score interpretation, course selection, and major selection—typically takes 5 to 15 minutes.

themselves differ: Through its college system, Alpha develops its own paper-and-pencil writing test; at Beta and Gamma, the writing test is developed by an independent private company and is computer-based. Furthermore, the colleges differ in how students take the tests: At Alpha students typically take all tests on the same day; at Beta and Gamma students are encouraged to take the math and English tests on different days. The grading process for the tests varies, at least for writing: At Alpha, the writing test is graded by trained readers who work within the college system; at Beta and Gamma, almost all tests are graded by a computer. Finally, the time it takes for students to obtain their placement test results varies: At Beta and Gamma, students obtain immediate reports on their performance; at Alpha, score reports can take a week or two to process.

Given this variation in testing procedures between the three colleges, we might expect to find substantial differences in input use and the costs of remedial testing. However, we caution that the colleges should not be compared against each other to see which has the lowest cost. To make valid comparisons, we would need to know the relative accuracy of each college at placing students, as well as the resource consequences of placement in terms of remedial courses provided. Given that our costs analysis is novel (and limited to three case studies), it would be premature to draw conclusions about the relative efficiency of remedial assignment practices at different colleges.

4. Costs of Remedial Testing

4.1 Costs by Ingredient

We present summary costs data for remedial testing across the three colleges in Table 1. Table 1 also shows the distribution of spending across ingredients. These estimates are for the costs of testing for placement into remediation during the full 2012 calendar year (using 2012 prices). Broadly, the use of ingredients is similar across the three settings: College spending covers 60 percent of the entire resources required for testing; the opportunity cost of student time covers the remaining 40 percent.

Table 1
Total and Average Costs in 2012 for Remedial Testing at Three Colleges

		Alpha College		Beta College		Gamma College	
	Units	**Cost**	**%**	**Cost**	**%**	**Cost**	**%**
Personnel							
Dean	FTEs	$29,160	3	$40,110	12	$41,350	14
Director	FTEs	$38,020	4	$6,270	2	$9,420	3
Administrative staff	FTEs	$34,700	4	-	-	-	-
Proctors	Hours	$95,370	11	$36,770	11	$41,290	14
Assistants/graders/readers	Hours/test	$101,120	12	$5,830	2	$5,620	2
Overhead	Rental rate	$107,990	12	$45,400	14	$26,800	9
Facilities							
Computer lab	Square feet	$79,750	9	$27,240	8	$22,420	7
Office space	Square feet	$11,310	1	$2,830	1	$1,890	1
Materials/equipment							
Computers	Per unit	$7,380	1	$4,630	1	$4,040	1
Tests: writing/reading	Per test	$18,720	2	$6,780	2	$6,880	2
Tests: math	Per test	$21,200	2	$10,240	3	$9,490	3
Total college expenditure [S]		**$544,720**	**62**	**$186,100**	**58**	**$169,200**	**56**
Student time							
Writing or English	Hours	$56,990	7	$28,590	9	$29,000	10
Reading	Hours	$69,550	8	-	-	-	-
Math (I and II)	Hours	$70,440	8	$34,480	11	$31,840	11
Commuting time	Hours	$53,360	6	$41,910	13	$40,560	14
Test prep time	Hours	$81,340	9	$30,860	10	$29,420	10
Total student opportunity cost [T]		**$331,680**	**38**	**$135,840**	**42**	**$130,830**	**44**
Total social cost [C = T + S]		**$876,400**		**$321,940**		**$300,030**	
Tests [*n*]		**12,300**		**5,800**		**5,600**	
Spending per test [S/*n*]		**$44**		**$32**		**$30**	
Unit cost per test [C/*n*]		**$71**		**$56**		**$54**	

Note. Costs reported in 2012 dollars. For Alpha, number of tests includes all writing, reading, and math tests; total excludes reading and writing exams administered for exit from remediation. For Beta, number of tests includes all English and math tests; total excludes reading and writing exams administered for exit from remediation. For Gamma, number of tests includes all English and math tests; total excludes reading and writing exams administered for exit from remediation. Costs rounded to nearest $10. Test numbers rounded to nearest 100.

Sources: Wage source: 2012 CUPA-HR Administrative Compensation Survey (http://www.cupahr.org/surveys/adcomp_surveydata12.aspx). Wages adjusted for experience and qualifications required for position. All non-hourly staff wages adjusted for benefits at 32 percent (Bureau of Labor Statistics, 2010). Materials/equipment prices from market prices. Licensing costs for tests from market prices and college contracts with test providers. Facilities rental rates per square foot based on new build for equivalent office space amortized over 30 years at 5 percent. Facilities space based on proportion of facility time allocated to remedial testing. Student time costs based on opportunity cost of wages forgone at state-level minimum wage (http://www.dol.gov/whd/minwage/america.htm#content).

Looking at spending within the colleges, Table 1 shows that remedial testing is a relatively human capital–intensive process: 72–75 percent of total college spending is on personnel, and a substantial proportion of the personnel costs are for managing the remedial testing process. The resources allocated to grading the tests are considerably smaller for Beta and Gamma (each with 3 percent of total college spending) than for Alpha (19 percent of total college spending). These differences are primarily due Alpha's in-house development and grading of the paper-based writing placement exam. The largest single cost item is also associated with personnel—namely, the cost of the overhead, which comprises 16 to 24 percent of total college spending across sites.[11]

Direct expenditures to devise the tests (or determine which existing tests should be applied) are quite low (in part because these tests are developed at the system or state level and applied across many campuses). In fact, spending on the tests themselves is a relatively small fraction of college spending on placement testing (at 7–10 percent). Therefore, colleges should be cautious in using the price of a privately provided test script as a guide to the overall costs of remedial testing.

Finally, we observe differences in costs between reading/writing tests and math tests. The unit social costs per test of $71, $56, and $54 for Alpha, Beta, and Gamma respectively are an average across the English and math tests, but in fact these tests can have quite different costs. In particular, at Alpha, the resources involved in the English exam—in terms of both institutional expenditures and student time—are much greater than for the math exam. We estimate social costs of $80 per English test (including both reading and writing) versus $54 per math test at Alpha. A major factor driving the difference across subjects is that the math modules are generally completed in about 1.5 hours, whereas Alpha's testing center director indicated that the reading and writing

[11] We adjust for resource use for remedial testing that is not sited at the colleges. For Alpha, some management tasks were performed by the central system office, which undertakes other tasks. Based on administrative data on all system-wide test records, Alpha college administers 11 percent of all system-wide placement tests; we apply this proportion to all central system office resources allocated for remedial testing. Also, writing placement tests at Alpha are graded off-site at a center that serves other campuses. Based on the system-wide administrative test-score data, 45 percent of off-site center resources are apportioned to tests from Alpha. Finally, college-site testing centers perform other services. Total testing center costs are therefore apportioned to remedial tests based on their proportion among all tests these centers provide and based on the percentage of time staff report spending on remedial testing. At Alpha, remedial testing represents three quarters of all center activities (with the remainder devoted to remedial exit testing). At Beta and Gamma, three tenths and one fifth of center activities are devoted to remedial testing respectively.

modules together typically take students 3 to 4 hours to complete (and as noted above, students are required to sit for 90 minutes for the essay, even if they finish early). This accounts for approximately $9 of the difference in costs between English and math tests at Alpha. The remaining difference is due primarily to the significant additional personnel costs associated with developing and grading the essay component of the English exam.[12]

Student time is also a very important cost of remedial testing, even though it does not involve direct expenditures by the college.[13] Our estimates of student costs are based on the amount of time needed to take the test multiplied by the opportunity cost of time expressed in terms of forgone wages. These estimates also include the average amount of time spent preparing for the test multiplied by forgone wages.[14] However, these opportunity costs are likely to be conservative because they are proxied by the state minimum wage. Although we have no direct evidence, it seems likely that test-taking (and waiting to take tests) has a lower utility than working and so would have a higher opportunity cost. Even with these conservative assumptions, the amount of time students spend commuting to take the test greatly exceeds the costs of devising and purchasing the test scripts. This argument gains further salience when we factor in the likelihood that many students are taking more than one test.

4.2 Total Costs and College Expenditures

From a social perspective, the total resource cost is salient. This includes both college expenditures and student time. In the bottom panel of Table 1, we show total social costs of $876,400 at Alpha, $321,940 at Beta, and $300,030 at Gamma. From the college perspective, total college expenditure on remedial testing is the relevant measure.

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[12] This practice ensures support for the application of these tests. Given that administrators and both full- and part-time faculty are involved in the development, field-testing, and grading process, the exam has widespread support from key system stakeholders. In addition, the system-wide testing director noted that as a result of the development and grading process, the writing exam is considered to provide an accurate assessment of the type of writing students are expected to produce in college-level courses.

[13] Although this type of cost might appear as "free" to the college, it may place a significant burden on students, even if they are not working, as childcare, family, and other responsibilities might increase opportunity cost in practical terms. The opportunity cost for students can potentially constrain colleges' ability to impose more thorough tests or diagnostics.

[14] The estimates of the time students spend preparing for the English and math placement tests were derived from focus group surveys administered at two of the colleges in the study. Calculations assume that students in the third college spend the same amount of time preparing for the tests.

This amount is $544,720 at Alpha, $186,100 at Beta, and $169,200 at Gamma. By comparison, total annual operating expenditures at these colleges are $203 million at Alpha, $52 million at Beta, and $39 million at Gamma. Expenditures on remedial testing are therefore no more than 0.5 percent of total operating expenditures.

Spending on diagnosis is very low compared with spending on the subsequent treatment of remedial instruction. At Alpha, Beta, and Gamma, total expenditures on remedial instruction are approximately $9.3 million, $2.0 million, and $2.2 million respectively.[15] Remedial testing expenditures are therefore 6 percent, 9 percent, and 8 percent respectively of the remedial instruction totals.

4.3 Average Costs Per English/Math Test Administered

Average costs per test are reported as total costs divided by the number of remedial English and math tests taken.[16] Our test numbers are based on the total number of placement tests administered at each college during the 2012 calendar year, as reported by the colleges. The colleges provided data on all test administrations (including retests) for first-time as well as continuing students, ability-to-benefit students, and dual enrollment students if they tested at the testing center. For our analysis, we separate out only students who are taking the test for the purpose of determining their initial remedial status. Our results show significant variation across the colleges, disproportionate to their size. Alpha administers a combined total of 12,300 English and math placement exams annually; by comparison, Beta administers 5,800, and Gamma (though it is much smaller than Beta) administers 5,600.

The final rows of Table 1 show the average college expenditure per English/math test and the average total cost (including students' time) per test. College expenditures per remedial test administered are $44 at Alpha, $32 at Beta, and $30 at Gamma.

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[15] These estimates are based on total instructional expenditures on first-time degree-seeking enrollees at the three colleges in this study (IPEDS, 2013). We estimate total expenditures in remedial instruction by assuming that remedial courses represent 10 percent of total instructional expenditures allocated to first-time degree seeking students.

[16] To ensure the comparability of results across colleges, we aggregate all modules that are administered to determine remedial English placement and count them as a single English test. This is to avoid calculating per-test costs on the basis of arbitrary divisions of test material into multiple modules. For example, although the reading and writing modules are technically separate exams at Alpha, we count them in our analysis as a single English test because they are administered jointly. This maximizes consistency with Beta and Gamma, which use a single English exam with both reading and writing components.

Respectively, total social costs per test are $71, $56, and $54. As discussed below, much of the difference in costs between Alpha and the other two colleges is driven by Alpha's use of a locally developed and graded writing exam, as well by the longer duration of time students spend on Alpha's battery of tests (4.5 hours versus 3 hours).

We are not able to precisely identify the number of unique students in the data but only the number of tests taken. Many students take tests in more than one subject, and some students may take tests multiple times. Thus, for example, testing a single student in both English and math would generate costs of $141, $112, and $108 at Alpha, Beta, and Gamma respectively. Requiring students to take exams again to test out of remediation (a feature in place at Alpha, which we do not incorporate in our analysis) would increase costs further still.

Nonetheless, even at Alpha, the per-test college expenditures are very low compared with college-level expenditures on students during their time in college. Based on a detailed cost study of one community college, Belfield, Crosta, and Jenkins (2014) estimated that the average amount of college resources allocated to each student is $13,970 over the entire period during which the student is enrolled at that college. In fact, students in remedial programs have even more resources allocated to them; the cost per student who is not college-ready ranges from $18,040 for students who place into the top level of remedial education to $15,390 for students who place into remedial courses that are three levels below the college level (the latter figure is lower because these students tend to drop out earlier). Therefore, as each student registers, the college commits to spending at least $13,970 while that student is enrolled, against which the cost of testing to determine whether that student is college-ready is approximately 0.5 percent ($27–40 times the number of tests each student takes). Thus, colleges appear to be spending relatively little on placement testing (diagnosis) compared with the resources committed to remedial education (treatment).

We also find that both college spending and the total costs of diagnosis (including students' time) appear low compared with the cost consequences of possible misplacement. There are two forms of misplacement that can occur, due to the imperfect nature of remedial placement tests. First, some students will be assigned to remediation even though they could have done well in college-level courses (underplacement); and

second, some students will be assigned to college-level courses even though they are unlikely to succeed there (overplacement). Scott-Clayton et al. (2014) estimate that one quarter to one third of tested students are misplaced, with underplacements being much more common than overplacements. Simply in terms of course credits, the misplacement cost consequences are high. Scott-Clayton et al. estimate that 14 to 29 percent of tested students are severely underplaced (depending upon the institution, test, and subject). Taking a low estimate from this research, an underplacement rate of 20 percent would generate additional college costs of $324 per misplaced student (assuming a misplaced student takes one remedial course at a cost of $1,620 per course). This direct cost of misplacement alone is about 10 times what colleges spend on a test. The time costs of misplacement for students are 5 to 20 times larger than the time costs of the test.[17] And these are only the costs associated with underplacement. There are also costs that result from students being placed into college-level courses that they are unable to complete; however, these costs are less straightforward to estimate.[18] Thus, colleges appear to be trading off resources for diagnosis at a very steep level; spending on diagnosis is much lower than the cost consequences of misdiagnosis.

5. Conclusion

Our main conclusion is that spending on remedial testing is very low. We appreciate that there are no recognized, *a priori* standards by which to test this conclusion. However, remedial test spending appears low in proportion to how much colleges spend on remedial courses (diagnosis versus treatment). It is low in proportion to the costs of misplacement (diagnosis versus consequences). And it is low in proportion to the amount each college commits to spending on a student when the student first registers (diagnosis versus commitment). This conclusion suggests that colleges might give much

[17] This range of estimates is calculated using estimates of 1.5–3.5 hours of student time per test depending upon the site and subject (as reported by testing directors), and a back-of-the-envelope estimate of 75–150 hours of class time and preparation time for a remedial course.

[18] An alternative way to measure the trade-off would be to look at the long-term consequences of being misplaced for college completion and future earnings. This approach would yield much larger cost consequences.

greater attention to their remediation processes and how students might be allocated to remedial or college-level courses.

Our second conclusion relates to student time spent on tests. Relative to the college resources committed to the tests, students' time commitment is substantial. Even measured conservatively, the value of student time is a large proportion of the total costs of remedial placement. Given these valuations, students may be unwilling or unable to invest further in the remediation process and may attempt simply to minimize the burden. Policymakers might consider placement options that require little or no investment of student time—for example, using high school transcripts and grade point averages to determine placement. Resources might then be reallocated to improvements in the advising that is part of the placement process. While a placement exam might still be necessary for students who do not have a recent transcript or grade point average above a certain level, the costs associated with placement would still be lower by adopting this alternative approach.

These conclusions hold across all three colleges. Despite many differences across the colleges in how remedial testing is structured, the differences in costs are not dramatic. As we have only collected evidence for three colleges, we are cautious about extrapolating across the community college sector. The processes and practices across our three colleges do not appear to be atypical (Hughes & Scott-Clayton, 2011; Hodara, Jaggars, & Karp, 2012), and, insofar as these colleges must adhere to external regulations across either a system or a state, resource use at other colleges may not be substantially discrepant. We further caution against using these cost findings as indicators of college efficiency. We cannot easily compare colleges because we do not know how accurate the placement tests are at each college. To assess cost-effectiveness, we would need, in combination with these costs data, information on the extent to which students are accurately placed into remediation. Such information is not available. Similarly, little is known about the economic constraints on the students who take these tests. Indeed, a better understanding of student time constraints—and how to alleviate them—would contribute toward improving the efficiency of remedial placement systems.

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Appendix: Data Collection and Interview Protocols

Open-ended questions were used to collect information on the inputs used for remedial testing (see interview protocol below). Documents were also collected to better understand the research setting as well as the policies and practices of the testing centers. These documents included college catalogs, pamphlets, and/or websites. These documents were used to supplement interview data.

The sample was drawn from three college sites in two states. The sites were selected for the study based on differences in the type of assessment system used—traditional computer-adaptive versus diagnostic math assessments, and hand-graded versus computer-graded writing assessments. Upon identification of the sites, the testing center director and other pertinent testing center staff and administrators at each college were recruited for an interview. A total of eight participants were interviewed for this study, two at Alpha, two at Gamma, and four at Beta. In-person interviews were approximately 60 minutes each and were supplemented with follow-up phone calls and emails. Data collection took place during the spring and summer of 2013.

Background

We would like to begin by learning more about the testing center and the number of students served overall and by subject.

1. Let's start off with a little background information.
    a. What is your position and title?
        i) What is your educational level?
        ii) How long have you worked here? In all, how many years of experience do you have conducting this type of work?
        iii) How many hours per week (or what percentage of time) do you spend on placement testing activities?
        iv) Do you have other responsibilities at the college besides those related to placement testing?
        v) Is your position full-time, part-time, or seasonal/temporary?

2. Tell me about the purpose and structure of the testing center.

a. What activities or responsibilities fall under your office's purview?
b. What proportion of this office's time is spent on placement testing?
(*Probe:* Want to learn about other activities the center does—for example, foreign language placement testing, College Level Examination Program testing, online education, etc.)

3. How many students were tested at this center over the last year? If possible, can you give this information separately by subject and by term for spring 2012, summer 2012, fall 2012, and spring 2013?
(*Probe:* Where does this estimate come from? Is there documentation on this? Are these test administrations or unique students? Want to be sure we do not double-count.)

4. What proportion of students retakes the placement test? If possible, can you give this information separately by subject and by term for spring 2012, summer 2012, fall 2012, and spring 2013?
(*Probe:* Where does this estimate come from? Is there documentation on this? Are these test administrations or unique students? Want to be sure we do not double-count.)

5. Are students tested at off-site locations, such as a local high school?
   a. Please describe how off-site testing works—for example, in terms of the staff involved; facilities, equipment, and materials required; and student recruitment.
   (*Probe:* Get a sense of how off-site testing works in terms of staff, facilities, equipment, and materials. We will gather more detailed resource information below. Also, learn whether special training is needed and if any of the staff involved are compensated or reimbursed beyond their normal pay.)

6. If off-site testing takes place, how many students were tested at off-site locations over the last year? If possible, can you give this information separately by subject and by term for spring 2012, summer 2012, fall 2012, and spring 2013?

(*Probe:* Where does this estimate come from? Is there documentation on this? Are these test administrations or unique students? Want to be sure we do not double count.)

Resources Required

Next, we would like to learn more about the resources required to operate assessment and placement systems at your college and at off-site testing locations, if applicable. We are particularly interested in resources used to carry out placement testing and related activities, which include preparing for, administering, grading, and interpreting the test results. If applicable, include how much time is spent by staff to develop materials.

7. How many staff members at the college and off-site testing location are involved with placement testing and related activities?
   a. For each staff member, we would like to know:
      i) the type of education required
      ii) experience in years
      iii) the number of hours per week (or percentage of time) spent on placement testing and related activities
      iv) other responsibilities the staff member has when not involved with placement testing
      v) employment status (i.e., full-time, part-time, seasonal, or temporary); if applicable, indicate if staff time is measured over an academic year (AY) or calendar year (CY)

   Staff at the college:

   Testing center director/coordinator (if not the person being interviewed)
   Staff
   Graders
   Guidance counselors for test interpretation/placement
   Administrative assistant/receptionist
   Data entry or database specialist
   Work study students

Other college students

Support from other college staff (writing center, math lab, human resources, information technology, etc.)

Others

Staff at the off-site testing location:

Principals

Teachers

Guidance counselors

Computer lab technician

Others

8. We would also like to learn more about the college's use of facilities for placement testing and related activities. This includes office space for staff and classroom/lab space for taking, grading, and interpreting tests. Also, if off-site testing or scoring takes place, describe these facilities as well.
   a. For each type of facility at the college and off-site testing location that is used for placement testing and related activities, we would like to know:
      i) What is the approximate size or number of facilities required? Try to approximate square footage if possible.
      ii) Are facilities used for other college activities? If so, for what purpose?
      iii) What percentage of the time are they used for placement testing activities?

   Office space

   Computer lab space

   Classroom space

9. We would also like to learn more about the use of equipment and materials for placement testing and related activities. This includes equipment and materials needed for staff and for taking, grading, and interpreting the test.
   a. For each type of equipment or material at the college and off-site testing location that is used for placement testing and related activities, we would like to know:
      i) What is the approximate size or number required?

ii) Are equipment or materials used for other college activities? If so, for what purpose?

iii) What percentage of the time are they used for placement testing activities?

License for the placement test

Computers (include computers for staff and for taking the test)

Printers

Special software

Materials for test prep

Materials for recruitment

Information materials (e.g., pamphlets, information sheets for advisors and students)

Others

10. Next, we would like to learn more about the approximate amount of time students spend on placement test–related activities.
    a. Please provide us with an approximate amount of time students spend on the following activities. Also, indicate if this varies by subject.
        i) waiting to take the test
        ii) taking the test
        iii) meeting with an advisor to interpret results
    b. Do these any of these activities require more than one visit to the testing site?
        i) If so, how many visits? Do you have a sense of how this affects transportation costs?
    c. Do students have to pay a fee to take the placement test?
        i) If so, how much? Can this fee be waived?

11. Are there any other inputs, from the college, off-site testing location, or the student, which are required in order to carry out placement test–related activities that we may have missed?
    a. Is there anything about your testing center that is unique?
    b. Is there something that makes it work especially well?