



**Contributions of
Florida International University
to the
Regional Economy**

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1. Introduction and Summary

This report provides estimates of three distinct concepts of Florida International University's economic contribution to Miami-Dade County and to the state of Florida. FIU has grown dramatically over the years, and will continue to do so for at least the next decade. However, this study ignores both FIU's history and its future. Instead, the economic contributions reported in each section are based on the university's scale of operations at a single point in time, Fall 2009.

Section 2 constructs estimates of the monetary value of the human capital produced as a result of the educational services that FIU provides. Section 3 provides a measure of the amount of regional economic activity that is associated with FIU's operations, and the expenditure of its alumni and students; I call this measure FIU's *economic size*. Finally, Section 4 reports estimates of the traditional measure of the *net economic impact* of FIU, which measures the difference between the regional output that exists with FIU and the output that we would expect if FIU did not exist.

The study contains numerous omissions. No attempt has been made to place an economic value on the many cultural activities that FIU sponsors and promotes. Similarly, the public service and engagement activities of FIU's faculty, staff and students have not been accounted for. Similarly, there has been no attempt to measure the social and commercial value of FIU's research output. These are standard omissions in educational economic impact studies, for the simple reason that it is all but impossible to measure the value of such intangibles. But there are also omissions that ideally one might like to include. First, the nascent contribution of the new Herbert Wertheim College of Medicine, which admitted its first class in Fall 2009, has not been included in this study. I have also omitted capital expenditures, and the value of expenditures made by visitors to FIU and its family.

In keeping with most studies of the economic contribution of universities, this report is built upon a large number of assumptions. It is too time consuming, too expensive, or in some cases impossible, to verify the validity of each of these assumptions. Where possible, I have made assumptions that seem reasonable in light of prior studies of other universities. However, many assumptions are little more than educated guesses. So, inevitably, the results presented here should be interpreted as perhaps crude estimates, subject to potentially significant, but

unquantified, margins of error.

In the remainder of this section, I provide a brief summary of the main results. I do so with some trepidation, because numbers presented so briefly often take on a life of their own, and the precise nature of the economic contribution they represent is lost. I would urge readers to be especially cautious in distinguishing the meaning of the economic size of FIU and the economic impact of FIU. This is particularly important because, even though they are markedly different concepts (see Section 3.1), many *authors* of existing studies have confused them.

FIU's Creation of Human Capital

The value of human capital produced each year by FIU is estimated by applying national data on the discounted present value of incremental lifetime earnings afforded by college education to current FIU rates of degree production. I take Fall 2009 admissions data, and estimate the rate of degree production that this level of enrollment will yield given recent graduation and attrition rates. I also produce estimates of degree-equivalent production, to account for the value of education obtained by students who do not actually graduate. The likely future residences of current students are inferred from the current residences of FIU's alumni.

The key findings are as follows:

- Under the current scale of operations, FIU produces the equivalent of 6,466 Bachelor's degrees, 1,833 Master's degrees, 123 doctoral degrees, and 174 Law school graduates.
- The value of education produced each year by FIU is about \$3.47 billion. The value of the annual production of human capital that remains in the state of Florida is about \$2.78 billion, and the value that remains in Miami-Dade County is about \$1.83 billion.

FIU's Economic Size

FIU's economic size is measured as the sum of the contributions from its non-payroll expenditures, personal employee expenditures, incremental expenditures of alumni that remain in the region, and student expenditures not already accounted for by FIU's outlays. These direct contributions have indirect and induced multiplier effects in the region, which are also estimated and included in the totals.

- The non-payroll operating expenditures of FIU and the personal

expenditures of its employees sustain 10,066 jobs in Miami-Dade County, of which 4,261 are employees of the university. An additional 271 jobs are supported elsewhere in the state.

- As an alternative measure of size, the non-payroll operating expenditures of FIU and the personal expenditures of its employees induce \$710 million in economic output in Miami-Dade, and an additional \$36.3 million elsewhere in the state.
- Expenditures by FIU students not already accounted for in FIU's operating expenditure sustain an additional 7,292 jobs and \$724 million in output in Miami-Dade. An additional 167 Florida jobs and \$22.5 million in output are sustained outside Miami-Dade.
- Incremental expenditures induced by the enhancement of FIU alumni income are especially important because of the large number of alumni that remain in the region. Around 78,000 alumni live and work in Miami-Dade, while an additional 40,000 live and work elsewhere in the state. The increments to their incomes resulting from the education obtained at FIU induces economics activity that sustains 14,373 jobs in Miami-Dade and a further 7,322 elsewhere in Florida. This activity amounts to about \$1.4 billion in Miami-Dade output and an additional \$726 million elsewhere in Florida.

FIU's Economic Impact

FIU's economic impact is measured as the sum of the *net* contributions from its non-payroll expenditures, personal employee expenditures, incremental expenditures of alumni that remain in the region, and student expenditures not already accounted for by FIU's outlays. This is arrived at by subtracting from FIU's economic size the regional economic activity that would continue to take place if FIU did not exist. The estimates are sensitive to many unverifiable assumptions that need to be made about, *inter alia*, the choices FIU's students would make, or the revenues that would continue to accrue to the state or county, if FIU did not exist.

- The net economic impact of FIU's non-payroll operating expenditures and the personal expenditures of its employees at the county level is 7,650 jobs created or \$539.8 million of output. The net impact at the level of the state is 2,373 jobs, or \$171.7 million.
- The net economic impact of student expenditures at the county level is

3,784 jobs created, equivalent to \$375.5 million in economic output. At the state level, the net impact is 1,266 jobs, or \$126 million.

- The net economic impact of incremental alumni expenditures at the county level is 10,845 jobs created, equivalent to \$1.08 billion in economic output. At the state level, the net impact is 1,634 jobs, or \$1.63 billion.

2. FIU's Creation of Human Capital

The primary mission of Florida International University is to provide high-quality education to residents of South Florida. FIU has excelled in its mission. Despite its youth, the university is proud to be the alma mater of over 152,000 alumni. Although students have come from all over the world, there is barely a family in South Florida that has not been touched by the opportunities afforded to them by FIU. The university is particularly proud to have attained the distinction of being the largest minority-serving institution in the nation, and to be the home of choice for so many first-generation college students.

College students stand to benefit in diverse ways from their studies. A college education develops the skills necessary to understand the world, to resolve social and personal conflicts and problems, and it provides the foundation for living a satisfied life. Time in college also expands a person's social networks, usually in durable ways. These are some of the intangible but invaluable benefits of college. There are also large tangible benefits, resulting from the formation of productive human capital, and made obvious by the raw earnings differentials between graduates and non-graduates.¹

In this section, I attempt to quantify FIU's annual formation of local productive human capital. Doing so involves three main tasks. The first is to measure the *amount* of human capital produced by FIU, the second is to measure the *value* of the human capital, and the third is to determine how much of this human capital remains in the region. The methods to accomplish these tasks are reasonably straightforward and are in large part based on observable statistics.

2.1 The Production of Human Capital

Most existing impact studies measure the production of human capital by a simple count of degrees produced. Table 2.1 provides data on recent degree production at FIU. Because the distinction will matter for the analysis to follow,

¹ In a widely-cited study, Day and Newburger (2002) document that average lifetime earnings of college graduates are at least \$1.3 million greater than those of high school graduates. However, for reasons discussed later, these raw earnings differentials exaggerate the monetary value of a college degree.

the data are reported separately for Florida resident and non-resident students. Enrollment and graduation numbers have been increasing at FIU for many years. In AY2008-9, FIU granted 6,005 Bachelor's degrees, an increase of 15 percent over 2003-4. Ninety-three percent of Bachelor's degrees were earned by students classed as Florida residents. Over 2,500 students earned a graduate degree, around 90 percent of which were at the Master's level. Non-residents figure more prominently in the receipt of graduate degrees, accounting for almost 30 percent of Master's degrees and over 40 percent of doctoral degrees.²

Table 2.1
Degree Counts

	BACHELOR'S		MASTER'S		SPECIALIST		LAW		DOCTORAL	
	R	NR	R	NR	R	NR	R	NR	R	NR
2003-04	4,696	592	1,559	324	24	0	0	0	60	18
2004-05	4,638	512	1,444	336	18	1	47	0	65	15
2005-06	4,971	454	1,271	344	21	0	81	1	65	23
2006-07	5,277	476	1,511	410	10	2	86	0	58	42
2007-08	5,424	387	1,554	594	24	0	90	0	69	53
2008-09	5,592	413	1,600	635	25	0	118	5	73	54

R: Florida resident. NR: non-resident for tuition purposes. SOURCE: Office of Planning and Institutional Research, FIU. <https://opireports.fiu.edu/degrees.html>, File: SDCF_DEGREE_CNTS_UNIV_WIDE.XLS. Accessed Feb 11, 2010.

FIU also educates many students who, for one reason or another, terminate their studies at FIU prior to graduation. It is difficult to track what happens to these students after they leave. Nonetheless, it appears that, while some of them transfer to other universities to complete their degree and some are unable to continue because of adverse health or family circumstances, the majority quickly enter the local workforce.

College education that does not yield a formal degree nonetheless provides valuable training that I need to account for. There are in principle two approaches one could take. The first would be to document the number of students who terminated their studies at various stages in their progress to graduation, and then to measure the economic value of having different durations of college education. The second approach is to turn these incomplete education

² The Law School is an exception. Its tuition structure and admissions programs creates a strong focus on the production of resident graduates.

careers into measures of degree-equivalents, in order to adjust the counts of degrees produced. The absence of reliable statistical data on the earnings of individuals with various amounts of college education persuades me to adopt the second approach.

2.1.1 *Undergraduate Degree Equivalents*

Figure 2.1 shows the graduation and retention rates over ten years for the 2,508 first-time in college (FTIC) students in the entering cohort of 1998-9.³ By the end of the sixth year after first admission (a standard benchmark period for assessing graduation rates), 44.3 percent of the cohort had graduated while 14.7 percent were still registered as continuing students. The remaining 41 percent had apparently discontinued their studies, at least temporarily.⁴ The data allow us to follow students for ten years, by which time there are few continuing students left. By the end of the observation period, 53.5 percent of the cohort had graduated, 43.8 percent had discontinued studies while 2.7 percent remained as enrolled students.

FIU admits transfer students in even greater numbers than FTIC students. In 2008-9, when FIU enrolled 3,432 FTIC students, an additional 3,804 enrolled students were admitted after earning an AA degree elsewhere and another 1,571 students transferred from other colleges without formally earning an AA degree. Ten years ago, AA transfer students did not figure quite so large in FIU's enrollments. Nonetheless, the 1998-9 entering cohort included 1,004 AA transfer students as well as 2,028 non-AA transfer students.⁵

Transfer students come to FIU after having made significant progress toward a

³ Later cohorts exhibit very similar patterns, although we are of course only able to follow them for shorter periods of time. The graduation rates of FTIC students who initially registered as full-time is modestly higher. Data from Office of Planning and Institutional Research, FIU <https://opiereports.fiu.edu>, UG_RETENTION_V0708_FTIC_UNIV_WIDE.XLS. Accessed Feb 13, 2010.

⁴ Some students suspend their studies for a period of more than a year before returning. These students appear to FIU as discontinued students in the first year of their hiatus. The effect on the data in Figure 1 is to induce a modest overestimate of the number of students who have permanently discontinued at FIU in the early years, and a modest underestimate in later years. This will have little net effect on the estimates of human capital formation produced in this section.

⁵ Office of Planning and Institutional Research, FIU: <https://opiereports.fiu.edu>, UG_RETENTION_V0708_TRANSFERS_UNIV_WIDE.XLS. Accessed Feb 13, 2010.

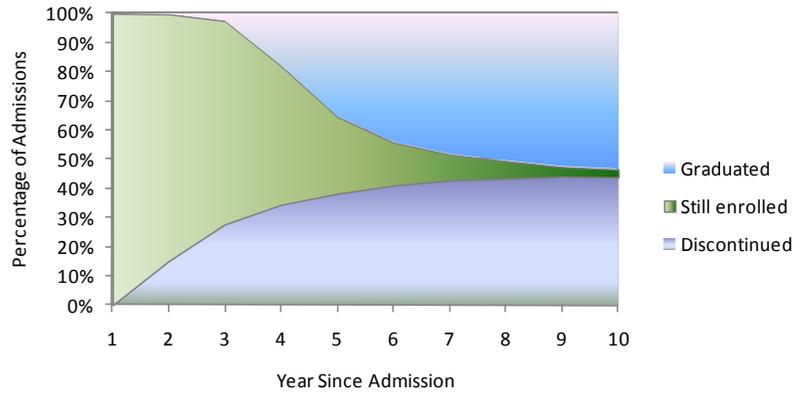


FIGURE 2.1 Undergraduate retention and graduation rates. FTIC students, 1998-99 entering cohort; $N=2,508$.

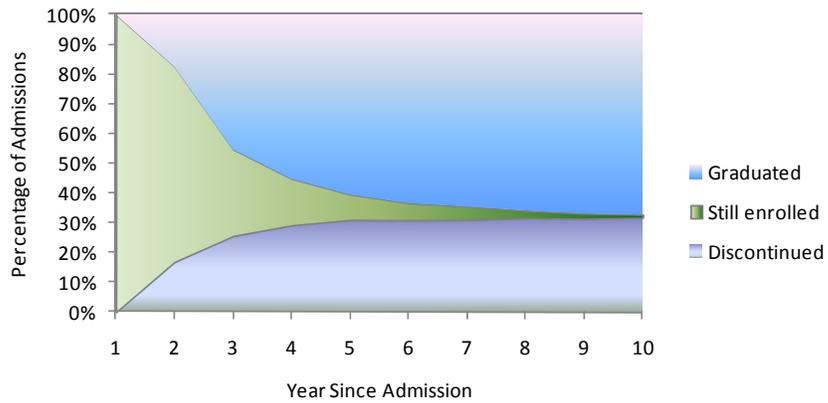


FIGURE 2.2 Undergraduate retention and graduation rates. AA Transfer students, 1998-9 entering cohort; $N=1,004$

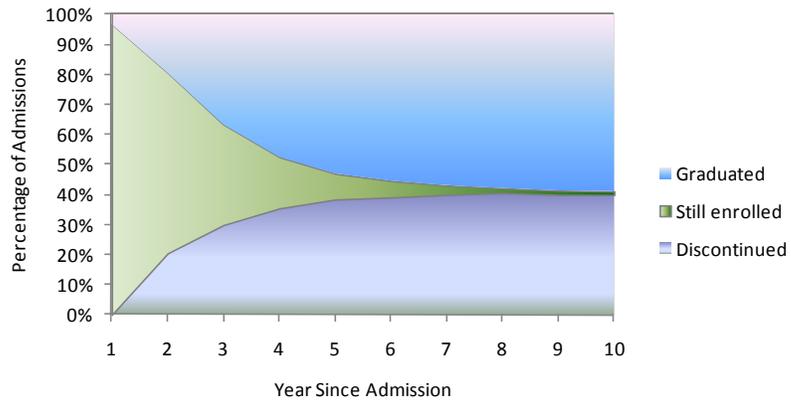


FIGURE 2.3 Undergraduate retention and graduation rates. Non-AA Transfer students, 1998-9 entering cohort; $N=2,028$

degree, so it is unsurprising that their graduation rates are higher than FTIC students. Figures 2.2 and 2.3 summarize the graduation and retention rates for the two types of transfer students. Those with AA degrees are most likely to graduate and they do so more quickly, while non-AA transfer students have graduation rates between those of FTIC and AA transfer students. After four years, 55.3 percent of AA transfer students have graduated, compared with 35.5 percent of FTIC students and 53.1 percent of non-AA transfer students. By 2008-9, 67.3 percent of the transferring cohort of 1998-9 had graduated, compared with 53.0 percent of FTIC student and 59.0 percent of other transfer students.

Figures 2.4 and 2.5, which plot empirical conditional probabilities of graduation in each year by undergraduate student type, provide another way to interpret these numbers. The graphs again refer to the entering students of 1998-9. Figure 2.4 plots the probability of graduating in each year for all students who entered in 1998-9 but had not yet graduated.⁶ This figure includes students who had failed to reenroll, and therefore were unlikely ever to graduate by returning at a later stage. The figure shows, for example, that about 21 percent of FTIC students who had not graduated prior to the fifth year after enrollment would do so in their fifth year; similarly about 34 percent of AA transfer students who had not graduated during their first or second year would graduate in their third year. Figure 2.4 shows that graduation probabilities peak in the third year for both types of transfer students, but in the fifth year for FTIC students.

Figure 2.5 eliminates from the risk set in each year students who were not enrolled, and who were therefore not candidates for graduating in that year. Only eight years of data are used because small sample sizes numbers make the estimates of conditional probabilities unreliable in the ninth and tenth years after initial enrollment. Enrolled students in their third year who had transferred to FIU with an AA degree were very likely to graduate in that year—fully 95 percent of them did so. There is much less concentration in the graduation times of FTIC students: the conditional probability of graduation among enrolled FTIC students peaks at only 66 percent, in their fifth year. There is also an interesting contrast between the behavior of non-AA transfer students and other students. Like AA students, non-AA transfer students are likely to graduate relatively quickly. However, if these students do not graduate by their third year, they are less likely to graduate than FTIC students in each year thereafter.

⁶ These conditional probabilities are frequently called *hazard functions*.

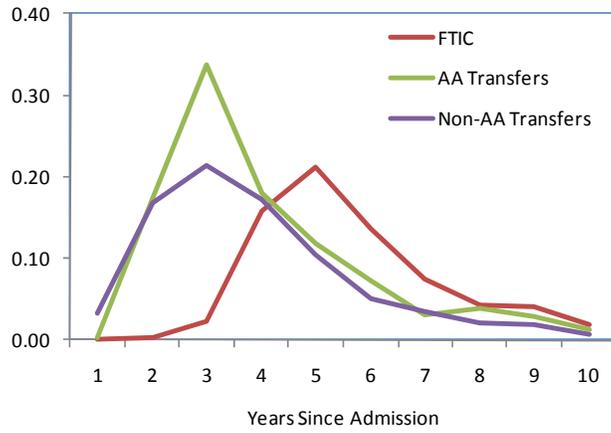


FIGURE 2.4 Conditional probabilities of graduation. All students from entering cohort of 1998-.

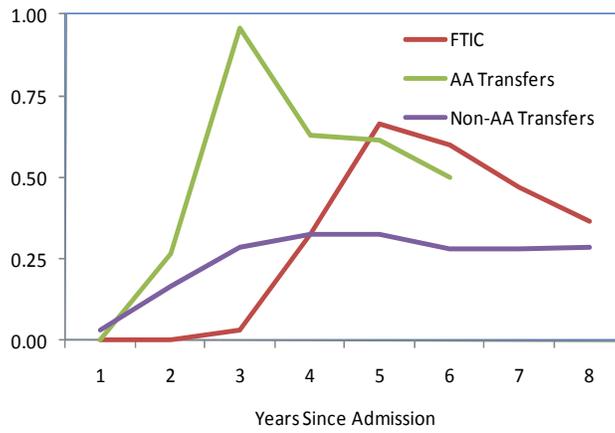


FIGURE 2.5 Conditional probabilities of graduation. All students from entering cohort of 1998-9 who were still enrolled in each year.

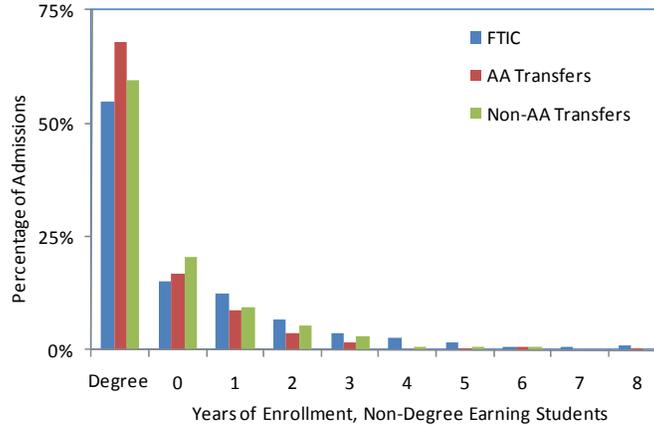


FIGURE 2.6 Distribution of students by education received prior to separation from FIU. All students from entering cohort of 1998-9.

One can readily construct from these data a distribution of the expected amounts of education obtained by incoming students at the time of their separation from the university (see Figure 2.6).⁷ To convert these into degree-equivalents, I need to make some assumptions. I shall assume for all students that after eight years of study without graduating, 80 percent of the requirements for a degree have been completed.⁸

I naturally assume that FTIC students enter with 0 percent and AA transfer students enter with 50 percent completed. Non-AA transfer students consist of students that came to FIU before completing their AA at a two-year college, and those that were at relatively early stages in a nother four-year program. I simply split the difference between FTIC and AA students, assuming that such students enter with 25 percent of the requirements completed. Finally, I assume that on average progression toward the degree is linear until the eighth year. Thus, an FTIC student who fails to reenroll after three years of study is assumed to have left with $\frac{3}{8} \times 0.8 = 0.3$ of a degree; an AA transfer student who leaves after two

⁷ I assume that fifty percent of students enrolled in the final year of observation will eventually earn their degree. The remaining 50 percent are assumed to have no further enrollment.

⁸ By limiting non-graduating students to 80 percent of a degree regardless of their length of study, I am accounting for the well-established “sheepskin effect”, whereby graduating is worth more in the labor market than an equivalent amount of study without graduating. See, for example, Fraziz (1993).

years of enrollment is assumed to have left with $0.5 + \frac{2}{8} \times (0.8 - 0.5) = 0.575$ of a degree.

To calculate Bachelor degree-equivalent production at FIU's current scale of operation, I apply these calculations to the 2008-9 student admission count. I assume that all AA transfers are Florida residents and 95 percent of non-AA transfer students are residents. I then calculate the number of non-resident FTIC admissions consistent with 93 percent of the total degree production accruing to residents. Table 2.2 provides the final numbers. The bachelor degree output at the current scale of operation is estimated at 6,466 degree-equivalents annually; 452 of these are earned by non-residents, and the remaining 6,014 by residents. Among the residents, 1,741 are earned by FTIC students, 3,229 by AA transfer students, and 1,044 by non-AA transfer students.

Table 2.2
Bachelor Degree Equivalent Production

	FTIC		AA TRANSFERS		NON-AA TRANSFERS	
	DE	FA	DE	FA	DE	FA
Degree	1	0.55	1	0.68	1	0.60
Years						
0	0.00	0.15	0.5	0.17	0.25	0.20
1	0.10	0.13	0.54	0.09	0.32	0.09
2	0.20	0.07	0.58	0.04	0.39	0.06
3	0.30	0.04	0.61	0.02	0.46	0.03
4	0.40	0.03	0.65	0.00	0.53	0.01
5	0.50	0.02	0.69	0.00	0.59	0.01
6	0.60	0.01	0.73	0.01	0.66	0.01
7	0.70	0.01	0.76	0.00	0.73	0.00
8	0.80	0.01	0.80	0.00	0.80	0.00
DEs per 1,000 admissions	623		849		724	
No. Admissions	3,432		3,804		1,517	
DE TOTAL	2,138		3,229		1,099	
	R	NR	R	NR	R	NR
DE TOTAL	1,741	397	3,229	0	1,044	55

DE=Degree equivalent, FA=Fraction of admissions, R=Resident, NR=Non-resident. Admissions totals are for 2008-9. Numbers may not add due to rounding. Source for admissions totals, Office of Planning and Institutional Research, FIU: <https://opiereports.fiu.edu/>, 5_YEAR_ANNUAL_HCNT_ADM_ENROLLED_UNIV_WIDE.xls. Accessed Feb 13, 2010.

2.1.2 Graduate Degree Equivalents⁹

Because the numbers are more modest, I shall be less involved in my calculations for the degree-equivalent production of Master's, Doctoral and Law degrees.¹⁰ For Master's and Doctoral degree students, I again base the degree completion rates on the outcomes for the 1998-9 entering cohort, and I apply these numbers to the 2008-9 admissions data. The Law program did not exist in 1998-9, and I will simply assume an 80 percent graduation rate for entering Law students.

About 1,800 students were first enrolled in Master's programs in AY1998-9. By 2007-8, 61.1 percent had graduated. Only 0.1 percent of the cohort remained enrolled in 2007-8, so the graduation rate at the end of the observation period can reasonably be treated as the final graduation rate.¹¹ The 1998-9 doctoral cohort numbered 128 students. 45.3 percent of these had obtained their doctoral degrees nine years later, and only 0.8 percent of the cohort remained registered without having graduated. I assume fifty percent of the continuing students eventually graduate, yielding a graduation rate of 45.7 percent.

I assume that students who began, but failed to graduate from, a Master's program left FIU with the same educational level they began with. I treat Law students in the same manner. Doctoral students who do not complete their degree programs tend to leave at three distinct stages. Some leave very early in the program, often after a single semester (20 percent of the 1998-9 cohort who failed to graduate); others leave soon after taking their comprehensive exams, having completed the requirements for the Master's (43 percent); a third group fails to complete the thesis and leaves the university with the status ABD (36 percent). I shall take a simple "average" of these three groups and treat all

⁹ The data used in this subsection are taken from Office of Planning and Institutional Research, FIU: <https://opiereports.fiu.edu/>, Student headcount - county, state, country, 2000-2009.xls, COHORT_DOCTORAL_1996_2008_UNIV_WIDE.xls, and COHORT_MASTERS_1996_2008_UNIV_WIDE.xls

¹⁰ I omit the small number of recipients of specialist graduate degrees. In Fall 2009, FIU admitted 43 individuals as its first cohort of medical students. Because our analysis is based on AY2008-9 enrollments, I do not include this group in our estimates of human capital formation.

¹¹ This assumption is also consistent with Graduate School requirements that students complete their requirements for a degree within ten years of first enrollment in the program.

entering doctoral students who fail to graduate after nine years as having obtained, on average, the equivalent of a Master's degree.¹²

Table 2.3 provides the resulting counts of degree-equivalents produced at the graduate level. In 2008-9, FIU enrolled 2,759 students in Master's programs, 270 into doctoral programs, and 217 into Law school. Using the completion rates of the 1998-9 cohort, I estimate production of 1,833 Master's degrees, 123 doctoral degrees and 174 Law degrees. The division between resident and non-resident students is based on the current headcount of enrolled resident and non-resident students.

Table 2.3
Graduate Degree Equivalent Production

	MASTER'S		DOCTORAL		LAW	
GRADUATION RATE	61.1%		45.7%		80%	
ENROLLMENT	2,759		270		217	
		MASTER'S		DOCTORATE		
		EQUIVALENT				
DEGREE PRODUCTION	1,686	147				
		1,833		123		174
	R	NR	R	NR	R	NR
DEGREE PRODUCTION	1,393	440	78	45	165	9

2.2 The Value of FIU's Human Capital Formation

Under the current scale of operations, FIU produces each year the equivalent of 6,466 Bachelor's degrees, 1,833 Master's degrees, 123 doctoral degrees, and 174 Law school graduates. This section develops estimates of the monetary value of these degrees.

Perhaps the most widely-cited statistics on the value of education are those produced by Day and Newburger (2002). They first compiled data on earnings by educational attainment and age from the US Census Bureau's Current Population Surveys of March 1997, 1998, and 1999. They then applied these

¹² International students, for whom local employment is usually not an option, are more likely to complete their studies than resident graduate students. However, I apply the same graduation rates to both groups.

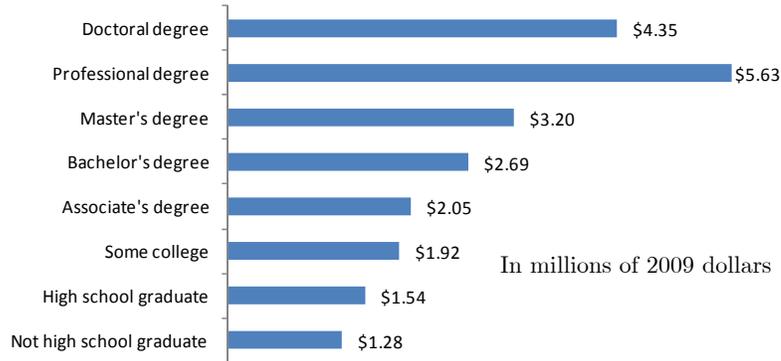


FIGURE 2.7 Synthetic work-life earnings for full-time, year-round workers, by educational attainment. Source: Day and Newburger (2202, Fig. 3); adjusted for inflation.

cross-sectional earnings data to a hypothetical individual’s life, assuming full-employment over a forty-year working life. Figure 2.7 reproduces their lifetime earnings estimates, adjusted for inflation to reflect current prices.¹³

Suppose we take these numbers at face value, and assume that the value of a Bachelor’s degree is the difference between the lifetime earnings for an individual with a Bachelor’s degrees and a high school graduate (i.e. \$1.15 million); that the value of a Master’s degree is the excess earnings over having a Bachelor’s degree (\$0.51 million); that a Doctorate yields \$1.15 million over a Master’s degree; and that a Law degree yields \$2.94 million over a Bachelor’s degree. Then, the imputed values of FIU’s annual degree production would be

- Bachelor’s degrees: \$7.43 billion,
- Master’s degrees: \$0.93 billion,
- Doctoral degrees: \$0.14 billion,
- Law degrees: \$0.51 billion,

yielding a total value of \$9 billion per year.

This calculation suggests a dramatic return to FIU’s annual expenditures on education. However, the numbers are far too large. The most obvious adjustment needed arises because expenditure on the creation of new human capital is an

¹³ The consumer price index rose by 28.0 percent between 1999 and 2009. (Bureau of Labor Statistics, <ftp://ftp.bls.gov/pub/special.requests/cpi/cpi.txt>; Accessed Feb 13, 2010).

investment that yields returns over a long period of time. Future earnings should be discounted to create a present value, and this alone greatly reduces the value of annual new human capital formation. For example, if we apply to the \$9 billion figure a standard three percent discount rate and assume average lifetime real earnings growth of around three percent per year during an individual's life, the present value is reduced to \$4.8 billion. This remains an overestimate, however. The lifetime earnings profiles for high school graduates are markedly flatter than for college graduates. As a consequence, a greater fraction of the lifetime earnings of high school graduates accrue in the early years, where earnings are subject to less discounting, than is the case for graduates.

I therefore construct annual earnings series by education and age, building upon the initial estimates reported by Day and Newburger (2002). I adjust their numbers upwards for inflation, and use interpolation to produce annual earnings from their group mean data. I include foregone income while studying in our estimates of lifetime earnings, but discount all earnings back to age eighteen. Finally, I adjust for variations across educational attainment in unemployment rates. Further details and the resulting annual earnings estimates are given in Appendix A.

Table 2.4 shows the estimated present values of FIU degrees, and the excess present value over the appropriate alternative comparison for each type of degree. Table 2.5 provides the totals. The annual value of human capital formation at FIU is about \$3.47 billion. Almost 90 percent of this value is accounted for by Bachelor's degree and degree-equivalent production.

Table 2.4
Net Present Values of FIU degrees (\$ millions)

	PRESENT VALUE	EXCESS PRESENT VALUE PRODUCED BY FIU DEGREES			
		P	D	M	B
PROFESSIONAL	2.73				
DOCTORAL	2.19				
MASTER'S	1.51		0.68		
BACHELOR'S	1.30	1.43		0.21	
ASSOCIATE'S	0.92				0.38 ^a
HIGH SCHOOL	0.72				0.58 ^b

^a AA transfer Students. ^b FTIC and non-AA transfer students.

Despite their apparent precision, the numbers in Tables 2.4 and 2.5 are sensitive to some of the assumptions I have made. For example, if the discount rate were raised from three percent to, say, five percent, the total value of human capital formed would be reduced to \$2.69 billion. Others have used discount rates higher than the one used here. For example, Schneider (2009), who also constructs synthetic lifetime earnings profiles from cross-sectional data, uses a discount rate of 4.8 percent because it “is roughly the average rate of long-term Treasury bills.” [p. 5]. However, the T-bill rate is nominal and the construction of lifetime earnings profiles from cross-sectional data demands a real interest rate. Subtracting the Federal Reserve’s target inflation rate of around two percent from the T-bill rate gives a real discount rate just below the three percent I have used.

How do our results compare with other studies? I focus on the value of a Bachelor’s degree for FTIC students, which I have estimated at \$580,000. This is considerably lower than the widely-cited value of \$1 million commonly attributed to the College Board in its *Education Pays* report. Schneider (2009) notes that the number was used by, among others, Arizona State University in 2007 to justify a tuition increase, and State Farm to promote its 529 investment fund. The million dollar figure appears to have been based on Day and Newburger’s (2002) estimated earnings differential of \$910,000, and sustained by Kantrowitz’ (2005) update that reported an increase in the added value of a Bachelor’s degree to \$1.2 million.

Table 2.5
Net Present Values of FIU degree production (\$ millions)

	NUMBER PRODUCED	UNIT VALUE (\$ Millions)	TOTAL VALUE (\$ Millions)
PROFESSIONAL	174	1.43	248.8
DOCTORAL	123	0.68	83.6
MASTER’S	1,393	0.21	292.5
BACHELOR’S			
NON-AA TRANSFERS	3,237	0.58	1,877.5
AA TRANSFERS	3,229	0.38	1,227.0
TOTAL			3,466.4

On the other hand, our estimate is also considerably higher than that of NASULGC (2008; \$121,539) and Schneider (2009; \$220,000-\$500,000, depending

upon selectivity). But Schneider discounts the future at too high a rate, while NASULGC contains “some errors and questionable assumptions” (Schneider, p. 7) that reduce their estimated value. Both studies also included tuition costs and subtracted Federal income taxes. These two adjustments are necessary to evaluate the *private return* to education but they are not appropriate for our present purpose of evaluating the ex post *economic value* of human capital formation.

There is one important way in which our analysis may yield overestimates of the value of human capital formation at FIU. I have made a comparison between the average earnings of, for example, all workers with a Bachelor’s degree and all workers with a high school diploma. However, an individual who graduated from college is almost certainly drawn from a better ability distribution than a high school graduate. He or she is likely to have better innate skills, be able to learn more quickly on the job, and to be more ambitious. In an experiment in which we simply prevented the prospective college graduate from entering college, we would expect him or her to earn more than the average high school graduate. If we were able to control (in a statistical sense) for selection on ability, we would inevitably obtain somewhat smaller estimates of the value of college education. There are well-understood techniques for estimating so-called sample-selection models, but the data demands are excessive and beyond the scope of this study.¹⁴

2.3 Regional Human Capital Formation

A large majority of FIU’s incoming students are residents of South Florida at the time of matriculation, and the majority of them remain in the region after graduation. To a greater extent than might be expected given FIU’s international reach and reputation, the university is a fundamental contributor to the region’s stock of human capital. For example, FIU’s approximately 78,000 alumni resident in Miami-Dade County account for 17.5 percent of all Bachelor’s or higher degrees earned by county residents; in Broward County, despite the presence there of Florida Atlantic University, FIU’s 22,776 resident alumni account for 6.5 percent of all Bachelor’s degrees or higher.¹⁵

¹⁴ The seminal statistical paper is Heckman (1979). Bagheri and Kara (2005) provide a recent application to the returns to education.

¹⁵ The U.S. Census Bureau reports that in 2006-2008, Miami-Dade County had about 1.61 million people over the age of 25, of whom 26.8 percent had earned or otherwise obtained a Bachelor’s degree or higher. In Broward, 29.3 percent of 1.20 million held at

In this section, I study the geography of FIU's human capital formation. I ask how many resident and non-resident students remain in the region or the state after graduation. I combine these findings about graduate mobility with the value of human capital already derived to estimate FIU's contribution to the creation of productive human capital in South Florida and the State of Florida.

Under ideal circumstances, we would like to track individuals that enrolled in and graduated from FIU, recording their residence at the time of matriculation and, if they left the region, the time that elapsed between graduation and outmigration. Doing so would enable us to distinguish precisely different channels through which FIU has contributed to the local human capital stock. The most direct channel is of course FIU's contribution to the local human capital stock of local students that remain in the region after graduation. Through these students, FIU has contributed not only to the productive capacity of South Florida, but also to the creation of opportunities for its residents. A second channel consists of students that were resident in the region at the time of matriculation but who leave the region after graduation; while these alumni do not contribute to the local human capital stock, FIU has fulfilled its mission for these students by helping them to seize opportunities elsewhere that would otherwise have been unavailable to them. Third, some local students may initially remain in the region, but leave to pursue career opportunities elsewhere after a number of years; these students contribute to the local human capital stock for a part of their working life. Fourth, many non-resident students choose to remain in the region after graduation, and when they do they contribute fully to the region's productive potential. Finally, non-resident students that leave the region after graduation play no direct role in the creation of local human capital.¹⁶

Unfortunately, the data do not allow me to track individuals. For residency at matriculation, I have access to student headcounts by origin for entering cohorts from 2000-2010. For destination of students, I obtained from University Advancement the last known mailing addresses (as of Spring 2010) of over 140,000 FIU alumni, who had graduated between 1972 and 2009.¹⁷ These data

least a Bachelor's degree (source: <http://factfinder.census.gov>; accessed 28 April, 2010).

¹⁶ However, they contribute to the fiscal solvency of FIU through payment of out of state tuition, and their diversity of backgrounds and cultures enrich student life.

¹⁷ I am grateful to Ms. Joan Casanova, Director of Data Management and Gift Services, for extracting and preparing the data files.

allow me to make some crude inferences about the mobility of FIU alumni, but they have some serious limitations. First, the alumni records do not contain any information on the current whereabouts of students who left without formally graduating. I shall have to assume that the mobility of students who earned fractions of degree equivalents (without obtaining a sheepskin) parallels that of FIU's graduates; in reality it is likely that a greater fraction of non-graduates remain in South Florida. Second, I have no data on when alumni moved to their current address, and no information on when they first left South Florida. I shall therefore ignore these dynamics, which is equivalent to assuming a naive model in which movements into and out of the region are entirely random. Third, I do not know if the last known mailing address is also the actual place of residence of the alumni; on occasions, especially when the address was obtained soon after graduation, it may be the address of the alumni's parents. Finally, I do not know the residency that the alumni had when they matriculated. As a result, I cannot directly link student residency to their subsequent mobility.

I begin with some summaries of the raw data. Figure 2.8 compares the distribution of residence of students enrolled between 2000 and 2009 with the last known addresses of alumni. The upper bars in the figure highlight the dominant role of South Florida as a source for FIU students, 72.7 percent of whom were residents of Miami-Dade, and 91.9 percent of whom were residents of the state. Only 3.4 percent of enrolled students came from other U.S. states, and a modest 4.7 percent came from other countries.¹⁸ The lower bars indicate that FIU alumni are more dispersed throughout the United States than are the students, while the fraction living in other countries is smaller than the fraction of enrolled students hailing from other countries. The fractions of alumni calling Miami-Dade County or Broward County their home are 52.8 percent and 16.8 percent respectively; another 10.6 percent live in other parts of Florida, 16.5 percent live in the U.S. outside of Florida, and 3.0 percent outside the United States.¹⁹

¹⁸ The data files reveal that several thousand students are recorded both as international students and as local residents. This reflects the considerable number of students who belong to families for which Miami is a second home: they consider another country to be their primary residence but have established domicile in Miami for long enough to be considered a local student.

¹⁹ However, it is likely that FIU graduates living in other countries are underrepresented in the alumni database.

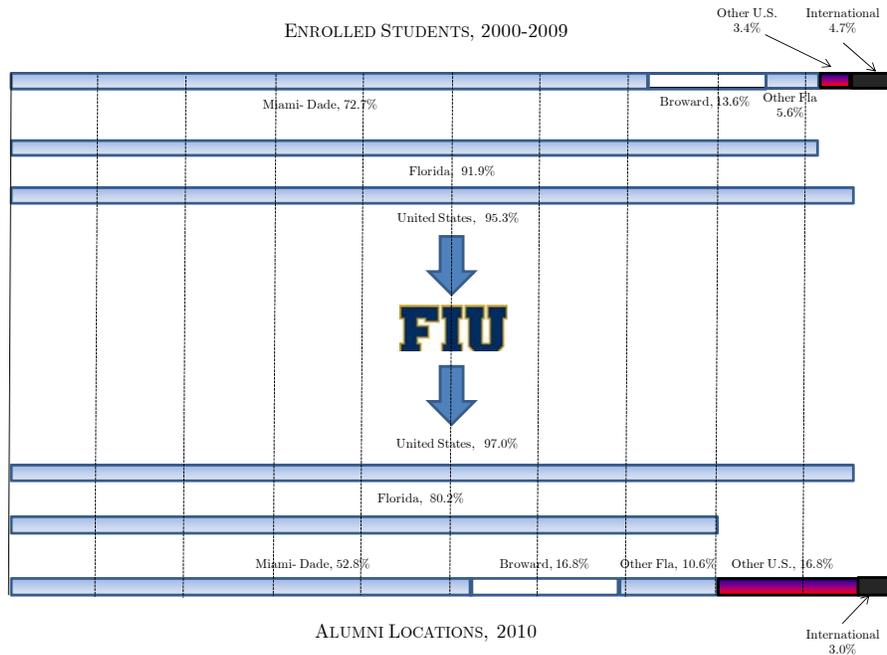


FIGURE 2.8 Student origins and alumni destinations.

FIU tends to draw students from South Florida, and to distribute a significant number of them around the country after graduation. This is perhaps to be expected of a successful urban university in a city that has relatively undiversified employment opportunities: it serves a large resident student population and prepares many of them for careers best advanced in different parts of the country. Figures 2.9 – 2.11 provide further details. Figure 2.9 shows the great majority of Florida alumni living in Miami-Dade and Broward Counties, with other, more modest, concentrations in Palm Beach County and around Orlando and Tampa. Figure 2.10 reveals, as one might expect, significant concentrations of FIU alumni in the major cities, especially New York city and its immediately surrounding counties (1,533), Los Angeles (751), Atlanta (573), and Houston (434). Figure 2.11 illustrates how FIU alumni are scattered around the world, with particular concentrations in Jamaica (723), China (395), Bahamas (263), and Puerto Rico (262).

Table 2.6 assigns the value of human capital production summarized in Table 2.5 to regions according to the residences of alumni. FIU’s total annual production of human capital, at its current scale of operation, is \$3.47 billion. Ninety-seven

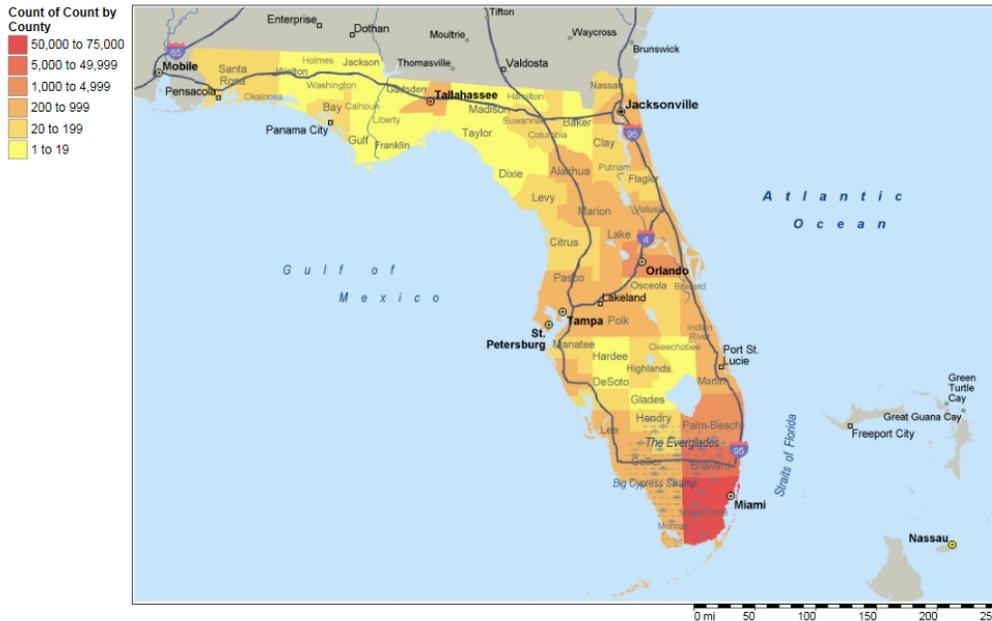


FIGURE 2.9. Alumni locations: Florida Counties

percent of this total, or \$3.36 billion represents FIU’s contribution to annual human capital creation in the United States. Florida is of course, by far the greatest beneficiary. The value of human capital created by FIU each year and that remains in Florida is about \$2.78 billion, of which \$2.48 billion remains in South Florida and \$1.83 billion remains in Miami-Dade.

Table 2.6
NPV of FIU degree production by regions (\$ millions)

	PERCENTAGE	UNIT VALUE (\$ Millions)
ALL	100.0%	3,466.4
UNITED STATES	97.0%	3,262.4
FLORIDA	80.2%	2,780.0
SOUTH FLORIDA*	71.9%	2,492.3
MIAMI-DADE	52.8%	1,830.3
BROWARD	16.8%	582.3

* Includes Miami-Dade, Broward, Palm Beach and Monroe Counties.

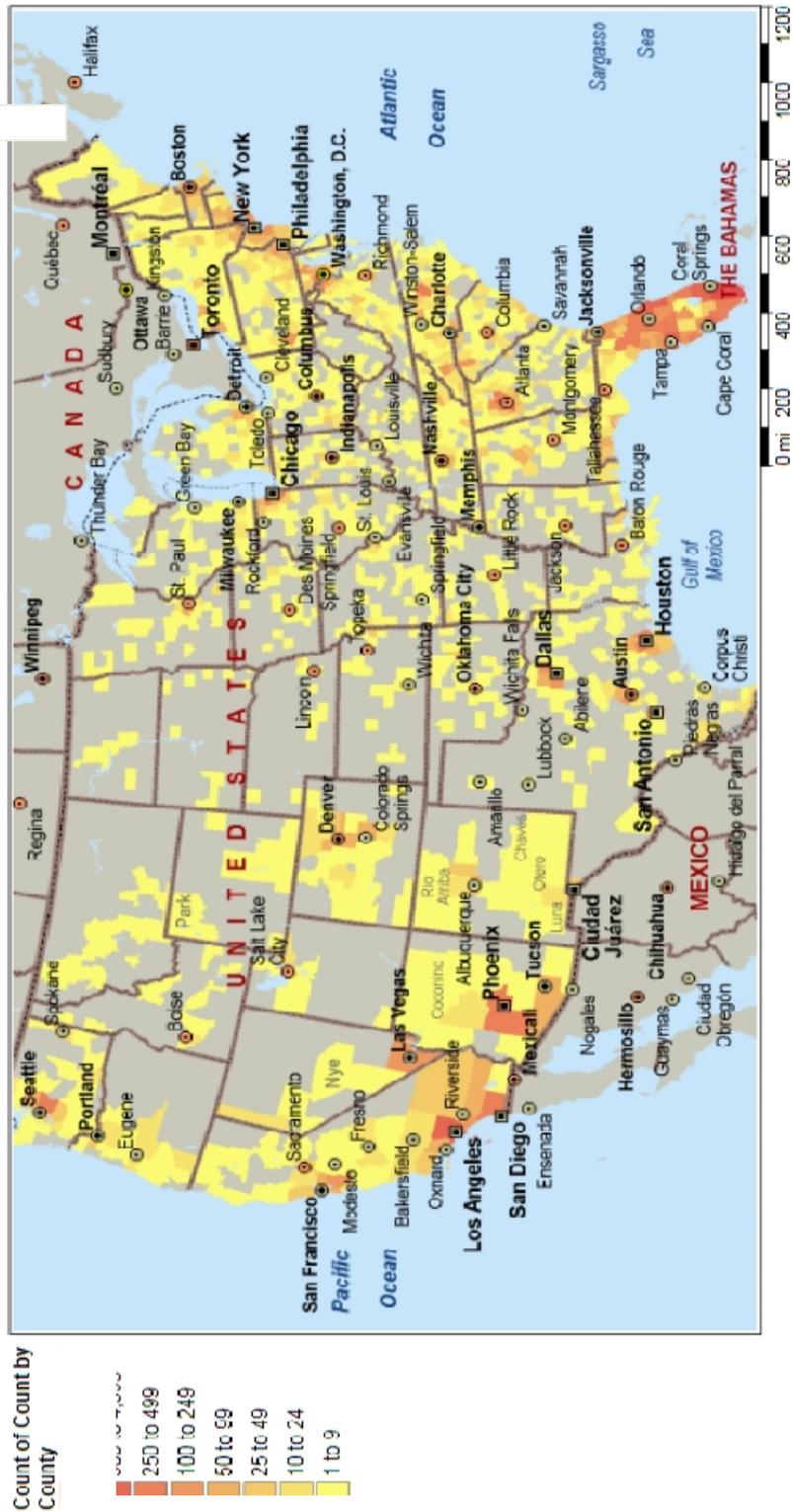


FIGURE 2.10. Alumni locations: US, county level

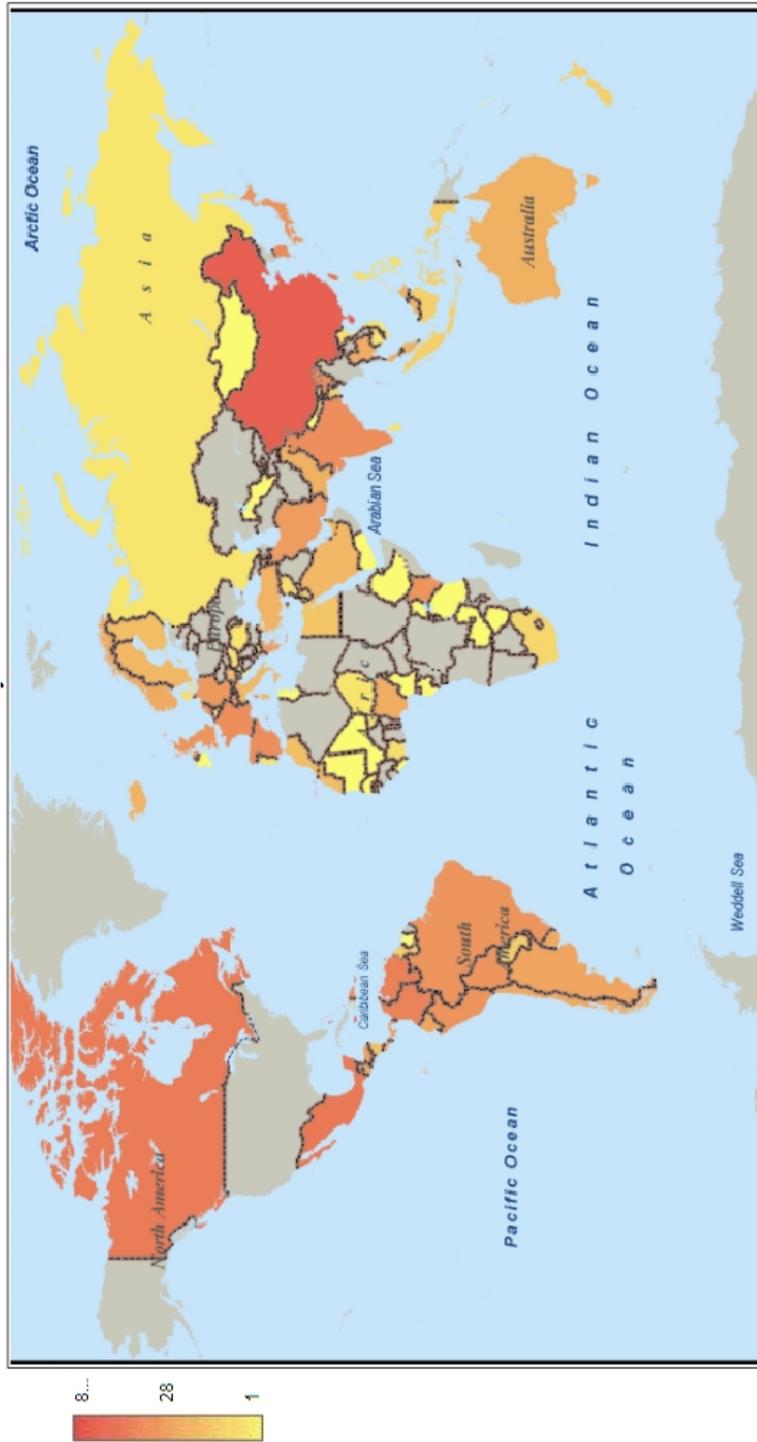


FIGURE 2.11. Alumni locations outside the United States

These final numbers are, of course, subject to some further caveats. First, I have assumed the overall geographic distribution of *alumni* applies to all former *students* whether or not a former student formally graduated, and regardless of the type of degree earned among the graduates. In reality, one might expect more dispersion of graduates than non-graduates, and more dispersion of alumni with graduate degrees than with non-graduate degrees. While I have the data to construct separate distributions by graduate and undergraduate degrees, doing so would have only a very modest impact on the numbers given in Table 2.6;²⁰ I do not have data to distinguish alumni from non-graduating former students.

Second, I have taken the geographic distribution obtained from the current addresses of alumni and applied it to the number of degrees currently produced. Doing so confounds two countervailing sources of error, a *cohort effect* and an *age effect*. Today's graduates may well exhibit different mobility patterns than the average pattern exhibited by alumni who graduated over the last thirty years. I expect that students today are more mobile than students from, say, thirty years ago, because FIU's student's body has changed and because mobility has increased in the United States over this time period. This cohort effect likely leads us to overstate the fraction of human capital that remains local. Offsetting this, mobility varies by age or the time that has elapsed since graduation such that people tend to gradually disperse away from where they graduated as their career progresses. This age effect induces an underestimate of the fraction of human capital that remains local, at least when alumni are relatively young. There is, unfortunately, a classic statistical identification problem that makes it impossible to separate age and cohort effects from cross-sectional data,²¹ and we shall have to live with these potential sources of error.

²⁰ In fact, the fraction of US resident graduate alumni remaining in Florida, at 81.5 percent, is almost identical to the corresponding fraction for all alumni, which is 82.7 percent.

²¹ Suppose that 1979 graduates are distributed differently from 2009 graduates. Is this because mobility patterns were different in 1979 than they are in 2009, or is it because the 1979 graduates are on average 30 years older?

3. FIU's Economic Size

This section reports some estimates of the regional economic importance of Florida International University. I do so by applying regional economic multipliers to FIU's operational expenditures, and to student and alumni spending. While this exercise serves to illustrate how significant a role FIU plays in the local economy, it does not tell us the *economic impact* of FIU, which is estimated in Section 4. I shall refer to the numbers produced in this section as the *economic size* of FIU.

3.1 Economic Size vs. Economic Impact

Before proceeding, it is important to make sure the distinction between an institution's economic size and its economic impact is clearly understood. The economic size simply tells us how much regional economic activity can be associated with the institution's activities. But when economists discuss the institution's economic impact on a region, they have in mind something rather more complex and subtle: it is a counterfactual comparison of the size of the local economy as it exists today against the size of the local economy that would have existed if the institution did not exist.

Consider, for example, the economic activity associated with FIU that is attributable to, say, new construction activity. Measuring economic size is straightforward: one needs only to know the construction budget. But to measure the economic impact, one has to estimate the fraction of this budget that would have been spent locally if FIU did not exist. Would the money appropriated by the state to construct a new student services center at FIU have instead been used to build a new school, or a new road? Would the private donation that funded a new art gallery at FIU have been donated for some other gallery? And if so, what is the likelihood that the new school, the road, or the art gallery would have been built in Miami-Dade County? Only that part of FIU's construction budget that would not have otherwise been spent locally counts as new expenditure for the purpose of assessing its economic impact.

To obtain the economic impact of a university, one has to make some heroic assumptions about plausible *substitution effects* along many dimensions: What fraction of the university's employees would have continued to reside and spend

in the county or the state if it were not here to employ them? What fraction of the student population would have left the county were the university not here to admit them? What fraction of research expenditures would have been undertaken in the region by other educational institutions had FIU not been here to earn the grants that fund the research?

There are rarely precise answers to these questions, but ignoring them leads to gross overestimates of the economic impact of a university. Yet many authors of economic impact studies fail to identify the appropriate counterfactuals, and as a result previous estimates of the impacts of colleges and universities have been all over the place:

Loyola-Chicago and Northwestern, for example, are similar in size and located within a few miles of each other. While Loyola estimated its local impact as \$1.04 billion in 1994 (\$1.42 billion in 2006 dollars), Northwestern claimed only \$145 million in 2006, an order of magnitude less. . . . Although colleges are heterogeneous, the variety is not enough to justify such a large range of estimates.

Siegfried, Sanderson, and McHenry (2006, pp. 4-5)

The effective counterfactual in the Loyola study was that none of the activity associated with the university would have taken place locally if the university did not exist. In contrast the authors of the Northwestern study assumed that much activity would simply substitute to other, nearby, educational institutions and local non-educational activities. As a result, only Northwestern conducted an economic impact study; the Loyola study measured the economic size of the university.

In Section 4, I produce estimates of the economic impact of FIU. However, because so many existing studies produce estimates of economic size (under the guise of impact studies)²², this section provides an estimate of size for FIU.

3.2 Regional Multipliers

FIU's economic importance in the region results from direct expenditures of the university, its employees, students and alumni. However, FIU's economic size is considerably larger than would be suggested by a simple sum of the direct

²² Economic impact studies previously conducted for FIU [Villamil (1996)] and FIU's Academic Health Science Center [Tripp Umbach (2009)] are in fact primarily estimates of economic size.

expenditures. FIU's payments to its suppliers induce additional economic activity through two channels: an indirect effect caused by the need for the institution's suppliers to increase their purchases from their own suppliers (who in turn increase their purchases); and the induced effect of incremental household expenditure that arises from the stimulation to employment and household income. Collectively, indirect and induced effects are called the *multiplier* effects of the initial spending. The multiplier effect of FIU's payroll expenditure is mediated through the induced effects of spending by FIU's employees. In addition, FIU induces local expenditures by its non-employee students, and its alumni.

Regional multipliers are primarily determined by two factors. First, a fraction of the income earned is saved or paid in taxes, rather than spent. Savings and tax revenue that leave the region induce no multiplier effects, so the greater the saving and tax rates the smaller the multiplier effect on the first round of incremental income resulting from FIU's operations. Second, a fraction of any income earned is spent outside the region. This extra-regional expenditure also induces no local multiplier effects. To see how these factors influence the total size of the multiplier, consider the following hypothetical example. Suppose first that Miami-Dade residents pay an average tax rate of 25 percent, and save ten percent of their after-tax income. Suppose further that eighty percent of each dollar of expenditure is spent within Miami-Dade County. Then on average a hundred dollars of payroll expenditure leads to \$54 of local expenditure by the employee.²³ This expenditure is equal, by definition, to gross revenues accruing to local firms. They in turn will retain part of this revenue as profits, spend part on employee wages, and spend the remainder on materials and services from their suppliers. Some of these suppliers will be local, and some will be from outside the region. Suppose, for illustration, that sixty percent of revenues are accounted for by profit and wages, and fifty percent of material and services are purchased from local suppliers. Then, the second-round of spending induces an additional \$17.50 of local household expenditure from the owners and employees of the "first-generation" suppliers, and payments by the "first-generation" suppliers to other local suppliers equal to \$8.75. In total, the second-round revenue impact on local firms is \$26.25, or 48.6 percent of the first-round revenues. This in turn induces a third round of local revenues, and then a fourth, and so on. The total

²³ This is simply $\$100 \times (100 - \text{tax rate}) \times (1 - \text{saving rate}) \times \text{fraction spent locally}$. I ignore that a possibly significant fraction of taxes will be returned to the region.

impact is given by

$$\$54.00 + \$26.25 + \$12.76 + \$6.20 + \$3.01 + \dots$$

Adding these up over all the subsequent rounds yields local economic activity of just over \$105. Thus, the multiplier in this example is 1.05 (when applied to FIU's gross payroll expenditure of \$100), or 1.4 (when applied to the employee's net income of \$75).

Although the principle of estimating these economic linkages is straightforward, the practical challenge is that the fraction of firm revenues that is retained as profits, accounted for by wages, and spent on local suppliers, varies by sector and location. Moreover, each sector spends money on suppliers in different sectors in varying proportions. There are, therefore, considerable informational demands involved in calculating the correct multipliers. Fortunately, commercial software packages, available from a number of vendors, offer statistical estimates of the relevant linkages between sectors, greatly simplifying our work. In this section, I make use of an especially popular software package, IMPLAN, that was originally developed by the US Department of Agriculture. IMPLAN contains estimates of linkages between each of 505 separate industries, differentiating these linkages within and across regions as disaggregated as the county level.

For my purposes, I need extract only a small number of multipliers. First, I analyze the effect of a \$1 million increase in expenditures of IMPLAN's sector 392- "Private junior colleges, universities and professional schools".²⁴ Second, I analyze the effect of a \$1 million increment to sector 438- "Employment, payroll, state educational sector." I assume these increments take place in Miami-Dade County, and record from IMPLAN's output the estimated effects on employment and output in the county and in the rest of Florida.

Table 3.1 provides the multipliers so obtained. I will apply the multipliers in Part A to non-payroll FIU expenditures. Thus, each one million dollars of non-payroll expenditure will be associated with the creation of 17.4 jobs in Miami-Dade and an additional 0.9 jobs elsewhere in Florida. Similarly, each one million dollars of non-payroll expenditure leads to total economic activity of \$1.863 million in Miami-Dade and an additional \$140,000 elsewhere in the state. The multipliers in Part B, which have a similar interpretation, will be applied to personal expenditure of FIU employees, the incremental personal expenditure of FIU

²⁴ This category is more appropriate than state education, which includes K-12.

alumni in the region, and student expenditures.

Table 3.1
IMPLAN *Multipliers*

	EMPLOYMENT			OUTPUT		
	Direct	Indirect	Induced	Direct	Indirect	Induced
A. 392-Private junior colleges, universities and professional schools						
Miami-Dade	11.5	2.0	3.9	1.000	0.345	0.518
Rest of Florida	0.0	0.4	0.5	0.000	0.082	0.058
B. 438-Employment payroll, state education						
Miami-Dade	12.5	0.0	5.0	1.000	0.000	0.737
Rest of Florida	0.0	0.0	0.4	0.000	0.000	0.054

Source: Calculated from multi-regional scenario analysis in IMPLAN.

3.3 Operational Expenditures

As Table 3.2 shows, FIU's operating expenditures for fiscal year 2008-9 were \$590 million. Sixty-one percent of this expenditure was accounted for by payments of salaries and benefits, nine percent on scholarships and other forms of student support, 21 percent on the purchase of supplies and services, and 2.6 percent on utilities. The remaining 6.4 percent is accounted for by depreciation of fixed assets. Almost 39 percent of the operating budget is spent directly on the university's central missions of instruction and research, while most of the remainder is spent on providing the institutional support essential to these activities.

These are not trivial numbers for Miami-Dade County. FIU's expenditure on compensation and benefits pays for the services of 4,261 employees, 83 percent of whom are employed full-time. These numbers rank FIU as the fourteenth largest employer in Miami-Dade (see Tables 3.3 and 3.4). With a little over one third of FIU's employees directly engaged in instructional and research activities, most of them with advanced degrees (as is the also the case for many management and professional employees), FIU gross compensation and benefits averages about \$84,500 per employee. Because of its highly educated workforce, FIU ranks among the ten largest employees in the county by size of payroll.

Table 3.2
FIU Operational Expenditures, FY 2008-9 (\$ millions)

BY EXPENDITURE CATEGORY		BY FUNCTIONAL CLASSIFICATION	
Compensation & benefits	\$360.43	Instruction	\$154.48
Services & supplies	124.21	Academic support	81.00
Utilities & communications	15.38	Research	74.21
		Institutional support	64.84
		Student services	22.38
		Plant operation	36.39
		Public service	7.80
		Auxiliary enterprises	78.54
Scholarships, fellowships & waivers	53.73	Scholarships & fellowships	34.11
Depreciation	36.09	Depreciation	36.09
Total Operating Expenses	\$589.83		\$589.83

Source: State of Florida Auditor General (2010)

3.3.1 *Economic Activity from FIU's Payroll*

Table 3.5 summarizes the economic activity associated with expenditures of FIU employees. To be conservative, I have assumed that 65 percent of expenditure on salaries and benefits is received by employees as personal disposable income, and of this five percent is saved. This gives \$222.6 million of employee personal expenditure. From Table 3.1, we see that each million dollars of personal expenditure induce the creation of 17.5 jobs in Miami-Dade, and 0.4 jobs elsewhere in the state. As a result, a total of 7,138 full-time equivalent jobs are dependent on FIU's payroll.²⁵ For each dollar of employee expenditure, IMPLAN estimates that an additional \$0.737 of economic activity is induced in the county, and another \$0.054 is induced in the rest of the state. The induced output effects are therefore approximately \$164.1 million in Miami-Dade and \$12.0 million elsewhere. In total, FIU's payroll expenditures are associated with \$398.7 million of economic activity in the state.

²⁵ Another way to interpret the employment numbers is as follows. FIU's payroll expenditures of faculty and staff pays directly for 4,261 jobs (listed under direct effects). The expenditures of these employees induces an additional 2,783 non-FIU jobs in the county and 89 non-FIU jobs outside the county (listed under induced effects).

Table 3.3
Top 20 Employers in Miami-Dade County 2007

	EMPLOYER	SECTOR	EMPLOYEES
1	Miami-Dade County Public Schools	Education	50,000
2	Miami-Dade County	Government	32,000
3	Federal Government	Government	20,400
4	Florida State Government	Government	17,000
5	Publix Supermarkets	Retail	11,000
6	Baptist Health South Florida	Health	10,826
7	Jackson Health System	Health	10,500
8	University of Miami	Education/Health	9,874
9	American Airlines	Transportation	9,000
10	Miami-Dade College	Education	6,500
11	Precision Response Corporation	Services	6,000
12	Bellsouth Corporation – Florida	Telecommunications	5,500
13	Winn-Dixie Stores	Retail	4,833
14	Florida International University*	Education	4,261
15	City of Miami	Government	4,034
16	Florida Power and Light	Energy	3,900
17	Carnival Cruise Lines	Tourism	3,500
18	Macy’s Florida	Retail	3,368
19	Mount Sinai Medical Center	Health	3,264
20	Miami Children’s Hospital	Health	2,600

* 2009 data. Source: Beacon Council: www.beaconcouncil.com. Accessed June 9, 2010.

Table 3.4
FIU Employment, 2009

CATEGORY	ALL	FULL-TIME
Clerical	447	435
Executive, Admin. & Management	615	608
Instructional / Research	1,554	871
Other Professional	1,102	1,072
Service / Maintenance	305	305
Skilled Craft	75	75
Technical / Paraprofessional	163	150
Total	4,261	3,516

Source: Office of Planning and Institutional Research (2009): *2009 Fact Book*.

Table 3.5*Economic Activity Associated with Employees' Personal Disposable Income*

		EMPLOYMENT	OUTPUT
		No. jobs	\$ millions
MIAMI-DADE COUNTY	Direct	4,261	222.6
	Indirect	---	---
	Induced	2,783	164.1
Total		7,044	386.7
REST OF FLORIDA	Direct	---	---
	Indirect	---	---
	Induced	89	12.0
Total		89	12.0
Total, Florida		7,138	398.7

Multipliers used are from Part B of Table 3.1, are applied to employees' personal expenditure. Personal disposable income is assumed to be 65 percent of payroll expenditure, and expenditure is assumed to be 95 percent of disposable income.

3.3.2 *Economic Activity from FIU's Non-Payroll Operational Expenditures*

Turning to FIU's non-payroll expenditures, it is necessary to make a couple of adjustments to the numbers given in Table 3.2. First, I remove the imputed \$19.6 million in tuition waivers (compare the left and right hand column entries for "scholarships. . ." in Table 3.2); this is an artifact of the accounts rather than a direct expenditure. Second, following standard procedures, I delete depreciation from the operating expenditures (the effects of depreciated fixed equipment on economic activity are included in maintenance and purchases of supplies).

Table 3.6 summarizes the economic activity associated with FIU's non-payroll operational expenditures, after making these adjustments. FIU's \$178.7 million of operational purchases sustain 3,178 jobs in Florida, and \$347.9 million of economic activity. As is the case for payroll expenditure, the bulk of this economic activity is located in Miami-Dade County.

Table 3.6
Economic Activity Associated with FIU Non-Payroll Operating Expenditure

		EMPLOYMENT	OUTPUT
		No. jobs	\$ millions
MIAMI-DADE COUNTY	Direct	1,998	173.7
	Indirect	347	59.9
	Induced	677	90.0
Total		3,022	323.6
REST OF FLORIDA	Direct	---	---
	Indirect	69	14.2
	Induced	87	10.1
Total		156	24.3
Total, Florida		3,178	347.9

Multipliers used are from Part A of Table 3.1

3.4 Alumni and Student Spending

3.4.1 *Economic Activity from Incremental Alumni Spending*

Many studies of the economic size of a university include measures of the amount of economic activity attributable to alumni spending. However, it is difficult to make such a concept meaningful. Does one simply measure all earnings, or only the increment to earnings afforded by the education obtained at FIU? It seems natural to consider only the incremental earnings. But once we do so, we are entering the world of counterfactual comparisons, because we are asking about the education alumni would have had they not come to FIU. Clearly it is not correct to suppose that none of our alumni would have received any college education if it were not for FIU.

Because the meaning of such an exercise is unclear, I shall provide here only a quick and crude estimate of the size of incremental expenditure caused by employment of FIU alumni in Miami-Dade County and in Florida. Of approximately 165,000 alumni, about 53 percent are residents of Miami-Dade, while another 27 percent live elsewhere in the state. Assuming a labor-force participation rate of 90 percent, this implies about 78,700 of Miami-Dade's labor force earned degrees from FIU, while about 40,100 alumni work elsewhere in the state. The Bureau of Labor Statics, Current Population Survey indicates that in 2009 gross annual earnings of college-educated workers were \$16,900 greater than

the earnings of high-school graduates. Applying a 65 percent rate to convert gross earnings to personal disposable income, and then applying a five percent saving rate, yields direct incremental alumni expenditure of about \$821 million in Miami-Dade County, and \$418 million elsewhere in Florida.

Because these are very crude calculations, I shall ignore the induced effects of Miami-Dade resident expenditure on the rest of Florida, and I use the same multipliers for alumni inside and outside Miami-Dade. The induced effects of this direct increase in spending are estimated to be around \$605 million of increased output in Miami-Dade and \$308 million in the rest of Florida; a total of 21,694 jobs are estimated to be created by the incremental spending of FIU alumni resident in the state.²⁶

Table 3.7
Economic Activity Associated with Incremental Alumni Spending

		EMPLOYMENT	OUTPUT
		No. jobs	\$ millions
MIAMI-DADE COUNTY	Direct	10,266	821.3
	Indirect	---	---
	Induced	4,106	605.3
Total		14,372	1,426.6
REST OF FLORIDA	Direct	5,230	418.4
	Indirect	---	---
	Induced	2,092	308.4
Total		7,322	726.8
Total, Florida		21,694	2,153.4

Multipliers used are from Part B of Table 3.1.

²⁶ Another way to interpret the reported employment effects for, say, Miami-Dade is as follows. The increment in income for the 78,700 alumni living and working in the county has the same effect as would the creation of 10,266 brand new jobs (listed as a direct effect). As a result of their expenditure, workers in these 10,266 new jobs would induce enough activity to create an additional 4,106 jobs (listed in the table as an induced effect).

3.4.2 Economic Activity from Student Spending

I am not aware of any current survey data for FIU students, so I make use of estimated data provided by collegeboard.com. Their numbers, which decompose expenditure into four categories, are given in Panel A of Table 3.8. However, Table 3.8 contains items that have already been included in FIU Auxiliary Enterprises, or that contain an unusually high percent of out-of-state spending. Room and board for on-campus residents (\$11,946) are excluded from the total because this item has already been included in the expenditures of FIU Auxiliary Enterprises. I assume that ninety percent of books and supplies are purchased either from FIU's own bookstore or from out-of-state (online) suppliers; this leaves only \$105 of non-excluded expenditure on books and supplies. Finally, I assume that twenty percent of personal supplies for campus residents are

Table 3.8
Student Expenditures

	LIVING	OFF CAMPUS	
	ON-CAMPUS	LIVING AT HOME	NOT AT HOME
Panel A. Collegeboard.com expenditure data			
Room and board	\$11,946	\$2,000	\$10,680
Books and supplies	\$1,048	\$1,048	\$1,048
Personal expenses	\$2,216	\$2,060	\$2,216
Transportation	\$1,864	\$2,616	\$2,616
Panel B. Excluding payments to FIU			
Room and board	----	\$2,000	\$10,680
Books and supplies	\$105	\$105	\$105
Personal expenses	\$1,773	\$1,957	\$2,105
Transportation	\$1,864	\$2,616	\$2,616
Total per capita	\$3,742	\$6,678	\$15,456
No. of students	3,009	23,806	15,871
Total expenditure (millions)	\$11.3	\$159.0	\$246.7

Source for expenditure: <http://www.collegeboard.com>, accessed July 16, 2010. Students in on-campus housing assumes full capacity utilization. Capacity figure taken from http://en.wikipedia.org/wiki/Florida_International_University#Student_housing. Sixty percent of commuter students are assumed to be living at home. Total unique student headcount was 42,686 in Fall 2009 (Office of Planning and Institutional Research, https://opiereports.fiu.edu/Annual_Undup_5yrs_UNIV_WIDE.xls. Accessed, July 16, 2010)).

purchased from FIU auxiliary enterprises, while only five percent are for commuter students. The resulting expenditure estimates are given in Panel B.

To calculate total student expenditures, I assume that on-campus housing is used to capacity, that sixty percent of commuter students live at home with parents, and I use the Fall 2009 enrollment figure of 42,686 students. As the last row of Table 3.8 indicates, total non-duplicated local expenditure is then estimated to be \$11.3 million for campus residents, \$159 million for commuter students living at home, and \$246.7 million for commuter students not living at home. The total for the three categories is \$417 million.

Finally, I apply IMPLAN multipliers to these expenditures. The results are provided in Table 3.9. The economic activity induced by student spending amounts to \$334 million in Miami-Dade, and an additional \$23.6 million elsewhere in the state. 7,297 jobs in the county are sustained by student expenditures, with a further 167 outside Miami-Dade.

Table 3.9
Economic Activity Associated with Student Spending

		EMPLOYMENT	OUTPUT
		No. jobs	\$ millions
MIAMI-DADE	Direct	5,212	417.0
COUNTY	Indirect	---	---
	Induced	2,085	307.3
Total		7,297	724.3
REST OF	Direct	---	---
FLORIDA	Indirect	---	---
	Induced	167	22.5
Total		167	22.5
Total, Florida		7,464	746.8

Multipliers used are from Part B of Table 3.1.

3.5 Summary Tables

Tables 3.10 and 3.11 summarize the calculations made in this section. In total, FIU's economic size, including the contributions from students and alumni, sustains 31,735 jobs in Miami-Dade, and 39,503 in the state as whole. This level of economic activity is equivalent to \$2.86 billion of output in Miami-Dade, and \$3.65 billion in the state as a whole.

Restricting attention to the activities of FIU and its employees, 10,066 jobs are sustained in Miami-Dade County, of which 4,261 are employees of the university. An additional 271 jobs are supported elsewhere in the state. The non-payroll operating expenditures of FIU and the personal expenditures of its employees induce \$710 million in economic output in Miami-Dade, and an additional \$36.3 million elsewhere in the state.

Table 3.10
The Economic Size of FIU: Employment

	Direct	Indirect	Induced	Total
A. Miami-Dade County				
Employee Expenditures	4,261	---	2,783	7,044
Non-Payroll Operational Expenses	1,998	347	677	3,022
Alumni Expenditures	10,266	---	4,106	14,372
Student Expenditures	5,212	---	2,085	7,297
Total	21,737	347	9,651	31,735
B. Rest of Florida				
Employee Expenditures	---	---	167	167
Non-Payroll Operational Expenses	---	77	35	112
Alumni Expenditures	5,230	---	2,092	7,322
Student Expenditures	---	---	167	167
Total	5,230	77	2,461	7,768
Total, Florida	26,967	424	12,112	39,503

Table 3.11
The Economic Size of FIU: Output (\$ millions)

	Direct	Indirect	Induced	Total
A. Miami-Dade County				
Employee Expenditures	222.6	---	164.1	386.7
Non-Payroll Operational Expenses	173.7	59.9	90.0	323.6
Alumni Expenditures	821.3	---	605.5	1,426.8
Student Expenditures	417.0	---	307.3	724.3
Total	1,634.6	59.9	1,166.9	2,861.4
B. Rest of Florida				
Employee Expenditures	---	---	12.0	12.0
Non-Payroll Operational Expenses	---	14.2	10.1	24.3
Alumni Expenditures	418.4	---	308.4	726.8
Student Expenditures	---	---	22.5	22.5
Total	418.4	14.2	353.0	785.6
Total, Florida	2,052.6	74.1	1,519.9	3,647.0

4. FIU's Economic Impact

Section 3 produced an estimate of the economic size of Florida International University. FIU's economic size is equivalent to its economic impact under the assumption that none of the measured expenditures would take place in the region if the university did not exist. In this section, we measure FIU's economic impact under plausible assumptions about the amount of activity that would continue to take place in other regional institutions, whether public or private, were FIU not to exist. The section analyzes FIU's economic impact using the same categories as in Section 3.

4.1 Operational Expenditures

Section 3.3.1 reported that the direct and induced effects on output of FIU's operational spending (non-payroll expenditure, and the expenditure of its employees) amounts to \$386.7 million in Miami-Dade (\$398.7 million in the state) resulting from payroll expenditure, and \$323.6 million in Miami-Dade (\$347.9 million in the state) resulting from non-payroll expenditure. To go from these measures to an estimate of the net economic impact, it is necessary to develop some reasonable estimates of the proportion of this expenditure that would continue take place in Miami-Dade or elsewhere in the state if FIU did not exist.

There are two common ways to think about the extent to which FIU substitutes for spending that would take place in other institutions. The first is to develop estimates of the fraction of FIU's employees who would remain working in the region if FIU did not employ them, and the fraction of non-employee spending that would shift to other public and private institutions. Suppose, for example, that 80 percent of non-faculty employees would find work elsewhere in the region, while 80 percent of faculty would secure employment out of state. Then this approach would take 20 percent of non-faculty employee spending and 80 percent of faculty spending as contributions to FIU's net economic impact. However, this approach does not take into account the likelihood that some of the payroll saved by the departure of these employees would be spent in other ways. For example, money spent by the state on employee payrolls may be diverted to other state universities, thereby ensuring no change in aggregate university employment at

the state level. Alternatively, the reduction in state expenditures caused by the absence of FIU could be used to reduce taxes; this increases disposable income in the state, thereby raising household expenditure by more or less the same amount that was lost by the elimination of FIU's payroll.

A second approach, which focuses on sources of revenues, provides a more complete picture. This approach identifies the fraction of revenues spent on payroll that would still come to the region if FIU did not exist, and the fraction that only comes to the region because of FIU's operations. Only the latter contributes to FIU's net economic impact.

I take the second approach here. Table 4.1 summarizes FIU's revenues by sources, along with estimates of the fraction that is "new to the region." These estimates merit some explanation.

- I assume that FIU revenues obtained from the state would be spent by the state on other activities. In the absence of evidence to the contrary, I assume that the state allocates these funds across counties at rates that are proportional to the population of each county. Given a 2008 population of 2.98 million in Miami-Dade and 18.54 million in Florida, this implies that thirteen percent of state spending on FIU would return to Miami-Dade if FIU did not exist. Thus, 87 percent of state spending on FIU is deemed to be new to Miami-Dade County, while none is new to the state.
- I assume that all Federal grant revenues are new to Miami-Dade County, while ninety percent are new to the state. The remaining ten percent is assumed to be captured by other Florida institutions, as a fraction of the grants awarded are for region-specific studies that might be carried out elsewhere in the state.²⁷
- Estimation of the fraction of tuition revenues that is new to the region demands differential treatment of three classes of students. First, it is necessary to eliminate students who would have remained in the region even in the absence of FIU, either as students at other local institutions or as employees of local firms: their expenditure on tuition at FIU does not constitute a contribution to the net economic impact of the university because FIU is simply substituting for other types of local expenditures.

²⁷ As a minor point, I expect that 13 percent of the 10 percent of Federal grant revenues remain in Miami-Dade. Hence the correct figure for the fraction of federal grant revenues that is new to the county is 99 percent.

Other students may, in the absence of FIU, have attended another university or college in Florida, but outside Miami-Dade; their expenditure on tuition contributes to the net economic impact of FIU on Miami-Dade, but not on the state. The tuition expenditure of a third class of students, who would not have studied or worked in the state if FIU were not here to serve them, counts as a net impact at both the county and state levels.

I assume that, if FIU did not exist:

1. Eighty percent of students not resident in Florida would have attended school or worked outside the county, while seventy percent would have left the state. Tuition earned from them contributes to FIU's economic impact at both state and county levels.
2. Seventy percent of undergraduates registered as Florida residents but not resident in Miami-Dade County would have attended a college or worked outside the county but inside the state; 25 percent of them would have continued to attend college or to have worked in the county, and five percent would have left the state. Thus, 75 percent of these students contribute tuition revenue that is new revenue to the county, while five percent contribute new revenue to the state.
3. Sixty percent of undergraduates registered as Miami-Dade residents would have attended a college or worked in the county; 35 percent would have relocated to other parts of Florida, and five percent would have moved out of Florida. Thus, forty percent of these students contribute new revenue to the county, while five percent contribute new revenue to the state.

Fall 2009 enrollment data indicate that 76 percent of resident undergraduates are Miami-Dade residents. Hence, taking weighted averages of the numbers in (2) and (3) above, I assume that 48.4 percent of undergraduate resident tuition is new to the county, while only five percent is new to the state.

4. A greater percentage of graduate students than undergraduates would leave the region. Overall I assume that sixty percent contribute net new revenues at the county level, and 25 percent contribute at the state level.

Revenue items not apportioned to these three types of students, including revenues from continuing education, housing and parking fees, are assumed to

Table 4.1
FIU Revenues by Source, FY 2009-2010

Item	Amount	% new to . . .		\$ new to		Notes
		County	State	County	State	
General Revenue	227,082,151	87	0	197,561,471	0	a
Contracts & Grants - State	-1,147,109	87	0	-997,985	0	
State Scholarships	4,202	87	0	3,655	0	
Tuition Undergraduate Res	64,573,560	48	5	31,253,603	3,228,678	
Tuition Undergrad NonRes	4,001,011	80	70	3,200,809	2,800,708	
Out of State Undergraduate	18,206,348	80	70	14,565,078	12,744,433	
Graduate & Prof. Tuition	44,190,973	60	25	26,514,584	11,047,743	
Financial Aid Fees, all students	6,419,085	58	23	3,702,013	1,461,590	b
All other student fees, all students	38,401,568	58	23	23,146,942	8,743,824	b, c
Continuing Education	31,984,077	58	23	18,445,848	7,282,597	b, d
Housing Fees	22,411,975	58	23	12,925,428	5,103,082	b
Parking	8,007,982	58	23	4,910,255	1,954,599	b
Federal & State Student Fin.	65,074,340	99	90	64,423,597	58,566,906	e
Contracts & Grants - Federal	2,698,029	100	100	2,698,029	2,698,029	
Federal Flow Through	93,459	100	100	93,459	93,459	
Contracts and Grants - Private	-1,801,155	75	50	-1,350,867	-900,578	
Private Scholarships	506,517	75	50	379,887	253,258	
Program Income	275	75	50	206	138	
Private Revenue	8,304,391	75	50	6,228,294	4,152,196	
Investment Earnings Dividends	5,577,454	100	100	5,577,454	5,577,454	
Other items	48,122,679	76	23	36,573,236	11,068,216	f
Total	592,711,810	76	23	448,563,103	135,745,115	

a. Fraction of revenues from state sources assumed to remain in county is assumed equal to the county's proportion of state population. b. Percentages new to county and state use same percentages as sum of tuition fees. c. Includes health, student activity, athletics, lab, late registration & payment, repeat course, photo id, equipment use, orientation, application and late fees. d. Includes cost-plus programs. e. Assumed to be 90% Federal. f. Includes numerous disparate items. Fractions new to county and state set equal to weighted averages of all previous items.

be new to the county and new to the state in the same proportions as a weighted average of the itemized student receipts; these proportions are 58 percent at the county level and 23 percent at the state level.

These and other assumptions are also indicated in the notes to Table 4.1. The sum effect of these allocations is that \$448.6 million, or 76 percent, of FIU revenues are estimated to be new to Miami-Dade County, while only \$135.7 million, or 23 percent, are estimated to be new to the state of Florida. In a complex organization such as FIU, it is not possible to map revenues by source to expenditure categories in any meaningful way. I will therefore apply these numbers to all categories in order to convert the estimates of the economic *size* of FIU into estimates of its economic *impact*. Clearly, because much of FIU expenditure is likely to be substituting for expenditure elsewhere in the state, the economic impact of FIU in Miami-Dade may be considerably larger than its impact in the state as a whole.

4.1.1 *Economic Impact of Payroll Expenditures*

The economic impact of FIU employee income is easily calculated as follows. I take the numbers for Miami-Dade county from Table 3.5 and multiply them by 0.76. This yields the economic impact in Miami-Dade County. I then take the sum of the numbers for both Miami-Dade and the rest of Florida, and multiply them by 0.23. This yields the economic impact in the state.

Table 4.2 provides the results. The economic impact of FIU employee expenditure is about \$294 million, or 5,353 jobs in Miami-Dade, and \$91.7 million or 1,641 jobs at the level of the state.

4.1.2 *Economic Impact of Operational Expenditures*

Table 4.3 reports the results of the same calculations, carried out for non-payroll expenditures using the numbers provided in Table 3.6. The economic impact of FIU non-payroll expenditure is about \$246 million, or 2,297 jobs in Miami-Dade, and \$80 million or 732 jobs at the level of the state.

Table 4.2
Economic Impact of Employees' Personal Disposable Income

		EMPLOYMENT	OUTPUT
		No. jobs	\$ millions
MIAMI-DADE COUNTY	Direct	3,238	169.2
	Indirect	---	---
	Induced	2,115	124.7
Total		5,353	293.9
ALL OF FLORIDA	Direct	980	51.2
	Indirect	---	---
	Induced	661	40.5
Total		1,641	91.7

Figures obtained by multiplying the Miami-Dade County numbers in Table 3.5 by 0.76, and the sum of the Miami Dade and Rest of Florida numbers by 0.23.

Table 4.3
Economic Impact of FIU Non-Payroll Operating Expenditure

		EMPLOYMENT	OUTPUT
		No. jobs	\$ millions
MIAMI-DADE COUNTY	Direct	1,518	132.0
	Indirect	264	45.5
	Induced	515	68.4
Total		2,297	245.9
ALL OF FLORIDA	Direct	460	40.0
	Indirect	96	17.0
	Induced	176	23.0
Total		732	80.0

Figures obtained by multiplying the Miami-Dade County numbers in Table 3.6 by 0.76, and the sum of the Miami Dade and Rest of Florida numbers by 0.23.

4.2 Alumni and Student Spending

4.2.1 Economic Impact of Incremental Alumni Spending

In Section 3.4.1, I reported some crude estimates of the incremental economic activity induced by the enhanced earnings power of FIU alumni. But the calculations reported there mislead about the economic impact of FIU in several ways. First, they assume that all alumni would have obtained no college

education at all if they had been unable to attend FIU. In reality, many alumni would have attended other colleges and universities. Second, they assume that the places in which FIU alumni choose to reside are independent of their educational experiences. In reality, if alumni had been unable to attend FIU, they may have chosen to attend college in other locations and this may have made it less likely that they would settle and work in Miami-Dade County or in the state of Florida. Third, the calculations treated all students the same. In reality, some students would have settled in Miami regardless of the educational track they followed; others settle in Miami only because they attended FIU.

To organize our thoughts, I adapt for FIU a typology of students used by Sallee, Rosaen and Anderson (2007) in their study of Michigan State University.²⁸ Student outcomes are divided into five types (see Table 4.4). The first three types are students who are residents of Miami-Dade. Type 1 students are those who would have obtained an equivalent education elsewhere in the region if FIU did not exist, and who are equally likely to remain in the region as FIU's alumni. Type 2 students are those whose education would have been adversely affected by the absence of FIU: they would not have obtained the degree they were seeking at FIU, instead terminating their education with the next lower degree. Type 3 students would have left the region and earned an equivalent degree.

There are two distinctions to be made between these types of local students. The first concerns the economic value of the education obtained at FIU relative to what would have been attained absent FIU. The second concerns the effect of earning a degree at FIU on the likelihood that a person would settle in the region after graduation. We assume that Type 1 and Type 3 students would have obtained an education with a monetary value equal to the education they obtain from FIU. For these groups, then, the only impact of FIU is from any effect it has on the probability that the student settles in the region after graduation. We have no surveys or experiments to draw on here, so we must make some reasonable, but preferably conservative, assumptions. To that end, we assume that type 1 students are as likely to remain in the region as FIU graduates, while we assume that type 3 students are half as likely to do so. This implies that FIU has no impact on the rate at which type 1 students work and earn locally. In

²⁸ The major difference with the Michigan State typology is that I do not assume there is an earning premium associated with attending FIU as opposed to another university.

Table 4.4
Typology of Students

TYPE	DESCRIPTION FRACTION OF ALUMNI BY DEGREE	INCLUDE IN IMPACT? FRACTION WORKING LOCALLY
1	Local students who would have gone to another university in Florida. These students are assumed to have the same probability of working in Miami and Florida as FIU alumni. 75% of Local Bachelor's 60% of Local Master's and Law Graduates 25% of Local Ph.D. graduates	No.
2	Local students who would not have earned the degree they earned at FIU. It is assumed that these students would have earned the next lower degree (e.g., AA for Bachelor's alumni; Bachelor's degree for Master's alumni), but have the same probability of working in Miami and Florida as FIU alumni. 20% of Local Bachelor's 20% of Local Master's and Law Graduates 25% of Local Ph.D. graduates	Yes. Earnings gap between appropriate educational levels for alumni that work in region. Fraction in FL: 81% Fraction in Miami-Dade: 54%
3	Local students who would have gone to an out-of-state university. These students are assumed to be half as likely as FIU alumni to work in Miami-Dade or Florida. 5% of Local Bachelor's 20% of Local Master's and Law Graduates 50% of Local Ph.D. graduates	Yes. Entire earnings. Fraction in FL: 40% Fraction in Miami-Dade: 26%
4	Non-local students who would have attended another university but whose choice of where to work is independent of where they got their degree. 75% of Non-local Bachelor's 80% of Non-local Master's and Law Graduates 90% of Non-local Ph.D. graduates	No.
5	Non-local students who would work in the region if and only if they had attended FIU. 25% of Non-local Bachelor's 20% of Non-local Master's and Law Graduates 10% of Non-local Ph.D. graduates	Yes. Entire earnings. Fraction in FL: 100% Fraction in Miami-Dade: 66%

contrast, the impact of FIU on local earnings of type 3 students is equal to the full earnings of additional students that remain in the region. Fifty-four percent of FIU's alumni settle in Miami-Dade (see Figure 2.8), so FIU's economic impact among type 3 students is equal to the full earnings of 26 percent of them.

I assume that type 2 students are as likely to stay in the region without FIU as they are having attended FIU. The economic impact of FIU among type 2 students is therefore given by the increment to earnings enabled by the completion of a higher degree. These numbers were developed in Section 2 and summarized in Table 2.4.

The remaining two types of students consist of non-local students. Type 4 students are those that would have attended a university somewhere were FIU not available to them, but their choice of work location is unaffected by where they attended university. These students do not contribute to FIU's regional economic impact. Type 5 students in contrast, are those who would choose to reside in the region if and only if they attended FIU. These students contribute the full amount of their earnings to FIU's regional economic impact.

Table 4.4 also summarizes assumptions made about how types are distributed across students for each degree. There is no science behind these distributions, although they seem reasonable. For example, I assume that only a small fraction, five percent, of undergraduates would attend an out-of-state university if FIU were not available, while half of all PhD students would do so.

To distinguish the relative importance of types in the student population as a whole, I also need data on the split between local and non-local students at each degree level. These data, taken from FIU headcounts of students enrolled as of Fall 2009, are summarized in Table 4.5. Local students account for 73.4 percent of undergraduate students, 56.7 percent of students enrolled in Master's programs and the Law School, and 47.2 percent of Ph.D. students.

How do our assumed distributions compare with those made by Sallee, Rosaen and Anderson (2007) for Michigan State? Table 4.6, which combines the distributions by type in Table 4.4 with the distribution by residence from Table 4.5 at the Bachelor's level, provides a comparative summary. In both cases, type 1 students are much the larger group. However, I have assumed type 2, 4, and 5 students to be considerably more common, and type 3 students to be considerably less common, at FIU than was assumed for Michigan State.

Table 4.5
Geographic Distribution of Student Origins, by Degree Type

DEGREE-EQUIVALENTS PRODUCED (COUNT)	STUDENT ORIGINS				
	MIAMI-DADE	OTHER FLA	OTHER US	NON-US	
Bachelor's	6,466	73.4%	20.7%	2.4%	3.4%
Master's/Law	2,007	56.7%	23.7%	8.4%	11.2%
Ph.D.	123	47.2%	19.5%	11.9%	21.4%

1,833 Master's degrees and 174 Law degrees. Distribution of student origins based on 2009-2010 headcounts (Office of Planning and Institutional Research, <https://opiereports.fiu.edu>, Annual_Undup_5yrs_UNIV_WIDE.xls. Accessed, July 16, 2010).

Table 4.6
Distribution of Bachelor's Types, FIU and MSU

Type	FIU	MSU
1	55	81
2	14	2
3	4	8
4	20	7
5	7	2

MSU assumptions from Sallee, Rosaen and Anderson (2007), Figure C.3.

These differences are readily explained. Type 2 students, which are those who would not obtain the degree they were seeking if the focal university were not available, are assumed to account for only two percent of the Michigan State undergraduate student body. This proportion seems far too low for FIU, which provides education to many more first-generation and non-traditional students of limited financial means and limited mobility. It would be difficult, if not impossible for many of FIU's students to turn to the private four-year colleges located in Miami, or to travel to state universities in other cities. If anything, my assumption that only 14 percent of undergraduate students would be unable to obtain the degree they are seeking were FIU not available to them, is likely to be an underestimate. For the same reasons, type 3 students, who would travel out-of-state, are assumed to be less common at FIU. Type 4 and 5 students represent a larger fraction of the student body at FIU than at Michigan State, in large part because we have defined local to be Miami-Dade in the present study while Sallee

et al. defined local to be state residents.

Having decided upon the distribution of student types, and the individual earnings increments that should be applied to each of them, the next step is to estimate aggregate incremental earnings of alumni. The standard approach is to apply the distributions and earnings increments just derived to the university's alumni population. However, doing so for FIU, which has grown remarkably over the last thirty years, would considerably underestimate the economic impact of FIU at its current scale of operation. To reflect FIU's current scale, I therefore imagine that FIU is in a "steady-state" with a long-term, sustained student body that is equal in size to its current enrollment. In this steady state, the annualized value of incremental earnings applied to the alumni population will be equal to the incremental lifetime earnings of the students graduating in a single year.

I can make use of the lifetime earnings numbers already reported in Section 2. Panel A of Table 4.7 provides the results for Miami-Dade, while Panel B provides the corresponding results for the rest of Florida. The numbers in these tables are calculated from the earnings data reported in Table 2.4, the assumptions made about the distribution of types in Table 4.4, the distribution of origins in Table 4.5, and the locations of alumni in Figure 2.8. For example, the \$194.9 million figure for the incremental value to Miami-Dade of type 2 Bachelor's graduates is calculated as follows: 73.4 percent of the 6,466 Bachelor's degree-equivalents produced each year are earned by students resident in Miami-Dade (from Table 4.5). This yields 4,746 students. Twenty percent of these, or 949 students, are assumed to be Type 2 (from Table 4.4). Of these, 54 percent remain after graduation to work in Miami-Dade, yielding 513 graduates (from Figure 2.8). It is assumed that type 2 Bachelor's graduates would have earned an Associate's degree in the absence of FIU. The difference between the present values of gross lifetime earnings for recipients of Bachelor's degrees and Associate's degrees is \$0.38 million (from Table 2.4). Multiplying \$0.38 million by the 513 graduates that fall into this category yields a total increment to earnings of \$194.9 million.

The total increment to Miami-Dade gross earnings accruing to FIU alumni, over and above what would have been earned in FIU's absence, is estimated to be \$1.003 billion. As was done for FIU employees, I take 65 percent of this sum, or \$652 million, to be the increment in local alumni personal disposable income, and 95 percent of this, or \$620 million, as incremental expenditure. Similar calculations indicate an additional \$321 million of incremental expenditure should be attributed to alumni living and working in the rest of Florida.

Table 4.7*FIU Impact on Local Alumni Earnings: Miami-Dade County*

TYPE	DEGREE	UNIT VALUE (\$ MILLIONS)	NUMBER OF GRADUATES	TOTAL VALUE (\$ MILLIONS)
Panel A. Miami-Dade County				
2	Bachelor's	\$0.38	513	\$194.9
	Master's /Law	\$0.32 ^a	123	\$39.4
	Ph.D.	\$0.68	8	\$5.4
3	Bachelor's	\$1.30	62	\$80.6
	Master's /Law	\$1.65 ^a	59	\$97.4
	Ph.D.	\$2.19	8	\$17.5
5	Bachelor's	\$1.30	284	\$369.2
	Master's /Law	\$1.65 ^a	114	\$188.1
	Ph.D.	\$2.19	5	\$11.0
Total incremental gross earnings				1,003.5
Total incremental expenditure				619.7
Panel B. Rest of Florida				
TYPE	DEGREE	UNIT VALUE (\$ MILLIONS)	NUMBER OF GRADUATES	TOTAL VALUE (\$ MILLIONS)
2	Bachelor's	\$0.38	257	97.7
	Master's /Law	\$0.32 ^a	62	19.8
	Ph.D.	0.68	4	2.7
3	Bachelor's	\$1.30	34	44.2
	Master's /Law	\$1.65 ^a	32	52.8
	Ph.D.	\$2.19	4	8.8
5	Bachelor's	\$1.30	146	189.8
	Master's /Law	\$1.65 ^a	59	97.4
	Ph.D.	\$2.19	3	6.6
Total incremental gross earnings				519.8
Total incremental expenditure				321.0

^a Weighted average for Law and master's degrees.

Finally, I apply the multipliers from Part B of Table 4.1 to obtain the induced effects of incremental alumni spending. I shall ignore the induced effects of Miami-Dade resident expenditure on the rest of Florida, and I use the same multipliers for alumni living in and outside Miami-Dade. The resulting totals are summarized in Table 4.8. The economic impact of incremental alumni spending due to the presence of FIU is estimated to be \$1.08 billion, or 10,845 jobs, at the level of Miami-Dade county, and about \$1.63 billion, or 16,463 jobs, at the state

level.

4.2.2 *Economic Impact of Student Spending*

To estimate the economic impact of student spending, I make use of the assumptions already summarized in Section 4.1 about the alternative choices students would make in the absence of FIU. Table 4.9 repeats these assumptions, and applies them to Fall 2009 enrollment data. Total student spending in Miami-Dade County that would not exist in the absence of FIU is about \$216.2 million. Student spending new to the state is estimated at \$70.7 million.

To calculate induced impacts, I apply the Miami-Dade multipliers from Panel B of Table 4.1 to the 216.2 million figure for the county. I then apply the sum of the Miami-Dade and rest-of Florida multipliers to the \$70.7 million state figure. Table 4.10 reports the results. The economic impact of student spending is estimated to be \$376 million, or 3,784 jobs, at the level of Miami-Dade county, and about \$127 million, or 1,266 jobs, at the state level.

Table 4.8
Economic Impact of FIU Alumni Incremental Expenditure

		EMPLOYMENT	OUTPUT
		No. jobs	\$ millions
MIAMI-DADE COUNTY	Direct	7,746	619.7
	Indirect	---	---
	Induced	3,099	456.7
Total		10,845	1,076.4
REST OF FLORIDA	Direct	4,013	321.0
	Indirect	---	---
	Induced	1,605	236.6
Total		5,618	557.6
ALL OF FLORIDA	Direct	11,759	940.7
	Indirect	---	---
	Induced	4,704	693.3
Total		16,463	1,634.0

Table 4.9
Students Contributing to FIU's Economics Impact

	Fall 2009 Enrollment	County Level		State Level	
		%	No.	%	No.
Undergraduate – MDC resident	24,674	40	9,863	5	1,234
Undergraduate – Other Fla	7,742	75	5,776	5	387
Undergraduate – Non-Fla	2,046	80	1,637	70	1,432
Graduate (all)	8,224	60	4,934	25	4,207
Total students count	42,686		22,210		7,260
Average expenditure per student ^a			\$9,735		\$9,735
Student spending contributing to FIU's economic impact (millions)			\$216.2m		\$70.7m

^a Weighted average of on-campus and commuter student spending, from the last two rows of Table 3.6. Fall 2009 enrollments from Office of Planning and Institutional Research, <https://opiereports.fiu.edu>, Annual_Undup_5yrs_UNIV_WIDE.xls. Accessed, July 16, 2010.

Table 4.10
Economic Impact of Student Expenditure

		EMPLOYMENT	OUTPUT
		No. jobs	\$ millions
MIAMI-DADE COUNTY	Direct	2,703	216.2
	Indirect	---	---
	Induced	1,081	159.3
Total		3,784	375.5
ALL OF FLORIDA	Direct	884	70.7
	Indirect	---	---
	Induced	382	55.9
Total		1,266	126.6

4.3 Summary Tables

Tables 4.11 and 4.12 summarize the calculations made in this section. In total, FIU's annual economic impact, including the contributions from students and alumni, is 22,279 jobs created at the county level, and 20,102 jobs created at the state level. This is equivalent to an economic impact on Miami-Dade County of \$1.99 billion, and an impact on the state of Florida of \$1.93 billion. Restricting attention to the activities of FIU and its employees, the county impact is 7,650

jobs or \$539.8 million. The state impact is 2,373 jobs, or \$171.7 million.

Table 4.11
The Economic Impact of FIU: Employment

	Direct	Indirect	Induced	Total
A. County Impact				
Employee Expenditures	3,238	---	2,115	5,353
Non-Payroll Operational Expenses	1,518	264	515	2,297
Alumni Expenditures	7,746	---	3,099	10,845
Student Expenditures	2,703	---	1,081	3,784
Total	15,205	264	6,810	22,279
B. State Impact				
Employee Expenditures	980	---	661	1,641
Non-Payroll Operational Expenses	460	96	176	732
Alumni Expenditures	11,759	---	4,704	16,463
Student Expenditures	884	---	382	1,266
Total	14,083	96	5,923	20,102

Table 4.12
The Economic Impact of FIU: Output (\$ millions)

	Direct	Indirect	Induced	Total
A. County Impact				
Employee Expenditures	169.2	---	124.7	293.9
Non-Payroll Operational Expenses	132.0	45.5	68.4	245.9
Alumni Expenditures	619.7	---	456.7	1,076.4
Student Expenditures	216.2	---	159.3	375.5
Total	1,137.1	45.5	809.1	1,991.7
B. State Impact				
Employee Expenditures	51.2	---	40.5	91.7
Non-Payroll Operational Expenses	40.0	17.0	23.0	80.0
Alumni Expenditures	940.7	---	693.3	1,634.0
Student Expenditures	70.7	---	55.9	126.6
Total	1,102.6	17.0	812.7	1,932.3

Appendices

A. Synthetic Earnings Data

Mean earnings by five-year age groups are taken from Day and Newburger (2002) and inflated by 28 percent to reflect the change in the CPI. These numbers, which are applied to the mid-points of each age group, are indicated in bold in Table A1. Annual earnings between adjacent mid-points are obtained by linear interpolation. Further adjustments were made as follows:

- It is well-known that the estimation of cohort lifetime from cross-sectional data induces a spurious decline in earnings in later years (cf., Thornton, Rodgers, and Brookshire, 1997). This is due in large part to higher age-conditional earnings among later cohorts resulting from advances in technology. The Day-Newburger data exhibit this spurious downturn for several series. To eliminate this, I took the highest year of earnings for each education class, and applied this level of earnings to all subsequent years.
- For ages younger than 27 (the youngest mid-point in the Day-Newburger data), I assumed an age of first entry into the labor force, and an initial salary consistent with modest income growth to age 27. I then applied linear interpolation between the initial earnings and the earnings at age 27. The assumed initial earnings and entry age are evident in Table A1.

I calculate the present value of each earnings profile using a real annual rate of three percent, and discounting back to age eighteen. I then adjust the present value of earnings downwards to account for variations by education in unemployment in 2008, the last year prior to the current recession. Unemployment figures are taken from the Bureau of Labor Statistics, Current Population Survey (www.bls.gov/emp/ep_chart_001.txt accessed Feb 13, 2010).

Table A1
Annual Earnings, By Age and Education

AGE	PROFESSIONAL	DOCTORAL	MASTER'S	BACHELOR'S	ASSOCIATE'S	HIGH SCHOOL
15	--	--	--	--	--	--
16	--	--	--	--	--	--
17	--	--	--	--	--	--
18	--	--	--	--	--	20,000
19	--	--	--	--	--	20,761
20	--	--	--	--	24,000	21,522
21	--	--	--	--	25,217	22,283

Table A1 continued, *Annual Earnings, By Age and Education*

AGE	PROFESSIONAL	DOCTORAL	MASTER'S	BACHELOR'S	ASSOCIATE'S	HIGH SCHOOL
22	--	--	--	35,000	26,433	23,044
23	--	--	--	36,456	27,650	23,804
24	--	--	40,000	37,912	28,866	24,565
25	--	--	42,543	39,368	30,083	25,326
26	50,000	--	45,087	40,824	31,299	26,087
27	54,084	--	47,630	42,280	32,516	26,848
28	59,998	--	50,157	44,426	33,601	27,695
29	65,912	68,000	52,683	46,573	34,686	28,541
38	133,032	102,357	73,803	60,378	42,376	33,338
39	132,475	103,311	73,137	61,195	43,348	33,866
40	131,918	104,264	72,471	62,012	44,319	34,395
41	131,361	105,218	71,805	62,830	45,291	34,923
42	130,804	106,172	71,139	63,647	46,263	35,451
43	132,659	107,247	72,112	63,800	46,171	35,512
44	134,513	108,322	73,085	63,953	46,079	35,574
45	136,368	109,397	74,058	64,106	45,987	35,635
46	138,222	110,472	75,032	64,259	45,895	35,697
47	140,077	111,547	76,005	64,412	45,804	35,758
48	137,351	111,917	75,882	65,461	46,287	35,760
49	134,625	112,286	75,758	66,510	46,770	35,761
50	131,899	112,656	75,635	67,559	47,253	35,763
51	129,173	113,026	75,512	68,607	47,736	35,764
52	126,447	113,395	75,388	69,656	48,219	35,766
53	133,861	113,697	75,376	68,776	48,259	35,766
54	141,274	113,999	75,363	67,896	48,299	35,766
55	148,687	114,301	75,351	67,016	48,339	35,766
56	156,100	114,602	75,338	66,136	48,379	35,766
57	163,514	114,904	75,325	65,256	48,419	35,766
58	169,872	114,904	75,325	65,256	48,419	35,766
59	176,230	114,904	75,325	65,256	48,419	35,766
60	182,588	114,904	75,325	65,256	48,419	35,766
61	188,946	114,904	75,325	65,256	48,419	35,766
62	195,304	114,904	75,325	65,256	48,419	35,766
63	201,662	114,904	75,325	65,256	48,419	35,766
64	208,020	114,904	75,325	65,256	48,419	35,766
65	214,378	114,904	75,325	65,256	48,419	35,766
Present value	\$2,772,668	\$2,235,978	\$1,550,619	\$1,342,030	\$965,127	\$760,283
Unemployment Rate	1.7%	2.0%	2.4%	2.8%	3.7%	5.7%
Adjusted Present Value	2,725,532	2,191,258	1,513,404	1,303,453	929,417	716,947

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