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The Illinois Institute for Rural Affairs (IIRA) works to improve the quality of life for rural residents by partnering with public and private agencies on local development and enhancement efforts.



**Western Illinois
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The Dynamics of Rural Illinois' Human Capital

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Abstract

This paper shows educational attainment by race and gender for rural Illinois. Public Use Microdata Sample (PUMS) were used to calibrate a human capital metric for rural Illinois. Results show that White females contribute the most to the human capital stock for rural Illinois.

Introduction

Knowledge and skills of a person, personal abilities, are called human capital. The term 'capital' implies that it gives rise to an income stream; in other words, variation in personal income can be explained by human capital. Also, at the macroeconomic level, the social stock of human capital is central to the process of economic growth.

I don't hypothesize about the stock of human capital in nonmetro Illinois, hypotheses *non fingo*, but it is logical to infer that rural population loss translates to loss of human-capital stock in the region. Specifically, over the course of the twentieth century, outmigration from rural regions of the US was widespread. By 1990, half of the country's residents lived in areas that had populations in excess of one million; today, more than 80% of the

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² Athiyaman, A. (2021). *Sustainability: An Exercise in Quantifying the Concept*. Available online:

³ It means, "I make no hypotheses".

nation's residents live in the metro region⁴. Empirical analysis suggests that the odds of a person in the 18-24 age group leaving a rural region to live in a city is 72,000 times higher than a person in the 50+ age category⁵. What is the status of human capital in rural Illinois? How has it changed since 2000? Are changes in human-capital stock more pronounced among certain segments of the rural population? This paper addresses these and other related questions.

Theory and Previous Work on the Topic

Variations in educational levels among the population can be explained using the concept of marginal utility – extra satisfaction associated with additional year of education. The earning-functions method⁶ can be used to estimate the average rate of return to one additional year of schooling; in an earlier study, I stated that an additional year of schooling would increase income by 9%⁷.

The earnings function method gives only private returns to education. The social rate of return to education is premised on the concept of positive externality – benefits for the society. For example, society will benefit if one's education lowers the likelihood of one committing crime, being in poor health, or using welfare.

Research by OECD suggests that social returns to education are lower than private returns⁸; others argue that external returns to education are around one percent and not significantly different from zero⁹. In contrast, Turkish researchers assert that social returns to education ranges from 13.2% to 31%¹⁰. In the absence of strong empirical evidence for social returns to education, I resort to rationality, not empiricism, and conclude that increases in education reduce criminal participation, improve health, and reduce dependence on welfare.

⁴ Danbom, D. B. (2017). *Born in the country: A history of rural America*. JHU Press.

⁵ Athiyaman, A. (2021). Explaining outmigration intentions of rural population. *Research Brief*, 3(17), 1-9. Available: <http://www.iira.org/wp-content/uploads/2021/10/Explaining-Outmigration-Intentions.pdf>.

⁶ Mincer, J. (1974). *Progress in Human Capital Analysis of the distribution of earnings* (No. w0053). National Bureau of Economic Research.

⁷ Athiyaman, A. (2011). Sources of Variation in Residents' Salary Income: An Exploratory Analysis of Rural Counties. Macomb, IL: IIRA, Working Paper.

⁸ Organization for Economic Cooperation and Development (OECD). (2006) *Education at a Glance. OECD Indicators 2006* (OECD Publishing: Paris).

⁹ Psacharopoulos, G. and Patrinos, H.A. (2004) "Returns to Investment in Education: A Further Update", *Education Economics*, 12(2), pp. 111-134.

¹⁰ Psacharopoulos, G. and H.A. Patrinos. 2018. "Returns to Investment in Education: A Decennial Review of the Global Literature." *Education Economic*, 26 (5): .445-458.

Methodology

Data on human capital for rural Illinois were tabulated using Public Use Microdata Samples (PUMS) from the US Census Bureau¹¹. Cross-sectional data for 2019 and 2009 were sourced and data related to educational attainment of three racial groups, by gender, were extracted: African-Americans, Whites, and Hispanics.

Table 1 shows the variables used in the analysis and Appendix 1 profiles the PUMA regions used in the analysis. Statistics computed from the data

include central tendencies and semi-interquartile range. To estimate the stock of human capital, a human capital index (HC) was developed using a “weighted score” method similar to the Fishbein’s attitude model¹²:

$$HC = \sum_{i=1}^n w_i M_i, \text{ where, } w_i \text{ is the weight for the } i^{\text{th}} \text{ group and } M_i \text{ is the central tendency statistic depicting the educational attainment for the } i^{\text{th}} \text{ group.}$$

HC scores are normalized, they sum to 1.

Table 1: Variables

Variable	Definition
PUMA	Public use microdata area code.
ST	State code: Illinois is 17.
PWGTP	Person weight.
SCHL	Educational attainment; Highest level of education.
RACIP	Race of the respondent.
FHISP	Hispanic origin.
SEX	Gender of the respondent.

Source: PUMS Data Dictionary, 2015-2019.

Findings

High school diploma is the typical human capital for rural Illinois (Figure 1). Group wise, White females contribute the most to the region’s human capital – 50% of the region’s HC score is derived

from White females. In terms of equality in educational attainment, the majority of Hispanic males (90%) have a high school diploma or some college education (Table 2). In contrast, the African-American female population shows high variability in educational

¹¹ <https://www2.census.gov/programs-surveys/acs/data/pums/>.

¹² Athiyaman, A. (2019). Social media data for market analysis: The case of higher education institutions in Illinois. *Research Brief*, 1(12), December, 1-18.

attainment, slightly more than 1 in 3 have less than a high school education but also 1 in 10 have a college degree.

Table 3 shows the semi-interquartile range of educational attainment by race and gender, for both 2009 and 2019.

Figure 1: HC Stock and HC Scores in Parenthesis

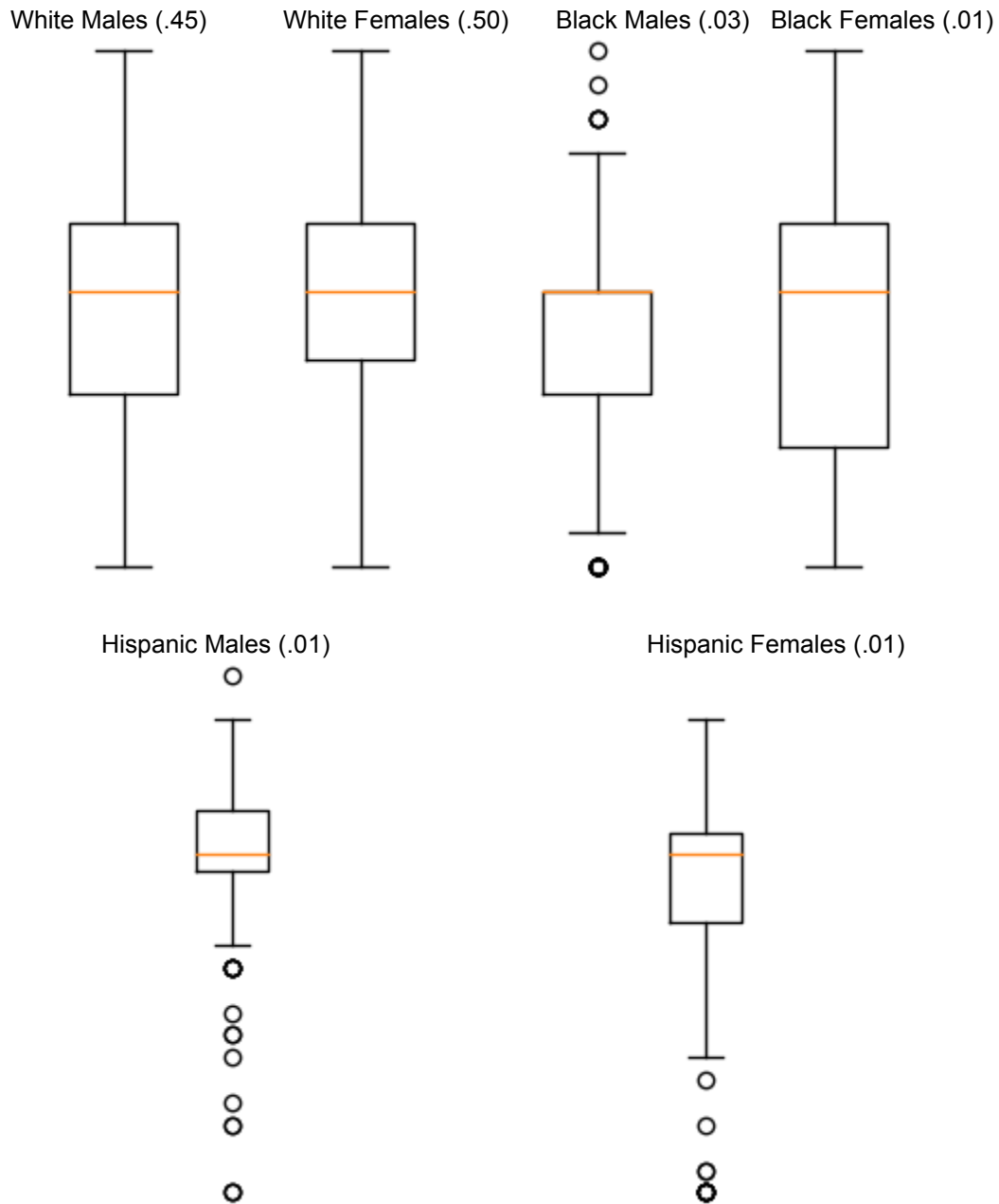


Table 2: Educational Attainment, Cross-Classified by Race and Gender

2019

Years of Schooling	African-Americans		Whites		Hispanics	
	Females	Males	Females	Males	Females	Males
LTE Grade 8	23%	16%	14%	17%	12%	16%
Grade 9	1%	3%	2%	2%	1%	3%
Grade 10	4%	5%	3%	3%	2%	9%
Grade 11	7%	13%	2%	3%	2%	6%
Grade 12, No Diploma	0%	1%	1%	1%	2%	2%
HS Diploma	22%	28%	27%	31%	53%	43%
Some college	33%	24%	22%	19%	15%	11%
Associate Degree	3%	8%	10%	8%	1%	3%
Bachelor Degree	5%	3%	12%	11%	9%	5%
Masters' Degree	3%	0%	6%	4%	1%	3%
Professional Degree	0%	0%	0%	1%	0%	0%
Doctorate Degree	0%	1%	1%	1%	1%	0%
Total	100%	100%	100%	100%	100%	100%
	N = 9,411	N = 21,835	N = 386,353	N = 377,423	N = 5,581	N = 9,734

2009

Years of Schooling	African-Americans		Whites		Hispanics	
	Females	Males	Females	Males	Females	Males
LTE Grade 8	15%	14%	12%	13%	18%	15%
Grade 9	3%	5%	3%	3%	2%	3%
Grade 10	1%	9%	4%	4%	3%	3%
Grade 11	5%	14%	4%	4%	3%	4%
Grade 12, No Diploma	1%	3%	1%	2%	3%	4%
HS Diploma	25%	28%	31%	33%	30%	34%
Some college	35%	19%	23%	22%	30%	30%
Associate Degree	4%	4%	9%	7%	4%	3%
Bachelor Degree	6%	4%	9%	9%	5%	3%
Masters' Degree	4%	1%	4%	3%	2%	1%
Professional Degree	1%	0%	1%	1%	0%	0%
Doctorate Degree	0%	0%	0%	1%	0%	1%
Total	100%	100%	100%	100%	100%	100%
	N = 9,235	N = 16,682	N = 335,447	N = 321,134	N = 7,299	N = 7,405

Table 3: Human Capital, 2009 versus 2019

2009

	White Males	White Females	Black Males	Black Females	Hispanic Males	Hispanic Females
1 st Quartile	10 th Grade	11 th Grade	10 th Grade	9 th Grade	11 th Grade	9 th Grade
Median	HS Dip.	HS Dip.	HS Dip.	HS Dip.	HS Dip.	HS Dip.
3 rd Quartile	Some Col.	Some Col.	Some Col.	Some Col.	Some Col.	Some Col.
Sem. IQ Range	3	2.5	2.5	3.5	2.5	3.5

2019

	White Males	White Females	Black Males	Black Females	Hispanic Males	Hispanic Females
1 st Quartile	11 th Grade	10 th Grade	11 th Grade	10 th Grade	HS Dip.	10 th Grade
Median	HS Dip.	HS Dip.	HS Dip.	HS Dip.	HS Dip.	HS Dip.
3 rd Quartile	Some Col.	Ass. Deg	Some Col.	Some Col.	Some Col.	HS Dip.
Sem. IQ Range	2.5	2	2.5	3	1	2

Note: Sem. IQ Range, or semi interquartile range is a measure of variability computed as the average deviation between 3rd quartile and first quartile values.

Summary and Conclusion

This paper models the stock of human capital in rural Illinois. Public Use Microdata Sample from the US Census, for the years 2009 and 2019, were used to assess changes to human capital in rural Illinois.

Some of the salient findings of the research include:

1. White females are the primary source of human capital for the region;

2. Colored females lag behind their male counterparts in educational attainment, and
3. Overall, disparities in educational attainment for all segments of the population are in the decline.

Our previous research on the topic demonstrated a decent return to education¹³. Social returns to education include lower crime rate and healthy population. These benefits suggest that public assistance such as student loans is warranted.

¹³ Same reference as footnote 7.

Appendix 1: PUMA Codes Related to the 2015-2019 and 2005-2009 PUMS

PUMA code, for 2015-2019 PUMS

Geographical Areas Covered by the Code

00104	Jo Daviess, Carroll, Whiteside, Lee
00202	Henry, Mercer, Henderson, Warren, Hancock, McDonough, Fulton
00300	Adams, Pike, Brown, Schuyler, Mason
00600	Douglas, Edgar, Coles, Cumberland
00700	Clark, Jasper, Crawford, Lawrence, Richland, Clay, Wayne
01001	Monroe, Randolph, Washington, Jefferson, Marion
02700	Stephenson, Ogle

PUMA Code for 2005-2009 PUMS

Geographical Areas Covered by the Code

00101	Carroll, Jo Daviess, Rock Island, Whiteside
00200	Fulton, Hancock, Henderson, McDonough, Warren
00300	Adams, Brown, Mason, Pike, Schuyler
00600	Coles, Cumberland, Douglas, Edgar
00700	Clark, Clay, Crawford, Jasper, Lawrence, Richland, Wayne
01000	Jefferson, Marion, Randolph, Washington
02600	DeKalb, Lee
02700	Ogle, Stephenson

Appendix 2: Educational Attainment of Rural Illinoisans, 2009 and 2019 Numbers

2019

Years of Schooling	African-Americans		Whites		Hispanics	
	Females	Males	Females	Males	Females	Males
LTE Grade 8	2154	3405	55570	63563	646	1519
Grade 9	93	611	8404	7049	46	302
Grade 10	346	1062	10613	11470	138	873
Grade 11	649	2842	8314	9756	115	544
Grade 12, No Diploma	12	144	4524	4760	137	193
HS Diploma	2078	6046	103893	118582	2956	4153
Some college	3130	5199	84570	72467	825	1030
Associate Degree	259	1661	38557	29437	66	307
Bachelor Degree	446	667	46332	41213	529	496
Masters' Degree	244	52	21675	13256	48	317
Professional Degree			1664	3232		
Doctorate Degree		146	2237	2638	75	
All	9411	21835	386353	377423	5581	9734

2009

Years of Schooling	African-Americans		Whites		Hispanics	
	Females	Males	Females	Males	Females	Males
LTE Grade 8	1425	2318	40279	41298	1287	1122
Grade 9	322	762	8853	9351	156	210
Grade 10	114	1444	12155	12966	196	200
Grade 11	487	2258	11795	11479	221	260
Grade 12, No Diploma	47	486	4694	5180	194	294
HS Diploma	2298	4752	102980	105506	2178	2543
Some college	3252	3108	77540	69292	2213	2219
Associate Degree	325	710	30336	23314	312	216
Bachelor Degree	537	710	30920	28637	372	191
Masters' Degree	364	118	13221	9024	144	80
Professional Degree	53	6	1846	3237	21	23
Doctorate Degree	11	10	828	1850	5	47
All	9235	16682	335447	321134	7299	7405

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