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2013

Online at <https://mpra.ub.uni-muenchen.de/53095/>

MPRA Paper No. 53095, posted 21 Jan 2014 21:03 UTC

ACADEMIC SUCCESS AND THE TRANSFER OF COMMUNITY COLLEGE CREDITS IN THE PRINCIPLES OF ECONOMICS

by Paul W. Grimes*, Jon P. Rezek**, and Randall C. Campbell***

Abstract

A growing number of today's college students attend local 2-year community colleges. Many of these students will ultimately transfer to major universities in pursuit of the traditional Bachelors degree. The question of whether such transfer credits adequately prepare students for future academic endeavors is important for educators interested in preparing successful students and maintaining the quality of their institution. In this paper, we examine whether students who transfer credits earned for the traditional Principles of Economics course sequence achieve the same levels of academic success, measured in terms of GPA, as students taking the sequence at a major state university. The model indicates that community college transfer students perform poorly relative to native students in terms of cumulative GPA. This result is driven by a self-selection process whereby the more academically challenged students are those who choose to transfer credit from 2-year schools. The results of our model are used to develop a grade equivalency measure between the university and 2-year schools. Using this measure we are able to reject the hypothesis that grades are equivalent between 2- and 4-year institutions. Finally, we find that grades in the Principles of Economics sequence are strong predictors of overall academic success.

Keywords: community college, Principles of Economics, transfer students, GPA, grade inflation

JEL codes: A2, A22

I. Introduction

In response to the escalating cost of college tuition at private institutions and public research universities, many of today's students choose to begin their higher educational experience at 2-year community colleges. During the decade between 1999 and 2009, enrollment in 2-year institutions rose by more than one and a half million students nationwide. Today, approximately 43 percent of all students enrolled in American institutions of higher learning attend 2-year schools (National Center for Educational Statistics 2010). Although

no comprehensive census exists, many of these students will ultimately transfer to universities to pursue the traditional Bachelors degree. In fact, more than one half of all college students now earn credit hours at more than one institution prior to graduation (National Center for Educational Statistics 2010).

In many states, the major universities are eager to attract students who wish to transfer from local community colleges and regional institutions. It is common practice for major public universities to maintain articulation agreements with the community colleges and regional universities in their state

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The authors sincerely thank the late Peter Kennedy and anonymous referees for constructive comments and suggestions. Thanks are also extended to John O'Bannon, formerly of Mississippi State University's Information Technology Services, for compilation of the student data records needed to complete this research. Marybeth Grimes provided expert editorial assistance.

and across their service region. These agreements serve as a guarantee that students who earn academic credits from their local institutions can transfer them into the major universities' degree programs. Today, many states mandate that articulation agreements must be reached between all in-state public institutions of higher learning.

For many students financial constraints limit their ability to enroll in major universities and 2-year community colleges provide an affordable alternative.¹ However, casual empiricism suggests that some students choose to begin their higher education at community colleges not only in response to lower financial costs, but also due to perceptions of lower "effort costs." As a consequence some educators have openly questioned whether the rigor and quality of courses at community colleges are academically equivalent to those found on the campuses of major universities. Since the traditional introductory Principles of Economics courses are usually taught at the sophomore level, the question of course equivalency is particularly relevant to economic educators. Previous researchers in the field have addressed the issue, but the results are dated and may not reflect the current higher educational environment.

Following a national boom in the opening of new community colleges, which occurred in response to the baby boom generation's demand for higher education, a number of community college studies appeared in the economic education literature during the early 1970s. For example, Lewis, Wentworth and Orvis (1973) found that students at 2-year colleges performed significantly below their 4-year counterparts on the standardized *Test of Understanding College Economics* (TUCE). Additional research studies used 2-year institutions as the setting for analyzing the relative effectiveness of different teaching pedagogies (for example, Wentworth and Lewis (1973) and Ross (1977)).

More recently, Laband and Piette (1995) using data from the late 1980s and early 1990s, examined the academic performance of community college transfers with non-transfer (native) students at Florida State University. They found that the community college transfer students did indeed perform worse in upper division economics courses than the native students. In a series of articles, Hilmer (1997, 1999, 2002) addressed the more general issue of how previous college transfer experience affects the labor market earnings of

university graduates. Hilmer's results support the human capital model of earnings and show that measures of institutional quality are reflected in graduates' wage profiles. Hilmer shows that student transfers between local/regional institutions and major universities reflect strategic behavior on the part of students seeking the higher returns to degrees granted by more prestigious universities. His empirical findings suggest that local colleges serve as accessible gateways for economically disadvantaged students to select into higher quality institutions.

To ultimately capture the economic benefits conferred by a major university degree, transfer students must receive instruction of a quality that prepares them to succeed at their destination institution. In this study we examine the role of 2-year community colleges in the higher education hierarchy with a particular emphasis on Principles of Economics. Specifically, this research addresses three primary questions. Are economics courses at 2-year community colleges academically equivalent to those taken at 4-year schools? Do academically-challenged students self-select into these colleges for economics courses? Do students who transfer general academic credit from 2-year community colleges achieve the same degree of academic success, measured in terms of overall grade performance, as those native students who earn equivalent credits in a university setting?²

II. Institutional Context and Data

This study uses Mississippi State University as a case example. MSU is a public Land Grant institution which enrolls a diverse student body with representatives from all 50 states and from more than 70 foreign nations. The largest university in the state, MSU has a total enrollment of approximately 20,400 full-time students. First-year students entering the university have an average ACT composite score of 23.6. MSU offers a full range of traditional academic programs from the Bachelors degree through the doctorate and is rated as a very high research activity institution by the Carnegie Foundation. In many ways, MSU reflects the institutional characteristics of a representative major public university in the United States. Over the past decade, MSU has experienced a significant increase in the number of students transferring in from community colleges, and to a

lesser extent, from smaller regional state universities. As required by state regulations, MSU maintains articulation agreements with all of the state's fifteen 2-year and seven 4-year public institutions. Thus, our results may be generalized to a significant number of other universities with similar characteristics and environment.

Our sample consisted of all students who matriculated in the academic year 1997–1998 (including new freshman and transfer students) *and* who completed *both* courses of the traditional Principles of Economics sequence (Principles of Macroeconomics and Principles of Microeconomics) by academic year 2002–2003.³ This length of time is often used for assessment and accreditation purposes to capture the six year graduation rate. A total of 892 students

met the criteria for inclusion in the sample. Approximately 71 percent of the student subjects completed the Principles of Economics sequence at MSU with the remaining 29 percent transferring the credits from other institutions (23 percent from 2-year institutions and 6 percent from 4-year institutions). Native students who took their economics courses at MSU had an 82.5 percent graduation rate while only 68.5 percent of economics transfer students graduated in six years or fewer.⁴

Table 1 provides the basic descriptive statistics for the sample. The second column reports the means for the demographic characteristics, academic aptitude, and the final college of enrollment for students taking the Principles of Economics sequence at MSU. The third column provides the

TABLE 1.
Descriptive Statistics: Sample Means and Standard Deviations by Transfer Group

	Native MSU	All Transfers	2-Year School Transfers	4-Year School Transfers
Dependent Variables				
GPA (4-point scale)	2.92 (0.57)	2.92 (0.62)	2.89 (0.60)	3.06 (0.67)
GRADUATION	82.52	68.48	67.98	70.37
Demographics - D				
MALE (%)	61.26	61.09	64.04	50.00
AFRICAN AMERICAN (%)	17.95	11.28	9.85	16.67
OUT-OF-STATE (%)	19.21	7.39	6.40	11.11
INTERNATIONAL (%)	2.52	0.39	0.49	0.00
AGE (in years)	20.56 (2.06)	19.86 (1.73)	19.87 (1.74)	19.83 (1.71)
Academic Aptitude - A				
ACT Score (Comprehensive)	22.35 (4.36)	20.94 (4.31)	20.56 (4.14)	22.37 (4.84)
Avg. Macroeconomics Grade	2.75	2.88	2.88	2.87
Avg. Microeconomics Grade	2.64	3.01	3.00	3.06
Major College - M				
Accounting* (%)	7.24	10.12	7.88	18.52
Arts and Sciences (%)	7.09	8.95	8.87	9.26
Business (%)	57.80	48.64	51.23	38.89
Education (%)	12.28	12.06	10.34	18.52
Engineering (%)	8.66	10.12	10.84	7.41
Other (%)	6.93	10.12	10.84	7.41
Transfer Credit - T				
Transfer Hours	17.78 (24.05)	70.99 (22.59)	69.68 (21.42)	75.9 (26.16)
Total Students	635	257	203	54

Standard deviations are in parenthesis.

* The School of Accountancy is a unit of the College of Business at MSU.

same information for students who took both of the Principles courses elsewhere and then transferred the credits to MSU. For all students in the sample with transfer credits on their official transcript, approximately 80 percent earned those credits at a 2-year community college. The final two columns delineate the transfer students by institution type.

For native and transfer students alike, Principles of Economics courses were disproportionately populated with white males compared to the institution as a whole. Only 39 percent of our sample was female and only 16 percent was African-American, while in the overall MSU student population 48.5 percent of students were female and 19.5 percent were African-American. Students transferring Principles of Economics credits from another institution were slightly younger and more likely to be white and from the state of Mississippi than all MSU economics students. Native economics students were more likely to major in a business field, but were less likely to major in accounting or an engineering field than the economics transfer students.

Academically, the average cumulative GPA, measured as the combination of the GPA earned at MSU and through transfer credits, was nearly identical across both subsets; however, the average ACT score was approximately 1.4 points higher among the native economics students than for the economics transfer students. These findings suggest that there may be a sample selection issue at work, with the decision to take economics at a community college or regional university being dependent on the student's academic abilities, as measured by their ACT score, and other demographic characteristics. Furthermore, the descriptive statistics indicate the grades earned in both macroeconomics and microeconomics were lower for students taking the course sequence at MSU relative to the grades earned by students who transferred the credit hours from other institutions. The combination of lower ACT scores but higher economics grades for transfer students suggests that grades may not be equivalent across institutions.

Differences also exist across the subsets in terms of the total transfer hours. The average MSU economics student transferred in about 18 semester credit hours in total. However, students who transferred credit for the Principles sequence averaged 71 hours credit at other institutions. Therefore, the economics transfer students were more likely to have completed an Associate's degree at a two-year

community college.⁵ Finally there does not appear to be a significant difference between when transfers and non-transfers took their Principles sequence. The students who transferred Principles credit likely took the courses in their first two years of college. This pattern is also observed for native Principles students, 77% of whom took these courses during their first two years at MSU.

III. Methodology and Results

We estimate an econometric model to determine the effect of transferring academic credits on ultimate academic success as measured by student grade point average. Specifically, the model takes the following functional form:

$$\text{GPA} = f(\mathbf{D}, \mathbf{A}, \mathbf{M}, \mathbf{T}) \quad [1]$$

where GPA represents student academic performance as measured by cumulative grade point average (using the standard 4-point scale).⁶ On the right-hand side, \mathbf{D} is a vector of student demographic characteristics, \mathbf{A} reflects student aptitude as measured by their ACT score and grades earned in the Principles of Economics course sequence, \mathbf{M} represents the students' major field of study as reflected by the college of enrollment,⁷ and \mathbf{T} represents transfer credit. Note that this specification suffers from a classic self-sample selection problem since students choose whether or not to transfer Principles credits.

The empirical regression equation was specified as follows:

$$\begin{aligned} \text{GPA} = & \alpha_0 + \alpha_1 \text{MALE} + \alpha_2 \text{AFRICAN AMERICAN} \\ & + \alpha_3 \text{OUT-OF-STATE} + \alpha_4 \text{FOREIGN} \\ & + \alpha_5 \text{AGE} + \alpha_6 \text{ACT} + \alpha_7 \text{ACCOUNTING} \\ & + \alpha_8 \text{ARTS \& SCIENCES} + \alpha_9 \text{BUSINESS} \\ & + \alpha_{10} \text{EDUCATION} + \alpha_{11} \text{ENGINEERING} \\ & + \alpha_{12} \text{TRANSFER HOURS} \\ & + \alpha_{13} \text{MACRO GRADE} \\ & + \alpha_{14} \text{MACRO GRADE} + \varepsilon \end{aligned} \quad [2]$$

where,

MALE = 1 for male student, 0 for female student;
AFRICAN AMERICAN = 1 if student is black,
0 for other;

OUT-OF-STATE = 1 for out-of-state student,
 0 for resident;
 FOREIGN = 1 for international student, 0 for
 U.S. resident;
 AGE = student's age in years
 ACT = student's composite ACT score
 ACCOUNTING = 1 if School of Accounting
 major, 0 otherwise;
 ARTS & SCINCES = 1 if College of Arts and
 Science major, 0 otherwise;
 BUSINESS = 1 if College of Business major,
 0 otherwise;
 EDUCATION = 1 if College of Education major,
 0 otherwise;
 ENGINEERING = 1 if College of Engineering
 major, 0 otherwise;
 TRANSFER HOURS = total number of trans-
 fer hours.
 MACRO GRADE = grade in Principles of Macro-
 economics (A=4... F=0)
 MICRO GRADE = grade in Principles of Micro-
 economics (A=4... F=0)

Grade Point Average

[12] The second panel of Table 2 reports the OLS estimation of equation [2]. The estimated equation yielded a significant F-statistic and an acceptable R^2 for cross-sectional data. Looking first at the results for the control variables, the coefficients for the race and gender variables were statistically significant at the .01 level. AFRICAN AMERICAN students had lower cumulative GPAs relative to non-black students and males had lower cumulative GPAs than females, *ceteris paribus*. The magnitudes of both of these coefficients were relatively large. The coefficient for AGE was also negative and significant at the .10 level, indicating that, holding all else constant, each decade of life reduced student performance by about 0.12 in cumulative GPA. This may reflect the increased opportunity costs facing many older students, or may indicate that time has eroded some of their academic skills. A student's country or state of origin did not significantly affect cumulative GPA.

As expected, student ACT scores were positively correlated with GPA and highly significant, although the magnitude was somewhat low. An increase of ten points in ACT score translated into

an increase of only 0.29 in cumulative GPA. The low magnitude is possibly due to students with higher ACT scores taking more difficult courses; although we mitigate this effect somewhat by including dummies for the student's college, we cannot account for all differences in course difficulty. The results also show that grades in both the macroeconomics and microeconomics courses are strong predictors of eventual academic success in terms of cumulative GPA. A student receiving an A in Principles of Macroeconomics earned a 0.17 higher cumulative GPA than a student receiving a B. The effect was even larger for microeconomics, where an increase of one letter grade increased cumulative GPA by 0.21 points. These results are consistent with Grimes and Niss (1991) who found that economic understanding is strongly tied to ultimate academic performance.

The expected sign for the TRANSFER HOURS coefficient is uncertain *a priori* due to two possible effects associated with transferring credit. First, if the courses are less rigorous or are simply graded less rigorously, then students who transfer credits might be expected to earn higher cumulative GPA's since more of these 'easier' courses appear on their transcripts. Conversely, if students develop poor study habits from less rigorous coursework or simply do not learn the material necessary to succeed in upper division courses, their cumulative GPA could suffer once they transfer to a 4-year institution. Here we find the coefficient on the number of transfer hours to be insignificant, suggesting the effects may offset one another.

Table 2 also reveals that no significant difference existed between the performances of BUSINESS or ACCOUNTING students relative to those enrolled in OTHER colleges (the omitted category). Although neither of these college dummy variables were found to be significant, three college dummies were significant. The negative and significant ENGINEERING coefficient most likely reflects programs of study which involve advanced math and science courses typically viewed as being relatively rigorous. Conversely, GPAs in EDUCATION were higher than the baseline by about 0.17 points, which again may be attributed to the level of rigor in the required courses. Lastly, at least two explanations for the negative and significant

TABLE 2.
OLS Results - GPA Equations

Variable	Equation 2		Equation 3a		Equation 3b	
	β	S.E.	β	S.E.	β	S.E.
CONSTANT	1.43733	0.16807	1.92979	0.17515	2.01986	0.17610
Demographics - D						
MALE	-0.22835	0.0267	-0.22745	0.02677	-0.22842	0.02673
AFRICAN AMERICAN	-0.21548	0.03812	-0.21943	0.03827	-0.21448	0.03829
OUT-OF-STATE	-0.02059	0.03659	-0.01669	0.03674	-0.01253	0.03679
FOREIGN	0.15645	0.09774	0.12847	0.09800	0.13489	0.09796
AGE	-0.00465	0.00641	-0.01213	0.00671	-0.01215	0.00674
Academic Aptitude - A						
ACT	0.03098	0.00372	0.02923	0.00379	0.02923	0.00378
MACRO GRADE	0.17498	0.01669			0.18235	0.01676
MSU MACRO A			0.39970	0.04603		
MSU MACRO B			0.15966	0.03814		
MSU MACRO D			-0.15514	0.05761		
T2 MACRO A			0.16032	0.06741		
T2 MACRO B			0.00940	0.06067		
T2 MACRO C			-0.09935	0.06474		
T2 MACRO D			-0.34687	0.10959		
T4 MACRO A			0.35686	0.09310		
T4 MACRO B			0.00515	0.11285		
T4 MACRO C			-0.11569	0.11822		
T4 MACRO D			-0.39356	0.15256		
MICRO GRADE	0.20597	0.01559	0.21648	0.01570		
MSU MICRO A					0.43013	0.04636
MSU MICRO B					0.16648	0.03841
MSU MICRO D					-0.23534	0.04919
T2 MICRO A					0.23201	0.06255
T2 MICRO B					0.06148	0.06159
T2 MICRO C					-0.17440	0.06880
T2 MICRO D					-0.40280	0.10722
T4 MICRO A					0.39422	0.08835
T4 MICRO B					0.12599	0.11024
T4 MICRO C					-0.31288	0.13436
T4 MICRO D					-0.36318	0.16219
Major College - M						
ACCOUNTING	0.05163	0.06477	0.05067	0.06498	0.05240	0.06512
ARTS & SCIENCES	-0.13904	0.06418	-0.12556	0.06444	-0.13032	0.06430
BUSINESS	0.03372	0.04848	0.04193	0.04854	0.04244	0.04867
EDUCATION	0.18815	0.05799	0.18709	0.05850	0.18125	0.05836
ENGINEERING	-0.11681	0.06414	-0.11583	0.06433	-0.11130	0.06439
Transfer Credit - T						
TRANSFER HOURS	-0.00009	0.00042	0.00131	0.00060	0.00125	0.00060
Adjusted R-squared	0.58576		0.58833		0.58768	
F-statistic	90.99570		54.05623		53.91465	

coefficient for ARTS & SCIENCES majors are possible. First, the coursework in some Arts and Sciences fields may be more difficult relative to majors in other colleges, pushing grades lower.

Second, some Arts and Sciences degree programs may serve as majors of last resort for students performing poorly in other colleges, also pushing GPAs down.

*Course Equivalency between MSU
and Transfer Institutions*

The MACRO GRADE and MICRO GRADE coefficients, shown in panel 2 of Table 2, quantify the effect of a one letter grade improvement in each Principles course on eventual cumulative GPA. However, as specified these grade variables did not account for the location of *where* the courses were taken. To investigate the possibility that economics grades are inflated at transfer institutions, we incorporated a location effect by replacing the discrete course grade variables with a set of dummy variables representing where the course was taken (MSU, 2-year institution, or other 4-year institution) and the grade received. The magnitude of these dummy variables was used to compare the effects of Principles grades, across institutions, on overall academic achievement as measured by cumulative GPA.

Unfortunately, estimating a model which incorporates a full set of dummy variables for both macroeconomics and microeconomics by location created near perfect collinearity among the explanatory variables, therefore, we estimated two separate models, one in which the discrete MACRO GRADE variable was replaced with a series of macroeconomics grade/location dummies and one in which the discrete MICRO GRADE variable was replaced with a series of microeconomics grade/location dummies. This modification of equation [2] yields the following two specifications:

$$\begin{aligned} \text{GPA} = & \alpha_0 + \alpha_1 \text{MALE} + \alpha_2 \text{AFRICAN AMERICAN} \\ & + \alpha_3 \text{OUT-OF-STATE} + \alpha_4 \text{FOREIGN} \\ & + \alpha_5 \text{AGE} + \alpha_6 \text{ACT} + \alpha_7 \text{ACCOUNTING} \\ & + \alpha_8 \text{ARTS \& SCIENCES} + \alpha_9 \text{BUSINESS} \\ & + \alpha_{10} \text{EDUCATION} + \alpha_{11} \text{ENGINEERING} \\ & + \alpha_{12} \text{TRANSFER HOURS} \\ & + \alpha_{13} \text{MSU MACRO A} + \alpha_{14} \text{MSU MACRO B} \\ & + \alpha_{15} \text{MSU MACRO D} + \alpha_{16} \text{T2 MACRO A} \\ & + \alpha_{17} \text{T2 MACRO B} + \alpha_{18} \text{T2 MACRO C} \\ & + \alpha_{19} \text{T2 MACRO D} + \alpha_{20} \text{T4 MACRO A} \\ & + \alpha_{21} \text{T4 MACRO B} + \alpha_{22} \text{T4 MACRO C} \\ & + \alpha_{23} \text{T2 MACRO D} \\ & + \alpha_{24} \text{MICRO GRADE} + \varepsilon \end{aligned} \quad [3a]$$

$$\begin{aligned} \text{GPA} = & \alpha_0 + \alpha_1 \text{MALE} + \alpha_2 \text{AFRICAN AMERICAN} \\ & + \alpha_3 \text{OUT-OF-STATE} + \alpha_4 \text{FOREIGN} \\ & + \alpha_5 \text{AGE} + \alpha_6 \text{ACT} + \alpha_7 \text{ACCOUNTING} \\ & + \alpha_8 \text{ARTS \& SCIENCES} + \alpha_9 \text{BUSINESS} \\ & + \alpha_{10} \text{EDUCATION} + \alpha_{11} \text{ENGINEERING} \\ & + \alpha_{12} \text{TRANSFER HOURS} \\ & + \alpha_{13} \text{MSU MICRO A} + \alpha_{14} \text{MSU MICRO B} \\ & + \alpha_{15} \text{MSU MICRO D} + \alpha_{16} \text{T2 MICRO A} \\ & + \alpha_{17} \text{T2 MICRO B} + \alpha_{18} \text{T2 MICRO C} \\ & + \alpha_{19} \text{T2 MICRO D} + \alpha_{20} \text{T4 MICRO A} \\ & + \alpha_{21} \text{T4 MICRO B} + \alpha_{22} \text{T4 MICRO C} \\ & + \alpha_{23} \text{T2 MICRO D} + \alpha_{24} \text{MACRO GRADE} \\ & + \varepsilon \end{aligned} \quad [3b]$$

where,

MSU MACRO A = 1 for students receiving A's in macro at MSU, 0 otherwise

MSU MACRO B = 1 for students receiving B's in macro at MSU, 0 otherwise

MSU MACRO D = 1 for students receiving D's or F's in macro at MSU, 0 otherwise

T2 MACRO A = 1 for students receiving A's in macro at 2-year colleges, 0 otherwise

T2 MACRO B = 1 for students receiving B's in macro 2-year colleges, 0 otherwise

T2 MACRO C = 1 for students receiving C's in macro 2-year colleges, 0 otherwise

T2 MACRO D = 1 for students receiving D's or F's in macro 2-year colleges, 0 otherwise

T4 MACRO A = 1 for students receiving A's in macro at 4-year colleges, 0 otherwise

T4 MACRO B = 1 for students receiving B's in macro 4-year colleges, 0 otherwise

T4 MACRO C = 1 for students receiving C's in macro 4-year colleges, 0 otherwise

T4 MACRO D = 1 for students receiving D's or F's in macro 4-year colleges, 0 otherwise

and

MSU MICRO A = 1 for students receiving A's in micro at MSU, 0 otherwise

MSU MICRO B = 1 for students receiving B's in micro at MSU, 0 otherwise

MSU MICRO D = 1 for students receiving D's or F's in micro at MSU, 0 otherwise

T2 MICRO A = 1 for students receiving A's in micro at 2-year colleges, 0 otherwise
 T2 MICRO B = 1 for students receiving B's in micro 2-year colleges, 0 otherwise
 T2 MICRO C = 1 for students receiving C's in micro 2-year colleges, 0 otherwise
 T2 MICRO D = 1 for students receiving D's or F's in micro 2-year colleges, 0 otherwise
 T4 MICRO A = 1 for students receiving A's in micro at 4-year colleges, 0 otherwise
 T4 MICRO B = 1 for students receiving B's in micro 4-year colleges, 0 otherwise
 T4 MICRO C = 1 for students receiving C's in micro 4-year colleges, 0 otherwise
 T4 MICRO D = 1 for students receiving D's or F's in micro 4-year colleges, 0 otherwise

Note that in both equations students earning a C *at MSU* are treated as the baseline group and are thus the omitted category.

The empirical results for [3a] and [3b] are presented in panels 3 and 4 of Table 2. As seen in the table, students receiving a B in macroeconomics at MSU are expected to earn a 0.16 higher GPA during their academic careers than baseline students, holding all other factors constant, while students receiving an A at MSU are expected to earn a 0.40 higher GPA than baseline students. Students receiving a D or F in macroeconomics at MSU are expected to earn a 0.16 lower GPA over the course of their academic careers than those earning C's. Each of these dummy variables is statistically significant at the .01 level.

The T2 coefficients quantify differences in cumulative GPA for 2-year economics transfer students relative to the baseline MSU C students. The results reveal that students transferring A's in macroeconomics from such schools are expected to earn a 0.16 higher GPA than the baseline students, holding other factors constant. The T2 MACRO B coefficient is near zero and insignificant, indicating that there is no significant difference in cumulative GPA between a student who earned a B in macroeconomics at a 2-year community college and a student who earned a C at MSU. The results further show the T2 MACRO C coefficient to be negative; however, it is not statistically significant at conventional levels, indicating that no conclusions can be made about the relationship between C's at MSU and 2-year colleges. Finally, students earning grades of D or F from 2-year

schools are expected to earn a 0.35 lower cumulative GPA than baseline students.

The T4 coefficients quantify the difference in cumulative GPA for 4-year college transfer students relative to MSU C students. Macroeconomics students receiving A's from other 4-year institutions are expected to earn 0.36 higher cumulative GPAs than MSU's C students. However, the magnitude and standard error of the T4 MACRO B and T4 MACRO C coefficients indicate there is no statistical difference between baseline students and students transferring B's or C's from the other 4-year schools in the sample. Finally, the T4 MACRO D coefficient is negative 0.39, meaning students earning D's or F's in macroeconomics from four year schools perform significantly worse than baseline students.

Similar results hold for equation [3b] when microeconomics grade dummies replace the macroeconomics dummies, as shown in panel 4 of Table 2. Native economics students receiving a B in microeconomics are expected to earn a 0.17 higher cumulative GPA than baseline students, and A students are expected to earn a 0.43 higher cumulative GPA than baseline students. Students receiving a D or F are expected to earn a 0.24 lower cumulative GPA than MSU's C microeconomics students. Each of these dummy variables is statistically significant at the .01 level.

According to the estimated coefficients, student transferring A's in microeconomics from 2-year schools are expected to earn a 0.23 higher cumulative GPA relative to baseline students; and those transferring A's from 4-year schools are expected to earn a 0.39 higher GPA relative to baseline students, holding other factors constant. At conventional levels of significance, there is no statistical difference between B's earned at either 2- or 4-year institutions and C's earned in microeconomics at MSU. However, the results show that students transferring C's from 2-year institutions are expected to earn 0.17 lower cumulative GPAs than baseline students while C microeconomics students from other 4-year schools are expected to earn a 0.31 lower cumulative GPA. Finally, students earning D's or F's from all other institutions performed very poorly relative to baseline MSU students, with T2 MICRO D equal to -0.40 and T4 MICRO D equal to -0.36 .

The empirical formulation of equations [3a] and [3b] allows us to create a measure of the equivalency

between grades earned in the Principles of Economics courses at 2-year community colleges or other 4-year institutions and those earned at MSU. This measure is based on two simple premises. First, grades in Principles of Economics courses are good predictors of overall academic performance, and second, the predictive power of economics grades should be equal across institutions if instructors at those institutions teach similar curriculum and grade with relatively equal rigor. We define our grade equivalency measure as:

$$E_{MT} = 1 - [(T_i - M_{i-1}) / (M_i - M_{i-1})] \quad [4]$$

where,

E_{MT} is the grade equivalency between institution M and T

T_i is the coefficient for the grade received at the transfer institution; $i = A, B, C, D$,

M_i is the coefficient for the grade received at MSU; $i = A, B, C, D$.

Equation [4] is constructed such that when $T_i = M_i$, then $E_{MT} = 0$ and grades are considered equivalent across institutions. However, if $T_i = M_{i-1}$ we obtain $E_{MT} = 1$ and grades are inflated by a full letter grade at the transfer institution. If $E_{MT} > 1$, then grades are inflated by more than one letter grade. For example, suppose we wish to calculate the equivalency of a 'B' grade received at a 2-year college and a 'B' received at MSU. From the results in Table 2, we calculate:

$$\begin{aligned} E_{MT} &= 1 - [(T_B - M_C) / (M_B - M_C)] \\ &= 1 - [.00940 / .15966] = 0.9411. \end{aligned}$$

TABLE 3.
Measures of Course Equivalency

Macroeconomics				
Grade	2-year		4-year	
A	0.9973	***	0.1785	
B	0.9411	***	0.9677	***
C	0.6404	***	0.7457	***
Microeconomics				
Grade	2-year		4-year	
A	0.751	***	0.136	
B	0.631	***	0.243	
C	0.741	***	1.329	***

*** Grade equivalency rejected at the .01 level

The implied equivalencies (Murphy and Topel 1985) between courses taken at 2-year schools or other 4-year institutions relative to MSU, as defined by equation [4], are given in Table 3. Results indicate that A grades in macroeconomics from 2-year colleges were inflated by nearly one full letter grade (0.997) but that there was only mild inflation in the A range at other 4-year institutions (0.178). Thus, an A in Principles of Macroeconomics obtained at a 2-year institution in our sample was almost identical to a B obtained at MSU, in terms of the overall impact on GPA and holding all else constant. For 4-year institutions in our sample, there was no significant difference between an A obtained at the transfer institution and an A obtained at MSU in macroeconomics. However, B's in macroeconomics at both 2- and 4-year institutions were inflated by about one letter grade as well (0.941 and 0.968, respectively), while C's were inflated by about 2/3 of a letter grade at 2-year schools and about 3/4 of a letter grade at other 4-year institutions.

The Principles of Microeconomics at 4-year institutions appears to be more equivalent to the course as taught at MSU, relative to its companion course in macroeconomics. No statistically significant difference was found for grades of A and B at other 4-year schools relative to MSU. However, C's in microeconomics were highly inflated relative to MSU. Table 3 shows that for 2-year community colleges, grade inflation ranged from 2/3 to 3/4 of a letter grade for microeconomics, somewhat less than macroeconomics but still considerable.

Sample Selection

Students may choose to take the Principles of Economics course sequence at a 2-year college for financial reasons or they may behave strategically, believing their chances of passing or receiving a higher grade at community colleges are greater. Given that their rewards may be greater, academically-challenged students may engage in such behavior disproportionately. To account for this possible sample selection phenomena, we re-estimated the GPA regression model using maximum likelihood techniques. As noted by Kennedy (2003, pp. 291-293), maximum likelihood estimation is an efficient alternative to Heckman's (1979) two-stage procedure for dealing with sample selection problems.

In our formulation, we developed a probit model to estimate the probability of a student selecting to

take the Principles sequence at a 2-year community college in which student aptitude, as proxied by ACT scores, and observable demographic characteristics served as explanatory variables.⁸ Specifically, we used the LIMDEP statistical package to simultaneously estimate equation [3a] (or [3b]) and the following selection equation:

$$\begin{aligned} \text{ECON} = & \alpha_0 + \alpha_1 \text{MALE} + \alpha_2 \text{AFRICAN AMERICAN} \\ & + \alpha_3 \text{OUT-OF-STATE} + \alpha_4 \text{AGE} \\ & + \alpha_5 \text{ACT} + \varepsilon \end{aligned} \quad [7]$$

where,

ECON = 1 if the courses were taken at a 2-year institution, 0 if the courses were taken at MSU.

The resulting probit estimates for choosing to take the Principles sequence at a 2-year community college are shown in Table 4. These maximum likelihood estimates revealed that students opting for economics at such colleges were disproportionately white state residents, younger when they took their economics classes, and most importantly, scored significantly lower on the ACT than their counterparts taking economics at MSU or other 4-year institutions. This last result suggests that less academically-able students self-selected into 2-year community colleges for the Principles of Economics course sequence and then transferred to MSU.

Accounting for sample selection resulted in only slightly different results for the GPA equations, as shown in Table 5. The only significant differences in the GPA equations after adjusting for sample selection bias were in the 2-year transfer dummy variables for macroeconomics grades. The OLS ver-

sion of the model indicated no significant difference between a C in macroeconomics at MSU and a C at 2-year community colleges. The adjusted results show that students receiving a C at a 2-year school are expected to earn a 0.14 lower cumulative GPA than baseline students. This difference is significant at the .10 level. Similarly, according to the adjusted results, there is no longer a significant difference between a C in macroeconomics at MSU and an A in macroeconomics at a 2-year school in terms of the resulting cumulative GPA.

Finally, TRANSFER HOURS appears positive and significant in both the adjusted and unadjusted models. However, in all cases, the magnitude appears to be quite small (approximately 0.0013). Thus, if a student took 60 hours at a 2-year college, the overall improvement in cumulative GPA was only about 0.08. While this appears to be quite low, recall that two effects are intertwined in this coefficient. “Easier” courses would tend to make this coefficient more positive, but if these courses leave students less prepared for higher level courses, then more hours at a 2-year college would hinder a student’s overall GPA, making this coefficient more negative. Since this paper provides evidence that Principles of Economics grades may be inflated at 2-year institutions, the low value of this coefficient suggests that the latter ‘preparedness’ effect may be counteracting the former ‘grade inflation’ effect.

Table 6 provides the grade equivalency measures based on the sample selection corrected results. The pattern of statistical significance is identical to those obtained when the self-selection issue was not taken into account. However, in all cases, the relative magnitudes of the corrected equivalency measures are *greater* than the uncorrected measures shown in Table 3. This provides additional evidence for the existence of strategic behavior by students with relatively weaker academic aptitudes – transferring credit from a 2-year community college may significantly increase cumulative GPA, and by extension ultimately increase the likelihood of graduation from a major university.

IV. Summary and Conclusions

Our analysis of academic success for students who transfer credit in the Principles of Economics from local community colleges and regional universities to a major research university revealed several interesting and important results. First,

TABLE 4.

Probit Results for Selection Equation (Dependent Variable: ECON)

Variable	Probit Coefficient	Standard Error
CONSTANT	5.25509	0.81295
Demographics - D		
MALE	0.04899	0.10329
AFRICAN AMERICAN	-0.77984	0.16091
OUTSTATE	-0.67068	0.15810
AGE	-0.19517	0.03411
Academic Aptitude - A		
ACT	-0.08804	0.01317
Log likelihood function:	-424.8268	

TABLE 5.
MLE Results - GPA Equations

Variable	Equation 3a		Equation 3b	
	β	S.E.	β	S.E.
CONSTANT	1.88126	0.15923	1.96897	0.15861
Demographics - D				
MALE	-0.22806	0.03030	-0.22886	0.03037
AFRICAN AMERICAN	-0.20977	0.04192	-0.20428	0.04179
OUT-OF-STATE	-0.00923	0.03810	-0.00472	0.03840
FOREIGN	0.13122	0.12409	0.13780	0.12193
AGE	-0.01163	0.00530	-0.01161	0.00524
Academic Aptitude - A				
ACT	0.03002	0.00391	0.03005	0.00384
MACRO GRADE			0.18256	0.01695
MSU MACRO A	0.40364	0.04746		
MSU MACRO B	0.16185	0.04080		
MSU MACRO D	-0.15503	0.05689		
T2 MACRO A	0.11309	0.08456		
T2 MACRO B	-0.02770	0.07517		
T2 MACRO C	-0.13816	0.07419		
T2 MACRO D	-0.37837	0.10913		
T4 MACRO A	0.35460	0.12302		
T4 MACRO B	0.00224	0.10296		
T4 MACRO C	-0.11700	0.10028		
T4 MACRO D	-0.40030	0.13498		
MICRO GRADE	0.21608	0.01543		
MSU MICRO A			0.43244	0.04629
MSU MICRO B			0.16642	0.04119
MSU MICRO D			-0.23533	0.04751
T2 MICRO A			0.18354	0.07507
T2 MICRO B			0.01984	0.07604
T2 MICRO C			-0.21582	0.07453
T2 MICRO D			-0.42985	0.12142
T4 MICRO A			0.39225	0.10708
T4 MICRO B			0.12338	0.10912
T4 MICRO C			-0.32189	0.12328
T4 MICRO D			-0.37113	0.13247
Major College - M				
ACCOUNTING	0.04954	0.06992	0.05059	0.07032
ARTS & SCIENCES	-0.12866	0.05457	-0.13350	0.05455
BUSINESS	0.03939	0.04284	0.03981	0.04265
EDUCATION	0.18668	0.05400	0.18066	0.05349
ENGINEERING	-0.11665	0.06296	-0.11201	0.06327
Transfer Credit - T				
TRANSFER HOURS	0.00133	0.00061	0.00127	0.00061

when we just control for the grade earned in both Principles classes, regardless of the institution at which they were taken, we find that both courses are significant predictors of overall academic success as captured by cumulative GPA. Although statistically insignificant, students who transferred more credits earned lower GPA's, however, when

we included dummy variables indicating both the grade received and *where* the Principles courses were taken, we found that TRANSFER HOURS had a positive and significant effect on cumulative GPA. This suggests that students of equal ability received higher grades if they took the courses at a 2-year college. Thus, we developed a grade

TABLE 6.
Measures of Course Equivalency (Controlling for
Sample Selection)

Macroeconomics				
Grade	2-year		4-year	
A	1.2017	***	0.2028	
B	1.1711	***	0.9862	***
C	0.8912	***	0.7547	***
Microeconomics				
Grade	2-year		4-year	
A	0.9357	***	0.1510	
B	0.8808	***	0.2586	
C	0.9171	***	1.5771	***

*** Grade equivalency rejected at the .01 level

equivalency measure based on our regression results, and found that Principles of Economics grades at 2-year community colleges were inflated by nearly a full letter grade for both the macroeconomics and microeconomics course.

Since students self-select into 2-year institutions, we estimated the model again to account for sample selection bias. We found that students who chose to transfer from local community colleges had significantly lower ACT scores and, therefore, were less prepared academically for future studies. Again, the results suggested that grades in the principles courses were between 3/4 and 5/6 of a letter grade higher in 2-year institutions compared to MSU. Our model indicated that the transfer of credits from 2-year institutions is a rational economic choice in that it raises cumulative GPAs, and by extension, enhances the probability of eventual graduation for this set of students.

Our results indicated that in addition to serving as a gateway for economically disadvantaged students, local community colleges serve as a gateway for less academically qualified students. These findings are important given the growing number of students who begin their higher education experience at local community colleges and then transfer to a major public university. Economic educators at institutions receiving transfer students should be aware of the self-selection process revealed by our findings and be cognizant that such students may need additional attention in order to achieve academic success. Furthermore, since there appears to be a significant lack of equivalency between Principles of Economics course grades between types of

institutions, articulation agreements may need to be reevaluated to determine if credit should be accepted for students who earned relatively low grades in Principles courses from 2-year community colleges. Alternatively, university economics departments that experience a significant number of 2-year transfers could consider the implementation of placement exams similar to those commonly found in departments of mathematics and foreign languages.

The issues surrounding course and grade equivalency highlighted by our findings also suggest that it would be helpful for university economists to open a dialog with their colleagues at local 2-year community colleges. If common standards could be agreed upon and adopted by sending and receiving institutions, students may be better prepared for future academic studies and grades more accurately reflect student proficiencies. Clearly, additional research is needed to determine exactly what type of practices and policies will enhance the ultimate success rate for community college transfer students.

Notes

1. For instance, in 2011–12 the full-time tuition rate for state residents at Mississippi State University (MSU) was \$2,902 but only \$2,000 for the state's 2-year schools.
2. A question of related interest to economic educators whether students who transfer Principles of Economics credits from 2-year community colleges achieve the same degree of success in subsequent economics courses as those students who earn equivalent credit at the home institution. This question was previously investigated by Laband and Piette (1995) but poses two problems here. First, our dataset does not delineate GPAs by major (for many majors, not all course requirements carry the discipline's course prefix) and second, the number of economics majors in the sample was not large enough to make any statistically significant conclusions. (Recall that the sample was defined as those who students who matriculated during one academic year.)
3. As at many institutions, the Principles of Economics course sequence is often taken by MSU students as part of the university's core curriculum requirements. In any given semester, approximately 1,000 students enroll in the two

courses combined. Given the institutional arrangements, many students in majors outside of the business school take only one of the two courses. Our sample, which includes only those students who took *both* courses, was defined to ensure that we captured students with a strong academic interest in successful completion of the course sequence.

4. A total of 124 credit hours with a cumulative GPA of 2.0 or better is required for graduation at MSU, although some colleges, including the College of Business, require a higher standard. Among the 192 students who did not graduate, the data show that the majority were not close to finishing. Of the non-graduates, 49.5% had a cumulative GPA less than 2.25 while 51% had an MSU GPA below 2.0. Nearly one-third of these students (31.8%) had fewer than 90 credit hours while over half (53.6%) had fewer than 110 credit hours. Finally, only 41 of the 192 non-graduates were enrolled during the 2002–2003 academic year. Thus, the majority of non-graduates had stopped making progress toward a degree at the time the study was concluded.
5. In Mississippi, the State College Board regulations require a minimum of 124 semester hours of credit to be earned for all Bachelors degrees. A minimum of 60 semester hours are required for all Associates degrees granted by the state's community colleges.
6. We chose cumulative GPA rather than MSU GPA to measure academic performance for two primary reasons: 1) According to the official *MSU Bulletin*, graduates must "make an overall C (2.0) average on all hours scheduled and rescheduled at all institutions attended, including Mississippi State University." Therefore, to receive an undergraduate degree, a student must earn a minimum 2.0 for all transfer *and* all MSU hours. Thus, whether or not a student ultimately graduates is dependent upon the cumulative GPA which accounts for both of these separate measures. A minimum 2.0 cumulative GPA is a necessary, though not sufficient, condition of graduation. (MSU's minimum graduation policy is common to a vast majority of its peer institutions in the Southeast and Midwest.) 2) The cumulative GPA includes a greater number of hours and thereby offers a more meaningful measure of

overall academic performance. There are several transfer students in the sample who took only a few (<30) hours credit at MSU. In our opinion, a GPA measured on such a small number of hours is not very meaningful. However, in addition to the reported results using cumulative GPA, we ran each model using MSU GPA for the full sample and using MSU GPA but deleting those observations with 30 or fewer MSU credit hours. The results for these models are very similar to the reported results and are available upon request.

7. The major academic administrative divisions of MSU include the College Agriculture and Life Sciences, the College of Architecture, Art, and Design, the College of Arts and Sciences, The College of Business, The College of Education, The Bagley College of Engineering, and the College of Forestry. The omitted OTHER reference category is the agglomeration of the agriculture, architecture, and forestry colleges which have relatively low economics enrollments.
8. We also ran the model using all transfers as the dependent variable and obtained similar results. When we run the model using Heckman's (1979) two stage procedure, the coefficient for LAMBDA is negative and significant.

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