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A PREDICTIVE MODEL OF COMPLETION AT MISSISSIPPI'S COMMUNITY COLLEGES

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A PREDICTIVE MODEL OF COMPLETION AT MISSISSIPPI'S COMMUNITY COLLEGES

by

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ABSTRACT

In the 2020 American presidential election and throughout the time since, the discussion of free community college continues to raise its head in the present political landscape in the United States. As the recognition of the contribution of community colleges to the overall educational level of the country grows, increased focus is going to be placed on how efficient and effective these two-year institutions are.

This research expands the body of knowledge by combining Resource Dependency Theory (RDT) and Astin's Input-Environment-Output (IEO) model into an educational production function as defined by Bowles (1970). Neither RDT nor IEO is complete on its own as used to date in an educational environment. This model is then applied to the Mississippi Community College system, the oldest and one of the most widely acclaimed systems in the United States, to develop a predictive model of college Completion Rates.

RDT indicates that any organization responds to its resources in an attempt to garner more resources. This research shows that RDT helps explain Astin's IEO model and how institutions respond to their respective resources (i.e., inputs) by operational changes (i.e., environment) in their attempt to influence completion rates (i.e., outputs).

Astin's (1991) work emphasizes that even disparate students can complete their educational endeavors if the environment is appropriate. Astin (1970) contends three relationships at play in higher education: Inputs-environment, Environment-outputs, Inputs-outputs. This model created here expounds on both RDT and IEO and finds that resources/inputs matter but that also the environment matters. Some items are outside of

the control of the colleges, but some items that affect completion rates are within control of both faculty and administrators.

As budgetary constraints become more pronounced and performance-based funding becomes more common, colleges must be aware and work smarter, not just harder to fulfill their mission.

ACKNOWLEDGMENTS

I would like to acknowledge the support and encouragement of my family along with the faculty, staff and students at the University of Southern Mississippi (USM).

My wife, Lesa Harrison Baker, encouraged me and supported me on this adventure for a new career and has stood by through many late nights and many evenings away from home. My mother, Dot Baker, who went back to college later in life, gave me a model and a passion for learning. I could not have done this, nor would I have ever had the confidence to try, without either of you.

I also cannot imagine a better faculty team than I have been introduced to. Dr. Robert J. Pauly has been an incredible support and a friend throughout my time at USM. "Dr. Bob" and I traveled to multiple countries, and had many discussions about the state of our world and how blessed we have been to enjoy the freedoms and privileges of living at this point in history. I miss his weekly radio briefings explaining world affairs, but will never read or hear a headline without filtering it through lens he gave me.

Dr. Joseph St. Marie challenged me and pushed me to always get better. His words were, he hopefully was a "mentor" and not a "tormentor." He challenged me, but always from a place of encouragement and excellence.

Dr. Shahdad Naghshpour always pushed me to examine the status quo, to ask the hard questions about research and to think for myself. Crossing political lines to follow the evidence and proposing policies because they are grounded in fact, not emotion, is a skill that many profess to have, but few exhibit. Thanks for the lessons.

And lastly, Dr. David Butler. Dr. Butler possibly made me the angriest for actually telling me how poorly I did on some assignments, but also made me the proudest

for congratulating me and praising me for work that was worthy of those accolades. I am honored to know someone whose passion for higher education is unrivaled. Thank you, my friend.

I also cannot imagine how I would have made it through this program without one classmate in particular, Dr. Christopher B. Smith. Thank you, my friend, and may God continue to bless you and keep you.

DEDICATION

I would like to dedicate this dissertation to two men who are no longer with us and one who is coming after me.

First, my father, Richard Thomas Baker, Jr., who I miss daily. He gave me a work ethic, he gave me a love of knowledge, and he gave me his name. I hope I can continue to honor his legacy.

Second, Dr. Hugh L. Davis, III, was a classmate and a confidant throughout the majority of my doctoral studies. Dave and I literally traveled throughout the world and he was always available with a smile, a prayer, and a word of encouragement. RIP my friend and I look forward to an eternal reunion one day.

Our world is a sadder place with the loss of these two men. If not for them, and many more like them, I would have less hope for the future. But because of them, I look to the future with hope and knowledge that words like honor and integrity can be cultivated. I hope I can pass those traits on.

Thus, finally, I want to dedicate this to my son, Thomas Harrison Baker. Thomas, I hope you will continue to strive for excellence, to not quit, to challenge yourself to think, and to devote your life to a purpose and a higher calling by serving others. I hope you have seen me work and learn through good times and bad and I pray that my completion will give you confidence to walk to the beat of your own drummer.

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LIST OF ABBREVIATIONS

ACT	American College Test
AP	Advanced Placement
BLS	Bureau of Labor Statistics
CC	Community Colleges
CTE	Career and Technical Education
DE	Dual Enrollment
FTE	Full-Time Equivalent Student
IEO	Input-Environment-Output
IPEDS	Integrated Post-Secondary Educational Data System
MCCB	Mississippi Community College Board
NCES	National Center for Education Statistics
NELS	National Education Longitudinal Study
PBF	Performance Based Funding
SAT	Scholastic Aptitude Test
USM	The University of Southern Mississippi
VIF	Variance Inflation Factor

CHAPTER I – INTRODUCTION

This dissertation creates a predictive model for student completion rate at Mississippi's Community Colleges. Resource Dependency Theory (RDT) (Pfeffer and Salancik 1978) is combined with the Input-Environment-Output (IEO) model of educational assessment (Astin 1991) to explain student completion rates. Efficient institutional effectiveness is a goal for any organization and one of the primary measures of a college's effectiveness is what percentage of its students graduate—the completion rate. As public sentiment continues to call for more access to college, ensuring institutional effectiveness is more important than ever. As of July 2019, 12 states already offer free community college access (U.S. Department of Education 2019). President Barack H. Obama called for tuition-free college in 2013, it was a much-discussed topic throughout the 2016 presidential election, and became a core component of the platform of many candidates in 2020. In 2021 it was a major component of the oft debated "Build Back Better" bill that could not garner enough votes to pass. The issue of free community college seems to always be just under the surface and as the contribution of community colleges to the overall educational level of the nation continues to grow and be more documented, the issue will not go away. Completion rates that are below optimum are an inefficient use of tax dollars and any policy proposal to increase access, must also consider effectiveness of the educational institution. This dissertation contributes to information that policy makers need to address when making choices about access, enrollment, funding, and performance of higher education institutions.

Resource Dependency Theory holds that the output of any organization is derived from its inputs. It also acknowledges that external factors influence the behavior of an

organization. Power over resources is at the heart of this theory, and the interdependence of organizations and those controlling the resources may be difficult to isolate (Hillman, Withers and Collins 2009). Most studies start with similar factors to isolate the effects of a process or environment to explain differences in outcomes. This study is different. All colleges do not have the same inputs, whether resources or students. Thus, for purposes of this dissertation, the definition of inputs will be broadened from a traditional economic term to include both resources from decision makers outside of the college, as well as average student characteristics of each institution.

Inputs

Most discussions of college effectiveness start with funding. The higher education appropriation is the third largest budget item of the state of Mississippi's spending following K-12 education and Medicaid (SHEEO 2018). Higher education appropriations see larger fluctuations than other budget items during budget cuts (SHEEO 2013). Phelan (2014) argues that the shifting of funds away from state appropriations to other sources increased more rapidly during the great recession of 2007 and has reached what he terms a "crisis level." Phelan and others contend that increasing transferring the financial burden from the state to the student leads to a decrease in completion rates (De Roulet 2013; Dowd and Taing Shieh 2014; Ma and Baum 2016; Riley 2017).

However, the Law of Demand suggests that an increase in price (tuition charged to students) leads to a decrease in the quantity demanded (Marshall 2009). Raising tuition may lead to higher completion rates as students who are not serious and/or willing to invest in their education seek not to enroll. On the other hand, tuition increases may

lead to lower completion rates, as students must work longer hours to pay the higher fees. As part of an overall model, this research includes both state appropriations as well as tuition rates to isolate their respective effects on completion rates.

Mississippi's community colleges have an open enrollment policy. Students with higher academic ability as evidenced from high school achievement and standardized test scores have been shown to complete degree plans at higher rates than students with lower academic ability (Bettinger, Evans and Pope 2013; Redford and Hoyer 2017; American College Testing 2019). Research has shown mixed effects on students' completion rates due to enrollment in dual credit (Direct) (An 2012; Struhl and Vargas 2012; Wang, *et al*. 2015), remedial (Inverse) (Attewell, *et al*. 2006; Zeidenberg, Jenkins and Carlos 2007; Xu and Dadgar 2018), and online courses (Both direct and inverse) (Jaggars and Xu 2010; Johnson and Mejia 2014). Averages of each of these items for each college are included as part of the model.

Environment

The environment within the Input-Environment-Output model is defined to include the allocation of resources within functional areas of the college. Pike, *et al*. (2006), Abouzeida (2014), and Hyman (2017) find that college completion rates are affected by the type of expenditures. The U.S. Department of Education finds reallocating resources among functional areas of colleges "can serve to increase educational productivity in a dramatic way (U.S. Department of Education 2019)."

The net cost accrued to students has been shown to have inverse effects on student completion (E. Bettinger 2004; Riley 2017; Anderson and Goldrick-Rab 2018). The size of the institutions has been shown to have inverse effects (M. Titus 2004; Astin and

Oseguera 2005; Bailey, Calcagno, *et al*. 2005). The student-to-faculty ratio has been found to have inverse effects (Bound, Lovenheim and Turner 2009; Millea, Elder and Molina 2018). The prevalence of part-time faculty has been shown to have inverse effects as well (Bettinger, Evans and Pope 2013; Hollis 2015; Hutto 2017).

Opportunity costs indicates that the cost of a good is the highest valued alternative that one must give up to obtain that good, (D. L. Green 1894). In the case of college education, it is often the foregone income. Consequently, during economic declines college enrollment increases. As wages increase, the opportunity cost to remain in college increases and may cause students not to complete their education. As a proxy for the overall economic environment, the unemployment rate of each Community College district will be used (BLS 2020).

Output

The concept of human capital can be traced to Adam Smith (1776). The modern embodiment of the capital produced by investing in knowledge was more clearly developed by Schultz (1961) and Becker (1962). Increases in human capital increase productivity and hence, the output in an economy (Romer 1986). One of the measures commonly used for human capital is educational attainment. Thus, the variable of interest, the output/dependent variable for this study is the college's completion rate. Cantrell (2006) finds that completion rate is the most important indicator used by the governing bodies of higher educational institutions to measure institutional performance and growth of human capital.

Table 1 - *Completion Rates at Mississippi's Community Colleges*

COMPLETION RATES - CR	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coahoma Community College	8	21	21	24	28	27	26	21	28	27
Copiah-Lincoln Community College	19	30	42	32	31	27	27	26	33	36
East Central Community College	31	35	34	31	29	27	24	23	33	37
East Mississippi Community College	23	17	21	21	20	26	27	33	41	44
Hinds Community College	10	14	25	19	19	15	13	15	18	22
Holmes Community College	14	15	28	23	27	27	25	23	28	29
Itawamba Community College	19	20	22	24	25	28	26	31	37	40
Jones County Junior College	23	21	24	25	26	25	27	30	31	31
Meridian Community College	25	28	27	33	39	32	35	31	30	25
Mississippi Delta Community College	11	20	20	22	20	26	21	20	27	31
Mississippi Gulf Coast Community College	18	20	23	25	26	27	25	26	28	32
Northeast Mississippi Community College	20	20	19	21	19	26	27	28	30	33
Northwest Mississippi Community College	17	18	15	16	21	20	18	19	22	22
Pearl River Community College	36	44	41	42	36	35	32	20	29	29
Southwest Mississippi Community College	30	23	25	27	31	28	27	27	32	42
Average	**20.3**	**25.7**	**25.8**	**25.7**	**26.5**	**26.4**	**25.3**	**24.9**	**29.8**	**32.0**

COMPLETION RATES - CR		Min.	Max.	Range	Mean	SD
Coahoma Community College		8.0	31.0	23.0	24.3	6.1
Copiah-Lincoln Community College		19.0	45.0	26.0	32.8	8.0
East Central Community College		23.0	43.0	20.0	32.3	6.1
East Mississippi Community College		17.0	44.0	27.0	29.3	9.5
Hinds Community College		10.0	30.0	20.0	18.8	6.0
Holmes Community College		14.0	37.0	23.0	25.9	6.8
Itawamba Community College		19.0	47.0	28.0	30.2	9.4
Jones County Junior College		21.0	38.0	17.0	27.8	4.9
Meridian Community College		25.0	39.0	14.0	30.4	4.1
Mississippi Delta Community College		11.0	36.0	25.0	23.9	7.0
Mississippi Gulf Coast Community College		18.0	36.0	18.0	26.8	5.6
Northeast Mississippi Community College		19.0	34.0	15.0	25.7	5.7
Northwest Mississippi Community College		15.0	25.0	10.0	19.8	3.3
Pearl River Community College		20.0	44.0	24.0	34.1	6.7
Southwest Mississippi Community College		23.0	46.0	23.0	31.5	7.3
Overall		8.0	47.0	39.0	27.6	7.8

Research on the effects of funding on student completion rates is sparse, although studies of the contribution of individual student characteristics on student success is

plentiful. Many have addressed how a student's net cost of attending college affects their completion rates, although the results are mixed. The institutional allocation of resources and their respective effects on completion rates have also been studied (Abouzeida 2014; Gansemer-Topf 2004). None, however, has utilized all the above-mentioned factors together to provide a predictive model of completion rates. Utilizing panel data from Mississippi's community Colleges for the period 2007-2018 (Data available in Appendix A), this paper incorporates the inputs of external funding and average student profiles into the specific environments of the community colleges in Mississippi.

Research Questions

What institutional or environmental factors are more effective at reaching the desired balance between successful outcomes and increasing resources? Or is it the combination of resources/inputs that are more determinant of completion rates?

This dissertation focuses on those research questions. Inputs are included as defined by both RDT and IEO. By combining multiple environmental factors and measuring them individually while controlling for resource/input differences, policy makers and educational leaders at Mississippi's community colleges can then focus their resources and efforts in areas that lead to the most desired outcomes. This dissertation could be used to form policy decisions at both the state and institutional levels. It could also be replicated for different classes of institutions in future studies.

Organization of the Study

The remainder of the dissertation is organized as follows. Chapter II reviews the relevant literature that provides the context for the study. Items that make up each college's inputs as well as the environment of each college are included, as well as details

on how the term college completion is defined. Each variable found through prior research to contribute to college completion rates is included along with its expected contribution – whether direct or inverse. This dissertation adds to that literature by combining the RDT and IEO models while focusing on community colleges in Mississippi.

Chapter III details the methodology used to examine the claims of the model. The panel data is tested for normality, multicollinearity, and heteroscedasticity, and then multiple OLS regressions are performed. Chapter IV presents and analyzes the findings of the analysis along with discussions comparing the results to prior studies. Also included in Chapter IV is an explanation of how this research fits into the appropriate theories used herein and how it furthers that body of academic thought. Chapter V summarizes the study's results and assesses the extent of the validity of the hypotheses, identifies the shortcomings of the findings and suggests areas for further research, and concludes by making recommendations for policy makers, college administrators, and faculty along with recommendations for future research.

CHAPTER II – LITERATURE REVIEW

Introduction

This dissertation expands the body of knowledge by combining RDT and Astin's Input-Environment-Output (IEO) model into an educational production function as defined by Bowles (1970). Neither RDT nor IEO is complete on its own as used to date in an educational environment.

RDT indicates that any organization responds to its resources in an attempt to garner more resources. This research shows that RDT helps explain Astin's IEO model and how institutions respond to their respective resources (i.e., inputs) by operational changes (i.e., environment) in their attempt to influence completion rates (i.e., outputs).

Astin's (1991) work emphasizes that even disparate students can complete their educational endeavors if the environment is appropriate. Astin (1970) contends three relationships are at play in higher education: Inputs-environment, Environment-outputs, Inputs-outputs. While most research had been focused on either the second or third relationship between the environments and the outputs or between the inputs and the outputs, his work includes the inputs and environment as well. He defines inputs as student characteristics, listing "talents, skills, aspirations, and other potentials for growth and learning that the new student brings with him to college" (Astin 1970, 2). The environmental factors he identifies include "administrative policies and practices, curriculum, physical plant and facilities, teaching practices, peer associations, and other characteristics of the college environment" (Astin 1970, 3). This dissertation's contribution to the existing literature is to broaden the definition of inputs from Astin's to include additional resources proposed by RDT. Inputs include not only student

characteristics but also resources in the form of appropriations and fees from tuition and related charges. This is the definition of RDT, which asserts that an environment is not static, given that it changes to garner more resources. The environment is thus controlled or at least influenced by the institution's decisions. It will change based on the resources it has available and how to secure more of those resources. Those resources then include not only additional funding but more students with different characteristics as well. Astin finds that those environmental changes then influence the outputs.

Resource Dependency Theory

RDT grew out of a wealth of organizational research conducted during the 1970s. Along with transaction cost economics (Williamson 1975), new institutional theory (Meyer and Rowan 1977), population ecology (Hannan and Freeman 1977), and agency theory (Jensen and Meckling 1976), RDT continues to exercise influence and add to the relevant literature on the establishment and evolution of institutions today. All of these evolved from Thompson's (1967) *Organizations in Action* and in some respects have always been friendly competitors, but RDT is perhaps the most widely researched.

RDT has been applied across multiple branches of research to explain how organizations deal with uncertainty. Pfeffer and Salancik's (1978, 2003) seminal work opened a discussion on how organizations respond to their external environment with internal policies. Pfeffer (1987) contends "organizations are not autonomous, but rather are constrained by a network of interdependencies" (25). Davis and Cobb (2010) argue RDT is the most comprehensive in its approach to organizations, in that it incorporates an analysis of power within an organization into a discussion of how that power is used to shape or manage their internal environments in practice. They also

argue that power can create an interdependence and is not a zero-sum condition, such that A can have power over B and B can also have power over A. In education, institutions have power over students, but students also have power over institutions. Legislatures have power over colleges due to funding mechanisms, but these educational institutions have power over legislators in the close knit and extremely loyal body of alumni who are also voters. Nienhuser (2008), interprets RDT to suggest differences in the behavior of organizations are influenced by both internal and external agents that control critical resources. Those who control the resources have power and power influences behavior.

One of the first studies using RDT in higher education was Tolbert (Tolbert 1985) In a study of 167 public and 114 private universities in the United States, she finds that those institutions with a higher share of income from public sources have a higher number of staff positions dealing with administrative responsibilities dealing with managing public funding. She finds the same increase in administrative positions with increases in private funding – but those staff manage private funding. Her conclusion is that firm behavior changes to match sources of funding at the expense of other areas on campuses and is supportive of RDT.

Fowles (2014) examines the relationship between a university's increased reliance on tuition and fees as opposed to government funding and the related expenditures on teaching. He finds support for RDT in panel data from 419 four-year institutions over an 11-year period. When colleges charge more to students, they put more of that money into instruction which would logically be a higher priority for students.

Coupet (2013) examines the effects of increased spending on positive student performance among Historically Black colleges and universities (HBCUs). He finds that an increased share of administrative costs is associated with lower student performance and higher dropout rates. He argues for a reallocation of expenditures at those institutions to improve educational outcomes.

Kholmuminov, Kholmuminov and Wright (2019) find a positive and statistically significant relationship between the amount of tuition and fees charged and the share of expenditures on teaching in their study of a relatively young higher education system formed upon the fall of the Soviet Union and the declaration of independence of Uzbekistan in 1991. RDT hold true and organizations will adapt to meet the demands of those who hold the resources.

As Performance Based Funding (PBF) for higher education institutions becomes more prevalent in legislative circles, institutions must adapt and respond to meet targets set by those who control resources.

RDT also focuses on an organization's environment that provide "critical" resources needed by that organization. To understand firm behavior, critical resources must be defined (Nienhuser 2008). "Criticality measures the ability of the organization to continue functioning in the absence of the resource or in the absence of the market for the output" (Pfeffer and Salancik 1978, 2003, 46). In higher education, criticality can be boiled down to two resources: money and students. RDT can help us understand firm behavior as it relates to both resources.

RDT at its core attempts to describe internal changes in an organizational environment in response to external influences. In many cases, power over resources and

power over internal processes are at odds and must come into alignment for an organization to be successful. When combined with Astin's (1991) Input – Environment – Output process in a type of modified production function, the resources or inputs of a higher education institution include not only funding, but the students themselves. Due to their very nature as predominantly taxpayer funded entities, public higher education institutions are also prohibited from stockpiling resources. Their very existence hinges from year to year on primarily appropriations from state legislatures and in the case of Mississippi's community colleges, local counties. RDT helps one to better understand how organizations make decisions whose entire existence is dependent on financial resources from external sources. A normal production function also attempts to standardize processes and to source inputs at a certain consistency. Raw materials would all be placed into production at the same stage, consistency, and normally sourced from consistent providers or in many cases, created or grown internally. With an open enrollment policy, Mississippi's community colleges enroll students that all arrive at various levels of "rawness." Students also have different priorities than legislators and accrediting agencies. How an institution deals with those uncertainties, conflicting priorities, how resources are allocated, and the resulting "output" is the purpose of this study.

Hillman, Withers and Collins (2009) lobby for an expansion of RDT to include research at both the macro level and micro level, as well as the juxtaposition of research at multiple micro-perspectives. They argue firm decisions and behavior can mirror individual decisions and individual behavior. At the macro level, they point to the interdependence of external forces and the environment as a determinant of firm success

while at the micro level reciprocal relationships among coworkers or departments of an organization allow for common goals to affect behavior and lead to cooperation. They argue for a synthesis of streams of research that operate on multiple levels and have multiple forces interacting in/on an organization.

This work is attempting to isolate firm behavior and decisions made in response to external sources that are the source of both funding and the raw materials used in higher education processes. Colleges that make more effective decisions about resource allocation, and faculty makeup, along with those that can influence their student body with items like institutional cost of attendance and financial aid, should be more successful in responding to the pressures from PBF and the requirement to increase completion rates and do more with less.

History of Higher Education

The roots of the modern higher education system can be traced all the way back to ancient Greeks, Egyptians, and Babylonians. The ruling and privileged classes of society created formal programs to further societal aims and to attempted to teach "skills and accomplishments that were of direct benefit for the official" (Pederson 2009, 6). As Greece developed one of the earliest democratic forms of government, it was no longer acceptable to educate only the elite of society. For each citizen to participate in a democratic form of government education had to be offered to all (Himanka 2015). Aristotle wrote about the growth in wisdom becoming possible when people did not have to work continuously for necessities of life. Time was able to be spent on other items and understanding the reasons for things. He referenced the *mallon eidenai* and the ability to

teach; “in general it is a sign of the man who knows and of the man who does not know that the former can teach” (Aristotle n.d.).

As knowledge spread and civilizations continued to develop, higher education and universities developed throughout Europe and then to the United States with Harvard University being founded in 1636 almost 150 years prior to the United States Declaration of Independence. Education and the ability to further one’s status in life is intrinsically linked to the American Dream. George Washington advocated for the creation of a national university citing the need for shared understanding of principles, opinions, and manners of citizens (Dudley 2015). He argued it would lead to the union being “more permanent, and the liberties of the country better guarded” (Osamudia 2012).

The federal government has provided incentives to both institutions and individuals in support of higher education since the mid 1800’s. The Morill Acts of 1862 and 1890 created land grant colleges and Historically Black Colleges and Universities (HBCUs) (Abouzeida 2014; Bryan 2016). This set the stage for higher education to be a public good and set the precedent for the funding of higher education in the United States (Key 1996). The “Coleman Report” in 1966 shifted the attention of education away from opportunity to the distribution of student performance – the outputs as opposed to the inputs (Hanushek 2008). During the 2018-2019 academic year there were 3,700 degree granting institutions in the United States – 2,300 4-year institutions and 1,400 2-year (NCES - National Center for Education Statistics 2019).

History of Community Colleges

The early 20th century saw the first founding of a community college in the United States, originally known as a Junior College. It was in Joliet, IL and is accredited to University of Chicago president William R. Harper (Deegan, Padgett and Tillery 1985). Harper's goal was to mirror the German education system that separated general college course work from the more stringent higher-level courses (J. B. Williams 2010). In 1910 there were no colleges within two hundred miles of Freson, CA and the city leaders drafted the first formal legislation to create a community college (Cohen, Brawer and Kisker 2014). The rural nature of the United States created a need for more local entities and these 2-year institutions were created as a way for students to begin their university studies closer to home at a lower cost by completing lower-division courses that would then be transferred to the 4-year institution for completion of a degree (Bryan 2016). By 1920, community colleges were in California, Kansas, Illinois, Iowa, Michigan, Minnesota, Missouri, and Texas (Dougherty 1994). The first statewide community college system was founded in Mississippi in the 1920s and today includes fifteen different institutions with a coordinating board located in Jackson (MCCB 2020).

The exact definition of a community college was created in 1922 by the American Association of Junior Colleges (AAJC) and was specifically geared to the first two years of college instruction allowing a student to transfer. However, new vocational courses began to materialize and needs for the country that were highlighted during WWI resulted in an expansion of the mission. The new definition became:

> The junior college is an institution offering two years of strictly collegiate grade. This curriculum may include those courses usually offered in the first two years

> of the four-year college, in which case these courses must be identical, in scope and thoroughness, with corresponding courses of the standard four-year college. The junior college may, and is likely to, develop a different type of curriculum suited to the larger and ever-changing civic, social, religious, and vocational needs of the entire community in which the college is located. It is understood that in this case also the work offered shall be on a level appropriate for high school graduates (Thornton 1960, 53).

The GI bill in 1944 expanded access to veterans of the armed services and financial aid in the forms of grants and subsidized loans (Wegner 2008). President Truman published the Truman Report in 1947 with the stated purpose of increasing the human capital resources of the nation (The President's Commission on Higher Education 1947). It challenged the nation to expand access to higher education recognizing barriers from both racial and financial factors. It also couched the need for additional trained citizens as a matter of national defense (Bryan 2016). As community colleges began to grow and more states began to create them, their mission remained the same even though they are location specific and should be tied to the needs of the local community (Cohen, Brawer and Kisker 2014).

Mellow (2009) says community colleges have the most broadly democratic mission of any part of higher education. These institutions have provided a gateway to higher education for millions of students from both the United States and abroad and Paul Elsner, the former chancellor of the Maricopa Community College system in Phoenix once observed, “community colleges are the Ellis Island of American higher education”

(Mellow 2009, 4). One cannot understand the history of American higher education without understanding something of the community college system in America.

Community College Counterparts around the World

Community colleges as comprehensive institutions serving academic transfer students, technical training, and workforce training exist only in the United States and Canada (Cohen, Brawer and Kisker 2014). But more than ninety countries offer some form of two-year tertiary educational institution (Latiner Raby and Valeau 2009). While the most recognized ancestor of today's community colleges started in Illinois and California as discussed above, international models also contributed to the institutions we see today. In the late 19th century, the *Scandinavian Folk High School* offered adult education for local community interests and the German *Volkhochschulen* defined post-secondary, pre-university institutions throughout Europe (Raby 2009). The *European Polytechnic and Institute of Technology* also offered alternatives to university study. Two-year institutions in other countries have different missions and even go by different names: technical colleges, further education (FE) institutions, technical and further education (TAFE) institutions, colleges of technology, and junior colleges are examples (Elsner, Boggs and Irwin 2008). While names differ, the institutions share some common traits:

- Post-secondary and post compulsory
- Open access
- Lower budgets by government
- Lower cost to students
- Community and workforce development

They also differ specifically in many aspects from traditional higher education institutions and are hard to classify in global categories. Raby (2009) says community colleges have characteristics of both:

- *Level 4 Post Secondary Non-Tertiary Education*
    - between upper secondary and post-secondary
    - provide degree foundation courses for Level 5
    - provide short-term vocational programs that have direct labor market entry
    - allow typically older and non-traditional students
    - have a curriculum that varies from one month to two years
- *Level 5 – First State of Tertiary Education*
    - provide preparation for high skills jobs
    - provide preparation for specific occupational skills
    - support a curriculum that is a minimum of two years
    - have faculty who have obtained advanced research credentials

This system of classification thus fails to adequately define what community colleges do.

In 1971, the Organization for Economic Co-operation and Development (OECD) convened a global conference to define these institutions and included delegates from Britain, France, Norway, Yugoslavia, and the United States (Raby 2009). While very few countries have exact duplicates of the U.S. model, some aspects are easily adaptable and have been utilized in places like Taiwan, Thailand, and Suriname. France's technical model does not include transfer capabilities and is like what many countries have including Iran and Mexico. In 1983, the OECD standards were added to the

Postsecondary International Network after meeting with representatives from Canada, Great Britain, and the U.S. In 1999, 36 countries throughout Europe established The First European Community College network to model schools after the *Grundtvigian Folk School* model for citizens of Europe and preparation of the workforce throughout the European Union (EU) (Raby 2009). Since 2002, the World Bank has also encouraged the adoption of community college model characteristics worldwide (World Bank 2003).

Globalization is also served by the structure of the community college. Peng (2011) defines globalization as "the close integration of countries and peoples of the world." By its very nature, globalization can cause conflict between local and global interests. Those who want to preserve the status quo vs those who want to expand. Globalization wants to shrink the world (Robertson 1992) while also preserving a local identity (McLaren 1999). It tends to promote a universal oneness in which boundaries are broken and economic, political, and cultural change occurs through the sharing of information. "Firms everywhere face increasing pressures to innovate and diversify into newer and more lucrative markets, as profit margins in traditional industries are squeezed by intense global competition" (Tan, McGough and Valerio 2010). Most measures of market integration, such as trade and FDI, have recently scaled new heights but still fall far short of pointing to a single, globally integrated market. In other words, what we have may be labeled <u>semi-globalization</u>, which is more complex than extremes of total isolation and total globalization. Semi-globalization suggests that barriers to market integration at some borders are high, but not high enough to completely insulate countries from each other (Ghemawat 2003). Entities that are nimble enough to change and help train a workforce to meet these challenges are vital to economic growth.

The International Labour Organization (2010) finds that globalization has been the defining characteristic of economic growth throughout the world over the previous fifty years. Shifts in the location of origin of products and trade patterns have led to a more heightened need for educational entities that can foster change in a short period of time. This combining of markets with customers from divergent locations is accelerating the spreading of technology and the pace of innovation. Skills and competencies required for new occupations are replacing old ones and the knowledge needed for services and even enhanced production processes is rising. And while globalization has been thought of a way to "Americanize" the world, Khanna (2008) says "it drastically accelerates the demise of Pax Americana." Globalization leads to ideas flowing both into and out of countries and for those who capitalize on the opportunity, it is the great equalizer.

Romer (1993) says that education and the creation of ideas are the real fuel to economic growth. Other tangible investments are proximate, but not the fundamental cause of growth. The ability to generate and use ideas which lead to change in the form of entrepreneurship is the key. Raby (2009) says community colleges are defined by their ability to change; to be permeable and adaptable. She also says that community college development has shown that not all adaptations flow outward from the United States. Increases in communication and transportation are allowing for increased participation and opportunities for partnerships around the world. She remarks, "As a result, community colleges circumvent the world, which has allowed them to become learning centers for the whole community" (Raby 2009, 23). Mellow (2009) says community colleges will not only survive but continue to prosper because they are capable of rapid change. This includes changes in curriculum and in areas of student

services. She argues that community colleges are the institutions who will continue to offer fresh perspectives on the American dream, regardless of where the college or student is located.

Community colleges popularity arises from their ability to serve a societal void and accommodate the educational needs of the specific communities they serve (J. S. Levin 2001). The demand for higher education cannot be met by universities alone and community colleges will continue to play an ever-increasing role in local communities, national educational landscapes and even globalization. Glewwe (2002) points out however, that all education is not equal and just allocating more resources will not necessarily lead to better educational outcomes. Governments need to ensure that policies are put into place that raise educational attainment. Kremer (2003) also says that providing additional resources has a limited impact on school quality. Educational institutions must learn to evaluate programs with an emphasis on specific outcomes.

History of Community Colleges in Mississippi

As mentioned earlier, Mississippi has the oldest statewide system of Community Colleges in the United States. It currently consists of fifteen independent institutions with a coordinating board in Jackson: The Mississippi Community College Board. In the fall of 2019, headcount enrollment was 71,591 with 59% in academic courses, 22% in career-tech programs and 19% in non-degree programs (MCCB 2020). During the year 2019-2020, 16,536 students graduated with 19,898 awards (MCCB 2020).

Mississippi's individual community colleges and the system overall have received numerous awards and recognition. Since 2010, a few of those awards are:

- Wallet Hub, a financial analyst company for small businesses and consumers, ranked Mississippi's system as number 1 in the nation for cost, classroom experience, and education/career outcomes.
- Nine out of fifteen colleges have been ranked in the top 150 community colleges in the nation by the Aspen Institute.
- "Washington Monthly" named three of Mississippi's Community Colleges among the top fifty in the nation.
- Ten out of fifteen have received Military Friendly designations by veteran organizations.
- The Brookings Institute ranked one of Mississippi's community colleges as the third best Value-Added college in the country.
- Nursejournal.org ranked one of the Mississippi's community college's nursing programs as the third best in the Eastern Region of the country.
- AffordableColleges.com selected one of Mississippi's community colleges among the 50 Most Affordable Colleges in the United States.

Education as Public and/or Private Good

The benefits of higher education are numerous for both society as a whole and the individual student. Levin, *et al* (2007) find that many benefits also accrue to society including higher taxes paid by workers, lower government spending on those with advanced degrees, reduced enrollment in Medicaid, a reduction in crime rates, and a reduction in welfare participation. Marginson (2011) argues that universal knowledge and information are the two most significant public goods created by higher education. This supports the original idea of all education discussed earlier and higher education in

general. In economic development terms, one of the ways we describe the benefits is as human capital.

Jacob Mincer's "Investment in Human Capital and Personal Income Distribution (1958)" is the seminal work for applying a quantitative formula to returns of education in the form of higher wages. He addressed standard questions as to how income inequality could be different than the distribution of ability. He attempted to quantify the value associated with "chance" at that point in history. He stressed training as the key to the difference in earnings and included the fact that increased training led to a logarithmic change in earnings over a person's lifetime. Without using the term, the "Higher education premium" was born.

Becker (1962) enhanced the study of human capital to include investments in schooling and on-the-job training. Mincer (1974) then expanded and strengthened his equation by quantifying returns to specific types of training. He included both education and experience. This formula has been used for almost forty-five years to estimate returns to education, educational quality and to measure differences among respective groups.

Baum, Ma and Payea (2013) include private benefits to higher education as increased lifetime earnings, increased job satisfaction, decreased unemployment rates, increased life expectancy, less sick time used during career, increased parental involvement with their children, and increased rate of civic engagement through volunteering and voting. Higher education is the key to addressing individual income inequality (Baum, Kurose and Ma 2013). It also serves to "close the achievement gap between those students in this country who are advantaged – educationally, culturally,

and economically – and those who are not" (Engaging Higher Education in Societal Challenges of the 21st Century 2008, 2). One of the ways we measure this private benefit is the increase in earnings of someone with a higher education degree as compared to someone without such degree – the college wage premium.

Katz and Murphy (1992) explain increasing wage inequality from 1963 to 1987 using a simple supply and demand framework and separated earners based upon their education level, sex, demographic groups, and experience level. Growth in the supply of college educated workers during the period was less than or equal to the increase demand and thus the higher education wage premium grew to the point where college educated males earned approximately 30 percent more than those men with twelve or fewer years of formal education in the period from 1979-1987.

Data shows clearly that jobs requiring a college degree pay more than those that do not (NCES - National Center for Education Statistics 2019). Students who complete a bachelor's degree can expect to at least double the earnings of a student with a high school diploma or less over their lifetime. Buam, Ma & Payea (2013) argue that increasing higher education attainment is a critical step in addressing economic inequality and is the most direct way to ensure that adult will move up the socioeconomic ladder.

While some portion of the public and private benefits of higher education may attach even if a student does not complete a degree, many of them will not. For society, students who do not complete a degree cause problem for society. Many times, students who drop out of college have student loans that must be repaid with no corresponding increase in earnings to pay for them. Those loans put a drag on the funds required to turn over in the system to allow other students to borrow. Also, minority students are much

more likely to not complete which leads to continued growth of income inequality and socioeconomic disparity within society (Shapiro, et al. 2017).

The signaling theory of education says that the job market awards those who complete a degree, and it is not necessarily the actual knowledge gained that leads to increased wages. Employers are interested in a "signal" that students (job applicants) will finish a task. They will not give up. They are willing to persevere. This makes the employers investment in the worker worthwhile (Spence 1973).

Completion rates matter if a society is going to get the most out of its resources and if it is going to offer opportunity to all. Completion rates matter if a student is going to maximize their value and reap the maximum private rewards available.

Studying Completion Rates

The beginning of studying student completion rates or the lack thereof can be traced back to Durkheim's theory on education and sociology (Durkheim and Sartre 1956). Spady (Spady 1970) extended the school of thought to say that the key factor in a student completing college or not was due to how well that student integrated into the complete setting of the college. Both led to Tinto's student departure theory (Dixon 2018).

Completion rates have been studied using economic, organizational, psychological, and sociological perspectives (Braxton and Hirschy 2005).

Tinto's (1975) economic factors include weighing the costs and benefits of attending college to the student. This incorporates choices that are made at both the college level and the student's level: tuition and fees, financial aid, job opportunities and the student's overall ability to pay. Organizational factors include how much a student

feels accepted at the organization and how much opportunity they have for interaction with both their instructors and their peers. Psychological factors include aptitude and attitude of students.

Many studies have shown different variables to affect college completion rates. Those variables will be included in either the Input or Environment category leading to the Output of college completion. A literature review of each of those variables follows.

The Dependent Variable: Student Completion

While more students are enrolling in college, not all are graduating. In 1960 37.9 percent of all high school graduates enrolled in college. In 2019 that number had grown to 71.4 percent (NCES - National Center for Education Statistics 2019). But completion rates have not kept pace. In 2019, 61% of students completed their degree within 6 years from four-year colleges and universities while only 24 percent of students enrolled in community colleges completed their course of study within 3 years.

The response variable for this study is student completion rate. With the increased adoption of Performance Based Funding (PBF), completion rates are not only vital to the students, but to the institutions as well. Educational costs are rising, the public is calling for more variety in course offerings and industry specific programs, and enrollment numbers are at best remaining level.

The major database for higher education is the Integrated Postsecondary Education Data System (IPEDS). IPEDS defines completion simply as graduation with either a diploma or a certificate of completion for Career and Technical Education (CTE) programs. IPEDS only includes First Time/Full Time students enrolled in the fall semester. It allows a student 3 years to complete a degree. It excludes students who

return to college after a break in their education and it does not account for students who attend college on a part time basis, or those who enroll for the first time in the spring or summer semester. Students returning to college, attending part-time, or those on non-traditional schedules, have unique characteristics that may affect their completion rates.

According to the National Center for Education Statistics from 2017, students completing a degree at a university within 6 years of enrollment is 57 percent for cohorts enrolling in 2011 nationally, and 54percent in Mississippi. While at community colleges, students completing their degree within 3 years is 24 percent of students enrolled in public institutions beginning in 2014 nationally and 34 percent in Mississippi (NCES 2019).

Explanatory Variables

The explanatory variables for this study have all been shown in prior research to influence completion rates at other institutions. Including them in this research will test whether they have the same effect at Mississippi's Community Colleges.

Independent Variable #1 – General Fund Unrestricted State Appropriations per FTE

While more funding is not always the exclusive answer to problems of educational institutions, lack of funding can hinder completion rates. Deming and Walters (2017) find a strong direct correlation between per student spending and rates of completion. This mirrors the results by Bound and Turner (2007) who find that reduced appropriations per student have significant inverse effects on completion rates. Bound, Lovenheim, and Turner (2009) find that state higher education budget cuts are more important than any other factor, including the academic preparedness of students when they enroll. They find that reductions in state funding leads to greater variation of

allocation of resources at the institutional level which has inverse consequences to completion rates. Phelan (2014) says that the notable shift away from state funding is the most significant challenge faced by community colleges today. While funding is being cut, or at best staying level, "… community colleges face intense and growing demand to increase student access, retention, outcomes, and completion rates while serving more students at a reduced cost" (Phelan 2014, 6). Murphy and Katsinas (2014) find the critical component of community college budgeting is under more pressure than ever. They find the total governmental appropriations per FTE fell 8.3 percent from 2000 to 2010 and the unpredictability of funds are forcing institutions to make decisions with short term survival being more important than long term success of its mission. Romano and Palmer (2016) find that community colleges are unique in their role especially during the business cycle and that polices that call for performance-based funding and free tuition may actually work against the role the community colleges are called to play in offering access to all students. As most state funding policies are based on prior enrollment, institutions such as community colleges that have large variations during economic cycles may be called to serve a much larger student body without the adequate resources to do so. State policies that require balanced budgets contribute to this as decreases in economic activity normally lead to decreases in tax revenue, which leads to decreases in funding to state institutions while during the same time, enrollment at community colleges normally increase. Level and timely state funding regardless of economic fluctuations is vital to offset those natural forces.

The State Higher Education Executive Officers Association reports that average appropriation per students in 2016 was $7,116 while in 2008 it was $8,732 in inflation

adjusted dollars (SHEEO 2018). Forty-four states had inflation adjusted per student appropriations lower in 2016 than 2008. In Mississippi community colleges, the average Revenue from state appropriations in 2008 was $4,649 and in 2016, it was $4,534 – in current dollars. Without stable funding sources, colleges cannot plan and operate effectively. Titus (2006) finds that appropriations per FTE are not as important as a percentage of total appropriations applied to higher education. For purposes of this study, appropriations per FTE will be used. There has been very little variation in the percentage of funds allocated to the respective classes of higher education.

Independent Variable #2 – Average ACT Score

Astin (1993) finds that standardized test scores along with a student's high school GPA were the two best predictors of student success. Titus (2006) finds a direct effect on completion from student variables such as academic preparedness. He also finds that standardized test scores may be a good indicator of such preparedness. While students' individual academic ability plays a part in their academic success, not all measures of that ability are equal. Different measures are used by different institutions and since high school grades have a potential to be subjective to the institution, a standardized measure may be preferred and Barro (2001), Camara (2001), and McWhorter (2001) find strong evidence of standardized test scores as predictors of students' collegiate success rates. Allensworth and Clark (2020) find that standardized test scores by themselves are not always a good indicator and that high school grade point averages also have an effect. However, the effects of both vary depending upon the specific high school attended. Sparkman, Maulding and Roberts (2012) find that both are effective although they only account for about 25 percent of the variation in student outcomes and that results have

not been consistent among different studies. Two major standardized measures are the Scholastic Aptitude Test (SAT) or the ACT which evolved from the American College Test. Nayar (2015) finds that all states use some form of standardized testing as part of admission decisions and forty-five use either the SAT or the ACT. Mississippi Community Colleges use the ACT as a barometer of student readiness and as a criterion for placement in beginning level classes or remedial classes in both English and math (MCCB 2017). This follows the findings of Bettinger, Evans and Pope (2013) who find that those portions of the exam have the most direct effect on students' academic success in college. Titus (2006) finds no relationship among standardized test scores or high school grades. He does, however, find that schools who are more selective in admission requirements have higher rates of completion. Student preparedness, while most find a factor in college success, cannot be used as a criterion for enrollment in Mississippi's community colleges. Open enrollment policies mean all students are given the opportunity to enroll. However, ACT scores are used as a cutoff for placement into certain remedial courses. High school grade point averages are not available from the institutions under study. ACT scores will be used in this study as one of the independent variables.

Independent Variable #3 - Percent of students enrolled in Dual Enrollment courses

The second individual variable that is considered is the students' enrollment in dual enrollment courses. Dual enrollment has grown out of Advanced Placement (AP) courses and has surpassed it as the method of choice for high school students to start their college career early. In AP courses, students took a more rigorous course with additional work than their high school peers. To prove to the credit granting institutions, their

mastery of subject matter, students must pass a comprehensive exam in order to get college credit to accompany their high school credit. Dual enrollment changes the dynamic and allows the student to be enrolled in what is supposed to be a class that specifically mirrors the college course, and no additional testing requirement exists for college credit to be awarded. Thus, the premise is that the course is a low-cost and efficient way for students to begin their college path.

An (2012) finds that a student's participation in any dual enrollment courses increases the likelihood that students will complete college by 8 percent. He also finds that students who enroll in at least two dual enrollment courses (6 credit hours) are 12 percent more likely to obtain a bachelor's degree. Wang, *et al.* (2015) find comparable results among two-year technical students in Wisconsin: an increase from a graduation rate of 52.1 percent for students who did not participate in dual enrollment to a rate of 60.0 percent for those that did. They find that dual enrollment creates "academic momentum" that allows students to get a head start on understanding the rigor of coursework. Among Tennessee community college students, Grubb, Scott and Good (2017) find that those "who participated in dual enrollment were (a) 9 percent or nearly 3.4 times less likely to take remediation, (b) 26 percent or nearly 2.5 times more likely to graduate in 2 years, and (c) 28 percent or nearly 1.5 times more likely to graduate in 3 years (2017, 79)," Struhl and Vargas (2012) find that students in Texas who participated in dual enrollment courses prior to graduating from high school in 2004 were:

- 2.2 times more likely to enroll in a two- or four-year college
- 2.0 times more likely to return for a second year of college
- 1.7 times more likely to complete a college degree

- Fifty percent more likely to obtain a degree from a Texas college within six years

In Mississippi's community colleges, dual enrollment participation has grown from 3 percent of the students in 2008 to over 16 percent in 2018. With such an increase in participation, questions apply: Does dual enrollment help? Or are we enrolling too many dual enrollment students? For this paper, including dual enrollment rates as part of a variable affecting Mississippi's community college completion sheds more light on the topic.

Independent Variable #4 - Percent of students enrolled in remedial courses

According to the National Education Longitudinal Study (NELS), over 60 percent of community college students enroll in at least one remedial course compared with only 29 percent of first year students at a four-year institution (Levin and Calcagno, Remediation in the Community College: An Evaluator's Perspective 2007). Zeidenberg *et al.* (2007) use the National Center for Education Statistics (NCES) data and find that approximately 42 percent of all students in two-year colleges participate in remedial activity while only 20 percent at a bachelor's degree granting institution. According to the Beginning Postsecondary Students (BPS) Longitudinal Study from the National Center for Education Statistics (NCES) 6-year follow-up data from 2009, about 68 percent of students enrolled in at least one remedial course within six years after their original college entry (Xu and Dadgar 2018).

While ACT scores and dual enrollment participation both normally exhibit a direct relationship with completion rates, a students' participation in remedial courses normally reflect an inverse correlation. Students who do not meet a minimum score on the ACT must enroll in these courses – primarily in Math and English. There have been

two levels of each discipline: Beginning Algebra or English and Intermediate Algebra or English. In 2017, Mississippi's Community Colleges eliminated one of those courses and some colleges have even begun to attempt a Co-Requisite model. This entails enrolling students with low ACT scores even in College Algebra or English Composition 1 while requiring them to do additional work while providing them extra resources and requiring them to attend extra tutoring sessions each week. Remedial courses do not generate transferable college credit. Thus, they can easily become an extra time hurdle for students who are forced to enroll in them. While the SAT or ACT scores serve as a barometer of a student's ability when entering college, many of these students also lack effective study habits and lack clear goals for college. These items are maybe more important at the beginning of a student's academic career. Enrollment in remedial courses attempts to address both their habits, goals and prepare them for the course material, but the time spent taking remedial courses is a factor that needs to be addressed when evaluating completion rates. While the prevalence of these courses is common, the results vary. While dual enrollment may be linked to creating "academic momentum," remedial coursework has the opposite effect. Attewell, *et al.* (2006) find that about 70 percent of students pass the remedial course in English and reading, but only approximately 30 percent pass a remedial course in math. Bailey *et al.* (2009) find that less than 50 percent of students complete the remediation plan developed for them. Xu and Dadgar (2018) find that for students needing the most remediation in math according to current standards, the remediation offers little help and reduces the likelihood of completion. CollegeAtlas (2020) finds that more than 75 percent of students who are required to take remedial courses never graduate college. Boylan, Calderwood, and

Bonham (2019) remind us that, “Indeed, poor remediation may be one of the many causes of student attrition, but it is far from the only one or even the major one. Other factors include illness, finance, personal and family issues, quality of teaching, expectations, engagement, and employment (Boylan, Calderwood, and Bonham 2019, 37).”

Independent Variable #5 - Percentage of students enrolled in online courses

Jaggars and Xu (2010) study the effects of online courses in Virginia’s Community College System. They find that regardless of the students’ preparation and academic progress prior to the online enrollment, students were more likely to not complete the online courses as compared to on-ground traditional delivery methods. They find a 4 percent difference in completion among students based upon enrollment in remedial courses, but a 13 percent difference in completion between on-ground and online students. Broken down between those who were considered “college-ready,” the differences are similar. The more academically prepared students had completion rates 13 percent to 15 percent lower in online courses, while students who were in developmental or remedial courses completed courses at a rate of 11 percent to 13 percent less than those who took the same courses on-ground. Also, students who enrolled in online coursework earlier in their academic career were less likely to enroll in college in subsequent terms and the higher the proportion of courses that students took online, the higher the likelihood that they would not complete their course of study

Johnson and Mejia (2014) find a reduction in specific course completion like that of Jaggars and Xu. Students have 11 percent to 14 percent less likelihood of completing courses. They also find that achievement gaps based on gender, age, and race are all

exacerbated by online courses. However, Shea and Bidjerano (2014) find that online enrollment is not automatically a cause for concern and that other factors are more important in determining completion rates. With Mississippi ranked 47th in broadband internet service access (BroadBandNow 2020), online courses are still a burden for many students.

Independent Variable #6 – Tuition and fees per FTE

Tuition increases have a major effect on college enrollment and completion. Getting students into college is much easier than getting them to finish. Denning (2017) finds that $1,000 decrease in tuition increases enrollment in community colleges by 7.1 percent. Hemelt and Marcotte (2011) find an elasticity of tuition of 2.5 percent. Liu (2016) finds that free community college plans increase enrollment by 17 percent but lowers the proportion of students completing by 9 percent. Youmans (2017) finds that tuition by itself is not a significant variable for completion rates at community colleges. He does find however, that students receiving loans have a direct relationship with completion rates while students receiving grants have an inverse relationship. Students who are having to pay for the cost of the tuition are more likely to complete. Students who do not have to pay and who receive free tuition for reasons other than academic performance are less likely to complete. Both of those are included as variables in this study. Declercq and Verboven (2018) find that even moderate admission standards reduce enrollment and increase completion. Titus (M. A. Titus 2006) finds a direct relationship among tuition increases and completion. He indicates institutions that are having to collect more of their revenue from students will be more concerned with helping those students complete. Each of these studies support the idea that students who

are having to bear the burden of paying for their own tuition are more likely to complete and institutions will be more concerned in helping them complete. Lowering or offering free tuition decreases the likelihood of completion. While at the same time, if students are serious, the proper allocation of financial aid is vital to the success of students who may lack the resources of their own to fund their education.

Independent Variable #7 - Percentage of students receiving Pell Grants

Pell grants have been instrumental in increasing college access in the U.S. since 1972 (The Pell Grant n.d.). The maximum award was $1,400 per academic year in 1972-73 and in 2020-21 has grown to $6,375 (Dortch 2018). In 2015-2016, Pell provided over $28 Billion to more than 7.5 million students – almost 40 percent of the total undergraduate population. Pell grants are split among all types of institutions and Four-year public institutions enroll 36 percent of Pell students while receiving 39 percent of Pell funds, and community colleges enroll 32 percent of Pell students and receive 29 percent of Pell funds. The balance goes to private and for-profit colleges. (Protopsaltis and Parrott 2017). However, due to increases in costs of attendance and decreased funding, the maximum Pell award only covers 29 percent of the average costs of college attendance at 4-year institutions, 58 percent of the costs at 2-year colleges nationwide, and 56 percent of the costs at Mississippi's Community Colleges. For comparison, it covered 79 percent, 100 percent, and 105 percent, respectively in 1975. This decline in the ratio of support from Pell awards puts more pressure on other funding sources including loans and students self-funding their education by working. For the 2020-2021 school year, the maximum Pell award is $6,345 (Federal Student Aid 2020). Prostopsaltis and Parrott (2017) find that the pressures on the Pell system due to

increased tuition, decreased state funding, and lack of increased maximum Pell awards result in a need to increase the maximum Pell by almost $5,000 in order to cover only 50 percent of the costs of attendance at a four-year institution. A raise of that magnitude would allow the maximum Pell award to cover roughly all the costs of attendance at two-year colleges which would restore the Pell program to its original place. Kennamer, Katsina and Schumacher (2010-2011) also find increased enrollment levels have placed an overwhelming burden on the entire Pell Grant program and that individual students' awards have not kept up with costs which makes it harder for to complete their degree.

Students who must work have less time for classwork. Tinto (1997) finds that employed students are more likely to complete college. Zao and Kuh (2004) find that participation in a learning community or campus club with other students with similar interests outside of class is directly related to student completion. Titus (2006) also finds that students being involved on campus in extracurricular associations or student groups such as Science or Math clubs, Student Government Associations, Business Fraternities, etc. all have a higher likelihood of completing their degree. He finds that unmet financial need has a negative effect on a student's ability to focus on coursework. Unmet need also decreases these opportunities for networking and exposure to other resources that occur outside of class. Financial aid in the form of grants allow these pressures on students to decrease while also allowing them to fully engage in the college.

Alon (2011) studied the effects of Pell grants on completion at all public colleges in the United States of America from 2000-2010. During that period, average tuition and fees increased from $7,040 to $12,404 and at Community Colleges from $1,728 to $2,923 (NCES - National Center for Education Statistics 2019). He finds that a $1,000

increase in Pell awards increased retention by up to 1.5 percent, depending on the original award level. Students whose original awards were less than $1,000 and who received in essence at least 100 percent increase had the highest increase in retention rates at almost 1.5 percent. He also found that students whose original award was between $2,000 and $3,000 which equates to a Pell increase of between 33 percent and 50 percent had an increase in retention rates of about .6 percent. And students whose original Pell was $5,000 where a $1,000 increase is 20 percent, had a .035 percent increase in retention rates.

Bettinger (2004) examined all students in Ohio in 1999-2000 with average tuition of $6,723 and finds that a $1,000 increase in Pell awards reduced the dropout rate of college students by 6 percent to 9 percent. Goldrick-Rab, Kelchen, Harris, and Benson (2015) find an increase in retention rates of up to 5 percent while Castleman and Long (2015) find a $1,300 or 21 percent increase in grant aid leads to a 22 percent increase in completion rates. Hardy and Katsinas (2006) find that students in rural community colleges are more reliant on federal grant aid than students in all other college sectors. Ma and Baum (2016) writing for The College Board in Trends in Community Colleges: Enrollment, Prices, Student Debt, and Completion, state "Despite the lower costs of attendance in community colleges, the income profile of students in this sector makes financial aid crucial for their access and success. Federal Pell Grants are the foundation of this aid (Ma and Baum 2016, 12)."

Independent Variable #8 - Percentage of students receiving loans

To supplement grants, students may have to borrow. Britt, Ammerman, Barret and Jones (2017) examine the relationship between borrowings and completion. They

find that the financial stress associated with additional borrowing leads to an increased likelihood of students dropping out. They find that students with even small amounts of self-reported loans are less likely to complete their degree; However, students with university reported loans have a decreased likelihood of discontinuing college as compared to students without any debt. Financial counseling as part of the loan approval process and college support during that process were found to help students understand their responsibility and ensure proper usage of debt. Students who sought financial counseling after loans had been obtained or from loans other than loans funded through the college were found to experience more financial stress and were more likely to drop out of college within the next year. The magnitude or size of the loans were not important. Their study indicates that students who dropped out had accumulated loans as small as $2,000 to $3,000 during their first two years of college.

CollegeAtlas (2020) finds that 60 percent of students that drop out of college are responsible for paying their own tuition over and above what a Pell grant would pay for. Engle and Tinto (2008) find financial stress leads to less time on campus and engagement with peers and faculty and results in lower retention and completion rates. Joo, Durband and Grable (2008) find that students with debt are more likely to reduce course loads and are even more likely to take entire semesters off to deal with financial concerns. Those students are less likely to return or compete their degree.

Titus (2006) on the other hand, finds a direct relationship between loans and student completion suggesting that students who have “skin in the game” are more likely to complete their studies.

Independent Variable #9 - Percentage of students receiving merit-based scholarships

Dixon (2018) finds that all types of financial aid are not created equal and that scholarships may very well be the most important indicator of completion. He finds that Federal grants and loans have inverse impacts on overall student retention. Federal aid is normally awarded to students from families of lower economic status and many of them have no financial means to attend college on their own. These students may very well have other difficulties that financial aid may not be able to solve. He finds that "that the biggest bang for the buck in terms of student retention would occur if colleges could award more state aid to their students followed by putting more of their own money towards financial aid (Dixon 2018, 68)." Colleges have more leeway in how scholarship funds would be awarded, and thus, could enroll students on a more selective basis that would increase completion rates.

Olbrecht, Romano, and Teigen (2016) find that institutional direct financial assistance increases a student's chance for completion. This assistance often is tied to retention policies that encourage a student to continue and monitors their performance along the way to completion. Matthews (2009) argues that institutional aid in the form of scholarships is the best way to retain students. Kuh, *et al.* (2007) also find an increased likelihood of persistence for students who receive institutional scholarships.

Titus (2006) finds that a state's allocation to need or merit based financial aid programs has a direct relationship on student completion. In Mississippi, institutional scholarships must come out of general fund appropriations or funds raised elsewhere by the institutions. Community colleges have limited access to other funds for scholarships

or need based resources for their students, so scholarships funded at the institutional level serve that purpose in Mississippi.

Independent Variables #10 to #14 - Institutional expenditures per FTE:

Colleges must choose how to allocate resources among distinct functions of the institution. Palmer (2014) reminds that college budgets serve two purposes: account for and control funds entrusted by taxpayers, students, and donors, and how to allocate resources to best accomplish the institutions stated mission. College choices about how to allocate resources among academic instruction, CTE courses, workforce development and community service vary over time and among institutions. Those choices have a profound impact on both enrollment and completion rates. All institutions of higher education operate in a competitive market. How a college chooses to allocate it resources has the potential to create competitive advantages and to attract and retain a different student body. In the past, and in many urban areas around the nation, community colleges were(are) seen only as commuter colleges. That is only part of the equation in Mississippi. All community colleges in Mississippi have housing options and as such function as small colleges similar to 4-year institutions of higher education. Spending on physical plant items, athletic facilities, seven days per week food services, on-campus health care facilities as well as traditional academic instructional services are the norm. Institutions thus must juggle competing demands for resources and can exercise much discretion when spending funds.

Deming and Walters (2017) echo other research pointing out one view of increased expenditures is that it leads to administrative bloat (Jacob, McCall and Stange 2013; Ehrenberg 2012). They argue that any increases in funding will be absorbed by

increases in spending in areas of inefficiency. They agree with Bettinger and Long (2005) who find spending cuts in certain areas harm instruction, limit the number and variety of course offerings, and increase class size.

Direct instructional costs include items like teacher's salaries and educational supplies. Instructional support includes items like secretaries, continuing education, training for faculty and administration focused on instruction. Student Services includes items like athletics, housing, counseling, and financial aid provided by the institution. It also includes assistance in applying for and receiving state and federal grants as well as loans for the individual students. Student services houses enrollment services including registrars and recruiting services. Institutional support includes items that are overall administrative in nature, i.e., executive level administrators' compensation, business office costs including purchasing, payroll, and accounting as well as auxiliary enterprises like bookstores and food services that may generate additional revenue for the college. Physical Plant funds are used to provide the physical facilities for the campus and maintain them along with roads, grounds, and janitorial services.

As schools make choices on where to allocate resources, they need to consider where the resources have the most effect on the desired outcome of increased completion. Gansemer-Topf, *et al.* (2018) finds that spending most relating to instruction are directly related to retention. They also find that increased funds spent on academic support and institutional scholarships lead to increased retention and graduation rates. While Ryan (2004) finds a significant direct relationship between instructional or instructional support expenditures and completion, Ryan (2005) also finds that administrative expenditures are inversely related to both student engagement and completion. Bailey, *etal* (2005) find

that increases in expenditures on instruction as well as student services have direct effects on graduation rates.

Abouzeida (2014) finds that the allocation of expenditures significantly predicted graduation and retention rates across all samples. Expenditures for Instruction and Instructional Support had direct effects on graduation rates while expenditures on Institutional support had inverse effects on graduation. Increased Student Services funding had small effects with some schools showing direct effects while other schools saw negative consequences from this allocation. Titus (2006) finds that colleges who invest more in student services, especially tutoring, counseling, and more options to engage student outside of class all have direct returns to graduation rates. He also finds that additional expenditures on institutional support have inverse influences on graduation rates. Institutional spending on scholarships is reported under student services and multiple studies mentioned above have found direct returns to completion rates due to increased percentages of student receiving institutional aid (Kuh, Cruce, et al. 2007; McPherson and Shapiro 1998; Dixon 2018). Britt, Atterman and Barret (Britt, et al. 2017) find that students who get timely relevant support in the form of financial aid counseling are more likely to complete. Chen and Volpe (Chen and Volpe 1998) find that institutions have achieved success by implementing financial education programs on campus.

McPherson and Shapiro (1998) examine the effects of decreased state funding on decisions made at the institutional level and how changes to enrollment, retention, and completion could all be affected by changes in internal decisions concerning financial aid. They write, “beset by their own fiscal problems and by intense competition for

highly qualified, fee-paying students, have ceased to think of their financial aid efforts principally as a noble charitable opportunity and have instead come to focus on the financial aid operation as a key strategic weapon both in recruiting students and in maximizing institutional revenues (McPherson and Shapiro 1998, 1)"

Plewa, Ho, Conduit and Karpen (2016) find that institutional reputation is important in both enrollment and completion rates. They examine the intersection and competition among various stakeholders of a higher education institution and how choices made of resource allocation affect an institution's reputation and ability to recruit and retain students. Having the latest computer technology and up to date health care equipment and science laboratories are vital, but also are the latest trends in housing design and availability, sports and recreation opportunities for students, franchised food eateries, and on campus shopping opportunities.

Physical plant spending forces many institutions, even community colleges in Mississippi to function as a closed captive environment for its student body. Institutions must balance that with demands from the local community. In Mississippi, many community colleges are the largest employers in the county they reside in. All the colleges receive funding from multiple counties. These colleges are expected to serve as a community center for educational, athletic, and cultural opportunities capable of hosting groups from throughout the area. Community colleges in Mississippi are expected to provide opportunities like Golf courses, tennis courts, employee and family fitness centers, team athletic facilities that can be shared with K-12 schools, concert halls, live theatre facilities, dance studios, running tracks and cross-country trails, even Sunday afternoon dinner facilities for the entire community. How a college spends it physical

plant resources has a direct impact on the reputation in the community, hence its ability to recruit and retain students.

Institutional expenditures on Physical Plant operations are found to have direct effects on student completion (M. Titus 2006). Physical appearance matters. Newer buildings and buildings that are maintained appropriately all are vital to the success of the college.

Institutional expenditure variables for this study include Expenditures per Full-Time Equivalent Student (FTE) in:

Instruction – Independent Variable #10

Instructional Support – Independent Variable #11

Student Services – Independent Variable #12

Institutional Support – Independent Variable #13

Physical Plant and Other – Independent Variable #14

Independent Variable #15 – Full-time Equivalent Enrollment - FTE

While all institutions have common problems, larger institutions (based on enrollment) have different concerns. The effects of enrollment on completion are mixed at 4-year institutions (Titus 2004; Astin and Oseguera 2005; Scott, Bailey and Kienzl 2006). However, little has been written about community college size and the effect on completion. Community colleges are different than four-year colleges in the variation they experience in their enrollment. Community colleges traditionally see much higher relative increases in enrollment when the economy is bad, for example, and enrollment falls rapidly if the economy improves (Roman and Palmer 2016). With funding from

state appropriations not keeping pace with rapid cyclical changes in enrollment, pressures to serve the student body are heightened.

Bailey *et al.* (2005) use data from IPEDS and find an inverse correlation between student completion and FTE enrollment at community colleges. They find that students in small colleges complete at a higher rate. They also suggest that smaller schools can provide a more personalized environment or that they offer specialized programs which attract a very specific and motivated student body. They also caution that large schools do the opposite. Students, especially those who may be less prepared academically coming out of high school or those who may not know what they want to study, may get lost at a large institution.

Bound, Lovenhiem and Turner (2009) find that increases in Full Time Enrollment mean increases in the number of students that must be served at a given budget level for many institutions. Only a portion of the funding received is directly tied to enrollment in the period when the funds are allocated and institutions who have large swings in enrollment suffer the most. Mast (2017) also finds that institutional characteristics matter and that there is an inverse relationship between college size and completion rates at community colleges in the state of Washington. Mississippi's community colleges FTE enrollment during the period of interest ranges from 1,219 to 10,830. The study attempts to isolate the effects of institutional size by including it as a variable.

Independent Variable #16 – Student to Faculty Ratio

Classroom size also matters. More access to faculty via smaller student to faculty ratios should lead to increased completion rates. Bound, Lovenheim, and Turner (2009) find that student to faculty ratios account for almost one fourth of the change in

completion rates. Millea *et al.* (Millea, Elder and Molina 2018) also find increases in both retention and completion rates.

Price and Tovar (Price and Tovar 2014) find student engagement directly with faculty account for well over 30 percent of the variance in grade point averages and in course completion rates. The opportunity for active and collaborative learning, support from instructors and smaller class sizes, increased grades, and completion rates for academically unprepared students more than those were deemed to be college ready.

McClenney and Marti (2006) also find student engagement and participation with faculty is equally important to student's academic preparation in predicting completion rates from community colleges within 3 years. Astin (1991) and Tinto (1988) both find that students' connection to their institution increases student retention and completion. That connection comes from forging a relationship with the person who is the most encountered representative of the institution, the faculty member.

Hollis (2015) finds "Less full-time faculty yields less service to students. Full-time faculty members have more time to support students and scholarship, in contrast with part-time faculty who must commit to inconsistent schedules and extensive commuting (p.5)." She argues that institutions must find ways other than trimming faculty to maintain costs.

No research has specified the effect of student to faculty ratio on completion specifically at Mississippi's community colleges.

Independent Variable #17 – Percentage of Adjunct/Part-time faculty

Nationwide in the fall of 2017, Community colleges enrolled 5.8 million students which made up approximately 34 percent of all undergraduate students (Community

College Research Center 2018). Also, approximately 49 percent of all students who receive a bachelor's degree attended community college for at least part of their degree (Jaeger and Eagan 2009). In Mississippi, community college enrollment was 71,662 which was 52 percent of total undergraduate enrollment (NCES 2019) and 69 percent of students who received a bachelor's degree had previous enrollment at a community college (Community College Research Center 2018). While enrolling a substantial portion of all undergraduate students, the faculty makeup of community colleges is drastically different from that of four-year institutions.

Kezar and Maxey (2013) find that in 2009 only 31.3 percent of faculty in public two-year colleges were full time. Lack of continuity across terms makes it much harder for students to build relationships with instructors. It leads to poorly executed hiring practices which causes faculty members to not know up until the last minute if they are going to teach or not and thus decreases the ability of the instructor to be prepared correctly on the first day of class. These faculty members face limited job security, low pay often coupled with no benefits, and a lack of access to professional development opportunities. They normally have no say in course design nor curriculum decisions. Many of them share minimal workspace, often with no capacity to spend time with students outside of the classroom.

Schuetz (2002) finds that part time faculty handle students outside the class differently than full time faculty. They are less likely to have guest speakers in class, assign collaborative group projects, have writing assignments, and they spend less time preparing.

Kuh, Laird, and Umbach (2004) analyzed data from both the National Survey of Student Engagement (NSSE) and the Faculty Survey of Student Engagement (FSSE) to review difference among faculty practices. They analyzed data from 20,226 seniors and 22,033 first year students at 137 schools along with 14,336 faculty members to look for more effective integrated learning activities in the classroom. They defined these activities as:

- Worked on a paper or project that required integrating ideas or information from various sources
- Included diverse perspectives (different races, religions, genders, political beliefs, etc.) in class discussions or writing assignments
- Put together ideas or concepts from different courses when completing assignments or during class discussions
- Discussed ideas from readings or classes with faculty members outside of classes
- Discussed ideas from readings or classes with others outside of classes (students, family members, coworkers, etc.)
- Synthesized and organized ideas, information, or experiences into new, more complex interpretations and relationship

They find a distinct deficit in the prevalence of these activities in the classrooms of part-time as opposed to full-time faculty members.

Jaeger and Eagan (2009) argue that part-time faculty usually form their professional identity outside of the world of academia. This may be a benefit to some students due to increased professional "real-world" experience, but due to time constraints, it may mean less commitment to the institution and the students. Jeager and

Eagan (2009) find that for every 10 percent increase in credit hours taught by part time faculty the rate of graduation falls by 1 percent.

Jacoby (2006) finds a 34 percent to 36 percent decrease in graduation rates for each percentage increase in the number of part-time faculty. Gansemer-Topf, *et al*. (2018) find increases in graduation rates with additional full-time faculty. Hutto (2017) finds an inverse correlation between part time faculty and completion rates at the course level in a community college setting in Florida. Bailey, *et al.* (Bailey, Calcagno, et al. 2005) also find that lower graduation rates in community colleges with more part-time faculty even when accounting for individual student characteristics.

Independent Variable #18 – District Unemployment Rate

Economic theory suggests that an increase in employment increases output of the economy. Most businesses see increased demand during expansionary periods of the economy. Hillman and Orians (2013) also find that community college enrollment is counter-cyclical to changes in the labor market; for every one percent decrease in unemployment, enrollment in community colleges decreases by 1.1 to3.3 percent and that increase comes with greater demand for full-time attendance. Romano and Palmer (2016) find distinct differences among community colleges and other institutions of higher education due to fluctuations within a business cycle. This follows multiple other authors. Betts and McFarland (1995) find that recessions have consistently sent students into community colleges at greater rates than four-year institutions. Even uncertainties among those that are currently employed may be enough to cause some workers to voluntarily enroll in additional education in a pre-emptive move to avoid becoming unemployed or to be more able to retrain and be more attractive in a difficult labor

market (Kane and Rouse 1999). Grubb and Jaussaud (1988) also find a direct relationship between unemployment and enrollment, but an inverse relationship between enrollment and completion. Cohen and Brawer (2003) find the community college sector to be the institution type whose enrollment and completion are affected the most by changes in unemployment rates.

Mullin and Phillippe (2009) find that during the 2007-2009 recession, full-time enrollment at community colleges in the United States increased by 24.1 percent from fall of 2007 to fall of 2009 and that in some cases, this led to colleges exceeding their service capacity. They find that multiple items contribute to this increase. First, the availability of workforce training offers a chance to retool or learn a new skill quickly in a location close to home. Second, cost savings are substantial when comparing community colleges to four-year institutions. Third, community colleges are able to move faster to create partnerships with local industries and employers to offer the specific programming and course offerings needed in the local employment market. During times of economic uncertainty or hardship, financial concerns are heightened.

In Mississippi, unemployment rates grew from 6.5 percent in 2007 to 11.11 percent in 2011. Average FTE enrollment increased during the same period by 26 percent and one community college experienced over a 60 percent increase in FTE enrollment in 2008. Incorporating the district unemployment rate into the study will isolate its effect on completion.

Contribution of this Dissertation

This dissertation fills a gap in the existing literature by combining the two theories of RDT and IEO and by focusing on the community colleges in Mississippi. No

other research has done a complete analysis of student completion rates. Resources matter, but so does the makeup of the student, as well as decisions made at both the state, institutional and classroom level. This dissertation shows that all of them are relevant and contribute to overall student success.

CHAPTER III – METHODOLOGY

Data

Most data for this study is obtained from the Integrated Postsecondary Education Data System (IPEDS). Supplemental data and some variables are obtained from the Mississippi Community College Board (MCCB) from either their public Annual Report or Demographic data on all institutions provided to the member colleges. Data for the colleges' district unemployment rates came from the Bureau of Labor Statistics and was calculated as a weighted average by county in each of the respective districts.

Data was collected for all fifteen colleges from 2007 to 2018 for the nineteen variables of interest. The variables and their respective tables are shown below.

Variables

- γ : CR Completion Rates – Table 1
- β_1: SA State Appropriations per FTE – Table A1
- β_2: ACT Average Students' ACT Score – Table A2
- β_3: DE % of Students participating in Dual Enrollment – Table A3
- β_4: RC % of Students participating in Remedial Courses – Table A4
- β_5: OC % of Students participating in Online Courses – Table A5
- β_6: T Tuition and Fees per FTE – Table A6
- β_7: P % of Students receiving Pell grants – Table A7
- β_8: L % of Students receiving loans – Table A8
- β_9: S % of Students receiving scholarships – Table A9
- β_{10}: EI Expenditures per FTE on Instruction – Table A10
- β_{11}: EIS Expenditures per FTE on Instructional Support – Table A11

- $\beta_{12:}$ SS Expenditures per FTE on Student Services – Table A12
- $\beta_{13:}$ IS Expenditures per FTE on Institutional Support – Table A13
- $\beta_{14:}$ PP Expenditures per FTE on Physical Plant and Other – Table A14
- $\beta_{15:}$ FTE FTE Enrollment - Table A15
- $\beta_{16:}$ SFR Student to Faculty Ratio – Table A16
- $\beta_{17:}$ ADJ % of adjunct faculty – Table A17
- $\beta_{18:}$ UNR District Unemployment rate – Table A18

Summary statistics of variables are shown in Table 2 below.

Table 2 – *Summary Descriptive statistics 2007-2018*

Variable	Obs	Mean	Std. Dev.	Min	Max
CR	180	27.56667	7.755409	8	47
SA	180	3956.272	1080.224	1608	9327
ACT	165	18.51091	1.119016	14.9	20.3
DE	165	7.139394	5.350971	0	24
RC	120	31.16667	13.77022	10	74
OC	150	36.09333	13.41758	6	76
T	180	1301.472	713.0125	226	3658
P	165	67.48485	11.26867	38	98
L	132	26.64394	11.44595	4	69
S	165	38.8303	14.67311	1	78
EI	180	5462.494	1282.092	2875	9952
EIS	180	404.0389	401.5941	60	2593
SS	180	1181.933	403.2709	486	3095
IS	180	1588.972	523.4559	696	4381
PP	180	3038.022	1441.999	939	9963
FTE	180	4071.572	2126.988	1540	11219
SFR	180	20.94444	3.960309	12	43
ADJ	180	37.9	13.8282	5	68
UNR	180	7.982222	2.441795	4.2	15.7

Discussion of Variables

Dep. Var. - CR - Completion Rates – Table 1

Completion rates were obtained from IPEDS (IPEDS 2020). IPEDS defines completion simply as graduation with either a diploma or a certificate of completion for Career and Technical Education (CTE) programs. IPEDS includes First Time/Full Time students enrolled in the fall semester. It allows a student 3 years to complete a degree from a community college or a two-year institution.

Nationally, in 2014, students enrolled in public two-year institutions completed their degrees within 3 years at a rate of 24 percent (NCES 2019). In Mississippi, that rate was 24.9 percent but grew to 36.1 percent in 2018 while the national rate has only grown to 32.7 percent during the same period (IPEDS 2020). The difference in the growth in the completion rate makes Mississippi's community colleges a meaningful study. With a range of thirty-nine, the need for and potential benefits from this study is obvious. Factors that determine the rate at which students can complete their degrees influence public policy, college management and the returns to education to individuals as well as society.

Ind. Var. #1 - SA – State Appropriations per FTE – Table A1

State appropriations are the primary funding mechanism for Mississippi's Community colleges. Approximately 50 percent of the revenue of Mississippi community colleges comes from the state (MCCB 2017). Although a base amount is similar among institutions, the actual amount received varies considerably among institutions and over time. The expected contribution of this variable is direct. Increases in state appropriations should increase completion rates.

Ind. Var. #2 - ACT – Average ACT score of student body – Table A2

The academic ability of students has a major impact on their completion rates and ACT scores may be one of the best indicators of academic ability (M. A. Titus 2006). The dataset under study in Mississippi has substantial variation and is summarized in Table A2 with averages calculated per institution per year and obtained from the Mississippi Community College Board (MCCB). The lowest average ACT score is 14.9 at Coahoma Community College in 2011 while the highest was at Mississippi Gulf Coast Community College in both 2017 and 2018 at 20.3. The mean overall average for all the community colleges was 18.5 with a standard deviation of 1.1. The expected contribution of this variable is direct. Increases in average ACT scores should increase completion rates.

Ind. Var. #3 – DE - Percentage of students enrolled in Dual Enrollment courses – Table A3

In 2007, no Mississippi community college tracked dual enrollment participation among their student body. Since then, the rate at which students are participating in dual enrollment has grown considerably. The mean rate of students' participation in dual enrollment courses in 2018 was 16.1 percent, and the maximum percentage was 24 percent in 2018 at both Hinds Community College and Copiah-Lincoln Community College. The lowest average from 2008 to 2018 was at Meridian at 4.8 percent while Co-Lin had the highest average at 11 percent. The expected contribution of this variable is direct. Increases in the percentage of students participating in dual enrollment courses should result in increases in completion rates.

Ind. Var. #4 – RC – Percentage of students enrolled in Remedial Courses – Table A4

Open enrollment at Mississippi's community colleges lead to many students being enrolled that may not be ready for the rigors of college. Upon enrollment, that means that many students are forced to enroll in remedial courses. The MCCB began accumulating this data in 2011 and there are substantial differences among colleges in the percentage of students who are enrolled in remedial courses prior to their enrollment in for-credit courses. The minimum percentage of students enrolled in remedial courses was 10 percent at Coahoma Community College in 2011 while the maximum percentage was seventy-four at Mississippi Delta Community College in 2015. From 2011 to 2018, the overall average increased from 27.1 percent to 34.9 percent. The expected contribution of this variable is inverse. Increases in the percentage of students who are enrolled in remedial courses should decrease completion rates.

Ind. Var. #5 – OC – Percentage of students enrolled in Online Courses – Table A5

The next input is the percentage of students enrolled in online courses. This data also was not being collected in the earliest years of the study and has been made available only since 2009 through the MCCB. The statewide average has grown from 26.7 percent of students having participated in at least one online class in 2009 to 44.6 percent participating in 2018. Coahoma has the least percentage of students participating with only 23 percent while Itawamba has the highest average percentage at 54. 9.. Studies have shown that higher participation in online courses lead to lower completion rates (Jaggars and Xu 2010) (Johnson and Mejia 2014). With Mississippi currently ranking 47th out of fifty states for broadband internet access (BroadBandNow 2020), the

challenges for effective online instruction are even greater. The expected contribution of this variable is inverse. The higher the participation rates in online courses, the lower the expected completion rate.

Ind. Var. #6 – T – Tuition and fees per FTE – Table A6

Tuition and fees are the second largest revenue source for community colleges in Mississippi and each college set their own rates of tuition and fees. Tuition charges are also the single largest component of direct costs to students. Studies have shown that increases in direct costs to students hurt access but increase completion rates (Liu 2016, Denning 2017). During the period under study, the mean charge per FTE (15 credit hours) is $1,301. The minimum is $226 at Mississippi Delta Community College in 2010 while the maximum is $3,658 at Itawamba in 2008. This variable is expected to have a direct effect on completion rates.

Ind. Var. #7 – P - Percentage of students receiving Pell grants – Table A7

Increasing the dollar amount of the Pell grant has been found to increase completion rates (E. Bettinger 2004, Castleman and Long 2015, Ma and Baum 2016). However, the completion rates for students who receive a Pell grant are less than the completion rates for students who do not receive a need-based award (Kennamer, Katsinas and Schumacker 2010-2011). In Mississippi's community colleges, the average percentage of students receiving Pell grants from 2007 to 2018 is 67.5 percent. The maximum was at Coahoma with 98 percent in 2010 while the minimum was at Meridian in 2008. Pearl River had the lowest average over the twelve-year period at 55.1 percent while Coahoma had the highest at 93.3 percent. The expected contribution of this

variable is inverse. Higher percentages of students receiving Pell grants should lead to lower completion rates.

Ind. Var. #8 – L – Percentage of students receiving student Loans – Table A8

Although approximately two out of every three students at Mississippi's community colleges received Pell grants during the period under study, those funds do not cover the entire cost of attendance. On average, the maximum Pell award only covers 56 percent of the total cost of attendance. Loans make up the gap for many students. The range of students taking out loans to pay for college varies from a minimum of 4 percent of the student body at Jones College in 2017 to 69 percent of the student body at East Mississippi Community College in 2009. The average for all of Mississippi's community colleges is 26.6 percent. Data for Coahoma, Mississippi Delta and Southwest are not available. The expected contribution of this variable is inverse. Increases in student loan participation rates should lead to decreases in completion rates.

Ind. Var. #9 – S – Percentage of students receiving Scholarships – Table A9

Institutions have one internally controlled variable to help offset the cost of attendance and to recruit students with desirable characteristics: institutional scholarships. Each college has different philosophies and funds available for this type of recruitment tool. During the period in study, the percentage of students awarded institutionally funded scholarships ranged from one percent at Coahoma in 2008 to 78 percent at East Mississippi Community College in 2014 with the mean being 38 percent. Northeast has over 61 percent of their students on scholarship on average from 2007 to 2018 while Hinds only has 23.4 percent. Mississippi Delta went from having only 13 percent in 2008 to 70 percent in 2016. The expected contribution of this variable is direct.

Increases in the percentage of students who are receiving scholarships should lead to increased completion rates.

Ind. Var. #10 – EI - Expenditures per FTE on Instruction – Table A10

How a college chooses to spend its resources matter. Consistency of funding and spending is vital to building an institution that attracts both students and staff while inconsistency points to changing priorities, budget concerns, deferred maintenance or a combination of those and other factors.

Expenditures on instruction vary among the institutions during the period under study. The mean spending per FTE student was $5,462 while the range extended from $2,875 at East Mississippi Community College in 2010 to $9,952 at Coahoma in 2008. East Central Community College was the most consistent with a mean of $4,187 per FTE and a standard deviation of only $380, while Coahoma had a range of $5,876 and a standard deviation over four times as large as East Central's at $1,715. The expected contribution of this variable is direct. Increases in spending per student on instruction should lead to higher completion rates.

Ind. Var #11 – EIS – Expenditures per FTE on Instructional Support – Table A11

Instructional support expenditures also vary by a substantial amount. The lowest is $60 per FTE at East Mississippi Community College in 2010 while the highest is $2,593 per FTE at Coahoma Community College in 2008. East Mississippi had the smallest range and standard deviation at $80 and $21 respectively, while Coahoma had the largest with a range of $1,784 and a standard deviation of $493. The mean is $404 with a standard deviation of $401. The expected contribution of this variable is direct.

Increases in spending per student on instructional support should lead to higher completion rates.

Ind. Var. #12 – SS – Expenditures per FTE on Student Services – Table A12

Spending on Student Services ranged from $486 per FTE at Holmes Community College in 2011 to $3,095 per FTE at Coahoma Community College in 2008. The mean is $1,182 with a standard deviation of $403. Holmes Community College had the smallest standard deviation at $151 while Coahoma had the largest at $516. The expected contribution of this variable is direct. Increases in spending per student on student services should lead to higher completion rates.

Ind. Var. #13 – IS - Expenditures per FTE on Institutional Support – Table A13

Institutional Support includes general and administrative costs of the college. Spending on Institutional Support ranges from $696 per FTE at Northwest Mississippi Community College in 2008 to $4,381 per FTE at Pearl River Community College in 2017 with a mean of $1,589 and a standard deviation of $523. East Central Community College had the smallest standard deviation at $190 while Pearl River had the largest at $666. The expected contribution of this variable is inverse. Increases in spending per student on institutional support should lead to lower completion rates.

Ind. Var. #14 – PP – Expenditures per FTE on Physical Plant and other – Table A14

Physical plant costs and the investment in physical assets show a drastic difference in each college's commitment to maintaining and improving physical facilities. Expenditures vary from $939 per FTE at Northwest in 2018 to $9,963 per FTE at Coahoma in 2008. Holmes Community College was the most consistent during the period under study with a low of $1,960 per FTE in 2016 and a high of $3,147 per FTE in

2012. Holmes' mean was $2,698 per FTE with a standard deviation of only $361, while Coahoma Community College varied from $2,770 in 2007 to a high of $9,963 immediately following in 2008. The expected contribution of this variable is direct. Increases in spending per student on physical plant items should lead to higher completion rates.

Ind. Var. #15 – FTE – Full Time Equivalent Enrollment – Table A15

Mississippi's community colleges vary considerably in size and variation from year to year fluctuates considerably. The lowest FTE enrollment reported was 1,540 at Coahoma in 2018 while the highest was at Hinds in 2015 with 11,219. This study also covers the period include the Great Recession of the United States in 2008-2009. The largest variations in enrollment were associated with that period. Copiah-Lincoln had an increase in FTE enrollment from 1,905 in 2007 to 3,063 in 2008 – an increase of over 60 percent, and the largest percentage decrease was almost 13 percent at Hinds in 2011. The expected contribution of this variable is inverse. Increases in the enrollment levels of an institution should lead to lower completion rates.

Ind. Var. #16 – SFR – Student to Faculty Ratio – Table A16

The Student to Faculty Ratio for each college during the period in the study varied from a low of 12 to 1 at East Mississippi in 2014 to a high of 43 to 1 at Meridian Community College in 2009. Pearl River Community College had the lowest average at 16 to 1 and the lowest variation with a standard deviation of only 1.1. Meridian Community College had the highest variation with a low of 16 to 1 and a high of 43 to 1. The expected contribution of this variable is inverse. Increases in the student to faculty ratio of an institution should lead to lower completion rates.

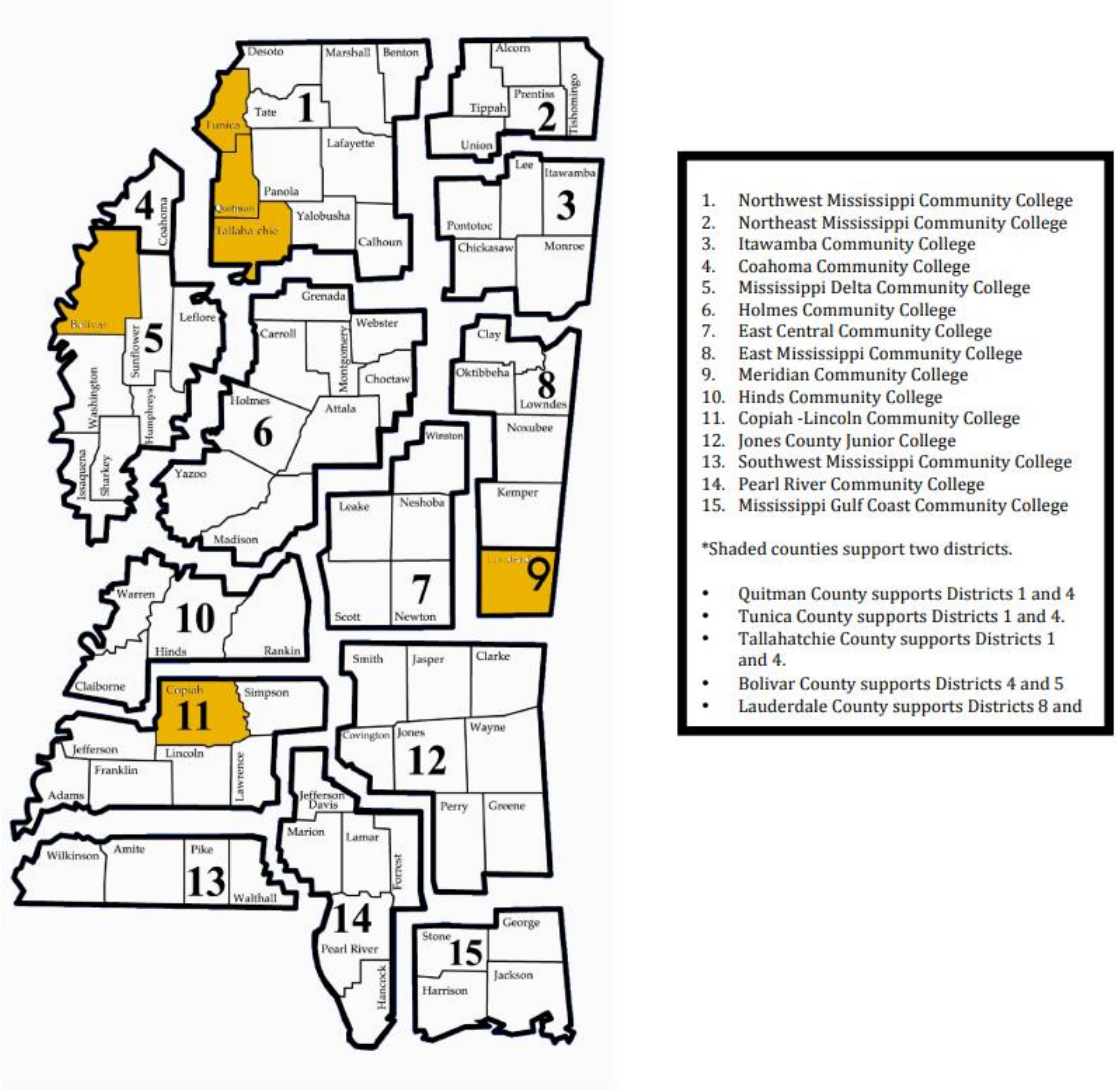
Ind. Var. #17 – ADJ – Percentage of Adjunct/Part-time Faculty – Table A17

A common issue at all institutions of higher education is the makeup of the instructional staff among Full or Part-Time employees. Mississippi's community colleges do not have a system of tenure and each college has a different philosophy and priorities. During the period under study, the minimum percentage of part time faculty was at Northeast at five percent during 2007 and 2008. The highest was at East Mississippi at 68 percent during 2014. The overall mean was 37.9 percent with a standard deviation of 13.8. Mississippi Gulf Coast Community College had the smallest standard deviation at three percent while Itawamba Community College's standard deviation was 15.1. The expected contribution of this variable is inverse. Increases in the prevalence of Adjunct/Part-time faculty of an institution should lead to lower completion rates.

Ind. Var. #18 – UNR – District Unemployment Rate – Table A18

Mississippi's fifteen community colleges are all supported by multiple counties within certain geographic districts (Figure 1).

Figure 1. Mississippi Community and Junior College Districts



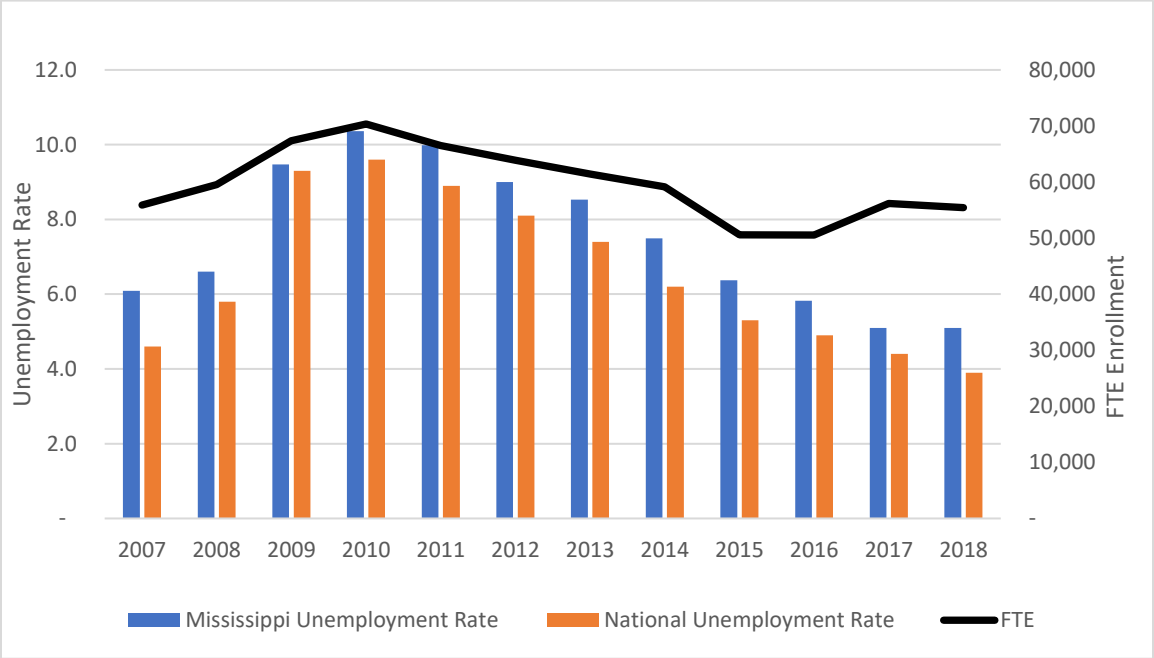
1. Northwest Mississippi Community College
2. Northeast Mississippi Community College
3. Itawamba Community College
4. Coahoma Community College
5. Mississippi Delta Community College
6. Holmes Community College
7. East Central Community College
8. East Mississippi Community College
9. Meridian Community College
10. Hinds Community College
11. Copiah -Lincoln Community College
12. Jones County Junior College
13. Southwest Mississippi Community College
14. Pearl River Community College
15. Mississippi Gulf Coast Community College

*Shaded counties support two districts.

- Quitman County supports Districts 1 and 4
- Tunica County supports Districts 1 and 4.
- Tallahatchie County supports Districts 1 and 4.
- Bolivar County supports Districts 4 and 5
- Lauderdale County supports Districts 8 and

Using data from the Bureau of Labor Statistics (BLS), each colleges unemployment rate was calculated as a weighted average of each of the counties that make up their respective districts from 2007-2018. The highest rate experienced during this period was at Itawamba in 2012 with an unemployment rate of 14.7 percent. The lowest was at Meridian and Northeast at 4.2 percent in 2018. Mississippi's unemployment rates are shown in comparison to national rates along with enrollment at Mississippi's community colleges in Figure 2.

Figure 2. Mississippi and national Unemployment Rate and FTE enrollment



The expected contribution of this variable is inverse. Increases in the unemployment rate of an institution's district should lead to lower completion rates.

Model

$$CR = \beta_0 + \beta_1 SA + \beta_2 ACT + \beta_3 DE + \beta_4 RC + \beta_5 OC + \beta_6 T + \beta_7 P + \beta_8 L + \beta_9 S + \beta_{10} EI + \beta_{11} EIS + \beta_{12} SS + \beta_{13} IS + \beta_{14} PP + \beta_{15} FTE + \beta_{16} SFR + \beta_{17} ADJ + \beta_{18} UNR + \varepsilon$$

The hypotheses tested in this research then are as follows:

Claims

Claim #1

Ha: β_1: State Appropriations per FTE is directly related to completion rates.

Claim #2

Ha: β_2: Average students' ACT score is directly related to completion rates.

Claim #3

Ha: β_3: % of students participating in Dual Enrollment is directly related to completion rates.

Claim #4

Ha: β_4: % of students participating in remedial courses is inversely related to completion rates.

Claim #5

Ha: β_5: % of students participating in online courses is inversely related to completion rates.

Claim #6

Ha: β_6: Tuition per FTE is directly related to completion rates.

Claim #7

Ha: β_7: % of students receiving Pell grant is inversely related to completion rates.

Claim #8

Ha: β_8: % of students receiving loans is inversely related to completion rates.

Claim #9

Ha: β_9: % of students receiving scholarships is directly related to completion rates.

Claim #10

Ha: β_{10}: Expenditures per FTE on Instruction is directly related to completion rates.

Claim #11

Ha: β_{11}: Expenditures per FTE on Instruction Support is directly related to completion rates.

Claim #12

Ha: β_{12}: Expenditures per FTE on Student Services is directly related to completion rates.

Claim #13

Ha: β_{13}: Expenditures per FTE on Institutional Support is inversely related to completion rates.

Claim #14

Ha: β_{14}: Expenditures per FTE on Physical Plant is inversely related to completion rates.

Claim #15

Ha: β_{15}: FTE enrollment is inversely related to completion rates.

Claim #16

Ha: β_{16}: Student to Faculty Ratio is inversely related to completion rates.

Claim #17

Ha: β_{17}: % of Adjunct Faculty is inversely related to completion rates.

Claim #18

.

Ha: β_{18}: District Unemployment Rate is inversely related to completion rates.

Methods

Ordinary least squares regression analysis will be used on the panel data in this study using the above model and to test the hypotheses listed above. The eighteen independent variables listed above for the fifteen community colleges in Mississippi over twelve years (2007-2018) were used. Although the primary analysis is based on parametric procedures where normality is assumed due to the Central Limit Theorem, when a dataset is small, non-parametric analysis should be used to assure normality. Although the Central limit Theorem is generally applied to sample sizes in excess of thirty, a Shapiro-Wilk test will be performed on the variable of interest, Completion Rates to test for normality in this study. A test for skewness and kurtosis will also be performed.

Another of the main concerns with a large number of variables in a study such as this is multicollinearity (Woolridge 2009). For multicollinearity, a variance inflation

factor will be calculated by regressing each of the independent variables on each other. A Breusch-Pagan and White test will be performed to test for heteroscedasticity.

One of the major assumptions for multiple regression models is that the independent or explanatory variables are *not perfectly correlated* – one of the variables should not be a linear function of another. If this is present, the effect that the variables have on the dependent variable would be overstated. To test for this, a variance inflation factor VIF is calculated for each variable. A VIF greater than ten indicates the presence of collinearity and would lead to one or more variables needing to be removed from the regression.

One of the primary assumptions of regression analysis is that the variance of the error term is constant, i.e., homoscedastic (R. Williams 2020). A violation of this assumption means the OLS estimates are no longer BLUE (Best linear unbiased estimator). "The consequence of heteroscedasticity is that regression coefficients are inefficient, although they are still unbiased and consistent (Naghshpour, Regression for Economics 2012). This could lead to the statistics not being large enough to be statistically significant and could lead to a Type II error (Naghshpour, Regression for Economics 2012). Heteroscedasticity may occur as the values of an independent variable become more extreme. It also may occur if errors occur in the data or if there are differences in the subpopulations of the data or interactions among them that are unaccounted for. Model misspecifications may also result in heteroscedasticity such as needing to use the log of Y instead of Y (R. Williams 2020). Breusch-Pagan and White test will be performed to test for heteroscedasticity.

A Breusch-Pagan test is a type of Chi Squared test which is used to determine heteroscedasticity in a linear regression model. It assumes a dataset's error terms have a normal distribution. It tests whether the variance of the errors from a regression is dependent on the values of the independent variables. This test starts with a null hypothesis of homoscedasticity. The alternative hypothesis has the error variances increasing as the predicted value of Y increases. A large Chi-square value with a corresponding low P value indicates that heteroscedasticity is present.

While a Breusch-Pagan test is designed to detect changes in the variance of the error term on a linear basis, it may not detect heteroscedasticity in data whose variances may take on an hourglass shape or other non-linear formations. A White test is used for that purpose. It also starts with a null hypothesis of homoscedasticity.

Another main concern with regression of panel data is whether to use fixed or random effects in the regression model. "The crucial distinction between fixed and random effects is whether the unobserved individual effect embodies elements that are correlated with the regressors in the model, not whether these effects are stochastic or not" (W. H. Green 2008). Fixed effects models are normally used to test for changes within a particular entity. "If you have reason to believe that differences across entities have some influence on your dependent variable then you should use random effects" (Torres-Reyna n.d., 25). A Hausman test is performed to confirm that the random effects model is the most appropriate.

Stepwise regression will also be used to narrow down the large number of independent variables and form a more efficient model. Stepwise models will be run both backwards (starting with all variables and removing individual variables one at a

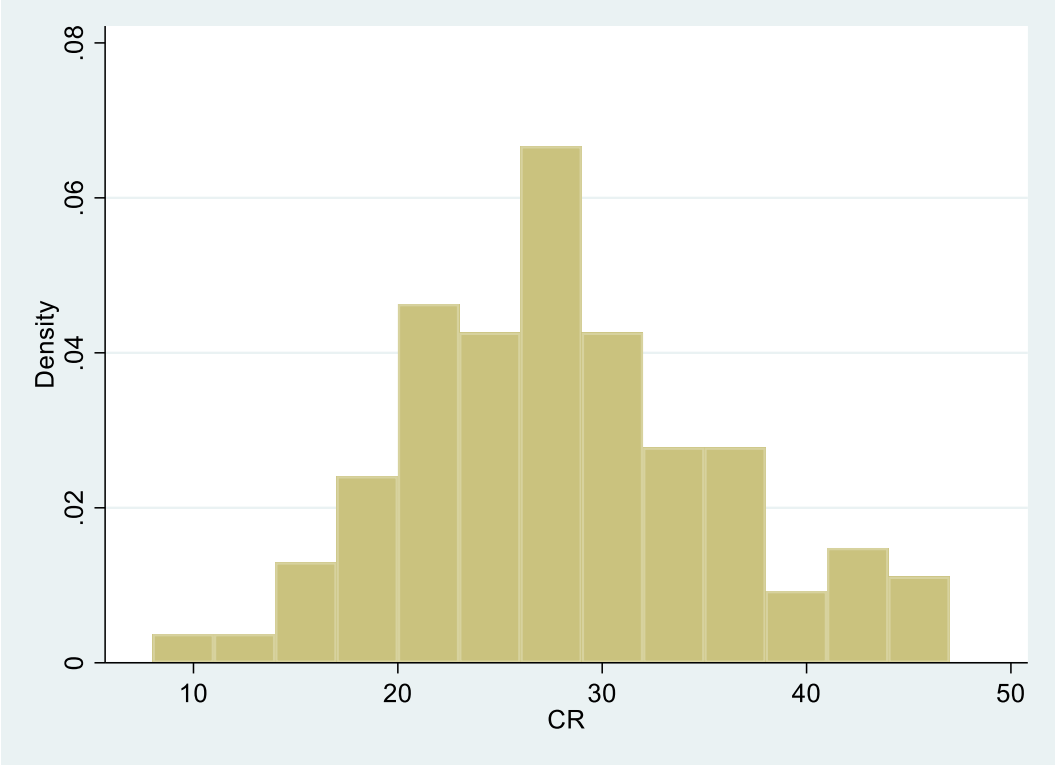
time) and forwards (starting with a null model and adding each variable one at a time) for each regression (Mertler and Vannatta 2017).

A Ramsey test will also be run for each regression to look for omitted variables and support for the use of a linear model.

CHAPTER IV – ANALYSIS

Due to a relatively small sample size, the first step in the analysis is to test for normality. A histogram was created of the dependent variable – Completion Rates and is shown in Figure 3.

Figure 3. Histogram of Completion Rates (CR) of Mississippi Community Colleges 2007-2018



Tests for Normality

Shapiro-Wilk Test

A Shapiro-Wilk test is also performed on the dependent variable with the following results shown in Table 3.

Table 3 – *Shapiro – Wilk test for Normality*

```
. swilk CR

                    Shapiro-Wilk W test for normal data

    Variable |        Obs       W           V         z       Prob>z
-------------+--------------------------------------------------------
          CR |        180    0.98841      1.578     1.045    0.14810
```

The null hypothesis for this test indicates an approximately normal distribution for the data in question. A P(value) of .14810 indicates that there is a 14.8 percent chance of committing a Type I error if the null is rejected. In this case, the null is not rejected, and normality of the data is within acceptable limits.

Skewness and Kurtosis Test

Another test to be performed on the data for consideration of normality is to test for the skewness and kurtosis. Those results are shown in Table 4.

Table 4 – *Skewness and Kurtosis tests for Normality*

```
Skewness and kurtosis tests for normality
                                                      ——— Joint test ———
> —
    Variable |       Obs   Pr(skewness)   Pr(kurtosis)   Adj chi2(2)  Prob>chi
> 2
-------------+-----------------------------------------------------------------
> —
          CR |       180         0.1307         0.8084          2.37     0.305
```

The null hypothesis for this test is that the data has a normal distribution (Naghshpour, A Primer on Nonparametric Analysis, Volume 1 2016). With a p value of

0.305, we again fail to reject the null and proceed with the data being assumed to be normal.

Tests for Heteroscedasticity

Breusch-Pagan Test

A Breusch-Pagan test is performed with the results shown in Table 5.

Table 5 - *Breusch-Pagan Test for Heteroscedasticity*

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of CR

         chi2(1)      =     0.86
         Prob > chi2  =   0.3532
```

The null hypothesis indicates a data set that is homoscedastic and where the error terms have a normal distribution. With a P value of 0.35, we fail to reject the null and accept that the data does not indicate heteroscedasticity on a linear basis.

White's Test

A White test is also performed to test for heteroscedasticity that may appear in a non-linear form. The results are shown below in Table 6.

Table 6 – *White's Test for Heteroscedasticity*

```
. imtest, white

White's test for Ho: homoskedasticity
         against Ha: unrestricted heteroskedasticity

         chi2(95)     =     96.00
         Prob > chi2  =    0.4520

Cameron & Trivedi's decomposition of IM-test
```

Source	chi2	df	p
Heteroskedasticity	96.00	95	0.4520
Skewness	15.39	18	0.6349
Kurtosis	0.00	1	0.9459
Total	111.40	114	0.5515

As with the Breusch-Pagan test, the null hypothesis is that the data is homoscedastic. With a resulting P Value of 0.45, we would again fail to reject the null and conclude that there is no heteroscedasticity present in the dataset.

Tests for Multicollinearity

Variance Inflation Factor

To test for multicollinearity, a Variance Inflation Factor was calculated for each variable. The results are shown in Table 7. Since none are greater than ten, we can assume no perfect collinearity.

Table 7 – *VIF for all variables*

```
. vif
```

Variable	VIF	1/VIF
ACT	5.69	0.175782
FTE	5.28	0.189400
SA	4.69	0.213085
T	4.17	0.239709
L	4.00	0.249743
DE	3.91	0.255617
EI	3.67	0.272787
SS	3.41	0.293416
S	3.26	0.307218
UNR	2.98	0.336044
EIS	2.90	0.345148
PP	2.81	0.355559
IS	2.71	0.369234
SFR	2.45	0.407746
OC	2.38	0.419514
P	2.29	0.437063
ADJ	2.22	0.450784
RC	2.01	0.497837
Mean VIF	3.38	

Determination of Fixed or Random Effects Model

Hausman Test

In models where there is a reasonable expectation of differences among entities and not just within the individual entity, a random effect model is normally preferred (Torres-Reyna n.d.). A Hausman test is performed to ensure the proper model is selected. The results are shown below in Table 8.

Table 8 – *Hausman Test for Fixed vs. Random Effects*

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
SA	-.0004487	-.0013753	.0009266	.0014126
ACT	4.435674	2.990134	1.44554	2.818223
DE	.2699198	.3399811	-.0700613	.2249505
RC	.0107849	-.006762	.0175469	.0166277
OC	-.0646414	-.0693289	.0046875	.0310278
T	.0017382	.0020325	-.0002943	.0020546
P	.00768	-.0589606	.0666405	.0871536
L	-.0537292	-.064251	.0105217	.0955911
S	.0424778	-.0185682	.0610459	.0414183
EI	.0018527	.0002827	.0015699	.0010675
EIS	-.0185242	.0030754	-.0215996	.0145934
SS	.0018535	.0002346	.0016189	.0046476
IS	-.0022152	.0000305	-.0022457	.0011936
PP	.002495	.002915	-.00042	.0005074
FTE	.0005734	-.0016762	.0022496	.0015251
SFR	-.0351899	-.2751627	.2399729	.1684247
ADJ	-.1190921	-.0737968	-.0452953	.0686446
UNR	-.2119511	-.1905976	-.0213534	.183372

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 13.27
Prob>chi2 = 0.2762
(V_b-V_B is not positive definite)

.

The null hypothesis for a Hausman test is that the random variable model is the most appropriate. In this case, the P value is 0.27 so we would again reject the null and choose the random effects model for our regression model which matches the theory that this dataset should have changes not only within each college, but among the colleges as well.

Regression Analysis

Following the structure of the research, multiple linear regressions are performed. Models are run representing the inputs (resources) and the environment. Those models are also broken down to include items that are representative of external resources provided by the state, the makeup of the students at each college, decisions made by the college to manage resources, and the overall environment in the college districts represented by the district unemployment rate. Final regressions are also run to include all variables and to combine significant variables into one model that combines the Resource Dependency Theory into Astin's IEO model. Each regression is performed using the Random Effects method.

Stepwise multiple regressions are run both backwards and forwards for each of the regression groups using STATA (Vers. 17). (In order to perform Stepwise regression each regression is also included without the random effects qualification. No significant differences are noted between the RE model and the normal model.) Stepwise regression is appropriate in research where there are many explanatory variables, and some method is needed to determine the specific ones that make significant contributions to the overall model (Mertler and Vannatta 2017).

1. Inputs
    a. Regression 1 - SA – State Appropriations – Table 9
    b. Regression 2 - Student Characteristics
        i. ACT – Average Students' ACT Score.
        ii. DE – Percentage of students enrolled in Dual Enrollment.
        iii. RC – Percentage of students enrolled in remedial courses.

iv. OC – Percentage of students enrolled in online course.

v. P – Percentage of students receiving Pell grants.

vi. L – Percentage of students receiving Loans.

2. Environment

    a. Regression 3 – College Characteristics

        i. T - Average tuition and fees

        ii. S – Percentage of students receiving scholarships

        iii. EI – Spending on Instruction per FTE

        iv. EIS – Spending on Instructional Support per FTE

        v. SS – Spending on Student Services per FTE

        vi. IS – Spending on Instructional Support per FTE

        vii. PP – Spending on Physical Plant per FTE

        viii. FTE – Full Time Equivalent Enrollment

        ix. SFR – Student Faculty ratio

        x. ADJ – Percentage of Adjunct Faculty

    b. Regression 4 – District Unemployment Rate

3. Regression 5 - All Variables

4. Regression 6 - Combined significant factors

Inputs

Table 9 - *Inputs – State Appropriations - Regression 1 -– Random Effects*

```
. xtreg CR SA, re

Random-effects GLS regression                   Number of obs     =       180
Group variable: ID                              Number of groups  =        15

R-squared:                                      Obs per group:
     Within  = 0.0084                                         min =        12
     Between = 0.0847                                         avg =      12.0
     Overall = 0.0284                                         max =        12

                                                Wald chi2(1)      =      2.25
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =    0.1333
```

CR	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
SA	.0008775	.0005845	1.50	0.133	-.0002682	.0020231
_cons	24.09508	2.590815	9.30	0.000	19.01717	29.17298
sigma_u	4.1089582					
sigma_e	6.6276865					
rho	.27764517	(fraction of variance due to u_i)				

With a P value of .133, the null is not rejected in favor of this variable at the 95% confidence level.

Table 10 - *Inputs – Student Characteristics - Regression 2– Random Effects*

```
. xtreg CR ACT DE RC OC P L, re

Random-effects GLS regression                   Number of obs     =         96
Group variable: ID                              Number of groups  =         12

R-squared:                                      Obs per group:
     Within  = 0.4935                                         min =          8
     Between = 0.1550                                         avg =        8.0
     Overall = 0.3628                                         max =          8

                                                Wald chi2(6)      =      77.11
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.0000
```

CR	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
ACT	2.856983	1.999032	1.43	0.153	-1.061047	6.775013
DE	.531479	.1487815	3.57	0.000	.2398726	.8230853
RC	-.0759745	.0449037	-1.69	0.091	-.163984	.0120351
OC	-.0329546	.0518567	-0.64	0.525	-.1345918	.0686826
P	-.113731	.1144602	-0.99	0.320	-.3380689	.110607
L	-.0859417	.0936088	-0.92	0.359	-.2694116	.0975282
_cons	-16.35197	38.37471	-0.43	0.670	-91.56502	58.86108
sigma_u	3.679338					
sigma_e	4.3891854					
rho	.41269835	(fraction of variance due to u_i)				

The overall R^2 of the model is .3628 but only one variable, DE – the percentage of students in Dual Enrollment courses is significant at the 95% level. Two other variables, ACT score and RC – the percentage of students who are enrolled in remedial courses would both be significant at a lower threshold and are of specific interest to administrators. ACT in particular has an extremely high coefficient, and it is hard to ignore the possible inherent effect on a student's academic ability.

Table 11 – *Inputs – Student Characteristics – Regression 2a - Normal*

```
. regress CR ACT DE RC OC P L
```

Source	SS	df	MS	Number of obs	=	96
				F(6, 89)	=	10.58
Model	2031.93439	6	338.655732	Prob > F	=	0.0000
Residual	2847.89894	89	31.9988645	R-squared	=	0.4164
				Adj R-squared	=	0.3771
Total	4879.83333	95	51.3666667	Root MSE	=	5.6568

CR	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
ACT	.9394215	1.605331	0.59	0.560	-2.250337	4.12918
DE	.5257857	.1207336	4.35	0.000	.2858906	.7656808
RC	-.0532419	.0504721	-1.05	0.294	-.1535288	.0470451
OC	.1001962	.0514234	1.95	0.055	-.0019811	.2023734
P	-.2014801	.1181806	-1.70	0.092	-.4363024	.0333422
L	-.1311429	.0687292	-1.91	0.060	-.2677064	.0054206
_cons	21.22866	33.47124	0.63	0.528	-45.27798	87.73529

The overall R^2 for the normal regression is .3771 and DE remains as the only significant variable at the 95% level. Three other variables are much closer, however: OC – percentage of students in online courses with a P value of .055 and L – percentage of students with loans with a P value of .06 and P – percentage of students receiving Pell grants with a P value of .092.

Table 12 – *Inputs – Student Characteristics – Regression 2b– Stepwise (Backwards)*

```
. stepwise, pr (.05): regress CR ACT DE RC OC P L

Wald test, begin with full model:
p = 0.5599 >= 0.0500, removing ACT
p = 0.2493 >= 0.0500, removing RC
p = 0.0730 >= 0.0500, removing L
```

Source	SS	df	MS	Number of obs	=	96
				F(3, 92)	=	19.11
Model	1873.34581	3	624.448603	Prob > F	=	0.0000
Residual	3006.48753	92	32.6792122	R-squared	=	0.3839
				Adj R-squared	=	0.3638
Total	4879.83333	95	51.3666667	Root MSE	=	5.7166

CR	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
OC	.1196722	.0454687	2.63	0.010	.0293675	.209977
DE	.5447004	.1065547	5.11	0.000	.3330735	.7563273
P	-.3419665	.0929011	-3.68	0.000	-.5264761	-.1574569
_cons	42.50491	6.637968	6.40	0.000	29.32133	55.68849

Table 13 – *Inputs – Student Characteristics – Regression 2c– Stepwise (Forward)*

```
. . stepwise, pe (.05): regress CR ACT DE RC OC P L

Wald test, begin with empty model:
p = 0.0000 <  0.0500, adding DE
p = 0.0003 <  0.0500, adding P
p = 0.0100 <  0.0500, adding OC
```

Source	SS	df	MS	Number of obs	=	96
				F(3, 92)	=	19.11
Model	1873.34581	3	624.448603	Prob > F	=	0.0000
Residual	3006.48753	92	32.6792122	R-squared	=	0.3839
				Adj R-squared	=	0.3638
Total	4879.83333	95	51.3666667	Root MSE	=	5.7166

CR	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
DE	.5447004	.1065547	5.11	0.000	.3330735	.7563273
P	-.3419665	.0929011	-3.68	0.000	-.5264761	-.1574569
OC	.1196722	.0454687	2.63	0.010	.0293675	.209977
_cons	42.50491	6.637968	6.40	0.000	29.32133	55.68849

Both Stepwise models show three variables to all be significant at the 5% level: DE, P and OC. These also show the overall R^2 to be .3638.

Table 14 – *Inputs - Student Characteristics – VIF for Significant Variables*

```
. vif

    Variable |       VIF       1/VIF
-------------+----------------------
          OC |      1.04    0.961617
          DE |      1.04    0.962620
           P |      1.01    0.991301
-------------+----------------------
    Mean VIF |      1.03
```

Testing for multicollinearity again among the significant variables indicates no multicollinearity is present.

A Ramsey test is performed next to test for omitted variables and proper linear form of the model. The results of both tests performed as expected.

Table 15 - *Inputs – Student Characteristics – Ramsey Test for Omitted Variables*

```
Ramsey RESET test for omitted variables
Omitted: Powers of independent variables

H0: Model has no omitted variables

F(9, 83) =   2.03
Prob > F = 0.0457
```

This test indicates that there are omitted variables from the model. With the R^2 for the significant variables at .3638, there are other items that we do not have included that are affecting the Completion Rates. Additional variables will be added based upon the Environmental factors.

Table 16 – *Inputs – Student Characteristics - Ramsey Test for Linear Model*

```
Ramsey RESET test for omitted variables
Omitted: Powers of fitted values of CR

H0: Model has no omitted variables

F(3, 89) =   0.95
Prob > F = 0.4191
```

This test shows that the null is not rejected which indicates a good fit for a linear model. After analysis of the student characteristics, a linear model has been created that would account for 36.38% of the variance in Completion Rates.

Environment

Table 17 – *Environment – College Characteristics – Regression 3– Random Effects*

```
. xtreg CR T S EI EIS SS IS PP FTE SFR ADJ, re

Random-effects GLS regression                   Number of obs     =       165
Group variable: ID                              Number of groups  =        15

R-squared:                                      Obs per group:
     Within  = 0.3441                                         min =        11
     Between = 0.6166                                         avg =      11.0
     Overall = 0.4192                                         max =        11

                                                Wald chi2(10)     =     87.60
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =    0.0000
```

CR	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
T	.0043484	.0010771	4.04	0.000	.0022373	.0064595
S	.017255	.0465393	0.37	0.711	-.0739604	.1084703
EI	-.0021672	.0006413	-3.38	0.001	-.0034241	-.0009103
EIS	-.0059478	.0023946	-2.48	0.013	-.0106411	-.0012545
SS	.0111869	.0020926	5.35	0.000	.0070854	.0152884
IS	-.0000826	.0014328	-0.06	0.954	-.0028908	.0027255
PP	-.0001245	.0004596	-0.27	0.787	-.0010252	.0007763
FTE	-.0010643	.0004324	-2.46	0.014	-.0019118	-.0002168
SFR	-.3056713	.1388301	-2.20	0.028	-.5777733	-.0335693
ADJ	-.0385689	.0465016	-0.83	0.407	-.1297103	.0525724
_cons	35.64012	5.414651	6.58	0.000	25.0276	46.25264
sigma_u	2.8256274					
sigma_e	5.2278032					
rho	.22609017	(fraction of variance due to u_i)				

This regression shows multiple items significant at the 95% level and an overall R^2 value of .4192. T - Tuition has a Z score of 4.04 and a P value of 0.00; EI – Expenditures on Instruction has a P value of .001; EIS – Expenditures on Instructional Support has a P value of .013; SS – Expenditures on Students Services has a Z score of

5.35 and a P value of 0.00; FTE – Full Time Equivalent enrollment has a P value of .014; and SFR – Student to Faculty ratio has a P value of .028.

Table 18 – *Environment – College Characteristics – Regression 3a - Normal*

```
. regress CR T S EI EIS SS IS PP FTE SFR ADJ
```

Source	SS	df	MS		
				Number of obs	= 165
				F(10, 154)	= 11.81
Model	3905.90511	10	390.590511	Prob > F	= 0.0000
Residual	5093.34337	154	33.0736583	R-squared	= 0.4340
				Adj R-squared	= 0.3973
Total	8999.24848	164	54.8734664	Root MSE	= 5.751

CR	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
T	.003587	.0008149	4.40	0.000	.0019771	.0051969
S	.0096608	.040441	0.24	0.812	-.0702299	.0895516
EI	-.0021291	.000514	-4.14	0.000	-.0031446	-.0011136
EIS	-.0040529	.0015844	-2.56	0.011	-.0071829	-.0009229
SS	.0082177	.0017933	4.58	0.000	.0046751	.0117603
IS	.0015506	.0012917	1.20	0.232	-.0010012	.0041024
PP	.0001527	.0004129	0.37	0.712	-.0006629	.0009683
FTE	-.0009939	.0002884	-3.45	0.001	-.0015637	-.0004242
SFR	-.3991036	.1338929	-2.98	0.003	-.6636074	-.1345998
ADJ	-.0632979	.0368073	-1.72	0.087	-.1360103	.0094145
_cons	38.63421	5.296462	7.29	0.000	28.17111	49.0973

The normal regression shows an overall R^2 of .3973 and has the same six variables significant at the 95% level: T, EI, EIS, SS, FTE and SFR.

Table 19 – *Environment – College Characteristics – Regression 3b– Stepwise (Backward)*

```
. stepwise, pr (.05): regress CR T S EI EIS SS IS PP FTE SFR ADJ

Wald test, begin with full model:
p = 0.8115 >= 0.0500, removing S
p = 0.7326 >= 0.0500, removing PP
p = 0.2450 >= 0.0500, removing IS
p = 0.0795 >= 0.0500, removing ADJ
```

Source	SS	df	MS		
				Number of obs	= 165
				F(6, 158)	= 18.84
Model	3753.58596	6	625.59766	Prob > F	= 0.0000
Residual	5245.66252	158	33.2003957	R-squared	= 0.4171
				Adj R-squared	= 0.3950
Total	8999.24848	164	54.8734664	Root MSE	= 5.762

CR	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
T	.0034533	.0006849	5.04	0.000	.0021006	.004806
SFR	-.3452187	.1191258	-2.90	0.004	-.5805032	-.1099342
EI	-.0017818	.0004579	-3.89	0.000	-.0026862	-.0008774
EIS	-.0045968	.0013944	-3.30	0.001	-.0073509	-.0018427
SS	.0095212	.0016314	5.84	0.000	.0062991	.0127433
FTE	-.0010769	.0002443	-4.41	0.000	-.0015594	-.0005945
_cons	35.69272	3.711107	9.62	0.000	28.36294	43.0225

Table 20 – *Environment – College Characteristics – Regression 3c– Stepwise (Forward)*

```
. stepwise, pe (.05): regress CR T S EI EIS SS IS PP FTE SFR ADJ

Wald test, begin with empty model:
p = 0.0000 <  0.0500, adding FTE
p = 0.0004 <  0.0500, adding T
p = 0.0017 <  0.0500, adding SFR
p = 0.0085 <  0.0500, adding SS
p = 0.0000 <  0.0500, adding EI
p = 0.0012 <  0.0500, adding EIS
```

Source	SS	df	MS	Number of obs	=	165
				F(6, 158)	=	18.84
Model	3753.58596	6	625.59766	Prob > F	=	0.0000
Residual	5245.66252	158	33.2003957	R-squared	=	0.4171
				Adj R-squared	=	0.3950
Total	8999.24848	164	54.8734664	Root MSE	=	5.762

CR	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
FTE	-.0010769	.0002443	-4.41	0.000	-.0015594	-.0005945
T	.0034533	.0006849	5.04	0.000	.0021006	.004806
SFR	-.3452187	.1191258	-2.90	0.004	-.5805032	-.1099342
SS	.0095212	.0016314	5.84	0.000	.0062991	.0127433
EI	-.0017818	.0004579	-3.89	0.000	-.0026862	-.0008774
EIS	-.0045968	.0013944	-3.30	0.001	-.0073509	-.0018427
_cons	35.69272	3.711107	9.62	0.000	28.36294	43.0225

Both stepwise models end up with the same six explanatory variables and an adjusted R^2 value of .3950.

Table 21 – *Environment – College Characteristics - VIF for Significant Variables*

```
. vif
```

Variable	VIF	1/VIF
SS	2.09	0.478318
EI	1.72	0.580930
EIS	1.54	0.648381
FTE	1.36	0.733538
T	1.17	0.855424
SFR	1.09	0.914504
Mean VIF	1.50	

Calculating a VIF also shows still no issues with multicollinearity among the significant variables in this model.

A Ramsey test is performed to test for omitted variables and proper linear form of the model. AS with the Student Characteristics, the results of both tests performed as expected.

Table 22 – *Environment – College Characteristics - Ramsey Test for Omitted Variables*

```
Ramsey RESET test for omitted variables
Omitted: Powers of independent variables

H0: Model has no omitted variables

F(30, 124) =   2.05
  Prob > F = 0.0033
```

The low P value indicates the presence of additional omitted variables.

Table 23 - *Environment – College Characteristics – Ramsey Test for Linear Model*

```
Ramsey RESET test for omitted variables
Omitted: Powers of fitted values of CR

H0: Model has no omitted variables

F(3, 151) =   0.52
 Prob > F = 0.6718
```

The high P value of .6718 indicates a good linear model.

Table 24 – *Environment – Unemployment Rate – Regression 4 – Random Effects*

```
. xtreg CR UNR, re

Random-effects GLS regression                   Number of obs     =       180
Group variable: ID                              Number of groups  =        15

R-squared:                                      Obs per group:
     Within  = 0.1027                                         min =        12
     Between = 0.0844                                         avg =      12.0
     Overall = 0.0354                                         max =        12

                                                Wald chi2(1)      =     16.80
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =    0.0000
```

CR	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
UNR	-.8401185	.2049672	-4.10	0.000	-1.241847	-.4383902
_cons	34.27268	2.015485	17.00	0.000	30.3224	38.22296
sigma_u	4.1519943					
sigma_e	6.3044557					
rho	.30251804	(fraction of variance due to u_i)				

This model shows that the unemployment rate is significant at the 95% level, but the variable alone only accounts for 3.54 percent of the change in Completion Rates.

All Variables

A regression is also run on all variables in one model to compare to the individual Input and Environmental models.

Table 25 – *All Variables – Regression 5 – Random Effects*

```
. xtreg CR SA ACT DE RC OC P L T S EI EIS SS IS PP FTE SFR ADJ UNR, re

Random-effects GLS regression                   Number of obs     =         96
Group variable: ID                              Number of groups  =         12

R-squared:                                      Obs per group:
     Within  = 0.5802                                         min =          8
     Between = 0.9660                                         avg =        8.0
     Overall = 0.7266                                         max =          8

                                                Wald chi2(18)     =     204.62
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.0000
```

CR	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
SA	-.0013753	.0014692	-0.94	0.349	-.0042548	.0015043
ACT	2.990134	1.919677	1.56	0.119	-.7723639	6.752631
DE	.3399811	.1513555	2.25	0.025	.0433298	.6366324
RC	-.006762	.0494598	-0.14	0.891	-.1037014	.0901774
OC	-.0693289	.050038	-1.39	0.166	-.1674016	.0287439
P	-.0589606	.1027215	-0.57	0.566	-.260291	.1423699
L	-.064251	.0831763	-0.77	0.440	-.2272736	.0987717
T	.0020325	.0011993	1.69	0.090	-.0003181	.0043831
S	-.0185682	.0511967	-0.36	0.717	-.1189119	.0817755
EI	.0002827	.0007849	0.36	0.719	-.0012557	.0018212
EIS	.0030754	.0027982	1.10	0.272	-.0024089	.0085597
SS	.0002346	.0026941	0.09	0.931	-.0050456	.0055149
IS	.0000305	.0013975	0.02	0.983	-.0027085	.0027696
PP	.002915	.0007123	4.09	0.000	.0015189	.004311
FTE	-.0016762	.0004624	-3.63	0.000	-.0025826	-.0007699
SFR	-.2751627	.2082856	-1.32	0.186	-.6833951	.1330696
ADJ	-.0737968	.0449552	-1.64	0.101	-.1619074	.0143138
UNR	-.1905976	.2993562	-0.64	0.524	-.7773251	.3961298
_cons	-11.81604	38.90044	-0.30	0.761	-88.0595	64.42741
sigma_u	0					
sigma_e	4.0904999					
rho	0	(fraction of variance due to u_i)				

This model shows a R^2 value of .7266 but only has three significant variables at the 95% level: DE with a P value of .025, PP with a Z score of 4.09 and a P value of 0.00 and FTE with a Z score of -3.63 and a P value of 0.00. The normal regression has comparable results.

Table 26 – *All Variables – Regression 5a - Normal*

```
. regress CR SA ACT DE RC OC P L T S EI EIS SS IS PP FTE SFR ADJ UNR
```

Source	SS	df	MS		
				Number of obs	= 96
				F(18, 77)	= 11.37
Model	3545.62081	18	196.978934	Prob > F	= 0.0000
Residual	1334.21253	77	17.3274354	R-squared	= 0.7266
				Adj R-squared	= 0.6627
Total	4879.83333	95	51.3666667	Root MSE	= 4.1626

CR	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
SA	-.0013753	.0014692	-0.94	0.352	-.0043008	.0015503
ACT	2.990134	1.919677	1.56	0.123	-.8324313	6.812698
DE	.3399811	.1513555	2.25	0.028	.0385938	.6413684
RC	-.006762	.0494598	-0.14	0.892	-.105249	.091725
OC	-.0693289	.050038	-1.39	0.170	-.1689673	.0303096
P	-.0589606	.1027215	-0.57	0.568	-.2635052	.1455841
L	-.064251	.0831763	-0.77	0.442	-.2298762	.1013743
T	.0020325	.0011993	1.69	0.094	-.0003556	.0044206
S	-.0185682	.0511967	-0.36	0.718	-.1205139	.0833775
EI	.0002827	.0007849	0.36	0.720	-.0012803	.0018458
EIS	.0030754	.0027982	1.10	0.275	-.0024965	.0086472
SS	.0002346	.0026941	0.09	0.931	-.0051299	.0055992
IS	.0000305	.0013975	0.02	0.983	-.0027523	.0028133
PP	.002915	.0007123	4.09	0.000	.0014966	.0043333
FTE	-.0016762	.0004624	-3.63	0.001	-.002597	-.0007555
SFR	-.2751627	.2082856	-1.32	0.190	-.6899124	.139587
ADJ	-.0737968	.0449552	-1.64	0.105	-.163314	.0157204
UNR	-.1905976	.2993562	-0.64	0.526	-.786692	.4054968
_cons	-11.81604	38.90044	-0.30	0.762	-89.27671	65.64462

Table 27 – *All Variables – Regression 5b – Stepwise (Backward)*

```
. stepwise, pr (.05): regress CR SA ACT DE RC OC P L T S EI EIS SS IS PP FTE SFR ADJ UNR

Wald test, begin with full model:
p = 0.9826 >= 0.0500, removing IS
p = 0.9217 >= 0.0500, removing SS
p = 0.8779 >= 0.0500, removing RC
p = 0.6907 >= 0.0500, removing EI
p = 0.6559 >= 0.0500, removing S
p = 0.5077 >= 0.0500, removing UNR
p = 0.4303 >= 0.0500, removing P
p = 0.3751 >= 0.0500, removing SA
p = 0.3995 >= 0.0500, removing EIS
p = 0.1303 >= 0.0500, removing L
p = 0.1293 >= 0.0500, removing SFR
```

Source	SS	df	MS	Number of obs	=	96
				F(7, 88)	=	29.49
Model	3421.42585	7	488.775121	Prob > F	=	0.0000
Residual	1458.40748	88	16.5728123	R-squared	=	0.7011
				Adj R-squared	=	0.6774
Total	4879.83333	95	51.3666667	Root MSE	=	4.071

CR	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
FTE	-.0018089	.000226	-8.00	0.000	-.0022581	-.0013597
ACT	3.16064	1.222152	2.59	0.011	.7318706	5.58941
DE	.3570528	.0941929	3.79	0.000	.1698642	.5442415
T	.003158	.0008055	3.92	0.000	.0015573	.0047588
OC	-.1023722	.0413065	-2.48	0.015	-.1844602	-.0202841
ADJ	-.0700047	.0320512	-2.18	0.032	-.1336996	-.0063097
PP	.0022868	.0005289	4.32	0.000	.0012358	.0033378
_cons	-28.93623	22.44318	-1.29	0.201	-73.53734	15.66487

Stepwise regression (backwards) gives us seven variables that are significant with an adjusted R^2 of .6774: FTE, ACT, DE, T, OC, ADJ and PP. It has four variables from the Student Characteristics, DE and P which match the individual regression on Student Characteristics and adds ACT scores and OC - Online Classes. It also includes three from the College Characteristics, T and FTE which match the earlier regressions but also adds PP – Spending per FTE on Physical Plant.

Table 28 – *All Variables – Regression 5c – Stepwise (Forward)*

```
. . stepwise, pe (.05): regress CR SA ACT DE RC OC P L T S EI EIS SS IS PP FTE SFR ADJ UNR

Wald test, begin with empty model:
p = 0.0000 <  0.0500, adding FTE
p = 0.0000 <  0.0500, adding T
p = 0.0000 <  0.0500, adding DE
p = 0.0132 <  0.0500, adding PP
p = 0.0196 <  0.0500, adding ADJ
p = 0.0158 <  0.0500, adding P
```

Source	SS	df	MS	Number of obs	=	96
				F(6, 89)	=	33.10
Model	3369.58865	6	561.598109	Prob > F	=	0.0000
Residual	1510.24468	89	16.9690414	R-squared	=	0.6905
				Adj R-squared	=	0.6696
Total	4879.83333	95	51.3666667	Root MSE	=	4.1193

CR	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
FTE	-.0015346	.0002245	-6.84	0.000	-.0019807	-.0010885
T	.0034744	.0006533	5.32	0.000	.0021763	.0047726
DE	.4636488	.0785851	5.90	0.000	.3075019	.6197958
PP	.0018464	.0004925	3.75	0.000	.0008678	.0028251
ADJ	-.0841651	.0323178	-2.60	0.011	-.1483798	-.0199504
P	-.1789839	.0727262	-2.46	0.016	-.3234893	-.0344785
_cons	38.19729	4.903015	7.79	0.000	28.4551	47.93948

The stepwise regression yields slightly different results when ran forwards. It removes the Student Characteristics of OC – Online Courses and ACT score and adds back the Student Characteristic of P – Pell Grants. It also drops the adjusted R^2 slightly to .6696.

Significant Variables

Table 29 – *Significant Variables – Regression 6 – Random Effects*

```
. xtreg CR OC DE P T SFR EI EIS SS FTE UNR ACT ADJ PP, re

Random-effects GLS regression                   Number of obs     =       150
Group variable: ID                              Number of groups  =        15

R-squared:                                      Obs per group:
     Within  = 0.4755                                         min =        10
     Between = 0.8770                                         avg =      10.0
     Overall = 0.6133                                         max =        10

                                                Wald chi2(13)     =    215.69
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =    0.0000
```

CR	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
OC	-.050948	.0416909	-1.22	0.222	-.1326607	.0307648
DE	.439339	.1176229	3.74	0.000	.2088023	.6698756
P	-.1316804	.0571165	-2.31	0.021	-.2436266	-.0197342
T	.0024812	.0008195	3.03	0.002	.0008751	.0040873
SFR	-.3574427	.1185309	-3.02	0.003	-.5897589	-.1251264
EI	-.0009326	.0004234	-2.20	0.028	-.0017625	-.0001028
EIS	.0007601	.0015287	0.50	0.619	-.0022361	.0037564
SS	.0022448	.001747	1.28	0.199	-.0011792	.0056688
FTE	-.0012762	.0002379	-5.36	0.000	-.0017425	-.00081
UNR	-.0725273	.2461431	-0.29	0.768	-.554959	.4099044
ACT	1.430683	.801879	1.78	0.074	-.1409706	3.002337
ADJ	-.0606457	.0372112	-1.63	0.103	-.1335784	.0122869
PP	.0010409	.0003962	2.63	0.009	.0002644	.0018175
_cons	21.3131	18.9056	1.13	0.260	-15.74118	58.36739
sigma_u	0					
sigma_e	4.44947					
rho	0	(fraction of variance due to u_i)				

Including all variables that have shown to be significant in any of the previous regressions gives us a model with a R^2 of .6133 and seven significant variables at the 95% level.

Table 30 - *Significant Variables – Regression 6a - Normal*

```
. regress CR OC DE P T SFR EI EIS SS FTE UNR ACT ADJ PP
```

Source	SS	df	MS	Number of obs	=	150
				F(13, 136)	=	16.59
Model	4691.98328	13	360.921791	Prob > F	=	0.0000
Residual	2958.39006	136	21.7528681	R-squared	=	0.6133
				Adj R-squared	=	0.5763
Total	7650.37333	149	51.3447875	Root MSE	=	4.664

CR	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
OC	-.050948	.0416909	-1.22	0.224	-.1333943	.0314984
DE	.439339	.1176229	3.74	0.000	.2067325	.6719454
P	-.1316804	.0571165	-2.31	0.023	-.2446317	-.0187291
T	.0024812	.0008195	3.03	0.003	.0008606	.0041017
SFR	-.3574427	.1185309	-3.02	0.003	-.5918447	-.1230406
EI	-.0009326	.0004234	-2.20	0.029	-.0017699	-.0000953
EIS	.0007601	.0015287	0.50	0.620	-.002263	.0037833
SS	.0022448	.001747	1.28	0.201	-.0012099	.0056996
FTE	-.0012762	.0002379	-5.36	0.000	-.0017467	-.0008058
UNR	-.0725273	.2461431	-0.29	0.769	-.5592903	.4142358
ACT	1.430683	.801879	1.78	0.077	-.1550811	3.016448
ADJ	-.0606457	.0372112	-1.63	0.105	-.1342332	.0129417
PP	.0010409	.0003962	2.63	0.010	.0002574	.0018245
_cons	21.3131	18.9056	1.13	0.262	-16.07386	58.70007

The normal regression on the same variables gives the same variables at the 95% significance level and has an adjusted R^2 of .5763.

Table 31 – *Significant Variables – Regression 6b – Stepwise (Backward)*

```
. stepwise, pr (.05): regress CR OC DE P T SFR EI EIS SS FTE UNR ACT ADJ PP

Wald test, begin with full model:
p = 0.7687 >= 0.0500, removing UNR
p = 0.5905 >= 0.0500, removing EIS
p = 0.2155 >= 0.0500, removing OC
p = 0.1789 >= 0.0500, removing ACT
p = 0.1356 >= 0.0500, removing SS
```

Source	SS	df	MS	Number of obs	=	150
				F(8, 141)	=	26.04
Model	4562.24344	8	570.28043	Prob > F	=	0.0000
Residual	3088.1299	141	21.9016305	R-squared	=	0.5963
				Adj R-squared	=	0.5734
Total	7650.37333	149	51.3447875	Root MSE	=	4.6799

CR	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
PP	.0007556	.0003451	2.19	0.030	.0000733	.0014379
DE	.5725532	.0736558	7.77	0.000	.4269408	.7181656
P	-.1954899	.0420552	-4.65	0.000	-.2786302	-.1123496
T	.0028657	.0006734	4.26	0.000	.0015345	.0041969
SFR	-.380892	.114289	-3.33	0.001	-.6068335	-.1549505
EI	-.0007523	.000365	-2.06	0.041	-.001474	-.0000306
ADJ	-.0983215	.0333917	-2.94	0.004	-.1643347	-.0323083
FTE	-.0012746	.0001973	-6.46	0.000	-.0016646	-.0008847
_cons	53.0859	4.184263	12.69	0.000	44.81389	61.3579

The Stepwise regression (Backward) results in a R^2 of .5734 and adds back to the significant variables ADJ – the percentage of Adjunct Faculty members.

Table 32 – *Significant Variables – VIF – Stepwise (Backward)*

```
. vif
```

Variable	VIF	1/VIF
T	1.53	0.654677
ADJ	1.50	0.666320
EI	1.42	0.703865
PP	1.42	0.704607
SFR	1.38	0.726166
P	1.35	0.741840
FTE	1.26	0.791126
DE	1.06	0.939283
Mean VIF	1.37	

The VIF for this model shows no multicollinearity problems.

Table 33 – *Significant Variables – Ramsey Test Omitted Variables (Backward stepwise)*

```
Ramsey RESET test for omitted variables
Omitted: Powers of fitted values of CR

H0: Model has no omitted variables

F(3, 138) =   5.37
 Prob > F = 0.0016
```

Table 34 – *Significant Variables – Ramsey Test Linear (Backward stepwise)*

```
Ramsey RESET test for omitted variables
Omitted: Powers of independent variables

H0: Model has no omitted variables

F(24, 117) =   1.31
  Prob > F = 0.1711
```

The Ramsey test shows again that there are omitted variables which is expected and that the model is appropriately linear.

Table 35 – *Significant Variables – Regression 6c – Stepwise (Forward)*

```
. stepwise, pe (.05): regress CR OC DE P T SFR EI EIS SS FTE UNR ACT ADJ PP

Wald test, begin with empty model:
p = 0.0000 <  0.0500, adding DE
p = 0.0000 <  0.0500, adding FTE
p = 0.0000 <  0.0500, adding P
p = 0.0000 <  0.0500, adding T
```

Source	SS	df	MS	Number of obs	=	150
				F(4, 145)	=	43.89
Model	4189.6447	4	1047.41117	Prob > F	=	0.0000
Residual	3460.72863	145	23.867094	R-squared	=	0.5476
				Adj R-squared	=	0.5352
Total	7650.37333	149	51.3447875	Root MSE	=	4.8854

CR	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
DE	.5907381	.0755422	7.82	0.000	.441432	.7400441
FTE	-.0015059	.0001908	-7.89	0.000	-.0018831	-.0011287
P	-.226621	.0386711	-5.86	0.000	-.3030529	-.1501891
T	.002762	.0005823	4.74	0.000	.0016112	.0039129
_cons	42.43317	3.065106	13.84	0.000	36.37512	48.49123

The Forward Stepwise results in four significant variables all which would even meet the 99% threshold and has an adjusted R^2 of .5352.

Table 36 – *Significant Variables – VIF – Stepwise (Forward)*

```
. vif
```

Variable	VIF	1/VIF
FTE	1.09	0.921033
T	1.05	0.954142
P	1.05	0.956091
DE	1.03	0.973093
Mean VIF	1.05	

The test for multicollinearity shows no issues.

Table 37 – *Significant Variables – Ramsey Test Omitted Variables (Forward stepwise)*

```
Ramsey RESET test for omitted variables
Omitted: Powers of fitted values of CR

H0: Model has no omitted variables

F(3, 142) =   5.19
 Prob > F = 0.0020
```

Table 38 – *Significant Variables – Ramsey Test Linear (Forward stepwise)*

```
Ramsey RESET test for omitted variables
Omitted: Powers of independent variables

H0: Model has no omitted variables

F(12, 133) =    1.38
  Prob > F = 0.1814
```

The Ramsey test shows again that there are omitted variables which is expected and that the model is appropriately linear.

Integration of Research into Theoretical Framework

The findings of this research add to the existing literature in both Resource Dependency Theory as well as the Input-Environment-Output Method of analysis. Prior studies have shown individual variables matter for completion rates. Combining variables allows for a more complete picture of what it takes for Mississippi's Community Colleges to increase completion rates. The mean effect of each significant variable is shown in Table 39.

Table 39 – *Mean Predictive Effect of Significant Variables*

COLLEGE	CONS	FTE	P	PP	EI	SFR	ADJ	DE	T	CR	CR	CR
		Env	Inp/Env	Env	Env	Env	Env	Inp	Env			
		-0.0013	-0.1954	0.0008	-0.0007	-0.3809	-0.0983	0.5726	0.0029	Predicted	Actual	Diff.
Mean	53.0859	3,695	69	2,994	5,536	20	36	16	1,475			
Effect on Completion Rates	53.0859	(4.80)	(13.40)	2.39	(3.88)	(7.52)	(3.53)	9.20	4.28	35.83	36.07	-0.23

Resource Dependency Theory is based on the fact that organizations adapt based on resources. This study shows that all resources are not created equal. Financial resources do not always explain the results. In the case of Mississippi's Community colleges, for example, student characteristics which are part of the Inputs make up a large portion of the predicted change in completion rates. The constant in the predicted

equation is 53.0859 with a net change based on the individual significant factors decreasing the rate to a mean of 35.83. Of the 17.25-point decrease in completion rates, the largest single factor in the equation is the percentage of students receiving Pell Grants. That factor alone accounts for a decrease in completion rates, on average, of 13.40 points. While the financial aid policies of the college may differ, Pell grant recipients may be more of an indicator of the student makeup than the college itself. The percentage of dual enrollment students causes an increase of 9.2 percentage points in completion rates, on average. This matches what Belfield, Jenkins and Fink (2019) found when they assessed the extent of success at community colleges. Students who are able to successfully complete what they term "gateway" courses early, are more likely to complete. Dual enrollment courses are all gateway courses. Those two factors, Dual Enrollment participation and Pell Grant participation, combined make up a net decrease of 4.2 points. If the Pell grant recipients are included in the environment, then the change based on resources is the positive 9.2 points. Resources matter, even if is not the financial resources normally accounted for.

This supplements Fowles (2014), who found that higher education institutions adapt to changes in sources of revenue by changing where they spend their money. Malaney (1985) found that student recruitment and student body makeup is affected by resources and higher educational institutions' response to funding sources and that resources are not just financial.

The findings of this dissertation also support Astin's Input – Environment – Output method. Organizations do not operate in a vacuum and while the original inputs or resources matter, this dissertation shows that the environment matters as well. The net

effect of the environmental characteristics equates to 13.05 of the 17.25 -point (76%) decrease if Pell grant percentages are used as an input. Or, if it is included in the environmental factors, the net effect is 26.45 points (153%). Decisions made at the institutional level matter and colleges need to pay particular attention to the environment that students are welcomed into.

These findings further support Millea, Wills, Elder and Molina (2018), who found that both the student characteristics matter as well as the environment. In particular, they found that student success rates were higher for students who were better academically prepared but also that were in smaller class sizes. Piland and Piland (2020) find that while faculty have no direct control over their college's graduation rates, they are the leading indicator of retention and persistence among community college students. This dissertation's findings support that idea with the student to faculty ratio and the percentage of adjunct faculty both being significant in college completion rates.

Both of these theories matter and this study shows that those interested in increasing college completion rates cannot look at any individual factor in a vacuum. Taking a complete look from a more holistic perspective allows decision makers more of a comprehensive idea of what policies will lead to more successful outcomes. This supports Tolbert (1985), who found that the environment of organizations become intertwined with the responses to their resources and they cannot be untangled.

Wang (2017) created a holistic theoretical model of community college student success by addressing and including student momentum as the key driver. That momentum came from the effects of individual instruction and the teacher's effectiveness

in the classroom as well as student attributes. Smaller class sizes and less adjunct faculty help students create a momentum to complete.

Blekic (2011) found that institutional effectiveness is affected by both resources and the culture and environment of higher education institutions. In order to create a sustainable effective, efficient organization, administrators must pay attention to both the inputs and the environment.

Umbach, Tuchmayer, Clayton and Smith (2019) also found that both individual factors and institutional factors are associated with student success.

Research should always strike a prudent balance between the theoretical and the practical. Looking at things from a "big picture" perspective while also being able to drill down into the details. This dissertation hopefully does both by expanding the definition of both of these theories in a way that will be of use to those interested in furthering the effectiveness and efficiency of higher education.

CHAPTER V – CONCLUSIONS

In both final models, characteristics of both the student and the college affect completion rates. This verifies the combining of the Resource Dependency Theory into the Input-Environment-Output model. Both the resources and how the colleges respond to those resources matter.

The last two models are both relevant for this study. Normally backwards stepwise regression is preferable to forward stepwise but, in this case, both have effects worth discussing. The forward regression has fewer significant variables, and they would all be significant at the 99% level with a R^2 of .5352. The backwards has more variables and does a slightly better job of predicting completion rates with a R^2 of .5734. The following tables show the predictive models and how both fit to actual data from 2018.

Table 40 – *Predictive model of Forward Stepwise Regression on Significant Variables*

COLLEGE	CONS	FTE	P	DE	T	CR	CR	CR
		-0.0015	-0.2266	0.5907	0.0027	Predicted	Actual	Diff.
Coahoma Community College	42.4332	1,540	94	11	1,275	28.76	31	(2.24)
Copiah-Lincoln Community College	42.4332	2,425	66	24	1,336	41.62	45	(3.38)
East Central Community College	42.4332	2,060	70	23	656	38.84	43	(4.16)
East Mississippi Community College	42.4332	2,911	68	14	1,800	35.79	37	(1.21)
Hinds Community College	42.4332	8,804	72	24	1,482	31.09	26	5.09
Holmes Community College	42.4332	4,249	60	17	1,520	36.61	35	1.61
Itawamba Community College	42.4332	3,827	64	14	3,335	39.46	47	(7.54)
Jones County Junior College	42.4332	3,687	60	14	900	34.01	38	(3.99)
Meridian Community College	42.4332	2,750	65	11	1,431	33.94	32	1.94
Mississippi Delta Community College	42.4332	1,947	89	14	505	28.98	33	(4.02)
Mississippi Gulf Coast Community College	42.4332	6,828	64	12	3,053	33.02	36	(2.98)
Northeast Mississippi Community College	42.4332	2,959	68	19	1,111	36.81	31	5.81
Northwest Mississippi Community College	42.4332	5,648	61	19	1,381	35.09	25	10.09
Pearl River Community College	42.4332	4,042	56	13	1,052	34.20	36	(1.80)
Southwest Mississippi Community College	42.4332	1,744	72	12	1,292	34.08	46	(11.92)

Summary statistics about this model are as follows:

	Predicted	Actual	Diff.
Min	28.76	25.00	-11.92
Max	41.62	47.00	10.09
Range	12.86	22.00	22.0118
Mean	34.82	36.07	(1.25)
Std Dev	3.61	6.83	5.50

The completion rates predicted by the model had a mean of 34.82 with range of 12.86 and a standard deviation of 3.61 while the actual data had a mean of 36.07 with a range of 22 and a standard deviation of 6.83. The differences ranged from estimating too low by 11.92 percentage points to overestimating by 10.09 points, with an average difference of 1.25 and a standard deviation of 5.50.

Table 41 – *Predictive model of Backward Stepwise Regression on Significant Variables*

COLLEGE	CONS	FTE	P	PP	EI	SFR	ADJ	DE	T	CR	CR	CR
		-0.0013	-0.1954	0.0008	-0.0007	-0.3809	-0.0983	0.5726	0.0029	Predicted	Actual	Diff.
Coahoma Community College	53.0859	1,540	94	3,336	5,392	16	38	11	1,275	31.78	31	0.78
Copiah-Lincoln Community College	53.0859	2,425	66	2,112	5,053	20	27	24	1,336	42.53	45	(2.47)
East Central Community College	53.0859	2,060	70	5,367	4,270	20	52	23	656	40.38	43	(2.62)
East Mississippi Community College	53.0859	2,911	68	3,662	4,485	19	56	14	1,800	36.30	37	(0.70)
Hinds Community College	53.0859	8,804	72	5,162	5,238	17	33	24	1,482	36.36	26	10.36
Holmes Community College	53.0859	4,249	60	2,898	4,697	18	65	17	1,520	35.77	35	0.77
Itawamba Community College	53.0859	3,827	64	3,919	7,564	19	47	14	3,335	39.28	47	(7.72)
Jones County Junior College	53.0859	3,687	60	4,034	4,200	25	13	14	900	36.68	38	(1.32)
Meridian Community College	53.0859	2,750	65	1,156	5,743	16	32	11	1,431	34.92	32	2.92
Mississippi Delta Community College	53.0859	1,947	89	2,933	5,822	18	37	14	505	30.42	33	(2.58)
Mississippi Gulf Coast Community College	53.0859	6,828	64	2,600	6,863	22	34	12	3,053	32.98	36	(3.02)
Northeast Mississippi Community College	53.0859	2,959	68	1,510	6,611	22	21	19	1,111	36.19	31	5.19
Northwest Mississippi Community College	53.0859	5,648	61	939	6,551	22	40	19	1,381	32.56	25	7.56
Pearl River Community College	53.0859	4,042	56	1,457	5,414	18	34	13	1,052	34.56	36	(1.44)
Southwest Mississippi Community College	53.0859	1,744	72	3,821	5,141	24	9	12	1,292	36.80	46	(9.20)

Summary statistics from this model are as below:

	Predicted	Actual	Diff.
Min	30.42	25.00	-9.20
Max	42.53	47.00	10.36
Range	12.11	22.00	19.56
Mean	35.83	36.07	(0.23)
Std Dev	3.24	6.83	5.19

This model has completion rates predicted by the model with a mean of 35.83 with range of 12.11 and a standard deviation of 3.24 while the actual data had a mean of 36.07 with a range of 22 and a standard deviation of 6.83. The differences ranged from estimating too low by 9.2 percentage points to overestimating by 10.36 points, with an average difference of .23 and a standard deviation of 5.19. The backwards model with more variables does a slightly better job of predicting completion rates.

Two variables, P – Percentage of Students who receive a Pell grant and T – Average Tuition and fees both seem to be dealing with the same issue – the socio-economic status of the student. Students from a lower income family have a much harder time completing college. Colleges also can increase their Completion Rates by raising tuition which would cause more of the same students who receive Pell grants to not

enroll. Colleges need to aware of this dynamic and administrators may be well served by looking for additional ways to serve this part of their student body. While spending on Student Services did not show up as a significant factor at the 95% significance level, it was significant at a lower threshold. It also may mean shifting where those funds are used. While a substantial portion of spending through student services is concentrated on athletic spending, other areas may offer a larger return to the college in the form of allowing more students to continue their education and to complete their course of study. This could be an area for further research.

Dual enrollment students seem to just perform better. While this study did not find multicollinearity among a student's ACT score and their participation in Dual Enrollment courses, it stands to reason those students who are more prepared academically are entering college ahead of the game. It also creates other opportunities for research to examine the effects of dual enrollment on college credit hours and funding received. This study shows that dual enrollment students increase the graduation rates for the college, but if they leave college early, what are the effects on the college over the long term? Mississippi's community colleges and many other community college systems around the country are based on a two-year model of student attendance. As dual enrollment increases in popularity, colleges need to be aware of the effects on the two-year model of operating.

Multiple factors dealing with school or classroom size and number of faculty all point in the same direction. FTE – Full time equivalent enrollment affects completion rates with a negative coefficient of -.0013. For every one hundred student increase

completion rates will drop by .13 percentage points. Smaller schools have an advantage. That advantage also shows up in the SFR – Student to Faculty Ratio.

As this ratio increases, completion rates decrease by .38%. Class sizes increasing by five students are shown to decrease completion rates by 1.9%. Both support Tinto's (1975) Departure Theory. Students who feel like they belong and can plug in are more likely to complete their education.

The percentage of Adjunct or Part-Time Faculty may also contribute to students finding their place. As this percentage increased, completion rates decreased by almost 10%. A five percent increase in adjunct faculty leads to a .5% decrease in completion. College administrators need to keep that in mind as budgeting becomes increasingly tied to performance-based outcomes.

Interestingly, two items dealing with spending have opposite effects on completion rates. Spending per FTE on Instruction has a minimal effect on completion rates and its effect is negative. An increase of $100 in spending on instruction per FTE is shown to have a decrease of .07% in completion rates. The effect is minimal but the fact that it does not show up with a larger coefficient is of interest. The almost identical coefficient shows up in a positive manner for spending on Physical Plant items. Students want to be at a school with adequate facilities and there could be a relationship among spending on physical plant matters and the quality of student a college is able to enroll. While that effect may be more pronounced at universities or other four-year institutions where most students are traveling away from home, there still may be some effect at the community college level even though most students at community college live within the district of their college.

Areas for further Research

This study sheds some light on what is happening in the community colleges in Mississippi. Arears of further interest and future research could be a broader based analysis of other states and comparisons among individual states. Also, although very few nations have similar higher educational institutions to the American community college, the same metrics being applied to international institutions could also illuminate opportunities for policy makers and educational administrators to increase the efficiency and effectiveness of higher education. The intersection between Pell Grant recipients and the tuition each college charges and how both of those affect enrollment as well as completion. Dual enrollment participation and its effect on the two-year model of operations at community colleges is also worth studying. Student participation in extracurricular activities and opportunities to be known along with other variables that may explain why increased enrollment leads to a decrease in completion rates are also worthy of study. The effect of Physical Plant spending on enrollment and the quality of students attracted is something that would be of interest to all college administrators as well.

Policy Recommendations

This dissertation then creates data to support the following recommendations. Keep class sizes small and hire fewer adjunct instructors. Students need the attention that a small class can provide and need instructors who are focused on their success and can help them “find their place.”

Pay attention to the colleges’ physical plant. Colleges that spend more on their physical plant have students complete at a higher rate. But having already controlled for

other factors of academic preparedness, there has to be another motivation at play. Students want to have pride in where they went to school. Students want to feel cared for and appreciated. Colleges that go the extra mile to maintain and even beautify their campuses instill a sense of accomplishment and a sense of success in students. That translates to success in the classroom.

Student makeup matters. While Mississippi has an open enrollment policy, colleges should actively recruit dual enrollment students. Increasing the number of enrolled students who graduate high school with college credit leads to increased completion rates. But if a student has too many dual enrollment courses completed by the time they actually graduate high school and enroll full time at a community college, they may miss out on the student involvement that Astin has found to encourage completion. The net effects of shared funding from the state and the shortened time to graduate and how that affects students are definitely worth more research, but good students make the entire college better. Every class is better when it has better students in it. It raises the bar for everyone, even if it for a shortened amount of time. At the same time, students who receive Pell grants are less likely to be successful. Colleges need to make an effort earlier in the academic career of those students to help them navigate the complexities of college life. In Mississippi, many students who receive Pell grants are first generation college students and they have no model for success, and it is easy for them to fall through the cracks. Small class sizes and less adjunct faculty are key to supporting this group of students. Spending more money on student services is not found to be significant at helping this group of students complete at a higher rate. So, colleges must approach this group differently to increase their completion rates.

Finally, increasing tuition leads to increased completion rates. Colleges need not be afraid to charge their students. While a major part of the community college mission is to increase access, quality education comes at a price. For students to be successful, colleges must spend at least an adequate amount and must generate enough revenue to do so. Tuition is the only major source of revenue under the colleges' control, and they must maintain a forward moving momentum in order to serve their students and their communities.

Appendix 1 – Data for Explanatory Variables

Table A1

State Appropriations per FTE – SA

State Appropriations per FTE - SA	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Coahoma Community College	3,655	9,327	5,433	6,054	3,548	3,167	3,981	4,834	4,848	5,043	4,726	3,914
Copiah-Lincoln Community College	3,892	6,305	5,504	4,082	2,838	3,633	3,965	3,324	3,822	3,970	3,969	3,875
East Central Community College	3,559	4,226	4,260	4,156	3,361	3,617	4,073	4,314	4,218	4,558	4,799	3,655
East Mississippi Community College	3,379	4,400	3,846	1,608	1,821	2,458	2,593	2,848	3,186	3,192	3,352	3,203
Hinds Community College	3,413	3,249	3,111	2,547	2,257	3,332	3,655	3,170	3,464	3,547	3,510	3,210
Holmes Community College	2,648	3,501	2,647	2,117	1,982	2,949	3,181	3,680	3,858	4,172	3,748	3,638
Itawamba Community College	5,317	5,942	5,466	4,636	2,443	3,247	3,650	3,517	3,869	3,900	3,841	3,717
Jones County Junior College	3,595	4,114	3,552	2,940	2,807	3,682	3,589	3,139	3,609	3,645	3,693	3,630
Meridian Community College	6,070	4,983	4,761	3,991	3,604	3,864	4,398	4,810	5,228	5,078	4,917	4,337
Mississippi Delta Community College	3,496	4,592	5,215	4,984	4,926	5,677	5,825	6,046	6,056	8,315	5,829	4,310
Mississippi Gulf Coast Community College	3,287	3,718	3,467	2,826	2,525	2,567	2,995	3,199	3,611	3,657	3,652	3,326
Northeast Mississippi Community College	2,743	3,235	3,881	3,543	3,010	3,240	3,756	4,049	4,037	4,249	4,112	4,055
Northwest Mississippi Community College	3,341	2,824	3,308	2,724	2,501	2,994	3,164	3,295	3,279	3,635	3,425	3,318
Pearl River Community College	4,288	5,157	4,649	4,367	3,748	4,408	4,705	3,790	3,973	4,173	3,865	3,576
Southwest Mississippi Community College	3,574	4,158	5,233	4,572	3,801	3,491	5,406	5,706	6,657	6,870	4,806	4,779
Average	**3,750**	**4,649**	**4,289**	**3,676**	**3,011**	**3,488**	**3,929**	**3,981**	**4,248**	**4,534**	**4,150**	**3,770**

State Appropriations per FTE - SA	Min.	Max.	Range	Mean	SD
Coahoma Community College	3,167	9,327	6,160	4,878	1,637
Copiah-Lincoln Community College	2,838	6,305	3,467	4,098	928
East Central Community College	3,361	4,799	1,438	4,066	433
East Mississippi Community College	1,608	4,400	2,792	2,991	790
Hinds Community College	2,257	3,655	1,398	3,205	414
Holmes Community College	1,982	4,172	2,190	3,177	708
Itawamba Community College	2,443	5,942	3,499	4,129	1,015
Jones County Junior College	2,807	4,114	1,307	3,500	362
Meridian Community College	3,604	6,070	2,466	4,670	678
Mississippi Delta Community College	3,496	8,315	4,819	5,439	1,193
Mississippi Gulf Coast Community College	2,525	3,718	1,193	3,236	423
Northeast Mississippi Community College	2,743	4,249	1,506	3,659	495
Northwest Mississippi Community College	2,501	3,635	1,134	3,151	326
Pearl River Community College	3,576	5,157	1,581	4,225	464
Southwest Mississippi Community College	3,491	6,870	3,379	4,921	1,112
Overall	1,608	9,327	7,719	3,956	1,080

Table A2

Average ACT Score – ACT

Average ACT Score - ACT	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Coahoma Community College		15.1	15	15	14.9	15.2	15.3	15.2	15.4	15.4	16.1	16.1
Copiah-Lincoln Community College		18	17.8	18	18.1	18.3	18.4	18.5	18.7	18.7	19	19
East Central Community College		17.9	17.7	17.7	18	18.4	18.7	19	19.2	19.2	19.2	19.4
East Mississippi Community College		17.4	17.3	18.8	18.8	19	19.2	19.5	19.6	19.6	19.9	20
Hinds Community College		17.7	17.7	17.7	17.7	18.2	18.3	18.5	18.6	18.6	18.8	18.6
Holmes Community College		18.3	18.3	18.3	18.4	18.6	18.8	18.9	19.2	19.2	19.6	19.6
Itawamba Community College		18.4	18.2	18.2	18.3	18.6	18.9	19.3	19.5	19.5	19.5	19.7
Jones County Junior College		18.5	18.4	18.5	18.8	19	19	19.2	19.3	19.3	19.5	19.7
Meridian Community College		18.6	18.6	18.7	18.6	18.7	18.8	18.7	18.9	18.9	19.1	19.1
Mississippi Delta Community College		16.9	16.7	16.9	16.9	17.1	17	17.1	17.3	17.3	17.5	17.4
Mississippi Gulf Coast Community College		19	19.2	19.3	19.3	19.4	19.4	19.8	19.8	19.8	20.3	20.3
Northeast Mississippi Community College		19	18.9	18.8	18.9	19.1	19	19.3	19.7	19.7	19.9	19.8
Northwest Mississippi Community College		18.2	18.2	18.4	18.4	18.6	18.6	18.8	19.2	19.2	19.7	20
Pearl River Community College		18.4	18.5	18.5	18.5	18.6	18.9	19	19.3	19.4	19.7	19.8
Southwest Mississippi Community College		18.2	18.2	18.5	18.6	18.6	18.7	18.8	19.1	19.1	19.3	19.2
Average		**18.0**	**17.9**	**18.1**	**18.1**	**18.4**	**18.5**	**18.6**	**18.9**	**18.9**	**19.1**	**19.2**

Average ACT Score - ACT		Min.	Max.	Range	Mean	SD
Coahoma Community College		14.9	16.1	1.2	15.3	0.4
Copiah-Lincoln Community College		17.8	19.0	1.2	18.4	0.4
East Central Community College		17.7	19.4	1.7	18.6	0.7
East Mississippi Community College		17.3	20.0	2.7	19.0	0.9
Hinds Community College		17.7	18.8	1.1	18.2	0.4
Holmes Community College		18.3	19.6	1.3	18.8	0.5
Itawamba Community College		18.2	19.7	1.5	18.9	0.6
Jones County Junior College		18.4	19.7	1.3	19.0	0.4
Meridian Community College		18.6	19.1	0.5	18.8	0.2
Mississippi Delta Community College		16.7	17.5	0.8	17.1	0.2
Mississippi Gulf Coast Community College		19.0	20.3	1.3	19.6	0.4
Northeast Mississippi Community College		18.8	19.9	1.1	19.3	0.4
Northwest Mississippi Community College		18.2	20.0	1.8	18.8	0.6
Pearl River Community College		18.4	19.8	1.4	19.0	0.5
Southwest Mississippi Community College		18.2	19.3	1.1	18.8	0.4
Overall		14.9	20.3	5.4	18.5	1.1

Table A3

Percentage of Students Enrolled in Dual Enrollment Courses – DE

% of Students in Dual Enrollment - DE	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Coahoma Community College		4	4	5	4	4	5	8	11	14	16	11
Copiah-Lincoln Community College		5	4	6	5	2	9	12	15	17	22	24
East Central Community College		1	1	1	4	6	9	10	14	14	17	23
East Mississippi Community College		0	1	1	1	3	3	6	9	9	12	14
Hinds Community College		2	3	3	3	7	7	11	9	12	17	24
Holmes Community College		4	3	2	3	3	5	8	12	14	16	17
Itawamba Community College		0	1	1	1	1	4	11	14	14	13	14
Jones County Junior College		3	4	4	4	5	6	6	10	9	11	14
Meridian Community College		2	2	2	3	3	3	4	6	8	9	11
Mississippi Delta Community College		6	5	0	4	6	6	8	8	9	11	14
Mississippi Gulf Coast Community College		2	2	2	2	3	4	6	6	6	10	12
Northeast Mississippi Community College		2	1	2	2	3	4	8	11	13	15	19
Northwest Mississippi Community College		0	1	1	1	2	3	5	8	10	13	19
Pearl River Community College		3	4	3	3	3	5	8	10	11	14	13
Southwest Mississippi Community College		4	5	4	5	5	4	6	8	9	10	12
Average		**2.5**	**2.7**	**2.5**	**3.0**	**3.7**	**5.1**	**7.8**	**10.1**	**11.3**	**13.7**	**16.1**

% of Students in Dual Enrollment - DE	Min.	Max.	Range	Mean	SD
Coahoma Community College	4	16	12	7.8	4.5
Copiah-Lincoln Community College	2	24	22	11.0	7.6
East Central Community College	1	23	22	9.1	7.3
East Mississippi Community College	-	14	14	5.4	4.9
Hinds Community College	2	24	22	8.9	6.8
Holmes Community College	2	17	15	7.9	5.8
Itawamba Community College	-	14	14	6.7	6.3
Jones County Junior College	3	14	11	6.9	3.6
Meridian Community College	2	11	9	4.8	3.2
Mississippi Delta Community College	-	14	14	7.0	3.7
Mississippi Gulf Coast Community College	2	12	10	5.0	3.4
Northeast Mississippi Community College	1	19	18	7.3	6.3
Northwest Mississippi Community College	-	19	19	5.7	6.1
Pearl River Community College	3	14	11	7.0	4.3
Southwest Mississippi Community College	4	12	8	6.5	2.8
Overall	-	24	24	7.1	5.4

Table A4

Percentage of Students Enrolled in Remedial Courses - RC

% of students in Remedial Courses - RC	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Coahoma Community College					10	12	12	10	29	30	29	33
Copiah-Lincoln Community College					31	28	26	22	28	27	26	25
East Central Community College					22	18	17	18	48	52	51	51
East Mississippi Community College					28	26	23	19	26	26	24	23
Hinds Community College					36	34	31	31	29	34	28	26
Holmes Community College					28	29	28	26	26	61	57	24
Itawamba Community College					35	32	30	26	27	27	26	26
Jones County Junior College					28	28	30	32	33	32	30	26
Meridian Community College					21	18	19	19	67	65	63	64
Mississippi Delta Community College					35	34	31	31	74	74	70	70
Mississippi Gulf Coast Community College					17	15	16	18	22	23	18	18
Northeast Mississippi Community College					32	29	31	29	28	30	26	28
Northwest Mississippi Community College					30	28	27	27	27	28	25	23
Pearl River Community College					26	21	23	22	58	59	51	54
Southwest Mississippi Community College					28	26	26	25	31	32	30	32
Average					**27.1**	**25.2**	**24.7**	**23.7**	**36.9**	**40.0**	**36.9**	**34.9**

% of students in Remedial Courses - RC	Min.	Max.	Range	Mean	SD
Coahoma Community College	10	33	23	20.6	10.4
Copiah-Lincoln Community College	22	31	9	26.6	2.6
East Central Community College	17	52	35	34.6	17.1
East Mississippi Community College	19	28	9	24.4	2.8
Hinds Community College	26	36	10	31.1	3.4
Holmes Community College	24	61	37	34.9	15.0
Itawamba Community College	26	35	9	28.6	3.4
Jones County Junior College	26	33	7	29.9	2.4
Meridian Community College	18	67	49	42.0	24.4
Mississippi Delta Community College	31	74	43	52.4	21.1
Mississippi Gulf Coast Community College	15	23	8	18.4	2.8
Northeast Mississippi Community College	26	32	6	29.1	1.9
Northwest Mississippi Community College	23	30	7	26.9	2.1
Pearl River Community College	21	59	38	39.3	17.6
Southwest Mississippi Community College	25	32	7	28.8	2.9
Overall	10	74	64	31.2	13.8

Table A5

Percentage of Students Enrolled in Online Courses – OC

% of Students in Online Courses - OC	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Coahoma Community College			17	13	17	20	24	24	16	15	41	43
Copiah-Lincoln Community College			27	29	40	43	48	46	16	15	17	17
East Central Community College			21	25	27	33	65	46	47	51	56	58
East Mississippi Community College			37	45	46	53	52	45	48	47	50	56
Hinds Community College			21	21	22	21	26	30	24	31	32	36
Holmes Community College			26	26	34	35	38	47	48	51	47	51
Itawamba Community College			48	51	54	54	54	53	58	60	61	56
Jones County Junior College			32	34	31	29	29	33	48	47	45	47
Meridian Community College			19	23	28	37	37	31	38	28	46	27
Mississippi Delta Community College			22	25	27	19	21	20	23	42	47	28
Mississippi Gulf Coast Community College			27	29	36	37	42	45	46	49	47	48
Northeast Mississippi Community College			27	27	31	33	34	45	61	66	70	76
Northwest Mississippi Community College			27	26	28	26	29	31	32	34	6	32
Pearl River Community College			19	17	24	25	29	32	33	36	36	43
Southwest Mississippi Community College			31	35	36	37	38	40	41	7	42	51
Average			**26.7**	**28.4**	**32.1**	**33.5**	**37.7**	**37.9**	**38.6**	**38.6**	**42.9**	**44.6**

% of Students in Online Courses - OC	Min.	Max.	Range	Mean	SD
Coahoma Community College	13	43	30	23.0	10.6
Copiah-Lincoln Community College	15	48	33	29.8	13.4
East Central Community College	21	65	44	42.9	15.4
East Mississippi Community College	37	56	19	47.9	5.3
Hinds Community College	21	36	15	26.4	5.5
Holmes Community College	26	51	25	40.3	9.8
Itawamba Community College	48	61	13	54.9	4.0
Jones County Junior College	29	48	19	37.5	8.1
Meridian Community College	19	46	27	31.4	8.1
Mississippi Delta Community College	19	47	28	27.4	9.5
Mississippi Gulf Coast Community College	27	49	22	40.6	8.0
Northeast Mississippi Community College	27	76	49	47.0	19.3
Northwest Mississippi Community College	6	34	28	27.1	7.9
Pearl River Community College	17	43	26	29.4	8.2
Southwest Mississippi Community College	7	51	44	35.8	11.4
Overall	6	76	70	36.1	13.4

Table A6

Tuition and Fees per FTE - T

Tution and Fees per FTE -T	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Coahoma Community College	2,142	2,235	2,409	2,375	991	876	1,087	1,165	1,250	1,012	1,149	1,275
Copiah-Lincoln Community College	1,790	2,246	2,547	2,243	1,061	1,542	842	898	875	1,040	1,046	1,336
East Central Community College	1,424	1,299	707	993	918	692	666	631	443	365	458	656
East Mississippi Community College	1,790	1,859	1,743	1,077	1,822	2,076	1,891	1,834	1,810	1,832	1,572	1,800
Hinds Community College	1,207	1,011	587	386	308	628	574	516	1,057	1,182	1,554	1,482
Holmes Community College	620	649	655	433	496	845	817	922	957	998	1,451	1,520
Itawamba Community College	3,585	3,658	3,513	3,364	2,044	2,301	2,310	2,609	2,864	2,974	3,157	3,335
Jones County Junior College	893	1,261	1,263	1,122	722	816	1,133	774	911	1,043	810	900
Meridian Community College	1,668	1,125	1,217	1,089	1,260	1,164	1,184	1,249	1,155	1,259	1,576	1,431
Mississippi Delta Community College	695	745	1,020	226	516	804	885	834	609	702	650	505
Mississippi Gulf Coast Community College	1,206	1,369	1,400	1,289	2,086	2,298	2,626	2,619	2,707	2,871	3,251	3,053
Northeast Mississippi Community College	1,198	1,211	1,331	1,206	1,015	923	991	918	949	1,257	840	1,111
Northwest Mississippi Community College	1,298	940	1,140	932	921	1,003	1,190	1,139	1,352	1,341	1,382	1,381
Pearl River Community College	826	1,191	959	841	1,077	1,029	763	825	657	519	576	1,052
Southwest Mississippi Community College	636	793	978	852	734	747	1,047	1,334	1,462	1,606	1,150	1,292
Average	**1,399**	**1,439**	**1,431**	**1,229**	**1,065**	**1,183**	**1,200**	**1,218**	**1,271**	**1,333**	**1,375**	**1,475**

Tution and Fees per FTE -T	Min.	Max.	Range	Mean	SD
Coahoma Community College	876	2,409	1,533	1,497	599
Copiah-Lincoln Community College	842	2,547	1,705	1,456	610
East Central Community College	365	1,424	1,059	771	330
East Mississippi Community College	1,077	2,076	999	1,759	243
Hinds Community College	308	1,554	1,246	874	427
Holmes Community College	433	1,520	1,087	864	341
Itawamba Community College	2,044	3,658	1,614	2,976	552
Jones County Junior College	722	1,263	541	971	188
Meridian Community College	1,089	1,668	579	1,281	182
Mississippi Delta Community College	226	1,020	794	683	207
Mississippi Gulf Coast Community College	1,206	3,251	2,045	2,231	742
Northeast Mississippi Community College	840	1,331	491	1,079	160
Northwest Mississippi Community College	921	1,382	461	1,168	183
Pearl River Community College	519	1,191	672	860	209
Southwest Mississippi Community College	636	1,606	970	1,053	316
Overall	226	3,658	3,432	1,301	713

Table A7

Percentage of Students Receiving Pell Grant – P

% of Studens Receiving Pell Grant - P	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Coahoma Community College		91	92	98	91	93	92	93	95	94	93	94
Copiah-Lincoln Community College		57	44	71	74	76	73	68	69	65	63	66
East Central Community College		53	55	58	69	70	62	70	68	64	61	70
East Mississippi Community College		68	65	69	56	58	65	65	59	57	63	68
Hinds Community College		67	66	78	83	78	79	79	79	74	76	72
Holmes Community College		55	60	74	76	67	69	65	67	67	60	60
Itawamba Community College		60	60	73	76	72	67	66	69	72	73	64
Jones County Junior College		53	47	59	64	65	63	62	58	57	58	60
Meridian Community College		38	63	71	64	75	72	70	68	54	64	65
Mississippi Delta Community College		75	75	70	82	83	80	79	82	82	84	89
Mississippi Gulf Coast Community College		42	45	53	58	63	65	61	66	65	64	64
Northeast Mississippi Community College		56	54	68	72	75	74	69	69	67	65	68
Northwest Mississippi Community College		55	55	66	67	67	67	70	61	62	61	61
Pearl River Community College		39	39	48	53	55	51	66	68	63	68	56
Southwest Mississippi Community College		62	70	74	75	77	70	70	69	68	68	72
Average		**58.1**	**59.3**	**68.7**	**70.7**	**71.6**	**69.9**	**70.2**	**69.8**	**67.4**	**68.1**	**68.6**

% of Studens Receiving Pell Grant - P		Min.	Max.	Range	Mean	SD
Coahoma Community College		91	98	7	93.3	2.0
Copiah-Lincoln Community College		44	76	32	66.0	9.1
East Central Community College		53	70	17	63.6	6.3
East Mississippi Community College		56	69	13	63.0	4.7
Hinds Community College		66	83	17	75.5	5.3
Holmes Community College		55	76	21	65.5	6.3
Itawamba Community College		60	76	16	68.4	5.4
Jones County Junior College		47	65	18	58.7	5.2
Meridian Community College		38	75	37	64.0	10.3
Mississippi Delta Community College		70	89	19	80.1	5.2
Mississippi Gulf Coast Community College		42	66	24	58.7	8.4
Northeast Mississippi Community College		54	75	21	67.0	6.6
Northwest Mississippi Community College		55	70	15	62.9	5.0
Pearl River Community College		39	68	29	55.1	10.5
Southwest Mississippi Community College		62	77	15	70.5	4.1
Overall		38	98	60	67.5	11.3

Table A8

Percentage of Students Receiving Student Loans – L

% of Students Receiving Loans -L	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Coahoma Community College		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Copiah-Lincoln Community College		24	20	31	27	28	25	24	22	22	19	22
East Central Community College		20	26	30	37	38	28	27	22	20	19	22
East Mississippi Community College		65	69	46	36	41	42	33	32	27	24	37
Hinds Community College		44	42	52	60	53	50	47	50	43	49	46
Holmes Community College		35	37	43	26	30	37	28	26	30	28	30
Itawamba Community College		33	34	35	36	32	24	20	22	20	22	18
Jones County Junior College		17	14	18	18	20	15	13	6	6	4	13
Meridian Community College		18	25	25	26	28	18	20	15	12	13	11
Mississippi Delta Community College		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Mississippi Gulf Coast Community College		8	12	18	23	27	26	30	27	26	37	32
Northeast Mississippi Community College		28	27	22	22	27	26	20	20	23	24	23
Northwest Mississippi Community College		18	27	22	21	23	22	19	17	17	19	15
Pearl River Community College		16	16	15	21	21	20	23	24	20	21	30
Southwest Mississippi Community College		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Average		**27.2**	**29.1**	**29.8**	**29.4**	**30.7**	**27.8**	**25.3**	**23.6**	**22.2**	**23.3**	**24.9**

% of Students Receiving Loans -L		Min.	Max.	Range	Mean	SD
Coahoma Community College		-	-	-	-	-
Copiah-Lincoln Community College		19	31	12	24.0	3.6
East Central Community College		19	38	19	26.3	6.6
East Mississippi Community College		24	69	45	41.1	14.3
Hinds Community College		42	60	18	48.7	5.2
Holmes Community College		26	43	17	31.8	5.4
Itawamba Community College		18	36	18	26.9	7.0
Jones County Junior College		4	20	16	13.1	5.5
Meridian Community College		11	28	17	19.2	6.1
Mississippi Delta Community College		-	-	-	-	-
Mississippi Gulf Coast Community College		8	37	29	24.2	8.6
Northeast Mississippi Community College		20	28	8	23.8	2.8
Northwest Mississippi Community College		15	27	12	20.0	3.4
Pearl River Community College		15	30	15	20.6	4.2
Southwest Mississippi Community College		-	-	-	-	-
Overall		-	69	69	26.6	11.4

Table A9

Percentage of Students Receiving Scholarships – S

% of Students Receiving Scholarships - S	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Coahoma Community College		2	1	16	21	19	18	30	34	32	39	45
Copiah-Lincoln Community College		40	23	27	30	33	33	35	38	35	42	26
East Central Community College		49	50	46	50	32	51	55	62	56	58	57
East Mississippi Community College		43	48	64	60	48	66	78	66	62	72	47
Hinds Community College		26	28	18	17	25	22	22	20	25	24	30
Holmes Community College		45	31	32	39	40	37	37	38	40	48	51
Itawamba Community College		51	50	42	44	51	49	51	50	47	41	55
Jones County Junior College		43	41	35	32	38	40	35	37	36	13	35
Meridian Community College		31	33	29	32	33	28	34	33	24	42	45
Mississippi Delta Community College		13	30	28	23	18	35	36	54	70	59	58
Mississippi Gulf Coast Community College		39	41	36	40	37	41	1	43	42	36	53
Northeast Mississippi Community College		53	53	47	62	62	64	63	66	70	68	72
Northwest Mississippi Community College		24	24	21	31	28	26	26	28	21	30	33
Pearl River Community College		21	21	23	21	21	27	28	41	44	51	39
Southwest Mississippi Community College		42	36	38	39	35	38	42	43	40	49	49
Average		**34.8**	**34.0**	**33.5**	**36.1**	**34.7**	**38.3**	**38.2**	**43.5**	**42.9**	**44.8**	**46.3**

% of Students Receiving Scholarships - S	Min.	Max.	Range	Mean	SD
Coahoma Community College	1	45	44	23.4	14.2
Copiah-Lincoln Community College	23	42	19	32.9	6.0
East Central Community College	32	62	30	51.5	8.0
East Mississippi Community College	43	78	35	59.5	11.4
Hinds Community College	17	30	13	23.4	4.0
Holmes Community College	31	51	20	39.8	6.1
Itawamba Community College	41	55	14	48.3	4.3
Jones County Junior College	13	43	30	35.0	7.9
Meridian Community College	24	45	21	33.1	5.9
Mississippi Delta Community College	13	70	57	38.5	18.8
Mississippi Gulf Coast Community College	1	53	52	37.2	12.9
Northeast Mississippi Community College	47	72	25	61.8	7.8
Northwest Mississippi Community College	21	33	12	26.5	3.9
Pearl River Community College	21	51	30	30.6	11.0
Southwest Mississippi Community College	35	49	14	41.0	4.7
Overall	1	78	77	38.8	14.7

Table A10

Expenditures per FTE on Instruction – EI

Expenditures per FTE on Instruction - EI	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Coahoma Community College	4,767	9,952	8,447	8,142	5,253	4,076	5,132	5,857	6,021	6,531	6,644	5,392
Copiah-Lincoln Community College	4,653	5,478	5,277	6,280	5,925	6,877	6,229	5,430	4,690	3,967	4,274	5,053
East Central Community College	4,019	4,809	4,536	3,803	3,770	3,586	4,086	4,438	4,036	4,186	4,700	4,270
East Mississippi Community College	4,479	6,595	5,167	2,875	3,202	3,893	3,889	4,013	4,502	3,822	4,272	4,485
Hinds Community College	4,723	4,226	4,545	5,757	5,019	6,461	7,229	6,704	6,214	6,353	6,669	5,238
Holmes Community College	3,298	4,404	3,433	2,918	2,902	4,137	4,110	4,508	4,940	4,816	4,899	4,697
Itawamba Community College	7,517	7,932	7,921	8,483	4,769	5,497	6,596	6,130	6,409	6,725	7,205	7,564
Jones County Junior College	4,411	5,013	4,272	4,053	4,181	4,982	5,419	4,555	4,787	5,030	4,864	4,200
Meridian Community College	6,663	5,197	5,013	4,933	5,061	5,336	5,911	6,428	6,619	6,455	6,223	5,743
Mississippi Delta Community College	4,844	5,034	6,483	6,160	6,917	7,928	8,349	8,330	6,206	9,529	7,022	5,822
Mississippi Gulf Coast Community College	4,907	4,849	4,905	4,882	5,039	4,334	5,154	5,209	5,485	5,598	6,509	6,863
Northeast Mississippi Community College	4,556	4,751	5,307	5,489	4,718	4,956	5,738	5,677	5,548	5,596	6,327	6,611
Northwest Mississippi Community College	4,153	3,166	4,760	4,586	4,576	5,162	5,275	5,462	5,455	5,828	6,379	6,551
Pearl River Community College	5,987	6,389	6,326	7,277	6,567	6,800	8,104	6,372	6,028	5,530	5,401	5,414
Southwest Mississippi Community College	4,234	4,474	5,990	5,242	3,950	4,052	6,199	7,032	7,139	7,273	5,266	5,141
Average	**4,881**	**5,485**	**5,492**	**5,392**	**4,790**	**5,205**	**5,828**	**5,743**	**5,605**	**5,816**	**5,777**	**5,536**

Expenditures per FTE on Instruction - EI		Min.	Max.	Range	Mean	SD
Coahoma Community College		4,076	9,952	5,876	6,351	1,715
Copiah-Lincoln Community College		3,967	6,877	2,910	5,344	874
East Central Community College		3,586	4,809	1,223	4,187	380
East Mississippi Community College		2,875	6,595	3,720	4,266	953
Hinds Community College		4,226	7,229	3,003	5,762	984
Holmes Community College		2,902	4,940	2,038	4,089	762
Itawamba Community College		4,769	8,483	3,714	6,896	1,087
Jones County Junior College		4,053	5,419	1,366	4,647	430
Meridian Community College		4,933	6,663	1,730	5,799	669
Mississippi Delta Community College		4,844	9,529	4,685	6,885	1,421
Mississippi Gulf Coast Community College		4,334	6,863	2,529	5,311	723
Northeast Mississippi Community College		4,556	6,611	2,055	5,440	630
Northwest Mississippi Community College		3,166	6,551	3,385	5,113	946
Pearl River Community College		5,401	8,104	2,703	6,350	790
Southwest Mississippi Community College		3,950	7,273	3,323	5,499	1,218
Overall		2,875	9,952	7,077	5,462	1,282

Table A11

Expenditures per FTE on Instructional Support - EIS

Expenditures per FTE on Instructional Support - EIS	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Coahoma Community College	1,415	2,593	1,906	2,060	1,296	809	1,042	1,555	1,032	1,627	1,645	1,380
Copiah-Lincoln Community College	316	382	351	411	397	526	520	408	399	359	296	300
East Central Community College	197	189	201	174	152	160	235	204	192	196	232	223
East Mississippi Community College	118	140	103	60	65	92	105	101	103	87	96	95
Hinds Community College	220	219	218	253	216	274	360	306	247	255	249	189
Holmes Community College	120	159	120	97	95	132	126	160	167	181	183	173
Itawamba Community College	188	231	218	222	126	150	180	178	172	203	202	195
Jones County Junior College	292	265	212	218	218	303	338	265	279	254	232	190
Meridian Community College	1,418	1,030	1,045	927	933	951	1,163	1,199	1,270	1,119	1,118	988
Mississippi Delta Community College	211	250	356	261	373	375	352	360	289	398	309	232
Mississippi Gulf Coast Community College	478	508	501	447	426	378	470	493	490	492	555	525
Northeast Mississippi Community College	158	158	164	152	181	184	200	240	237	248	267	262
Northwest Mississippi Community College	194	149	235	236	227	255	261	284	267	326	319	294
Pearl River Community College	344	381	368	435	379	403	478	337	333	336	340	316
Southwest Mississippi Community College	242	261	257	296	206	216	331	337	354	417	287	290
Average	**394**	**461**	**417**	**417**	**353**	**347**	**411**	**428**	**389**	**433**	**422**	**377**

Expenditures per FTE on Instructional Support - EIS	Min.	Max.	Range	Mean	SD
Coahoma Community College	809	2,593	1,784	1,530	493
Copiah-Lincoln Community College	296	526	230	389	75
East Central Community College	152	235	83	196	26
East Mississippi Community College	60	140	80	97	21
Hinds Community College	189	360	171	251	46
Holmes Community College	95	183	88	143	32
Itawamba Community College	126	231	105	189	30
Jones County Junior College	190	338	148	256	43
Meridian Community College	927	1,418	491	1,097	149
Mississippi Delta Community College	211	398	187	314	64
Mississippi Gulf Coast Community College	378	555	177	480	47
Northeast Mississippi Community College	152	267	115	204	44
Northwest Mississippi Community College	149	326	177	254	51
Pearl River Community College	316	478	162	371	48
Southwest Mississippi Community College	206	417	211	291	61
Overall	60	2,593	2,533	404	402

Table A12

Expenditures per FTE on Student Services – SS

Expenditures per FTE on Student Services - SS	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Coahoma Community College	2,092	3,095	1,729	1,431	1,351	1,123	1,425	1,874	1,876	2,095	2,155	1,678
Copiah-Lincoln Community College	1,299	1,484	1,474	1,477	1,333	1,787	1,804	1,402	2,032	1,797	1,964	1,917
East Central Community College	822	847	910	866	868	899	1,474	1,140	1,100	1,179	1,324	1,124
East Mississippi Community College	810	1,020	1,117	615	728	970	1,109	1,240	1,336	1,102	1,291	1,349
Hinds Community College	658	686	699	839	710	928	1,078	960	947	941	1,076	1,030
Holmes Community College	556	731	590	517	486	667	679	721	839	909	912	863
Itawamba Community College	1,190	1,035	1,174	1,114	613	837	1,016	1,014	1,007	1,171	1,195	1,112
Jones County Junior College	913	1,036	957	854	886	1,224	1,224	1,058	1,110	1,292	1,447	1,188
Meridian Community College	1,464	1,048	994	1,009	1,019	1,057	1,188	1,301	1,429	1,484	1,507	1,463
Mississippi Delta Community College	598	649	809	733	1,195	1,088	1,116	1,264	1,422	2,137	1,436	1,369
Mississippi Gulf Coast Community College	780	954	904	953	1,003	842	993	1,014	1,162	1,163	1,344	1,378
Northeast Mississippi Community College	575	547	651	636	909	913	1,123	1,167	1,180	1,402	1,449	1,421
Northwest Mississippi Community College	770	584	870	847	917	1,010	1,044	1,064	1,171	1,364	1,345	1,327
Pearl River Community College	1,310	1,323	1,247	2,282	1,342	1,681	1,652	1,335	1,504	1,419	1,413	1,381
Southwest Mississippi Community College	1,220	1,086	1,344	1,199	842	971	1,645	1,896	2,041	2,190	1,680	1,567
Grand Total	**1,004**	**1,075**	**1,031**	**1,025**	**947**	**1,066**	**1,238**	**1,230**	**1,344**	**1,443**	**1,436**	**1,344**

Expenditures per FTE on Student Services - SS	Min.	Max.	Range	Mean	SD
Coahoma Community College	1,123	3,095	1,972	1,827	516
Copiah-Lincoln Community College	1,299	2,032	733	1,648	262
East Central Community College	822	1,474	652	1,046	211
East Mississippi Community College	615	1,349	734	1,057	240
Hinds Community College	658	1,078	420	879	156
Holmes Community College	486	912	426	706	151
Itawamba Community College	613	1,195	582	1,040	170
Jones County Junior College	854	1,447	593	1,099	182
Meridian Community College	994	1,507	513	1,247	214
Mississippi Delta Community College	598	2,137	1,539	1,151	431
Mississippi Gulf Coast Community College	780	1,378	598	1,041	186
Northeast Mississippi Community College	547	1,449	902	998	340
Northwest Mississippi Community College	584	1,364	780	1,026	245
Pearl River Community College	1,247	2,282	1,035	1,491	283
Southwest Mississippi Community College	842	2,190	1,348	1,473	432
Overall	486	3,095	2,609	1,182	403

Table A13

Expenditures per FTE on Institutional Support – IS

Expenditures per FTE on Institutional Support - IS	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Coahoma Community College	1,741	2,563	1,941	1,872	1,258	1,277	1,604	1,807	2,121	1,979	1,708	1,520
Copiah-Lincoln Community College	1,377	2,151	1,580	1,468	1,741	2,411	2,086	1,589	1,502	1,323	1,448	1,567
East Central Community College	871	841	901	963	1,028	966	1,274	1,153	1,107	1,164	1,440	1,316
East Mississippi Community College	1,137	1,498	1,411	719	886	1,165	1,358	1,441	1,498	1,344	1,572	1,688
Hinds Community College	1,198	984	1,181	1,179	1,131	1,455	1,727	1,685	1,584	1,534	1,420	1,193
Holmes Community College	1,143	1,308	942	857	957	1,371	1,167	1,355	1,517	2,448	1,664	1,577
Itawamba Community College	1,491	1,566	1,440	1,561	952	1,190	1,403	1,385	1,458	1,644	1,650	1,675
Jones County Junior College	1,067	1,507	1,184	1,536	1,795	1,985	2,018	1,957	2,044	1,897	1,830	1,662
Meridian Community College	1,890	1,281	1,174	1,188	1,272	1,424	1,678	1,704	1,720	2,031	2,776	2,457
Mississippi Delta Community College	981	1,372	1,686	1,208	1,573	2,575	2,699	2,769	2,215	3,457	2,446	2,068
Mississippi Gulf Coast Community College	1,176	1,410	1,361	1,482	1,583	1,472	1,750	1,987	2,183	2,311	2,553	2,517
Northeast Mississippi Community College	987	963	963	1,201	1,320	1,040	1,308	1,594	1,773	1,606	1,720	1,675
Northwest Mississippi Community College	910	696	1,022	1,057	1,154	1,259	1,325	1,545	1,583	1,742	1,807	1,813
Pearl River Community College	2,038	1,745	2,003	2,499	2,404	2,416	2,375	1,938	2,294	2,507	4,381	2,418
Southwest Mississippi Community College	996	1,051	1,355	1,166	943	960	1,871	1,752	1,772	1,931	1,438	1,421
Average	**1,267**	**1,396**	**1,343**	**1,330**	**1,333**	**1,531**	**1,710**	**1,711**	**1,758**	**1,928**	**1,990**	**1,771**

Expenditures per FTE on Institutional Support - IS		Min.	Max.	Range	Mean	SD
Coahoma Community College		1,258	2,563	1,305	1,783	361
Copiah-Lincoln Community College		1,323	2,411	1,088	1,687	344
East Central Community College		841	1,440	599	1,085	190
East Mississippi Community College		719	1,688	969	1,310	285
Hinds Community College		984	1,727	743	1,356	242
Holmes Community College		857	2,448	1,591	1,359	429
Itawamba Community College		952	1,675	723	1,451	208
Jones County Junior College		1,067	2,044	977	1,707	325
Meridian Community College		1,174	2,776	1,602	1,716	509
Mississippi Delta Community College		981	3,457	2,476	2,087	741
Mississippi Gulf Coast Community College		1,176	2,553	1,377	1,815	478
Northeast Mississippi Community College		963	1,773	810	1,346	316
Northwest Mississippi Community College		696	1,813	1,117	1,326	372
Pearl River Community College		1,745	4,381	2,636	2,418	666
Southwest Mississippi Community College		943	1,931	988	1,388	371
Overall		696	4,381	3,685	1,589	523

Table A14

Expenditures per FTE on Physical Plant and Other – PP

Expenditures per FTE on Physical Plant and Other - PP	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Coahoma Community College	2,770	9,963	5,394	6,113	4,786	4,402	6,088	6,328	4,287	4,439	4,095	3,336
Copiah-Lincoln Community College	2,651	5,781	4,518	3,011	2,189	2,281	1,749	1,497	2,961	2,865	3,379	2,112
East Central Community College	3,570	3,526	3,011	3,955	3,974	4,123	2,796	3,113	2,982	3,053	6,014	5,367
East Mississippi Community College	3,913	3,906	3,851	1,676	3,372	3,034	2,706	2,509	2,268	3,861	3,820	3,662
Hinds Community College	2,909	2,816	2,762	1,686	2,350	2,168	1,956	1,707	2,688	3,049	3,696	5,162
Holmes Community College	2,271	3,057	2,511	2,437	2,576	3,147	3,122	2,847	2,750	1,960	2,797	2,898
Itawamba Community College	7,349	7,622	7,871	7,260	4,028	3,905	3,755	3,749	3,713	3,746	3,605	3,919
Jones County Junior College	2,984	2,927	2,912	1,967	2,383	2,134	1,858	1,464	1,359	1,623	1,953	4,034
Meridian Community College	4,793	3,606	3,387	2,278	2,300	2,258	1,897	1,633	1,642	1,515	1,350	1,156
Mississippi Delta Community College	2,170	2,467	4,094	3,484	1,781	1,940	1,575	1,616	1,350	1,469	1,031	2,933
Mississippi Gulf Coast Community College	3,835	3,431	3,103	2,034	3,262	2,413	2,738	2,978	3,174	2,631	2,897	2,600
Northeast Mississippi Community College	3,410	3,322	2,662	2,668	1,718	1,634	2,175	2,007	1,808	1,974	1,482	1,510
Northwest Mississippi Community College	2,590	2,086	1,679	1,639	1,654	1,657	1,462	1,423	1,382	1,324	1,097	939
Pearl River Community College	3,665	4,704	5,180	2,577	2,511	2,464	1,905	1,298	1,289	1,131	1,554	1,457
Southwest Mississippi Community College	2,881	2,943	3,760	4,454	3,468	3,440	4,779	4,817	5,276	5,185	3,663	3,821
Average	**3,451**	**4,144**	**3,780**	**3,149**	**2,823**	**2,733**	**2,704**	**2,599**	**2,595**	**2,655**	**2,829**	**2,994**

Expenditures per FTE on Physical Plant and Other - PP	Min.	Max.	Range	Mean	SD
Coahoma Community College	2,770	9,963	7,193	5,167	1,869
Copiah-Lincoln Community College	1,497	5,781	4,284	2,916	1,207
East Central Community College	2,796	6,014	3,218	3,790	999
East Mississippi Community College	1,676	3,913	2,237	3,215	765
Hinds Community College	1,686	5,162	3,476	2,746	962
Holmes Community College	1,960	3,147	1,187	2,698	361
Itawamba Community College	3,605	7,871	4,266	5,044	1,842
Jones County Junior College	1,359	4,034	2,675	2,300	783
Meridian Community College	1,156	4,793	3,637	2,318	1,086
Mississippi Delta Community College	1,031	4,094	3,063	2,159	926
Mississippi Gulf Coast Community College	2,034	3,835	1,801	2,925	484
Northeast Mississippi Community College	1,482	3,410	1,928	2,198	670
Northwest Mississippi Community College	939	2,590	1,651	1,578	436
Pearl River Community College	1,131	5,180	4,049	2,478	1,366
Southwest Mississippi Community College	2,881	5,276	2,395	4,041	835
Overall	939	9,963	9,024	3,038	1,442

Table A15

Full-Time Equivalent Enrollment – FTE

Full Time Equivalent Enrolment - FTE	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Coahoma Community College	2,047	2,126	2,338	2,501	2,724	2,043	1,928	1,877	1,762	1,735	1,611	1,540
Copiah-Lincoln Community College	1,905	3,063	3,301	3,457	3,249	2,983	2,727	2,574	2,572	2,475	2,432	2,425
East Central Community College	1,964	2,076	2,317	2,353	2,256	2,144	2,175	2,163	2,130	1,958	2,094	2,060
East Mississippi Community College	3,045	3,219	3,977	3,786	3,440	3,369	3,257	3,071	3,362	2,980	2,934	2,911
Hinds Community College	8,019	7,798	8,936	10830	9,428	9,242	9,618	9,109	11219	8,577	8,829	8,804
Holmes Community College	4,059	4,433	5,172	5,224	5,211	5,053	4,706	4,513	4,369	4,337	4,405	4,249
Itawamba Community College	4,740	5,417	6,281	6,428	5,628	5,001	4,697	4,409	4,278	4,220	3,954	3,827
Jones County Junior College	3,955	3,897	4,438	4,519	4,186	3,721	3,865	3,952	4,028	3,997	3,769	3,687
Meridian Community College	2,899	2,974	3,273	3,292	3,301	3,440	2,895	2,793	2,765	2,860	2,804	2,750
Mississippi Delta Community College	2,588	2,777	2,900	3,140	2,896	2,741	2,522	2,292	2,047	1,976	1,975	1,947
Mississippi Gulf Coast Community College	6,663	6,924	7,912	8,031	8,001	7,966	8,004	7,509	7,445	6,985	6,936	6,828
Northeast Mississippi Community College	2,972	2,855	3,266	3,276	3,285	3,048	2,898	3,006	3,091	3,025	2,944	2,959
Northwest Mississippi Community College	5,770	6,000	6,878	7,053	6,697	7,019	6,599	6,495	6,428	6,345	6,018	5,648
Pearl River Community College	3,654	4,224	4,439	4,594	4,285	4,223	3,666	3,598	3,410	3,398	3,857	4,042
Southwest Mississippi Community College	1,587	1,754	1,922	1,872	1,941	1,892	1,852	1,769	1,682	1,685	1,697	1,744
Average	**3,724**	**3,969**	**4,490**	**4,690**	**4,435**	**4,259**	**4,094**	**3,942**	**4,039**	**3,770**	**3,751**	**3,695**

Full Time Equivalent Enrolment - FTE	Min.	Max.	Range	Mean	SD
Coahoma Community College	1,540	2,724	1,184	2,019	359
Copiah-Lincoln Community College	1,905	3,457	1,552	2,764	453
East Central Community College	1,958	2,353	395	2,141	124
East Mississippi Community College	2,911	3,977	1,066	3,279	335
Hinds Community College	7,798	11,219	3,421	9,201	1,004
Holmes Community College	4,059	5,224	1,165	4,644	415
Itawamba Community College	3,827	6,428	2,601	4,907	866
Jones County Junior College	3,687	4,519	832	4,001	263
Meridian Community College	2,750	3,440	690	3,004	249
Mississippi Delta Community College	1,947	3,140	1,193	2,483	423
Mississippi Gulf Coast Community College	6,663	8,031	1,368	7,434	539
Northeast Mississippi Community College	2,855	3,285	430	3,052	149
Northwest Mississippi Community College	5,648	7,053	1,405	6,413	471
Pearl River Community College	3,398	4,594	1,196	3,949	407
Southwest Mississippi Community College	1,587	1,941	354	1,783	112
Overall	1,540	11,219	9,679	4,072	2,127

Table A16

Student to Faculty Ratio – SFR

Student to Faculty Ratio - SFR	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Coahoma Community College	28	28	23	28	28	26	25	26	22	23	19	16
Copiah-Lincoln Community College	24	24	20	23	22	19	19	23	21	23	23	20
East Central Community College	21	21	24	26	25	19	23	22	22	20	21	20
East Mississippi Community College	21	21	17	24	16	15	14	12	13	17	18	19
Hinds Community College	15	15	18	20	18	18	19	18	19	21	17	17
Holmes Community College	25	25	25	24	23	16	18	18	18	19	19	18
Itawamba Community College	28	28	31	23	20	20	19	19	19	17	18	19
Jones County Junior College	20	20	27	24	21	22	24	25	27	26	26	25
Meridian Community College	18	18	43	25	18	20	22	21	18	18	18	16
Mississippi Delta Community College	18	18	20	16	14	19	18	18	18	18	18	18
Mississippi Gulf Coast Community College	17	17	21	20	26	24	24	22	21	20	19	22
Northeast Mississippi Community College	22	22	25	23	23	22	20	22	24	18	25	22
Northwest Mississippi Community College	23	23	26	19	19	26	25	23	25	20	26	22
Pearl River Community College	14	14	16	16	16	16	16	16	17	17	16	18
Southwest Mississippi Community College	22	22	24	24	24	24	24	24	22	20	23	24
Average	**21.1**	**21.1**	**24.0**	**22.3**	**20.9**	**20.4**	**20.7**	**20.6**	**20.4**	**19.8**	**20.4**	**19.7**

Student to Faculty Ratio - SFR		Min.	Max.	Range	Mean	SD
Coahoma Community College		16	28	12	24	4
Copiah-Lincoln Community College		19	24	5	22	2
East Central Community College		19	26	7	22	2
East Mississippi Community College		12	24	12	17	4
Hinds Community College		15	21	6	18	2
Holmes Community College		16	25	9	21	3
Itawamba Community College		17	31	14	22	5
Jones County Junior College		20	27	7	24	3
Meridian Community College		16	43	27	21	7
Mississippi Delta Community College		14	20	6	18	1
Mississippi Gulf Coast Community College		17	26	9	21	3
Northeast Mississippi Community College		18	25	7	22	2
Northwest Mississippi Community College		19	26	7	23	3
Pearl River Community College		14	18	4	16	1
Southwest Mississippi Community College		20	24	4	23	1
Overall		12	43	31	21	4

Table A17

Percentage of Adjunct/Part-time Faculty – ADJ

% of Adjunct/Part-time Faculty - ADJ	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Coahoma Community College	55	56	40	46	41	49	41	31	43	46	37	38
Copiah-Lincoln Community College	30	29	29	50	22	36	37	47	20	31	33	27
East Central Community College	35	38	35	41	42	38	43	51	52	51	54	52
East Mississippi Community College	53	54	57	57	59	58	53	68	55	49	53	56
Hinds Community College	37	32	41	42	47	58	46	44	45	41	39	33
Holmes Community College	24	26	47	56	56	56	65	46	64	63	63	65
Itawamba Community College	19	22	25	57	56	54	54	63	53	52	51	47
Jones County Junior College	37	45	33	27	30	25	23	26	8	32	14	13
Meridian Community College	26	23	20	23	26	24	20	34	34	45	38	32
Mississippi Delta Community College	48	44	45	48	49	51	46	39	41	43	39	37
Mississippi Gulf Coast Community College	39	37	40	42	43	44	41	42	40	43	37	34
Northeast Mississippi Community College	5	5	7	17	23	26	22	19	10	19	15	21
Northwest Mississippi Community College	46	46	48	47	48	48	43	44	47	52	43	40
Pearl River Community College	28	30	32	33	30	25	28	35	34	34	34	34
Southwest Mississippi Community College	17	19	21	23	22	20	18	19	21	20	18	9
Average	**33.3**	**33.7**	**34.7**	**40.6**	**39.6**	**38.5**	**38.7**	**40.5**	**37.8**	**41.4**	**37.9**	**35.9**

% of Adjunct/Part-time Faculty - ADJ		Min.	Max.	Range	Mean	SD
Coahoma Community College		31	56	25	43.6	7.3
Copiah-Lincoln Community College		20	50	30	32.6	8.9
East Central Community College		35	54	19	44.3	7.2
East Mississippi Community College		49	68	19	56.0	4.7
Hinds Community College		32	58	26	42.1	6.9
Holmes Community College		24	65	41	52.6	14.4
Itawamba Community College		19	63	44	46.1	15.1
Jones County Junior College		8	45	37	26.1	10.6
Meridian Community College		20	45	25	28.8	7.8
Mississippi Delta Community College		37	51	14	44.2	4.5
Mississippi Gulf Coast Community College		34	44	10	40.2	3.0
Northeast Mississippi Community College		5	26	21	15.8	7.3
Northwest Mississippi Community College		40	52	12	46.0	3.1
Pearl River Community College		25	35	10	31.4	3.2
Southwest Mississippi Community College		9	23	14	18.9	3.6
Overall		5	68	63	37.9	13.8

Table A18

District Unemployment Rate – UNR

Average Unemployment Rate - UNR	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Coahoma Community College	8.2	8.8	11.7	12.7	12.7	11.7	8.9	9	8.8	7.7	6.5	6.3
Copiah-Lincoln Community College	6.8	7.1	10.1	11.2	10.8	11.9	8.2	8.4	7.1	6.8	6.2	5.7
East Central Community College	8.5	9.3	12.9	15.7	15.5	10.6	7.3	7.5	10.6	9.2	7.7	7.2
East Mississippi Community College	8.4	8.1	11.5	12.4	11.2	9.8	7.9	9	7.4	6.4	5.7	5.3
Hinds Community College	5.5	6	9.8	10.6	9.8	9.2	7.5	8.3	6.1	5.7	5.1	4.8
Holmes Community College	5.5	5.7	8	9.3	9.7	8	6.5	7.1	6.5	6	5.4	5.2
Itawamba Community College	5.1	5.4	7.8	9	8.6	14.7	8.6	8	5.5	5.1	4.5	4.4
Jones County Junior College	6.4	7	10.2	10.4	9.5	14.5	8.3	7.5	6.1	5.5	4.8	4.6
Meridian Community College	7.2	8	11.5	11.1	10.2	12.7	7.3	6.7	6.1	5.2	4.4	4.2
Mississippi Delta Community College	5.6	6.4	9.1	10.6	10	10	8.9	8.4	6.6	6.4	5.6	5.2
Mississippi Gulf Coast Community College	6.3	6.7	9.5	10.7	10.2	10.1	8.8	7.8	6.5	5.9	5.4	5
Northeast Mississippi Community College	7	8.1	12.3	11.9	10.9	9.2	7.8	6.8	5.8	5.1	4.4	4.2
Northwest Mississippi Community College	5.3	6	9	9.4	8.9	8.7	9	10.8	5.8	5	4.4	4.3
Pearl River Community College	5.2	5.8	8.2	9.4	9.4	8	8.4	10.1	6.1	5.7	4.9	4.6
Southwest Mississippi Community College	6.7	7.1	10.5	12.2	11.8	6.9	7.3	8.8	7.8	7.4	6.6	6.3
Average	**6.51**	**7.03**	**10.14**	**11.11**	**10.61**	**10.40**	**8.05**	**8.28**	**6.85**	**6.21**	**5.44**	**5.15**

Average Unemployment Rate - UNR		Min.	Max.	Range	Mean	SD
Coahoma Community College		6.3	12.7	6.4	9.4	2.3
Copiah-Lincoln Community College		5.7	11.9	6.2	8.4	2.1
East Central Community College		7.2	15.7	8.5	10.2	3.0
East Mississippi Community College		5.3	12.4	7.1	8.6	2.3
Hinds Community College		4.8	10.6	5.8	7.4	2.1
Holmes Community College		5.2	9.7	4.5	6.9	1.5
Itawamba Community College		4.4	14.7	10.3	7.2	2.9
Jones County Junior College		4.6	14.5	9.9	7.9	2.9
Meridian Community College		4.2	12.7	8.5	7.9	2.9
Mississippi Delta Community College		5.2	10.6	5.4	7.7	2.0
Mississippi Gulf Coast Community College		5.0	10.7	5.7	7.7	2.0
Northeast Mississippi Community College		4.2	12.3	8.1	7.8	2.8
Northwest Mississippi Community College		4.3	10.8	6.5	7.2	2.3
Pearl River Community College		4.6	10.1	5.5	7.2	2.0
Southwest Mississippi Community College		6.3	12.2	5.9	8.3	2.1
Overall		4.2	15.7	11.5	8.0	2.4

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