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DO INTERCOLLEGIATE ATHLETICS SUBSIDIES CORRELATE WITH EDUCATIONAL SPENDING? AN EMPIRICAL STUDY OF PUBLIC DIVISION-I COLLEGES AND UNIVERSITIES

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DO INTERCOLLEGIATE ATHLETICS SUBSIDIES CORRELATE WITH EDUCATIONAL SPENDING? AN EMPIRICAL STUDY OF PUBLIC DIVISION-I COLLEGES AND UNIVERSITIES

DISSERTATION

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the College of Education at the University of Kentucky

By

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ABSTRACT OF DISSERTATION

DO INTERCOLLEGIATE ATHELTICS SUBSIDIES CORRELATE WITH EDUCATIONAL SPENDING? AN EMPIRICAL STUDY OF DIVISION-I COLLEGES AND UNIVERSITIES

Intercollegiate athletics are a prominent feature of American higher education. They have been characterized as the "front door" to the university due to their unique ability to draw alumni and other supporters to campus. It is often supposed that the exposure from high-profile athletics produces a number of indirect benefits including greater institutional prestige. Such exposure comes at a cost, however, as most Division I athletics programs are not financially self-sufficient and receive institutional subsidies to balance their budgets. At present, it is unclear how institutions budget for athletics subsidies or whether the recent increases in subsidies have impacted the overall financial picture of colleges and universities. Prior research has shown that athletics subsidies and student tuition and fees are not significantly correlated for public Division I institutions, which suggests the possibility that institutions have reallocated funds from other core areas to athletics. In this dissertation, the relationship between athletics subsidies and one of the most important core areas of the university – education and related activities – was examined. This relationship was investigated using fixed-effects structural equation models to analyze a panel dataset of public Division I institutions.

It was found that total athletics subsidies (school funds and student fees) per student and education and related spending per student were positively correlated. This suggests that rather than decrease educational spending, institutions that increase total athletics subsidies have simultaneously increased their educational expenditures. However, in the analyses involving the more restrictive definition of athletics subsidies, it was shown that athletics subsidies from school funds was not correlated with educational spending. The results also provided some evidence that differences in the relationship between athletics subsidies and educational spending exist according to Carnegie classification and level of athletics competition. The findings from this study have a number of implications for higher education policy and future research. The absence of a negative relationship between athletics subsidies and educational spending suggests that athletics subsidies are not associated with decreases in educational spending that could ultimately harm the quality of education provided by colleges and universities.

Furthermore, the existence of a positive correlation between athletics subsidies and educational spending and the fact that core revenues were controlled for in the models suggest the possibility that institutions have redirected funds from other areas to support education and athletics.

KEYWORDS: intercollegiate athletics, intercollegiate athletics subsidies, higher education economics, higher education finance, structural equation modeling

Michael J. Rudolph

April 27, 2017

Date

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DEDICATION

This dissertation is dedicated first and foremost to my lord and savior Jesus Christ for his grace, mercy, and favor throughout this process. There were far too many instances where I found myself "lucky" - whether it was in finding the right committee members or meeting deadlines at the very last moment – for them to be mere coincidences. I also dedicate this dissertation to my wonderful wife, Laura, for all of her love, support, patience, and encouragement as I pursued yet another degree. In nearly nine years of marriage I have been in school for eight and also working full-time during most of those years. I imagine that after all of this time your family began to think I was striving to be a professional student and would never actually finish my formal education. Thank you for enduring and being understanding of all of the long hours and the weekends I have spent completing coursework and working on my dissertation, often at the expense of our time together. I cannot wait for us to pursue all of the vacations and weekend getaways that we have discussed but delayed for so long.

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CHAPTER ONE: INTRODUCTION

Resource allocation in higher education has received increasing public attention in recent years in part due to the continued rise of published student tuition and fee rates (Ehrenberg, 2000). Even after accounting for inflation, tuition and fees were 3.25 times higher in 2014-15 than they were 30 years prior at public four-year institutions (Baum & Ma, 2014), where the majority of students pursuing a four-year degree are enrolled (Snyder & Dillow, 2013). In real 2014 dollars, this represents an increase from $2,810 to $9,139 for in-state students. Climbing tuition rates have led to considerable public scrutiny along with demands for greater accountability for institutions to hold down costs and limit future tuition increases (Wollan & Lewin, 2009; Nelson, 2013; Woodhouse, 2015; and Kapsidelis, 2016). In response, a number of states are working toward new legislation that will limit annual tuition increases to a fixed amount between 2 and 6 percent (e.g. Maryland and Florida) or the rate of inflation (Wisconsin, Texas, and Georgia) (Dance, 2005; Dunkelberger, 2014; Stein & Herzon, 2015; Watkins & McCrimmon, 2015; Sheinen, 2016).

A number of explanations have been proposed for the rising costs of higher education, and those explanations can generally be classified into two categories: mismanagement of resources and cost disease. The former view has received much attention through the media, and typically follows that an “academic arms race” is taking place, leading institutions to construct lavish facilities and services, such as suite-style dormitories, gourmet meals, and fitness centers in the competition to attract top students (see Zemsky, Wegner, & Massy, 2005; Winston, 2000; Ehrenberg, 2000; and Smart, 2007). The cost disease argument is based in economic theory and supposes that in times of economic prosperity, private industry is able to increase its profits through increased productivity, which leads to wage increases for its workforce. Colleges and universities are unable to increase productivity in a similar manner without compromising the quality of their education and services, but must also pay higher wages in order to successfully compete with industry for an educated workforce (see Massy, 1996; Becker & Lewis, 1993; Archibald & Feldman, 2001). The net result is cost increases for colleges and universities, which are forwarded on to the consumer in the absence of increased funding to subsidize the services provided.

There is also a third explanation for the rise in college tuition and is one that has been oft-cited within the higher education community itself. This explanation suggests that tuition increases are primarily, if not entirely, the result of declining state appropriations (American Academy of Arts & Sciences, 2016). Between 2008 and 2013, states have collectively decreased their funding of public institutions by 21 percent or $14.1 billion ("Federal and state funding," 2015). As an example, the University of Illinois-Champaign has seen its state funding decrease from $526.6 million in 1987 to $335.3 million in 2012 (in real 2012 dollars) ("Twenty-five years of declining state support," 2014). While some institutions have fared better than the University of Illinois in terms of state support, it is certainly not alone in its experience. The continued decline in state funding has forced public institutions to become increasingly reliant on other sources of revenue, most notably student tuition and fees (Fowles, 2014). Institutions have used tuition to balance their budgets because it is the revenue stream over which they have had the greatest control and student demand has been largely inelastic with respect to price up to this point (Funk, 1972; Ghali, Miklius, & Wada, 1977).

Faced with declining state support and mounting pressure to limit tuition increases, public institutions have been forced to make a variety of difficult financial decisions over the past decade. Such cost-saving measures as hiring freezes, employee furloughs and layoffs, administrative re-structuring, and early retirements have become commonplace (Pelletier, 2011; Blackford, 2016; Box, 2016). A number of institutions have eliminated certain degree programs as well, leading to the closing of academic departments and with it the laying off of tenured faculty (Douglas-Gabriel, 2016; Brown, 2016). As a university contemplates such actions, it must consider not only the economic costs and benefits of each program but also the intrinsic value it provides to the institution and its constituents. This raises the question of *how does a university make the determination that one program is more valuable than another?*

Bowen (1980) was among the first to suggest that the primary goal of colleges and universities is to increase their influence and prestige. Moreover, he argues the only limitation on how much schools will spend in pursuit of greater prestige is the amount of revenue they are able to obtain. Garvin (1980) has further expounded upon Bowen's theory, commonly known as the Revenue Theory of Costs, by suggesting that a university's overall prestige is a weighted sum of the prestige of its academic departments. He argues that each department's prestige is based chiefly upon the prestige of its discipline and secondly upon its standing within that discipline. In other words, a lower tier physics program is believed to provide greater prestige than a top-ranked Spanish program. Alpert (1985) has observed that when resources for higher education were relatively abundant during the 1950s and 1960s, colleges and universities expanded almost unilaterally, adding or enhancing programs in a large number of disciplines. In more recent decades, however, competition for campus resources has intensified, leading the university to allocate resources in a less egalitarian manner by favoring those programs that bring the greatest prestige and external revenues (Pfeffer & Moore, 1980).

Beyond academic programs, another activity that can generate a high level of visibility and recognition for the university is a successful Division-I athletics program. Athletics has been famously characterized as the "front door to the university," meaning that it is the first and perhaps only contact many outside of campus will ever have with the institution (Toma & Cross, 1998). There appears to be considerable truth in this statement as athletic events have shown a unique ability to draw crowds of current and prospective students, parents, and alumni to campus in a manner that is unmatched by other activities (Toma, 1999). Furthermore, televised games offer significant national exposure, particularly for schools in the Power 5 conferences (Big Ten, Big 12, SEC, ACC, and PAC-12). Such exposure is believed to generate a "halo effect," leading prospective students and other outside observers to conclude that an institution whose athletics programs are successful is a successful institution in general (Fisher, 2009; Quattrone, 2008).

In addition to greater visibility and prestige, it has often been argued that Division-I athletics provide a number of indirect benefits to the university. One such benefit is the purported windfall of student applications resulting from a successful football or basketball season (Clotfelter, 2011). The case of Boston College, whose student applications rose 33 percent following the football team's upset victory over Miami University in 1984, is frequently cited to support such claims (Marklein, 2001). More recently, Butler University saw a 40 percent increase in applications following its back-to-back appearances in the championship game of the NCAA basketball tournament in 2010 and 2011 (Johnson, 2013). Such increases in applications are attractive to universities because they provide considerable flexibility in admissions, assuming the overall quality of the pool remains constant (or improves). For example, the institution can increase its enrollment and generate additional revenue, all while maintaining its current student quality (Pope & Pope, 2009). Alternatively, enrollment can be held constant, which allows the institution to become increasingly selective.

Others have suggested that athletics are an important means of increasing philanthropic donations, in part because they provide a reason for alumni and other prospective donors to participate in on-campus events (Fizel, 2004). Once on campus, development officers have convenient access to prospective donors to solicit gifts for a variety of purposes, athletics as well as academic. The recent example of Texas A&M University appears to support such a connection between athletics and fundraising. Following its first season in the SEC in 2012, one in which its football team posted an 11-2 record and defeated Oklahoma in the Cotton Bowl, A&M raised $740 million in donations, $300 million more than any other year in school history (Khan Jr., 2013).

Athletics programs have also been credited with helping to build a sense of campus community, developing important character and leadership skills in student-athletes, and even improving access for low-income and minority students to higher education (Clopton, 2009; French, 2004; Bok, 2003). However, research examining the many indirect benefits of intercollegiate athletics to the university has provided mixed results (see for example Pope & Pope, 2009; Stinson & Howard, 2007; Brooker & Klastorin, 1981). Furthermore, studies that have found positive and significant relationships between athletics and student applications or alumni donations have generally shown such effects to be small (Frank, 2004). For example, Pope and Pope (2009) estimated that an NCAA basketball tournament appearance would lead to a 1 percent increase in applications and a top-20 football ranking a 2.5 percent increase, controlling for other factors. In surveying the body of empirical evidence, Frank (2004) has concluded that "institutions overspend on athletics in order to reap few benefits."

Despite the lack of evidence to support the argument that universities reap substantial indirect benefits from Division-I athletics programs, there is little question that many institutions assign a high priority to building (and maintaining) a successful program. Between 2004 and 2014, FBS athletics departments increased their median spending from $29.0 million to $64.0 million (120 percent) and FCS departments from $7.8 million to $15.1 million (94 percent) (Fulks, 2015). As a baseline for comparison, the total rate of inflation during this time period was only 23 percent (US Department of Labor, 2015). Increased athletic spending in and of itself may not be an issue if it coincides with increases in revenue from ticket sales, television contracts, or donations. This has not been the case for most Division-I institutions, however, as their reliance on institutional subsidies to balance athletics department budgets has only increased. Data indicate the median FBS subsidy climbed from $7.2 million to $12.9 million (79.2 percent) between 2006 and 2014 (Fulks, 2008; Fulks, 2015).

Counter to what one might expect, it is not the high-profile programs who generally have the largest subsidies. For example, Ohio State, Alabama, and Texas all reported $0 in total subsidies in 2015 (USA Today, 2016). Rather, FBS institutions in non-power conferences, such as the Mid-American, Atlantic-10, and American Athletic

Conferences, have been among the worst offenders as far as subsidies are concerned. Houston, Connecticut, and Delaware all reported total subsidies in excess of $25 million in 2015 (USA Today, 2016). Unable to generate the same level of revenue through ticket sales, television contracts, and donations as Power 5 programs, these institutions are forced to heavily subsidize athletics in order to remain competitive. In short, the desire to compete in Division-I athletics has given rise to an arms race in which no one institution is likely to de-emphasize athletics and curtail spending voluntarily (Frank, 2004).

Despite the unprecedented growth in intercollegiate athletics spending there has been relatively little empirical research on the impact of subsidies on university budgetary decisions. A portion of student fees are earmarked for athletics at most institutions, but it remains unclear how universities budget for subsidies coming from institutional funds. For example, do subsidies represent a fixed line-item within the student services, facilities, or another unit-level budget, or are reserve and other funds re-allocated from other departments at the end of the year to cover athletics budget shortfalls? Furthermore, it is not readily apparent what role, if any, athletics subsidies have played in the recent rise in student tuition.

To date, a few researchers have studied the relationship between athletics on-field success and student charges. Alexander and Kern (2009) sought to determine the correlation between various measures of athletics success and in-state and out-of-state tuition. Their analysis showed a positive correlation between football and men's basketball win percentages with both in-state and out-of-state tuition, although effects were most pronounced for schools in the Power 5 conferences. In another study, Smith (2012) found a positive relationship between football success and a combined measure of student costs (tuition, fees, and room and board), controlling for other factors. However, the relationship between basketball success and student charges was non-significant.

A recent study by Jones and Rudolph (2016) provides the most direct look at the effect of subsidies on student charges. Their study utilized data for 223 public, Division-I institutions from the *USA Today NCAA Athletic Department Revenue Database* (2016). They estimated a series of fixed-effects models to test the relationship between athletics subsidies and both in-state and out-of-state student charges (tuition list price and net price). Controlling for a variety of factors related to the state's economy, student demand, regional competition, and student financial aid, it was shown that the correlation between athletics subsidies and student charges was non-significant in all of the model specifications.

The finding by Jones and Rudolph (2016) that athletics subsidies are not correlated with student charges at public institutions is not entirely surprising. Although Bowen (1980) has suggested that universities seek to raise additional revenue rather than decrease costs, the ability of public institutions to increase their tuition rates is generally restricted because they are subject to approval from a state governing board. As a result, it is possible that universities are having to decrease costs in other areas, such as instruction or student services, in order to provide increasing institutional support to athletics.

In this vein, the goal of this dissertation was to examine the extent to which public universities are "robbing Peter to pay Paul" by re-directing funds from instructional activities to support athletics programs. To date, empirical research on this subject has not been published, and related studies have focused upon the impact of athletics on student costs rather than institutional resource allocation. The current study complements this existing research because it focuses upon the expense, rather than revenue side of the university budget. Moreover, this study is timely because of the present financial climate in higher education, and important because it speaks to the impact of athletics on the core mission of public higher education. The research questions addressed in this study include:

1. How do the rates of growth in total athletics subsidies per FTE and school funds per FTE compare to the rate of growth in education and related (E&R) expenditures per FTE for public Division I institutions between 2005 and 2014?
2. What is the relationship between total athletics subsidies per FTE and E&R expenditures per FTE, controlling for other factors?
3. Is the relationship between total athletics subsidies per FTE and E&R expenditures per FTE dependent upon institution type (research university, flagship university) or characteristics of the athletics program (reporting structure, level of play), controlling for other factors?
4. What is the relationship between school funds per FTE and E&R expenditures per FTE, controlling for other factors?
5. Is the relationship between school funds per FTE and E&R expenditures per FTE dependent upon institution type (research university, flagship university) or characteristics of the athletics program (reporting structure, level of play), controlling for other factors?

In chapter two of this dissertation, a review of the literature pertaining to university resource allocation is presented. This discussion begins with an overview of the resource allocation process and various university budget models that are used to distribute funds to units and departments across campus. Subsequently, the types of revenues and expenditures and their relative importance to public and private four-year institutions is presented. This is followed by a discussion of the empirical research on indirect benefits to the university from intercollegiate athletics. Lastly, the theoretical framework and research questions that were used to guide the study are presented. The theories presented include: property rights theory of the firm; principle-agent theory; resource-dependence theory; and Bowen's revenue theory of costs.

Chapter three begins with a discussion of the research hypotheses for the study, which have been developed according to existing economic and higher education theory. Next, the research methodology is described with respect to the data collection and preparation, the empirical models that were tested, and the statistical procedures used to analyze the dataset. Chapter four presents the results from the analyses used to investigate each of the five research questions. The final chapter of this dissertation summarizes key findings and discusses the implications of the results for higher education theory and future research.

CHAPTER TWO: LITERATURE REVIEW

This chapter presents an overview of the literature in three principal areas that provide the necessary background information to contextualize the proposed study. The first section focuses upon university resource allocation, including a review of higher education budget models. It follows with a presentation of university revenue and expense categories and differences in revenue and expenditure patterns between public and private four-year institutions. The second section of this chapter reviews the most frequent justifications for intercollegiate athletics on the basis of proposed indirect benefits. These benefits include: increased marketing and prestige; number and quality of student applications; philanthropic donations; and student-athlete character development. The arguments for each of these areas is presented followed by a review of existing empirical research that has tested these assumptions. The third section presents the theoretical framework for this study drawing upon key economic and higher education theories to shed light on university financial decision-making processes and priorities. Finally, the research questions that will be examined in the proposed study are presented at the end of the chapter.

Resource Allocation in Higher Education

Budget Models

Each college and university develops an annual budget in order to specify how resources are to be allocated across departments and for what purpose. A useful definition of a budget is provided by Wildavsky (1988, p.2) who characterizes it as a "link between financial resources and human behavior in order to accomplish policy objectives." Four types of higher education budgets have been identified by Barr and McClellan (2011):

operating, capital, auxiliary, and special funds. Most expenses incurred during the day-to-day operations of core units such as academic departments and administrative units are contained within the operating budget. Capital budgets consist of revenues and expenses for large capital projects such as new building construction or renovation (McClellan & Barr, 2011). It is common for capital projects to be assigned their own budgets because revenues are restricted and projects may span multiple fiscal years. Many auxiliary units possess distinct budgets because, as non-core units, they are expected to accrue sufficient revenues to cover all of their expenditures. Common auxiliary units include student housing, dining services, teaching hospitals, and Division-I athletic departments (Clark & d'Ambrosio, 2006). Lastly, special funds budgets may be designated for specific programs or services, such as an endowed scholarship (Goldstein, 2005).

The annual budget is unique to each college or university, but a number of commonalities exist across American higher education. First, each budget has a finite life cycle that in most cases is 12 months and follows the institution's defined fiscal year. Generally, a fiscal year is the period between July 1st and June 31st but may vary depending on the institution (Barr & McClellan, 2011). The fiscal year determines when new funds are allocated and charges cease to be made against funds for the current year. Second, the budgets of all institutions are governed by a number of constraints. For all colleges and universities – for-profit and non-profit alike - expenditures are not to exceed revenues in a given fiscal year (Granof, Khumawala, 2013). An annual deficit may not result in the immediate failure of an institution, but persistent losses are not sustainable. And third, a number of revenues are restricted – such as those associated with special funds or capital projects – and cannot be used to support activities beyond those for which they were specified (Massy, 1996). Moreover, some expenses cannot readily be eliminated or even decreased from one budget to the next. One example is the salaries and outlays of tenured faculty who cannot be let go except in cases of dire financial need or gross incompetence.

Resource allocation may follow a centralized process, with decisions made largely by the central administration, or a decentralized process where budgeting authority is delegated to the individual units. In a highly centralized environment, a small group of administrators is responsible for compiling financial information, developing budget projections, and overseeing budget operations. Institutions that operate from a centralized position seek to closely regulate the spending of each unit in an effort to align its behavior with institutional priorities (Rodas, 1998). In practice, centralized budget processes tend to limit unit accountability, which frequently leads to wasteful spending (Hoenack, 1994). Centralized models also tend to foster distrust between units and the central administration because limited financial information is transmitted from the administration to the units.

Historically, most institutions operated under a centralized budgeting process; however, many have moved to decentralized models in recent years due to the shortcomings of centralized control as well as the growing complexity and size of the university (Massy, 1996; Rodas, 1998). Decentralization seeks to place much of the responsibility for budgeting and resource management in the hands of deans and other unit leaders under the premise that those individuals are most informed regarding what resources are needed and how they can best be utilized. Furthermore, decentralization increases each unit's knowledge and understanding of the budgeting process, and leads to greater communication between the administration and individual units (Goldstein, 2005). However, decentralized budgeting, depending on the model that is in place, can lead to principal-agent problems if control mechanisms or incentives are not developed to ensure units pursue institutional goals and not simply their own agenda (Rodas, 1998). Another common issue is that the central administration may itself be resource-poor, making it difficult to fund new programs and initiatives (Lasher & Greene, 1993).

A number of budget models – centralized and decentralized - that have been developed within higher education over the past 50 years will be presented in the subsequent paragraphs. Specifically, incremental budgeting, formula and performance-based budgeting, zero-based budgeting, planning, programming and budgeting systems, and responsibility-centered management will be presented in some detail. Additionally, some notable advantages and disadvantages of each approach will be discussed.

Incremental Budgeting

One of the oldest yet still the most widely used budget model in higher education is line-item or incremental budgeting (IB) (Schuh, 2003). Development of a new annual budget using this method begins with the budget from the most recent fiscal year, with increases or decreases being applied to the individual line-items or more broadly to the college, school, or unit-level budgets (Lasher & Greene, 1993). For example, a unit may be given a flat three-percent increase to its budget from the previous year. Responsibility for developing the budget resides with the central administration, which generally communicates with units in a top-down manner. Units may have the opportunity to request additional funding for new faculty lines or technology upgrades for example, but the decision of which needs will be addressed is made by the administration. Once the new budget is developed, it is communicated to the units who are then responsible for executing their share of the overall budget. Expenditures are monitored closely by the administration in order to identify and address potential overages within unit-level budgets or line items (Massy, 1996).

IB has a number of inherent strengths. First, it is the budget model that arguably provides the central administration with the greatest control over resource allocation because the administration allocates all resources and specifies how they are to be used. Because all funds flow through the central administration, it should also be capable of locating funds for new initiatives, such as the launching of a new graduate program. Second, IB is a simple, straight-forward approach because adjustments are made to the preceding budget and line items are not examined in detail (Barr & McClellan, 2011). Moreover, the time to develop and implement the annual budget should be less than in other forms of budgeting because of the relatively few steps and persons involved. Finally, since the central administration develops and tracks the budgets of individual units, possible issues may be identified and addressed prior to the end of the fiscal year.

On the other hand, a number of key disadvantages can be attributed to IB, and those disadvantages loom large enough that many institutions have transitioned to other budget models (Rodas, 1998). For one, IB is based on a flawed assumption, namely that resources were properly allocated in previous fiscal years and only minor adjustments are necessary moving forward (Lasher & Greene). Such reasoning is flawed because the priorities of institutions change over time, and the costs of all activities and services do not necessarily increase at the same rate. Second, programs are automatically continued from one year to the next, in most cases, without consideration of their continued viability or contribution to the institution's current priorities. Still another issue with IB is that it fails to promote fiscal conservativeness by unit budget managers. In fact, units have a *disincentive* to save money because unused funds are usually collected by the administration at the close of the fiscal year, and a large leftover balance may cause a unit to receive less funding in subsequent years (Massy, 1996). Thus, departments are encouraged to spend any remaining funds before the end of the fiscal year.

Zero-based Budgeting

Whereas incremental budgeting does not entail a detailed review of line items, zero-based budgeting (ZBB) requires that each line item be justified on an annual basis (Schloss & Cragg, 2013). ZBB is designed to allow the administration opportunity to shift resources and better align them with institutional priorities, locating resources where they are most needed. The budget process for ZBB is typically managed by the central administration but tends to be more collaborative than IB due to the direct involvement of the units in the development of their annual budgets. This leads to less information asymmetry between the administration and the unit by comparison with IB.

ZBB has several advantages, most notably its ability to minimize wasteful spending. Because each line item is reviewed on an annual basis, poor management of funds in previous years can be corrected in the future. Furthermore, the central administration can shift funds from one area to another if less funds are required to sustain an existing activity and new costs have been identified elsewhere. Another advantage is that the budget process involves sharing of information between the unit and the administration, and the ability of the unit to request funding may improve buy-in and ownership.

The clearest disadvantage for ZBB is the time required of all groups involved in the budget process. The steps of requesting and preparing detailed budgets and line-item justification for each unit, reviewing all line items, and allocating the necessary funds for each line item are time and resource intensive (Barr & McClellan, 2011). As a result, very few institutions currently adhere to a pure ZBB approach. Institutions have been much more inclined to implement a hybrid model that involves certain aspects of ZBB, such as the allocation of funding for discretionary line items according to ZBB principles, with more static items such as tenured faculty salaries being funded according to IB (McClellan, & Stringer, 2009). Another potential drawback to ZBB is that it may suffer from a lack of rapport between the central administration and the units if the review and decision-making process by the administration is not sufficiently transparent. As with IB, departments may become frustrated and view the process as arbitrary if their requests for additional funding are repeatedly denied and no explanation is provided.

Planning, Programming, and Budgeting Systems

A quantitative approach to organizational budgeting called planning programming, and budgeting systems (PPBS) was developed during the 1960s and implemented within a few colleges and universities, including the University of California, Ohio State, Princeton, and the University of Utah during the 1970s (Meisinger & Dubeck, 1985). However, the approach has disappeared from higher education altogether in the decades since (Lasher & Greene, 1993). The focus of PPBS was to closely tie institutional objectives with resource allocation, and it relies upon careful planning to identify program-specific outcomes and the resources needed to achieve those outcomes (Vandement, 1989). Additionally, a list of alternative approaches and their costs must be developed for each outcome in order to select the most cost-effective means of accomplishing that outcome. The unit of analysis in PPBS is the program, which may range from degree programs to student services initiatives and even maintenance of the physical plant (Bers, Head, & Palmer, 2014). To be successful, PPBS requires clear and measurable objectives, detailed cost estimates, outcomes data, and careful analysis of all information.

PPBS has a number of strengths, including its ability to integrate resource management and planning (Caruthers & Orwig, 1979). The institution, once it has created long-range plans and cost estimates, is able to justify all expenses according to their relationship to the stated objectives. Another strength is that PPBS provides a clear sense of direction to the activities of the university, which theoretically improves alignment of the goals of the agents (units) with those of the administration (principal) (Caruthers & Orwig, 1979). Moreover, without PPBS the institution may not ordinarily engage in long-term planning or may fail to develop quantifiable outcome measures. Finally, if conducted successfully at the program level, the institution is able to better understand the costs associated with each program as well as the costs of alternatives.

PPBS is a logical approach to organizational budgeting, but is one that institutions have found difficult to implement and sustain. As with ZBB, the amount of time and resources the university is able or willing to devote to the budget process is often limited. PPBS requires a substantial volume of quantitative information to be compiled and analyzed on an annual basis, including program costs and performance towards stated objectives (Lasher & Greene, 1993). Moreover, PPBS assumes that an institution has access to cost information for all programs as well as for possible alternatives, which is rarely if ever the case. Institutions have also found it difficult to define outcomes and determine quantitative means of measuring those outcomes (Barr, 2004). Another problem for PPBS is that the unit of analysis is the program, which is inconsistent with the manner in which most institutions estimate costs and allocate resources. Resources tend to be allocated at the school or department level, but rarely the program level. Because programs often draw upon resources from multiple units, estimating their total costs is an onerous task. As an example, a department of biology may offer undergraduate programs in biology, biology education, and zoology as well as graduate programs in ecology, genetics, and microbiology. More than likely, biology faculty will teach in most if not all of these programs.

Formula and Performance-Based Budgeting

Two other approaches to higher education budgeting, formula-based budgeting (FBB) and performance-based budgeting (PBB), are discussed together in this section due to their evident similarity. With FBB, resources are allocated according to a set of criteria selected by the institution, and may include such measures as student enrollments, degrees conferred, student contact hours, or externally sponsored research (Pickens, 1982). The purpose of a funding formula is to relate program demand with costs, and formula are based upon historical data, projections, and desired levels of output (Lasher & Greene, 1993). For a criterion to be included in the formula, it must be both measurable and quantifiable. At its foundation, FBB attempts to provide an equitable means of allocating resources as well as to implement criteria that align with the priorities of the institution. Similarly, PBB identifies criteria that are used to gauge success towards meeting desired outcomes (Daugherty & Natow, 2015). These may include similar items to those noted above or other incentives that signal increases in performance. While not necessarily the case with FBB, PBB seeks to identify criteria that are moveable and serve to motivate departments to improve their performance.

Due to their similarities, the two systems possess many of the same strengths and weaknesses. For either approach, the allocation of funds is arguably an equitable and objective means of allocated resources (Lasher & Greene, 1993). Additionally, once the criteria are defined, PBB and FBB are relatively simple to implement, assuming the required data are easily obtained. Further, the criteria used for PBB may serve to motivate individual units to improve in the areas measured by the institutional performance indicators. The possibility of additional funding or the fear of decreased funding in future years should encourage units to manage resources in a manner consistent with their intended purpose.

Critics of formula budgeting and PBB cite the difficulty in identifying appropriate criteria and assigning reasonable weights to each criterion in the funding formula (Caruthers & Orwig, 1979). If not chosen carefully, units may complain that criteria are arbitrary or inappropriately emphasized. Another concern is the possibility that FBB and PBB may further strengthen units that are already resource-rich at the expense of resource-poor units. In other words, the units that have the most resources at their disposal are likely to be in the best position to pursue and be successful in achieving the performance criteria. Still another issue for these two methods is that they inherently emphasize certain behaviors, while devaluing others. Departments may focus exclusively on the criteria in the formula at the expense of other, potentially critical activities that are not linked to resources.

Responsibility Centered Management

One of the more common methods of decentralized resource allocation is known as responsibility centered management (RCM) budgeting. This approach follows the Harvard mantra of "every tub on its own bottom" where each unit, or cost center, is responsible for generating its own revenues and covering all of its expenses (Hoenack & Collins, 1990). Cost centers are typically identified as each college or school and administrative, auxiliary, and service unit. In addition to holding each unit accountable for its costs, the responsibility of developing and monitoring the budget is largely transferred to the unit itself. Accordingly, deans and other unit leaders are able to focus resources where they are most needed or will provide the greatest utility. Units are further incentivized by the fact that they are able to retain all of the revenues they raise. Another common feature of most RCM systems is the use of overhead charges (or taxes) applied to each unit by the central administration to cover its operating costs (Rodas, 1998). Units are often charged for their consumption of campus resources including utilities, facilities, technology, and a variety of administrative functions. In some institutions, enough funds are gathered by the administration to allocate subsidies or subventions to units that are unable to raise sufficient revenues on their own.

RCM has a number of advantages over the budget models that have been reviewed to this point. First, it leads to greater accountability for each cost center, as each is responsible for raising enough revenues to cover its costs. Units that fail to cover their costs must make up for any deficits by raising additional revenues or decreasing costs in subsequent years in order to repay the central administration. Second, RCM encourages entrepreneurial behavior by its deans and other unit leaders (Barr & McClellan, 2011). To increase revenues, departments may develop, for example, new revenue-generating programs or increase their fundraising efforts. Third, RCM places the responsibility for budgeting directly in the hands of those who are most familiar with a unit's operations and needs. Deans, department chairs, and even faculty are afforded much greater input into budget decisions than in other budget models.

RCM is not without its flaws, however. A frequent criticism is that it can accentuate principal-agent problems because units are given substantial freedom in deciding how to allocate their resources and may become too entrepreneurial (Schuh, Jones, & Harper, 2010; Barr, 2004). For example, a university may wish to decrease its average class size, whereas the college of engineering may prefer large classes in order to decrease faculty teaching loads and free up additional time for research. Hence, fostering participation in university-wide initiatives becomes difficult without explicit incentives. Another challenge with RCM is determining an equitable process for making overhead charges and allocating subventions (Rodas, 1998). Overhead charges perceived to be excessive, or large increases from one year to the next, will be viewed negatively by units who then may decide to look for ways around the system. Discontent may also arise over subventions. Units that generate positive net revenue and receive little to no subventions may view units that are provided sizeable subventions as not pulling their weight (Barr & McClellan, 2011). Finally, the central administration may have difficulty securing enough revenue to fund its own operations or university-wide initiatives if overhead charges are insufficient.

Having reviewed several important budget models in higher education, the paper proceeds with a discussion of the primary types of revenues and expenditures for colleges and universities.

Revenues and Expenditures in Higher Education

One of the strengths of higher education in the United States is the diversity of revenue sources from which colleges and universities are able to draw. It is in part due to this diversity that institutions have been able to survive and even thrive following sustained periods of decline to one or more sources of revenue (Michael, 2005). While most institutions have multiple revenue streams available to them, the specific streams and size of those streams vary according to institutional type, size, mission, and geographic location. In this section, the various types of revenues and expenditures as well as their importance to public and private four-year institutions will be discussed.

Revenues

Broadly, higher education revenues can be classified as either restricted or unrestricted in their use. Restricted revenues may only be allocated for expenses that match their intended use, while unrestricted revenues can generally be used however the institution deems most appropriate (Lasher & Greene, 1993). Most colleges and universities are funded through a combination of the following: student tuition and fees, federal and state government appropriations, private gifts, grants and contracts, endowment income, and a handful of others such as auxiliary enterprises and hospital services (Toutkoushian, 2001). The most comprehensive public source of college and university financial data is available through the Integrated Postsecondary Education Data System (Department of Education, National Center for Education Statistics, 2015b).

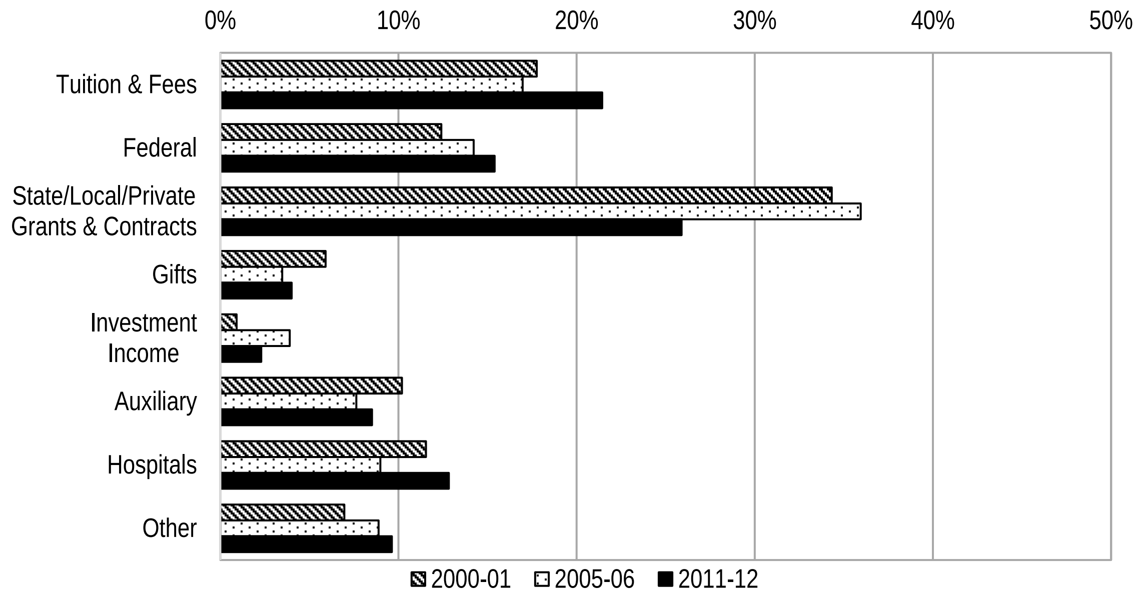
All institutions that participate in any form of Title IV financial aid are required to report their annual revenues and expenditures to NCES using either Governmental Accounting Standards Board (public institutions) or Financial Accounting Standards Board (private institutions) (National Center for Education Statistics, N.D.a). Although differences between the two accounting standards exist (particularly for expenditures) a careful review of their methodology as well as comparative statements provided by the NCES (Department of Education, National Center for Education Statistics, N.D.b) and Delta Cost Project (2011) allow for comparisons to be made between institutions of varying types.

To demonstrate the relative importance of each revenue source within higher education, the percentage of total revenues attributed to each source is shown in Figure 2.1 for all public four-year institutions during the time period of 2000-01 to 2011-12. Percentages for private not-for-profit four-year institutions are provided in Figure 2.2. Evident from Figure 2.1 is the reliance of public institutions on state, local, and private appropriations, gifts, and contracts. This category represents the largest source of funding in each year shown; however its place within the overall budget decreased from 34 percent in 2000-01 to 26 percent in 2011-12. Declines in state funding for public higher education have occurred not only in terms of the share of public funding within overall institutional budgets, but also in terms of real dollars. At public research universities the average revenue per student FTE (full-time equivalent) from state and local appropriations declined from $10,983 in 2000-01 to $7,902 in 2010-11, a decrease of 28 percent (Desrochers & Hulburt, 2014). Regardless of the reasons for declining state support of public higher education, Figure 2.1 demonstrates that public institutions have become more dependent upon student tuition and fee revenue, federal support (including federal student aid), and other revenues. From 2000-01 to 2011-12 each of these categories has seen its share within the overall revenue picture increase by about 3 percent (see Figure 2.1).

Private institutions, as one might expect, exhibit a heavier reliance on student tuition and fees in place of state, local, and private appropriations (see Figure 2.2). In 2000-01 and 2011-12, tuition and fee revenue represented nearly 40 percent of the budget for private colleges and universities compared to roughly 20 percent for public institutions. Additionally, private institutions drew upon private gifts and donations as part of their annual budget to a greater extent than public institutions over the time period shown: 11 percent compared with 4 percent in 2011-12. Federal appropriations and support (including federal financial aid), hospital services, auxiliary enterprises, and other sources of revenue each occupied a comparable share of the revenue for public and private four-year institutions.

Investment income occupies a consistent share of public institution revenues (1 to 4 percent) but fluctuates from -7 to 23 percent for private institutions. Greater insight into these ranges can be obtained through Table 1, which shows the percentage of total revenues from investment income for each year between 2000-01 and 2011-12 for public and private four-year institutions. It is evident from the table that in most years investment income occupies a greater share of private institutions' total revenues (median of 13 percent) than public institutions (median of 4 percent). Much of this difference can be attributed to the larger endowments of private institutions. For example, in 2011-12, the median endowment per student FTE for private doctoral universities was $63,700 compared to $15,500 for public doctoral universities (Baum & Ma, 2014).

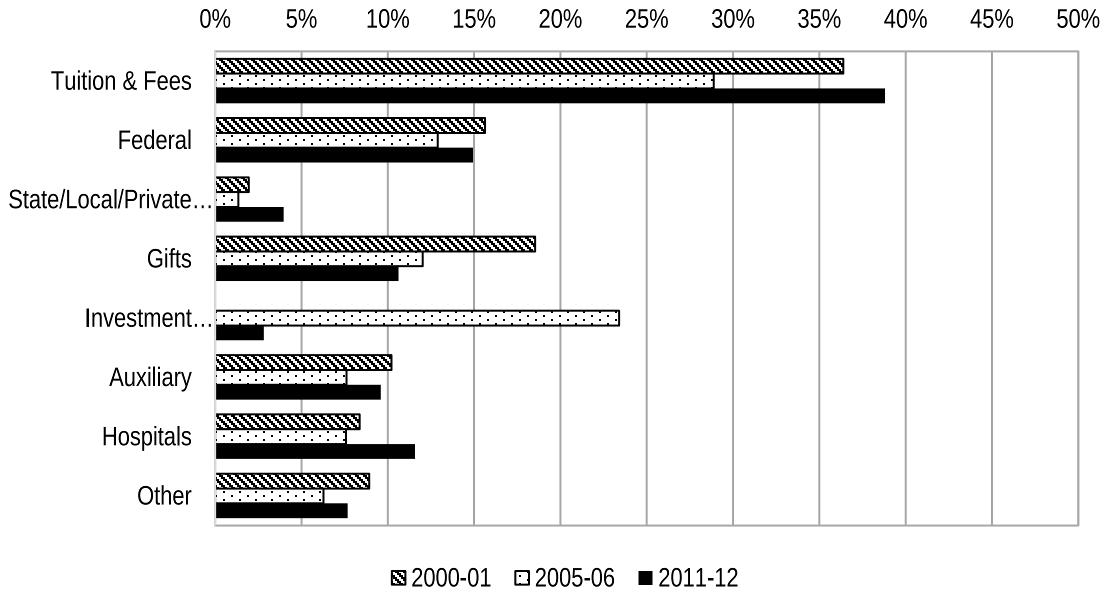
Figure 2.1
Percentage of Total Revenue by Category for Public 4-year Institutions in 2000-01, 2005-06, and 2011-12



Source: Data have been compiled from the Digest of Education Statistics provided by the National Center for Education Statistics.

Figure 2.2

Percentage of Total Revenue by Category for Private Not-for-profit 4-year Institutions in 2000-01, 2005-06, and 2011-12



Source: Data have been compiled from the Digest of Education Statistics provided by the National Center for Education Statistics.

Table 2.1

Percentage of Total Revenue for Public and Private Not-for-profit 4-year Institutions Attributable to Investment Income for 2000-01 to 2011-12.

	Public 4-year	**Private Not-for-Profit 4-year**
2000-01	1%	-4%
2001-02	NA	-8%
2002-03	NA	9%
2003-04	4%	23%
2004-05	5%	22%
2005-06	4%	23%
2006-07	7%	31%
2007-08	2%	5%
2008-09	-5%	-94%
2009-10	4%	17%
2010-11	5%	26%
2011-12	2%	3%
Median	4%	13%

Source: Data have been compiled from the Digest of Education Statistics provided by the National Center for Education Statistics.

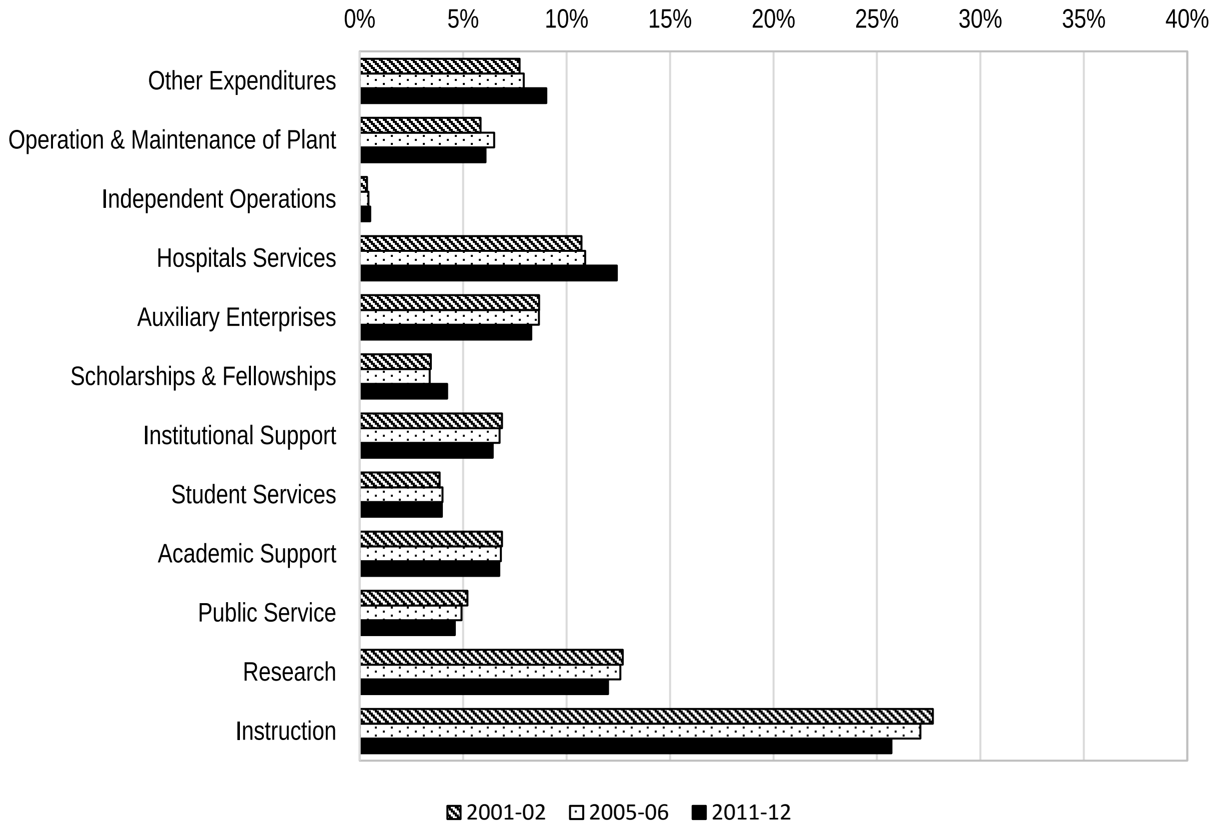
Expenditures

College and university expenditures have been functionally classified by the National Center for Education Statistics (NCES) into the following areas: instruction, research, public service, academic support, student services, institutional support, operation and maintenance of the physical plant, scholarships and fellowships, auxiliary enterprises, hospital services, independent operations, and other expenses and deductions (Department of Education, National Center for Education Statistics, 2015a). Provided in Figure 2.3 is the percentage of total expenditures according to functional category for all public four-year institutions during the time period of 2001-02 to 2011-12. Figure 2.4 shows the same information for all private, not-for-profit, four-year colleges and universities. Data for both sets of institutions have been extracted and compiled from the IPEDS database, with several transformations having been made to address differences in accounting. Specifically, the expenses for operation and maintenance of plant, depreciation, and interest are reported as totals for FASB institutions (private) but are aligned with other expense categories, such as instruction and research, for GASB institutions (public). The expenses for each of these three areas were subtracted from the corresponding expense categories and then summed to create totals for maintenance, depreciation, and interest. Lastly, for the sake of simplicity, the interest and depreciation expenses were added to the "other expense" category for both public and private institutions.

In comparing the expenditures of public and private institutions in Figures 2.3 and 2.4, the spending patterns are surprisingly similar, with most categories differing by only 2 to 3 percent. The largest expense category for both types of institutions is instruction, which ranges from 26 to 29 percent for 2001-02 to 2011-12. In general, public institutions appear to devote more resources to hospital services, public service, and research, while private institutions devote more resources to institutional support, independent operations, and student services. Though the data appear to indicate that public institutions allocated roughly 3 to 4 percent more of their resources to scholarships and fellowships than private institutions, this is likely an artifact from the different accounting standards that use different definitions of financial aid.

Figure 2.3

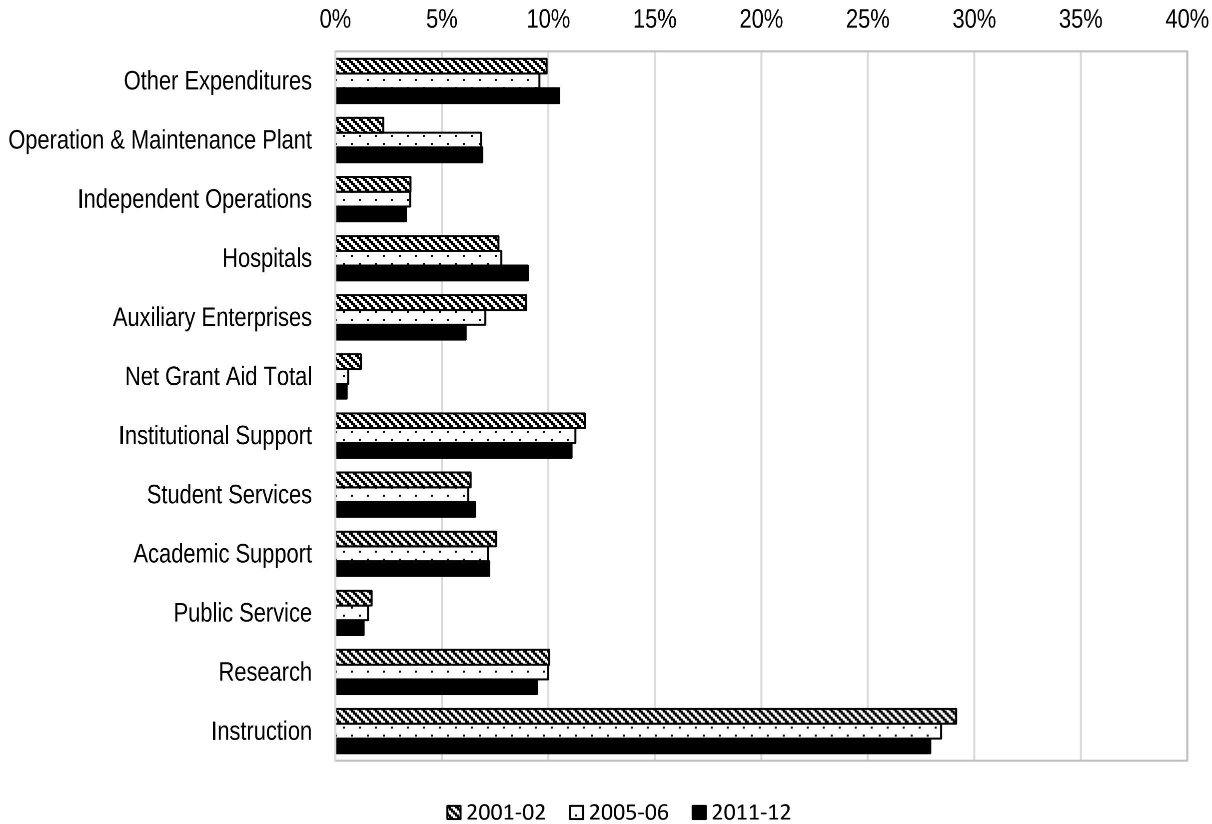
Percentage of Total Expenditures by Category for Public 4-year Institutions in 2000-01, 2005-06, and 2011-12



Source: Data have been compiled from the Digest of Education Statistics provided by the National Center for Education Statistics.

Figure 2.4

Percentage of Total Expenditures by Category for Private, Non-profit 4-year Institutions in 2000-01, 2005-06, and 2011-12



Source: Data have been compiled from the Digest of Education Statistics provided by the National Center for Education Statistics.

Intercollegiate athletics represent a special case in university budgeting. For many institutions – particularly Division II, III, and smaller Division-I programs – athletics expenses are reported as part of student services (McKeown-Moak & Mullin, 2014). With larger Division-I programs, for example most of the institutions in Power 5 conferences (ACC, SEC, Big Ten, Big 12, Pac 10), athletics departments are auxiliary units. Worth noting is that a handful of institutions (e.g. University of Florida) do not follow either of these models and instead have established an entirely independent association for their athletics department (Schneider, 2014). Based upon the discussion of core and auxiliary units on p. 10-11, one might assume that athletics departments serving as auxiliary units would be required to generate sufficient revenues to cover their expenses while those departments located under student services would not. As it turns out, both types of departments frequently receive substantial subsidies in the form of student athletics fees and institutional funds. For example, the Ohio University and North Carolina State University athletics departments, both auxiliary units, were the beneficiaries of $19 million and $26 million in institutional subsidies in 2014-15, respectively (USA Today, 2016a). Thus, the athletics department may be one of the few (and perhaps only) auxiliary units on campus that receives institutional subsidies allocated from the general fund, which is comprised largely of student tuition and fees and state appropriations.

Summary

In this section, the ways in which colleges and universities attempt to allocate and control their resources through various budget models has been presented in some detail. From this discussion, several important conclusions can be drawn. First, a university's ability to control the diversion of resources depends, to a high degree, upon its budget model. A centralized model allows for close monitoring by the administration, but may lead to wasteful spending if budgets are not revisited and adjusted annually. Decentralized models may be used to incentivize departments to become more entrepreneurial but can lead to units pursuing goals that do not align with the university. Second, no budget model is without drawbacks, and as a result many institutions have developed hybrid models that incorporate desirable features from several approaches in order to meet their specific needs. Third, although the percentage of revenues received by public and private universities has differed historically, they are becoming increasingly similar with the decline in state appropriations for public institutions. Expenditure patterns between the two types of institutions have been surprisingly similar during the time period examined. Lastly, athletics departments represent a somewhat special case within university budgeting. For most Division-I institutions, athletics serves as either an auxiliary unit or a department within student services. Despite this difference in alignment of athletics between institutions, the data show that both models frequently result in substantial subsidies being provided from the general fund to support the athletics program.

Indirect Benefits of Intercollegiate Athletics

Institutional Marketing and Prestige

One of the most widely-held beliefs regarding the value of intercollegiate athletics is that it provides institutions with a cost-effective marketing tool (Bremmer & Kesselring, 1993). When a college's football team competes in a high-profile bowl game in January, it has the opportunity to reach a broad audience of sports fans, including prospective students and their parents, alumni, donors, and even state legislators. In addition to the notoriety that the game itself brings, institutions are afforded air time during the TV breaks in order to advertise their institution. Institutions generally use this time to demonstrate their excellence in teaching and research, success of recent graduates, and to show that campus is generally a fun and exciting place to be (Dimaggio & Powell, 1983). To illustrate this idea of a fun student environment, the advertisements frequently show students competing in athletics as well as cheering on their peers at a sporting event such as the homecoming football game.

An opposing view suggests that athletics is separate, even at odds with the academic missions of colleges and universities which focus primarily upon education and research. However, some have argued that a successful Division-I athletics program may in fact contribute to the academic mission by creating a halo effect that extends to other areas of the university (Fisher, 2009). Such a halo effect, if present, may lead prospective students, donors, and other stakeholders who know little else about a university to conclude that because it is successful in athletics it must be a successful institution, in general. In this way, athletics may prove to be a more cost-effective means of raising an institution's prestige than universally improving the quality of its academic offerings. This may help to explain why less distinctive institutions are often eager to move up from lower levels of competition to Division-IA.

At present, there is little empirical research on the extent to which an institution can raise its brand awareness through athletics, in part due to challenges in isolating marketing and branding variables and their effects on various institutional outcomes (Anctil, 2009). There are however several studies that have examined the effects of athletics on institutional prestige. Trenkamp (2009) has studied the relationship between football and men's basketball success and the *US News & World Report* (USNWR) rankings. His dataset consisted of a cross-sectional sample of 173 institutions that competed in Division-I men's basketball, football, or both. He estimated a series of OLS models treating the institution's 2004 USNWR rank as the dependent variable and football success, basketball success, and various institutional controls for size, quality, and type as independent variables. The model estimates indicated that both football and basketball success had positive and significant effects on institutional ranking. A one-point increase in either football or basketball Sagarin ratings was estimated to increase an institution's USNWR ranking by 1.4 positions on average.

Quattrone (2008) also tested the hypothesis that football and men's basketball performance contributed significantly to institutional prestige, as indicated by the USNWR peer score within its annual rankings. For the football and basketball success variables, he used a comprehensive measure of success developed by Lucas and Lovaglia (2005) that included all-time win percentage, the number of bowl game appearances (or NCAA tournaments), national championships, top-25 finishes, and the number of players who entered the NFL or NBA over the previous five years. He tested several empirical models for USNWR peer score that included the athletic success measures and various institutional characteristics as control variables. Model estimates showed that a 10-point increase in men's basketball success score was expected to increase the institution's USNWR peer score by 0.75 points (on a 5-point scale). Surprisingly, football success was not a significant predictor in the model.

In another study, Cox and Roden (2010) explored the relationship between USNWR ranking and winning a championship in either football or men's basketball. The authors conducted a two-part analysis using a sample of all national universities in the USNWR rankings between 1992 and 2006. In the first part, they restricted their sample to only those institutions who won a football or basketball national championship during this time period and compared their rankings in the two years prior to the championship with the two years following. Their findings indicated that, on average, an institution's overall ranking in USNWR improved by 6.9 positions following a national title in football and 7.5 positions following a title in basketball. However, there was no statistically significant change in peer score, only in three student-related factors of the USNWR formula were increases observed: acceptance rates, retention rates, and graduation rates. In the second part, the authors examined the correlation between football ranking (Sagarin rankings) and USNWR ranking over a nine-year period. In this case they found no significant relationship between the two variables.

Student Admissions

A related concept to the idea that intercollegiate athletics increase prestige is the belief that they can enhance a university's student applicant pool. As noted previously, football and men's basketball games afford institutions the opportunity to market themselves indirectly through competition and directly through TV advertisements during halftime or timeouts. While in-state students are likely already familiar with their local state university, high-profile athletics may be a particularly effective means of raising awareness among out-of-state students. It has been suggested that prospective students seek to purchase a "bundle of services" that include not only academic programs, dining, and residence halls but also certain student activities and experiences (Mixon & Ressler, 1995). Among those experiences may be the opportunity to play in or attend athletics events.

If in fact an institution is able to increase its applicant pool following a successful football or men's basketball season, this allows the institution to improve itself in a variety of ways. First, if the number of student applications increase but the overall quality of the applicant pool is unchanged, the institution could expand enrollment and thereby increase tuition revenue all while maintaining its present student quality (Pope & Pope, 2009). Alternatively, the university could maintain the size of its current enrollment but increase its selectivity. This would in turn enhance the institution’s reputation because many external rankings are based upon the quality of entering students (i.e. SAT, high school rank, acceptance rates, etc.). Either of these two scenarios may further increase tuition revenue for public institutions if the percentage of applicants from out-of-state has increased.

The total number of empirical studies in the area of athletics success and student admissions is impressive. Although a range of research questions has been explored in previous research, most studies can be broadly classified into one of three categories: athletics success and the total number of student applicants; athletics success and the quality of student applicants; and athletics success and out-of-state student enrollment. The literature for each of these lines of inquiry is discussed briefly in the following sections.

Number of Student Applications

One of the earliest studies exploring the relationship between success in intercollegiate athletics and undergraduate applications was conducted by Murphy and Trandel (1994). Their research attempted to determine whether a significant correlation existed between football win percentage and the number of applications the following year. Using a panel dataset from 1978 to 1987 containing 55 institutions with elite Division-I football programs, they determined that an increase of 0.250 in a team’s win-loss record would produce an increase in applications of roughly 1.3 percent the following year. They note this increase in applications to be very modest in light of the difficulty involved for a football team to win an additional 25 percent of its games.

Toma and Cross (1998) studied the impact of successful football and men's basketball programs on the number of student applications. They used data from all institutions that won a national championship in either sport from 1979 to 1992 to determine whether the number of applications in the three years before winning a championship differed from the number in the three years following. In addition, they compared admissions data from each championship school with a small group of academic peers (non-champions). Their results showed that most institutions winning a football or basketball championship increased their applications over each of the next three years. In fact, seven of the 16 football national champions experienced at least a 10 percent increase in applications the following year. Moreover, these increases were generally well above and beyond those that occurred at peer institutions.

In his 2005 study, McEvoy investigated whether changes in the performance of various NCAA DI-A athletics teams had a significant effect on undergraduate applications. He compared applications for institutions whose winning percentage had increased by at least 0.250, decreased by at least 0.250, or remained essentially unchanged for the two most popular men's and women's sports. Football was determined to be the only sport having a significant relationship with the number of applications. His results showed that schools whose football teams improved their record by 0.250 or more experienced an average increase in applications of 6.1 percent. By comparison, schools whose football team records were unchanged or declined by at least 0.250 saw smaller increases in applications of 2.5 and 0.4 percent, respectively.

Two recent studies provide additional evidence that successful football and men's basketball teams can lead to increases in student applications. The first, by Pope and Pope

(2009), analyzed data from 1983 to 2002 for all 332 institutions participating in NCAA athletics. Controlling for various school characteristics, they found that participation in an NCAA DI men's basketball tournament produced a 1 percent increase in applications and a top-20 football team ranking a 2.5 percent increase. Private schools saw an increase in applications that was a factor of two to four times greater than for public institutions experiencing similar athletic success. Jones (2009) has expanded upon previous research by examining the effects of playing in any football bowl game versus a popular bowl game on both student applications and admissions yield. His research draws upon a panel dataset for all NCAA DI-A institutions from 2002-2003 to 2007-2008. Model estimations showed that appearance in any football bowl game increased male applications by about 2.4 percent, on average, and that a more highly rated game led to even greater increases in the number of male applicants. On the other hand, female applications were unaffected by a football bowl appearance regardless of whether or not it was a high-profile game. Lastly, appearance in a bowl game did not correlate significantly with yield for either gender, but playing in a more highly rated game did significantly increase the yield of both male and female students.

Quality of Student Applications

A second sub-set of the literature on student admissions focuses upon whether intercollegiate athletics has an impact on the quality of entering students to the university. One of the foundational studies in this area was published in 1987 by McCormick and Tinsley. Their study sought to determine whether the average SAT scores of the entering freshmen cohort could be predicted, in part, by the presence of a "big-time" athletics program or the success of the football team. Findings indicated that institutions with high-profile athletics had average SAT scores between 26 and 43 points higher than other institutions, depending on the model specifications. Football win percentage also had a positive and significant relationship with SAT scores. A school that increased its winning percentage by 100 percent over the previous 15-year period was predicted to increase its average SAT score by 279 to 302 points in the current year.

A study by Bremmer and Kesselring (1993) was published as a direct response to McCormick and Tinsley (1987). The authors used the same set of institutions, dependent variable (average SAT score), and many of the same explanatory variables. In addition, Bremmer and Kesselring introduced variables for the number of football bowl appearances, the number of NCAA men's basketball tournament appearances, and the average SAT score of high school students in the state as independent variables. In contrast to McCormick and Tinsley (1987), their results indicated that none of the sports variables – the presence of a high-profile sports program or football or basketball postseason appearances – were significant predictors of students' SAT scores. They contend there is no evidence that athletics contributes significantly to the quality of the student body.

Tucker and Amato (1993) also conducted a follow-up study to McCormick and Tinsley (1987). In their manuscript, they investigated the relationship between average SAT score and success in football and men's basketball as measured by the end-of-season AP rankings. They used the same set of explanatory variables and a dataset consisting of the same 63 institutions with "big-time" athletics programs as McCormick and Tinsley (1987). The authors estimated both a cross-sectional model using only 1989 data and a model containing the change in values of each continuous variable from 1980 to 1989. While none of the athletics success measures were significant in the cross-sectional model, football success was a significant predictor in the longitudinal model. It was estimated that a 31-point increase in football success score would increase the institution's mean SAT score by 14 points.

A study was published by Mixon (1995) that again estimated the relationship between the mean SAT score and athletics, but used an improved measure of basketball success over earlier studies. Rather than using the number of basketball tournament appearances, Mixon calculated the number of tournament games played by each institution from 1978 to 1992. For a sample of 217 institutions, Mixon estimated a series of models for SAT using this new measure of basketball success along with several explanatory variables for institutional type and quality. He found that basketball was a positive and significant contributor in the model and that an increase in one tournament round was associated with an increase in SAT score of 1.6 points, on average.

Finally, Mixon, Trevinos, and Minto (2004) have examined the impact of football performance on median SAT score. Here, the authors have looked at the impact of football winning percentage from 1990 to 2000 on the median SAT score of entering freshmen in 2000-2001 for 68 institutions with prominent DI athletic programs (the five power conferences and major independents). They included various control variables from *US News & World Report* for 2000-2001 to account for institutional size, quality, and selectivity. Football win percentage was determined to be a significant predictor for median freshmen SAT score. A one-point increase in total win percentage over the preceding 10-year period was estimated to raise the median SAT of entering students by 0.94 points.

Out-of-state Enrollment

In addition to the research on athletics success and the number and quality of student applications, a few studies have attempted to answer whether athletics success can lead to increases in tuition revenue. In their 1995 study, Mixon and Ressler examined whether athletics success could serve to lower the price elasticity of demand for out-of-state students. Even if a public institution was unable or unwilling to increase its total enrollment, the ability to increase its out-of-state to in-state student proportion could generate additional revenue. The authors tested a series of quantitative models to determine whether a significant relationship existed between success in men's basketball and the percentage of enrolled students from out of state. Basketball success was measured by the number of NCAA basketball tournament rounds played from 1978 to 1992. The authors found that a positive and significant relationship existed between basketball success and the percentage of out-of-state students. Estimates suggested that a 100 percent increase in the number of NCAA tournament rounds played would lead to a 6 percent increase in the proportion of non-resident to resident students, controlling other factors.

A study by Mixon and Hsing (1994) examined the relationship between a variety of institutional characteristics and out-of-state student enrollment. They used a Tobit model to analyze data from 1990 for a sample of 220 institutions. In their specifications, the percent of enrollment from out-of-state was the dependent variable and their independent variables included measures for price (tuition), size, selectivity, quality, and NCAA athletics division. Most of the predictors were found to be significant in the model. NCAA athletics division, although it exhibited a positive sign with the dependent variable, was only marginally significant ($p \leq .10$).

Institutional Advancement

Another important thread in the argument that athletics yields indirect benefits to colleges and universities proposes a causal relationship between on-the-field success and philanthropic donations (Frank, 2004). This line of reasoning focuses upon the ability of athletics, particularly the high-profile sports of football and men's basketball, to draw alumni and other supporters to campus in numbers that are unmatched by other arguably more legitimate university activities (Suggs, 2009). Athletics provides unique opportunities for development officers to access donors and request support for numerous campaigns including those pertaining to academics. Furthermore, it has been argued that alumni and other donors are more likely to donate to a university when it produces a winning sports program (Anctil, 2009). Some donors give out of a desire to be associated with a successful organization, and although athletics is generally not viewed as central to the university's mission, it can create an impression that a successful athletic institution is also a successful academic one (Fisher, 2009).

Alternatively, it has been suggested that athletics does not increase donations to the university or at the very least does not increase giving to other areas besides athletics. Those who support this view have argued that athletics merely provides a consumable (entertainment) for alumni and community members and their support of the institution arrives only in the form of ticket sales and donations for improved athletic facilities (Sperber, 1990; Sperber, 2000). Still others maintain that athletics creates a crowding-out effect on donations to support academic activities by re-directing funds to athletics that would have gone to support a new classroom building, scholarship, endowed chair position, etc. (Stinson & Howard, 2008). Ehrenberg (2000) cites an example of a Cornell alumnus who, after being approached by an athletics administrator, suddenly decided to split his gift, originally intended for arts and sciences, with athletics.

The prevalence of theories and commentaries on the subject of intercollegiate athletics and donations as well as the availability of considerable giving data has produced a rich set of empirical studies. Studies have been conducted using cross-sectional and longitudinal datasets, data from a single or all NCAA institutions, and with a variety of athletics success and giving measures. One of the earliest studies to appear on the subject was completed by Sigelman and Carter (1979). They used correlation and regression analyses to explore the relationship between several measures of athletics success and three measures of alumni giving. The dataset spanned a fourteen year period between 1960-61 and 1975-76 and included all NCAA division-I institutions. The authors found no evidence that athletics performance significantly affected alumni giving the following year.

Another early study by Brooker and Klastorin (1981) showed more promising results towards the usefulness of athletics for university fundraising. Using longitudinal data from 1962 to 1971 on 58 universities with "big-time" athletic programs, the authors tested several models to determine whether the average total and capital gift per alumnus was impacted by football and men's basketball team performance. Their findings indicated that football win percentages and bowl appearances were generally positive and significant for alumni giving at private institutions. For major public universities, football win percentage had a positive effect on the percentage of alumni who gave but a negative effect on the average gift per alumnus. In total, the authors found a positive and significant relationship between at least one measure of athletics success and alumni giving for all types of institutions.

In their 1983 study, Sigelman and Bookheimer examined the effects of on-the-field success in football and men's basketball and alumni giving to both the general fund and athletics. They conducted a cross-sectional analysis using data from the *Omaha World Leader* for 57 of the same 58 institutions used by Brooker and Klastorin (1981). In contrast to earlier studies, a series of control variables for institutional size, type, quality, and location were included in their models. The results demonstrated that athletics success had a positive and significant impact on alumni giving to athletics: a 10 percent increase in football success generated an additional $125,160 in donations, on average. However, they did not find any evidence that athletics performance increased giving to the general fund. Yet the relationship between athletics and academic giving was non-significant, suggesting that a "crowding-out" effect was not present.

A number of more recent studies provide additional evidence that athletics success has the potential to increase giving to the university. Baade and Sundberg (1996) used a panel dataset of 309 colleges and universities from 1973 to 1990 to explore whether success in football and men's basketball affect alumni giving. They showed that a football bowl appearance increased giving by 54 percent for private and 40 percent for public universities, on average. A basketball tournament berth increased alumni giving by 35 percent at public institutions, but had no significant effect on giving at private institutions. Rhoads and Gerking (2000) drew upon a dataset from 1986-87 to 1995-96 for 87 universities that were members of a power five athletics conference (PAC-10, Big

Ten, SEC, Big 12, ACC) or high-profile independents (e.g. Notre Dame). Using a two-way fixed effects model, they showed that a football bowl appearance led to an increase in alumni donations of about $858,000 (7.3 percent) in that year. However, none of the athletics performance variables were significant in the model for total contributions, which included both alumni and other philanthropic donations.

Humphreys and Mondello (2007) analyzed data on restricted and unrestricted giving for all NCAA institutions from 1973 to 1990. They estimated that a basketball tournament appearance increased restricted donations the following year by 8.5 percent for public and 9.8 percent for private institutions. Further, a football bowl appearance led to an increase in restricted donations of 12 percent at public universities. Importantly, none of the athletics success measures were significant in the models for unrestricted giving, which suggests that athletics may only increase athletic giving. An extensive study by Stinson and Howard (2007) probed the relationship between football success and seven measures of charitable giving for DI-A institutions. They found that athletics performance had no discernible effect on academic giving, but football win percentage did positively influence giving to athletics and the proportion of total giving directed to athletics.

With a few notable exceptions, most of the research conducted on this topic has focused upon NCAA Division-I, and often football bowl subdivision (FBS) institutions. An important study on athletic performance and private giving for division I-AA (D-IAA) and division I-AAA (D-IAAA) institutions was produced by Stinson and Howard in 2008. Using data from 1998 to 2003 for a sample of 208 institutions, they developed a linear mixed model to examine the effects of football and men's basketball success on the number of alumni who gave and the average gift per alumnus to athletics and academics. In contrast to their study on D-IA institutions, Stinson and Howard found that athletic success positively influenced both athletic and academic giving. A basketball tournament appearance was estimated to increase the average alumnus donation to athletics by $18 (50% increase) and academics by $435 (100% increase), on average, in the model for D-IAA institutions. However, once D-IAAA institutions were included, the relationship between athletic success and academic giving became non-significant.

Lastly, a few studies have utilized data from a single institution to examine more detailed financial records and introduce new explanatory variables that are generally not available through large public datasets. In their study, Grimes and Chressanthis (1994) modeled the effects of athletics performance on alumni giving to the Mississippi State University Foundation for academic purposes. Their dataset, which spanned from 1961 to 1991, included four indicators of athletics performance for football, men's basketball, and baseball. In the overall model, both win percentage and TV appearances were significant. They estimated that a one percent increase in overall win percentage for the three major sports would produce $268,702 in additional donations the following year. Meer and Rosen (2009) studied the relationship between football and men's basketball performance and giving by alumni who were athletes and non-athletes at an elite private university. They also examined whether a former athlete's team success impacted his or her donation. It was shown that football and men's basketball generally had small and non-significant effects on donations from athletes as well as non-athletes. However, if a male graduate's athletic team won its conference championship the average size of his general and athletic gifts each increased by 7 percent. Team success had no significant effect on donations from female alumni.

Character Development

It has often been said that "the battle of Waterloo was won on the playing fields of Eton" (French, 2004, p. 14). Although the origin of this statement is unclear, its implication is that the victorious British general Arthur Wellington honed his leadership skills while playing sports at the Eton boarding school (Sage, 1998). Belief in the importance of athletics has perhaps reached its pinnacle in the United States where the collegiate ideal is not simply an intellectual pursuit but a balanced experience in which students develop a "sound mind in a sound body" (Shulman & Bowen, 2001). Supporters of athletics further cite that it has the ability to instill important character traits in youth such as discipline, teamwork, leadership, respect, and fairness (Childs, 1987). However, some scholars have pointed to the fact that these claims are largely unproven and that the most compelling evidence consists of anecdotes from current and former athletes, coaches, and athletic directors (French, 2004). Further still, many have found it difficult to reconcile the all-too frequent sanctions and rule violations in intercollegiate athletics with the NCAA's core values of integrity and sportsmanship ("NCAA Core values," 2015).

Behavioral researchers over the past 50 years have attempted to quantify the effect athletics has on character development in adolescent and college athletes. This line of inquiry is not without its problems, however, due to the difficulty in measuring character as a construct. In addition to the fact "character" is broad and somewhat poorly defined, much subjectivity abounds with respect to what constitutes "good character"

(Sage, 1998; Bowen & Levin, 2005). Yet, a number of scholars have attempted to address these issues by focusing upon specific types of character that a student might be expected to acquire through athletics, such as sportsmanship.

In his 1983 study, Silva sought to determine how student perceptions of the legitimacy of various athletic rule violations varied according to gender, the type of sport, and level of experience. He showed a series of slides to 167 undergraduate and graduate students and asked them to rate the extent to which they agreed the demonstrated behaviors, all athletics-related, were acceptable. His findings showed female students were more likely than male students to rate the rule infractions as unacceptable. For both genders, the number of years of experience playing an organized sport, having competed at a high level (i.e. varsity athletics in college or high school), and the amount of physical contact in the sport were all positively correlated with willingness to accept the rule violations.

Another study by Bredemeier and Shields (1986) compared the moral reasoning ability of high school and college athletes and non-athletes. The authors developed an intensive interview protocol based upon the Haan interactional model of moral development (1978, 1983) that presented the interviewees with a number of social and sports-specific dilemmas. The sample consisted of 120 students, both male and female, who were non-athletes or had competed in varsity basketball or swimming. No significant difference was found between athlete and non-athlete high school students. At the college level, moral reasoning scores of swimmers and non-athletes were similar but the scores of both groups were significantly higher than basketball players. Consistent with Silva's findings, it was shown that females generally had higher moral reasoning scores than males.

Beller and Stoll (1995) conducted their landmark study on the moral reasoning of athletes and non-athletes at the secondary level. Their research sought to determine whether there was a difference in moral reasoning for team- versus individual-sport athletes and between under- and upper-classmen. They administered the Hahm-Beller Values Choice Inventory (HBVCI), which asks students about sports-related scenarios such as retaliation, personal fouls, and drug use, to a sample of 1,330 high school students in the U.S. Overall, it was shown that at all ages non-athletes scored higher than athletes and female students higher than male students in moral reasoning. There were no significant differences between team- and individual-sport participants or between upper- and lower-classmen. The authors interpret the fact that athletes generally scored lower than non-athletes as an indication that the "win at all costs" mantra has taken precedence over sportsmanship and rule-following among athletes.

Two additional studies utilized the HBVCI to study social and moral character among college athletes. Priest, Krause, and Beach (1999) studied whether college athletes' moral reasoning improved over the course of their four years in college by administering the assessment to 631 students at the United States Military Academy. They found that all groups – men and women, team- and individual-sport athletes – declined in their moral reasoning scores during their four years at the academy. Furthermore, team-sport athletes' scores were lower than individual-sport athletes, and varsity athletes lower than intramural athletes. Rudd and Stoll (2004) sought to measure both the social and moral character of college athletes at a variety of intercollegiate levels of competition. They administered an instrument containing 10 items from the HBVCI for moral character and 10 newly developed items addressing social character to a random sample of 595 college students at NCAA DI, II, III, and NAIA institutions. The moral character items focused upon sportsmanship whereas the social character items centered on teamwork, loyalty, and self-sacrifice. Results showed that non-athletes scored significantly higher on the moral character scale than athletes, but athletes generally scored higher on the social character scale. Team-sport athletes scored significantly higher than individual-sport athletes in social character. The authors conclude that the lower moral reasoning scores among athletes may be evidence of an overemphasis on winning, while team athletes' high social reasoning scores likely reflect the emphasis placed on teamwork and self-sacrifice by parents and coaches.

Finally, Doty and Lumpkin (2010) explored whether college athletes who competed at the varsity, club, and intramural levels differed in their character in sports. They developed a new instrument to measure athletes' character in athletic scenarios, and administered the assessment to a sample of 4,184 students at the U.S. Military Academy. The authors found that the level of character exhibited depended most heavily upon the sport the athlete played, but as a general rule female and club sport athletes had the highest overall scores. Varsity male athletes in high contact sports: ice hockey, football, and lacrosse had the lowest average scores. There was no evidence of significant growth over time in character for students competing at any of the three levels of competition.

Summary

In this section, several of the persistent claims regarding the indirect benefits of intercollegiate athletics have been reviewed. Findings were somewhat mixed, although most studies have shown that colleges and universities appear to receive some benefits to their prestige, student applications, and fundraising as a result of athletics success at the NCAA Division-I level. Moreover, these effects appear to be most pronounced when an institution wins a national championship in either football or men's basketball. On the other hand, there is no clear evidence that participation in intercollegiate athletics increases student character. In fact, studies suggest the longer an individual participates in athletics and the higher the level of competition (i.e. varsity vs. club), the less moral character s/he exhibits. Furthermore, non-athletes were found to have higher character, on average, than athletes. These findings suggest that an emphasis of "winning at all costs" may have superseded the importance of sportsmanship and rule-following among athletes.

The conclusion that intercollegiate athletics can improve an institution's prestige, student applications, and fundraising, although supported by empirical evidence, should be interpreted with caution. First, the size of the effect that athletics success has on these areas is often small. For example, Murphy and Trandel (1994) showed an increase in football win percentage of 0.250 led to a 1.3 percent growth in applications and Pope and Pope (2009) found a top-20 football ranking led to a 2.5 percent increase. These are relatively modest results when one considers the difficulty of a football team finishing in the top 20 or winning an additional 25 percent of its games. Second, studies have typically focused upon institutions in one of the power five conferences or major independents. Consequently, it is difficult to interpret how these effects translate to FCS institutions or those looking to transition from Division-II to Division-I. Lastly, the present research does not indicate whether athletics is a cost-effective means of improving the university. Future research should look to examine the opportunity cost of investing in athletics over other marketing or improvement strategies.

There are several additional areas that require further empirical research. For one, it remains unclear how long an institution continues to reap the benefits of winning a national championship in football or men's basketball. Researchers should seek to determine whether a championship permanently raises the number or quality of student applications, or if they return to their pre-championship levels after a given period. Relatedly, future research should look to better understand the benefits, if any, an institution receives from having a low-performing Division-I program as opposed to a successful Division-II program. Finally, there is a paucity of research on the impact of athletics on university expenditures. Most of the existing research has examined the relationship between athletics success and various revenues – donations, student tuition, and state appropriations.

Theoretical Framework

The framework for this study draws heavily upon classical economic models of organizational behavior. A number of these models can be applied successfully to the decisions of colleges and universities, most notably property rights theory of the firm, principal-agent theory, and resource dependence theory. Each of these theories is discussed briefly in the following section. Additionally, Bowen's revenue theory of costs – an economic theory specific to higher education – is reviewed. The section concludes with a summary of these theories with a view toward their significance to the proposed study.

Property Rights Theory of the Firm

Property rights theory supposes that the owner of a firm has control over certain resources – human, physical, or capital, and that she or he has the ability to decide who has membership within the firm and is given access to its resources (Buckley & Michie, 1996). The owner has a right to decide how the resources are to be utilized, to retain profits, and to capitalize on gains made by the firm through the selling of his or her ownership rights (Frech III, 1976). In most organizations, the owner must delegate responsibility for management and use of the firm's resources to one or more actors who are then empowered to take action on behalf of the firm. Although assigned by the owner, property rights are generally derived through a political process that involves negotiation among group members and are frequently rooted in historical precedence (Libecap, 1989).

The property rights of an owner or the firm's actors may become attenuated if the rights to control one or more resources are not clearly established (Van Wezel, Jorna, & Meystel, 2006). Moreover, property rights tend to be highly attenuated in non-profit organizations because the owner's property rights are inherently limited. Namely she or he cannot retain profits for personal use or capitalize on the gains of the firm by selling his or her ownership rights (Frech III, 1976). As a result, there is often little incentive for non-profit organizations to minimize costs, leading them to operate less efficiently in most cases than profit-seeking firms (Frech III, 1976). This is a particular cause for concern within colleges and universities that utilize incremental budgeting, where departments tend to view the financial resources allocated to them annually through their budget as property rights, making it difficult for the institution to decrease unit-level budgets from one year to the next.

Principal-Agent Theory

A useful model for understanding the behavior of an organization from a resource management perspective is that of principal-agent theory. In this view, a principal contracts with one or more agents to perform services that fulfill the organization's mission, but that s/he is unable to provide for him/herself. In higher education, the principal is often identified as a state government, taxpayers, donors, or others external to the university, with administrators, faculty, and staff who deliver the education and other services as the actors (Martin, 2011). However, the model is also useful for understanding relationships between internal constituents. For example, an administrator such as the president or provost can be viewed as a principal who contracts with faculty, staff, or third-party contractors to perform specific services.

From principal-agent theory, it is understood that the objectives of the agent may not always align with those of the principal, which gives rise to principal-agent conflicts. Differences in priorities between principal and agent can occur for a number of reasons, but often they stem from an agent's desire to pursue self-interests. Principal-agent conflicts produce wasteful spending and increase operating costs as the agent diverts resources away from their intended purpose (Sappington, 1991). The severity of principal-agent problems depend upon the disparity between the objectives of the principal and agent, the likelihood that the principal will be able to determine the agent is diverting resources, and the extent to which market forces can control principal-agent problems (Martin, 2005).

According to Hoenack (1983) there are three approaches to minimize principal-agent problems: regulatory, formulaic, and persuasive measures. In the first, an organization may develop policy that tightly regulates the actions of its agents. Regulation can provide a high level of control, but may not be cost-effective due to the time required to monitor the activities of agents. Formulaic measures, on the other hand, are designed to align agent priorities with those of the principal through incentives. As an example, a provost may allocate additional funding to academic departments that reach a targeted benchmark for sponsored research funding (matching funds) in order to encourage more grant applications and research activity. While often successful in promoting desired behaviors, a weakness of formula-based methods is that they have a tendency to de-emphasize and even marginalize activities that are not explicitly rewarded (Massy, 1996).

Persuasive measures seek to align agent objectives with those of the principal through arguments of rationality. In short, the principal will attempt to demonstrate to the agent that although diversion of resources may appear beneficial in the present, it will over time harm the institution's financial stability and reduce the amount of funding available in the future. Persuasion may have positive short-term effects and be the least costly of the three approaches, but is unlikely to be successful when the gap between principal and agent interests is significant (Martin, 2011).

Resource Dependence Theory

Resource Dependence Theory (RDT) describes how an organization interacts with its environment to obtain resources that are critical to its survival (Smart, 1999). The theory suggests that no organization is entirely autonomous but must rely upon other organizations for resources that it cannot provide for itself. Resources can range from fiscal capital or raw materials to human resources and services (Austin & Jones, 2016). The fact that an organization, A, relies upon another organization, B, for a given resource suggests that B possesses a certain level of power over the actions and decisions of A. The level of dependence of A on B, and inversely the power of B over A, is shaped by the scarcity of the resource, the importance of the resource to the continued survival of A, and the extent to which the resource is concentrated within one or a few organizations in the environment (Emerson, 1962). In other words B has limited influence over A if the resource is not particularly scarce or vital to A and can be provided by any number of other organizations.

The dependence of an organization on its environment for certain resources creates uncertainty in the future of that organization. It is unclear, for example, whether an organization will continue to have access to sufficient quantities of critical resources and at a price that allows its operations to continue successfully. Managers within the organization will respond to this uncertainty by taking steps to reduce environmental dependencies (Hillman *et al*., 2009). One type of action the organization can take is to merge, acquire, or enter joint ventures with other organizations that have access to the resources it requires. Another approach is to diversify its products and services, thereby reducing its dependence on any single activity and the resources that are associated with it (Smart, 1999). In other cases, the organization might seek to change its environment by shaping governmental policy or regulation. In higher education, a college or university might push for legislation that leads to greater state or federal financial assistance for students, which would likely increase enrollments and ensure a more consistent flow of tuition revenue to the institution.

Two other types of actions an organization might take to reduce uncertainty deal with its internal structure. Organizations will often establish a governing board or board of directors, which may provide any of the following benefits: new information and expertise, external legitimacy, political influence, and greater access to resources (Pfeffer & Salancik, 1978). The size and structure of a governing board varies across organizations based upon the types of dependencies the organization experiences and what role(s) its board is to assume. Hodge and Piccolo (2005) have shown that boards within privately-funded non-profit organizations are more involved in their operations and decisions than those for commercial or federally-funded organizations. Lastly, an organization tends to structure its administrative offices in a way that emphasizes management of important external dependencies (Hillman *et al.*, 2009). Administrators who oversee those offices often acquire considerable power and are granted the authority to shape many of the organization's decisions.

RDT is an important theory for understanding administrative structure and organizational behavior in American higher education (Fowles, 2014). Like any organization, the university depends upon its environment for resources, most notably funding. The types and sources of funding vary considerably across institutions, but as discussed in Chapter 2 generally include: tuition and fees, state appropriations, state and federal grants and appropriations, donations, and private grants and contracts. Each stakeholder group that provides funding to the university (students, federal and state governments, alumni and donors, etc.) holds a certain degree of power to influence its decision-making processes. Historically, public institutions have relied to a much greater extent on state appropriations and less on student tuition revenue than private institutions. Consistent with RDT, Tolbert (1985) has shown that in general private institutions invest more heavily in administrative offices that support private sources of funding (admissions, alumni, and development) than public institutions. Conversely, public institutions invest to a greater extent in offices that support public sources of funding – institutional research and strategic planning.

As noted previously, state appropriations to public institutions have declined considerably in recent decades. One of the important consequences of this decline has been the rise in student tuition and fee charges. Fowles (2014) has noted that this shift from a public to a private model of financing for higher education has important implications for institutional control. In his research, he has shown that a significant relationship exists between the source of revenue in higher education and instructional expenditures. His estimates indicate that a one-percentage point increase in the share of revenue from net tuition produces a 0.78 percentage point increase in the share of total expenditures to education-related activities. These findings support the usefulness of RDT for interpreting resource management in colleges and universities.

In addition to the power that external groups have on university decisions, actors within the organization possess power based on their ability to acquire critical resources for the institution (Johnson, 1995). Salancik and Pfeffer (1974) found that academic departments that were most successful in securing external funding had the greatest level of internal power. These units received a greater share of scarce internal resources, such as graduate fellowships, which only served to reinforce the existing power structure. In another study, Pfeffer and Moore (1980) found that enrollment and external funding both play significant roles in determining subunit power. Subunit power, in turn, was a significant determinant of departmental budgets and faculty lines. It was also found that departments were more likely to exercise their power to attain scarce resources during times of financial stress than periods of relative abundance. Finally, Hackman (1985) studied the impact of internal power, external power, and resource negotiation strategies on resource allocation. Core units, typically academic departments, with the greatest external funding, internal support from administration, and that focused most upon their own needs while negotiating (rather than the best interests of the institution) were generally the most successful in acquiring resources. Peripheral units (e.g. administrative and support units) that secured the most external funding, had substantial internal visibility and administrative support, and focused on the benefits they provided to the university received the most resources.

Revenue Theory of Costs and Prestige Maximization

One of the most enduring theories that has been proposed to explain the economic behavior of American colleges and universities is Bowen's revenue theory of costs (Bowen, 1980). In his groundbreaking work *The Costs of Higher Education*, Bowen (1980) proposed the following rules that govern college and university behavior:

1. The primary goals of the university consist of educational excellence, prestige, and influence
2. In seeking excellence, prestige, and influence there is essentially no limitation on the amount of capital an institution will spend on educational endeavors
3. Each institution raises as much capital as it can

4. Each institution spends all of the capital it raises
5. The result of rules one through four is a continual increase in total expenditures

In short, Bowen's theory suggests that there is no limit to how much colleges or universities will spend other than the necessary condition that as non-profit entities their annual expenditures cannot exceed revenues. Institutions have an apparently unquenchable appetite for resources, and are continually able to justify any new expenditures in the name of quality improvement to the education and research they provide. Bowen further observed that each group providing funding to the university – federal and state governments, students, donors, private corporations, etc. – can exert some level of influence over the expenditures of the university, but its activities are not closely regulated by any one group (Bowen, 1980).

Bowen's theory is consistent with property rights theory, which suggests that non-profit institutions will have difficulty holding down costs due to attenuation of the owner's property rights. His theory is also consistent with principal-agent theory that suggests actors' pursuit of their own self-interests will ultimately serve to increase costs. It has often been observed that since the rise of federally sponsored research following World War II, many faculty have come to identify more closely with their profession than their own institution (Paulsen, 2014). Faculty increasingly view themselves as members of a discipline - biologists or economists for example - who merely have their offices and labs located at a particular institution of higher learning and work more frequently with colleagues who are located elsewhere.

Garvin (1980) argues, however, that Bowen's theory has several shortcomings in its characterization of university behavior. First, he notes that although the university may at times engage in revenue-maximizing behavior, it also tends to focus upon quality improvement of its services. Furthermore, some institutions – notably the selective, private liberal arts colleges – actively restrict the number of seats in their freshman class. If the university truly sought maximum revenues, it would likely hold quality constant while raising tuition and fees and recruiting as many students as possible (Garvin, 1980). Second, Garvin has noted that institutions have at times invested in academic departments that do not improve their ability to attract students but that the institution may view as important to its liberal arts mission. Finally, it is well documented that the true cost of providing an education at most colleges and universities is subsidized through a number of sources including institutional aid such that the student is only responsible for paying a portion of the total cost of his or her education (Paulsen, 2001). Rationally speaking, a revenue-maximizing enterprise would not subsidize the cost of its products or services.

Garvin (1980) has proposed that colleges and universities seek to maximize a utility function that is dependent primarily upon institutional prestige. He suggests that the university's overall prestige is a weighted sum of the prestige of each academic department, where certain programs and departments provide greater recognition than others. Graduate programs, particularly doctoral, are more important to an institution's reputation than undergraduate in most cases, which explains the proliferation of new graduate programs at small colleges and regional universities in recent decades. At the academic department level, Garvin has argued that reputation is derived mainly from research productivity and sponsored research funding, and that the two means of improving reputation are to recruit higher quality faculty or increase the number of faculty. This proposition was confirmed through Garvin's ordinary least squares estimates, which showed that the average improvement to an institution's average departmental prestige (as measured by the Cartter and Roose-Anderson ratings) was positively and significantly correlated with both a positive change in the number of faculty and a positive change in the average faculty salary (proxy for faculty quality) (Garvin, 1980).

Summary

Three economic models of organizational behavior were reviewed in this section: the property rights theory of the firm, principal-agent theory, and resource dependence theory (RDT). Bowen's economic model of higher education, known as the revenue theory of costs, was also presented. Each model appears to have some merit in explaining university decision-making processes under various conditions. From property rights theory, one can understand that, as non-profit organizations, there is little incentive for colleges and universities to hold down costs. Furthermore, each department or unit may come to view access to its annual budget as a property right, making it difficult for administrators to decrease unit-level funding when needed.

Principal-agent theory suggests that the principal, for example the president or provost, allocates responsibility for management of institutional resources to various agents – faculty, staff, and at times students. However, the agent may not share the same goals as the principal and therefore could be inclined to divert resources in order to pursue individual or departmental rather than organizational goals. Such principal agent problems can only be held in check through regulatory, incentivizing, or persuasive tactics. Reflecting on the previous chapter, one can see how university budget models frequently employ one or both of these strategies in an effort to limit wasteful spending. However, these approaches have been met with varying degrees of success.

Resource dependence theory (RDT) has been used by a number of theorists and researchers to explain the behavior of colleges and universities in developing administrative structures and allocating resources. Those units that are most central to the mission of the institution and successful in providing scarce and valuable resources, whether it be prestige or external funding, receive preferential treatment when it comes to internal resources. Departments are most likely to exercise power during times of campus-wide financial distress. Finally, Bowen's revenue theory of costs postulates that the university's primary goal is to increase its prestige and influence. In its quest for prestige a university will raise as much revenue as it can and spend all that it raises. This suggests that institutions will invest in the departments and programs that are most likely to produce the greatest dividends in terms of prestige and additional capital.

Research Questions

A number of important conclusions can be drawn from the preceding review of the literature and economic theories of organizational and university behavior. First, it is clear that many public universities have willingly allocated large subsidies in the form of student fees and institutional funds to support intercollegiate athletics departments. This has occurred despite a lack of convincing evidence that Division-I athletics programs produce sizeable indirect benefits to universities. Second, the athletics department is generally located within student services or serves as an auxiliary unit at public, Division-I institutions. However, athletics departments that are set up as auxiliary units do not appear to be held accountable in the same manner as other auxiliary units that are responsible for generating sufficient revenues to cover their expenses. In fact, it is common for institutions with this model to allocate large subsidies in the tens of millions from the general fund to support the athletics department.

The willingness of colleges and universities to allocate large and increasing subsidies to support intercollegiate athletics can be interpreted through several of the theories that have been discussed. Bowen (1980) notes that the main objective of most institutions is to increase their prestige and influence. RDT suggests that the athletics department is afforded considerable power and influence within the institution because of its perceived ability to provide the institution with its most important commodity – prestige. This power in turn allows athletics to negotiate for and receive internal resources, potentially at the expense of other units. On the one hand, Bowen (1980) has suggested that universities seek to raise additional revenues rather than decrease expenditures. On the other hand, state institutions are limited in the amount that they are able to increase tuition and fees on an annual basis. Thus, public universities may have at times reduced expenditures to other core areas in order to fund growing athletics subsidies.

Existing research has studied the relationship between athletics success and student tuition and fees. However, the effect(s) of intercollegiate athletics subsidies on resource allocation to other core areas of the institution has not been studied empirically. This dissertation sought to address this gap in the literature by examining the correlation between athletics subsidies and resource allocation to education and related expenditures in public, Division-I colleges and universities. More specifically, this study examined the following research questions:

1. How do the rates of growth in total athletics subsidies per FTE and school funds per FTE compare to the rate of growth in education and related (E&R) expenditures per FTE for public Division I institutions between 2005 and 2014?
2. What is the relationship between total athletics subsidies per FTE and E&R expenditures per FTE, controlling for other factors?
3. Is the relationship between total athletics subsidies per FTE and E&R expenditures per FTE dependent upon institution type (research university, flagship university) or characteristics of the athletics program (reporting structure, level of play), controlling for other factors?
4. What is the relationship between school funds per FTE and E&R expenditures per FTE, controlling for other factors?
5. Is the relationship between school funds per FTE and E&R expenditures per FTE dependent upon institution type (research university, flagship university) or characteristics of the athletics program (reporting structure, level of play), controlling for other factors?

The next chapter begins with a presentation of the hypotheses pertaining to the above research questions. Subsequently, the institutional sample, data sources, and variables that were examined are discussed. The chapter proceeds with a presentation of the statistical models and methods used to analyze the datasets in order to address the five research questions above. Finally, several limitations that have been identified for the study are discussed.

CHAPTER THREE: RESEARCH METHODS

This chapter provides an overview of the methods that were used in addressing the five research questions for this dissertation. The chapter begins with a presentation of the hypotheses for each of the research questions, drawing upon the literature review and theoretical framework discussed in chapter two. Next, the institutional sample, variables, and data sources are discussed followed by the empirical models and statistical procedures used to investigate the research questions. The chapter concludes with a brief discussion of study limitations.

Research Hypotheses

Research Question 1

How do the rates of growth in total athletics subsidies per FTE and school funds per FTE compare to the rate of growth in education and related (E&R) expenditures per FTE for public Division I institutions between 2005 and 2014?

Theory and the available evidence suggest that athletics subsidies have grown at a faster rate than instruction and other education-related expenditures at most Division-I institutions. Desrochers (2013) has shown that athletics subsidies per athlete have increased by 51 and 61 percent at FBS and FCS football institutions compared to increases in academic spending per student of 23 and 22 percent between 2005 and 2010. Therefore, it is hypothesized that this trend has persisted and the rate of increase in athletics subsidies per FTE has outpaced the increase in education and related (E&R) spending per FTE for Division-I institutions during the period of 2004-05 to 2013-14.

Research Question 2

What is the relationship between total athletics subsidies per FTE and E&R expenditures per FTE, controlling for other factors?

It is hypothesized that E&R expenditures will be negatively correlated with intercollegiate athletics subsidies for public Division I institutions. The rationale behind this hypothesis is two-fold. First, while Bowen's revenue theory of costs suggests that colleges and universities seek to increase revenues rather than decrease spending, it is likely that the present fiscal climate in higher education has seriously limited the ability of public institutions to secure additional funding. As a result, institutions may be forced to cut spending in other functional areas, such as instruction or student services, in order to provide additional subsidies to athletics. This proposition is further supported by the recent study from Jones and Rudolph (2016) that found the relationship between athletics subsidies and student tuition and fees is non-significant, despite the statistically significant rise in athletics subsidies over time. If public institutions have been unable or unwilling to substantially increase student tuition and fees to fund growing athletics subsidies, it stands to reason that funds from other university activities are being diverted to athletics.

Second, from both Bowen (1980) and Garvin (1980), it is supposed that the primary objectives of colleges and universities are to increase their influence and prestige. Resource Dependence Theory (RDT) further suggests that those organizational units most capable of securing the resources that are vital to the organization's continued success receive the most internal resources and power in decision-making processes (Johnson, 1995). Therefore, the perceived ability of a successful Division-I athletics program to enhance a university's reputation should lead to significant power, influence, and resources being directed to the athletics department. Although prior studies have not examined the result of competition for resources between athletics and academic units, it has been shown when comparing academic departments that those disciplines with the greatest prestige and ability to secure external funding are the most successful in obtaining scarce resources from the institution (Salancik & Pfeffer, 1974; Hackman, 1985).

Research Question 3

Is the relationship between total athletics subsidies per FTE and E&R expenditures per FTE dependent upon institution type (research university, flagship university) or characteristics of the athletics program (reporting structure, level of play), controlling for other factors?

It is hypothesized that the relationship between total athletics subsidies per FTE and E&R expenditures per FTE will depend upon characteristics of the institution and the athletics program. Differences in spending on instruction and other core activities according to institution type, for example Carnegie classification, have been well documented by Bowen (1980), Ehrenberg (2001), and others. In general, state flagship and large research institutions generate more revenues and have greater expenditures in most categories than other types of public four-year institutions. It has also been shown that athletics subsidies differ based upon the level of athletics competition (Desrochers, 2013) and conference affiliation (Denhart & Vedder, 2010), with comprehensive public institutions in the less prestigious FBS and FCS conferences having substantially larger per-student subsidies than members of a "power five" conference (ACC, Big Ten, Big 12, Pac 10, SEC). Since athletics subsidies generally represent a larger portion of core revenues at non-research and non-flagship institutions, the correlation between athletics subsidies per student and E&R expenditures per student was predicted to be stronger for these types of institutions compared to research and flagship universities. In fact, it was anticipated that the findings from this dissertation may identify that a significant and negative relationship between subsidies and E&R spending exists for non-research or non-flagship institutions, but that the relationship between these two variables is non-significant for research and flagship universities.

In addition to research, flagship, or FBS status, the reporting location of the athletics department within the university budget was included as a moderating variable. Generally, athletics departments at the Division I level are located within student services or an auxiliary or similar unit (Barr & McCellan, 2011). Auxiliary units other than athletics (e.g. housing, dining services), while they often enjoy a high level of financial autonomy, are typically responsible for generating sufficient revenues to cover their expenses. If this is true for athletics departments as well, it may be that campus administrators at institutions with the auxiliary model of athletics have been more successful in limiting increases to athletics subsidies than those at institutions that have located athletics within student services. The ability to place greater restrictions on athletics spending and particularly athletics subsidies would presumably prevent or limit the diversion of educational funds to athletics. Thus, it was predicted that the correlation between total athletics subsidies per student and E&R expenditures per student would be stronger for institutions whose athletics departments report within student services than for those whose athletics departments are treated as auxiliary or other units.

Research Question 4

What is the relationship between school funds per FTE and E&R expenditures per FTE, controlling for other factors?

The hypothesis for research question four followed the same rationale as question two: the relationship between school funds per FTE and E&R expenditures per FTE would be statistically significant and negative for the institutions in the dataset. However, where question two examined total athletics subsidies – an aggregate measure of school funds and student athletics fees - question four examined only school funds. Compared to the total athletics subsidies variable, it was expected that school funds may have a stronger correlation with E&R expenditures. One reason is that student fees are generally subject to review by a governing board and state legislature, which limits annual fee increases, including those to athletics (Barr & McClellan, 2011). Moreover, because of this approval process student athletics fees can be budgeted for from one year to the next with relative certainty, barring substantial fluctuations in student enrollment. With respect to athletics subsidies from school funds, it is presently unclear the extent to which institutions budget for these expenses. If one assumes that school funds are at least in part the result of athletics budget shortfalls, then it may be that institutions are forced to revise their budgets and redirect funds from other functional areas such as instruction during the fiscal year. This may lead to more dramatic changes in university resource allocation than the gradual changes resulting from increases to student athletics fees. And while significant recurring budget shortfalls would likely not be tolerated for an academic or auxiliary unit, such behavior by athletics departments may be permitted by campus administrators due to the perceived value of the athletics department for enhancing institutional prestige and securing external resources (Hillman, Withers, & Collins, 2009; Fowles, 2014).

Research Question 5

Is the relationship between school funds per FTE and E&R expenditures per FTE dependent upon institution type (research university, flagship university) or characteristics of the athletics program (reporting structure, level of play), controlling for other factors?

The final research hypothesis asserted that the relationship between school funds per FTE and E&R expenditures per FTE would depend upon both characteristics of the institution and athletics department. As noted above, substantial differences exist in the expenditures of different types of Carnegie institutions such as instruction, student services, and research. While school funds have not been examined specifically in the literature, athletics subsidies have been found to differ based upon the level of athletics competition and conference affiliation (Desrochers, 2014; Denhardt & Vedder, 2010). As discussed for research question three, the relationship between school funds per student and E&R expenditures per student was expected to be stronger for non-research, non-flagship, and FCS institutions due to the fact that these institutions have access to fewer core revenues per student and yet have higher school funds per student compared to research, flagship, FBS institutions. Additionally, institutions whose athletics departments are located within student services were hypothesized to have a stronger relationship between school funds per student and E&R spending per student compared to institutions whose athletics departments are treated as an auxiliary or similar unit.

Sample and Data Collection

The population of interest for this study includes all colleges and universities that had a Division-I athletics program during one or more years of the chosen time period. Due to the reliance on public data sources and the lack of available information for private institutions, the sample consisted exclusively of public institutions. Data were drawn primarily from two sources: the *USA Today NCAA Athletic Department Revenue Database* (2016a) and the *Integrated Postsecondary Education Data System* (IPEDS) (Department of Education, 2015b). The *USA Today* database provides institution-level athletics revenue and expense data for public colleges and universities with Division-I programs. These data are obtained by *USA Today* directly from the institutions through the Freedom of Information Act (USA Today, 2016b). Private institutions, however, are not required to comply with such requests and, not surprisingly, have not provided their data voluntarily. IPEDS is one of the most comprehensive sources of higher education data and contains information on university finances, human resources, enrollment, and financial aid, although the detail available is limited (Toutkousian, 2001). All colleges and universities that participate in Title IV financial aid programs are required to complete annual IPEDS reports, which means that IPEDS data are available for all institutions appearing in the *USA Today* dataset (Department of Education, n.d.a).

Owing to the size of the *USA Today* database, the initial sample for this study consisted of 231 public colleges and universities. The availability of data for multiple years allowed for the creation of a panel dataset consisting of all data that were available from both *USA Today* and *IPEDS* between 2004-05 and 2013-14. Although a number of institutions did not report athletics data in one or more years, use of Full Information

Maximum Likelihood (FIML) procedures for the analysis allowed for inclusion of all institutions regardless of the number of observations (Byrne, 2016). Issues with the data provided from two institutions necessitated their removal, which resulted in a final sample size of 299. Additionally, several institutions had outlying values for one or more variables, and these were treated as missing values when running the analyses. Data cleaning procedures are discussed in further detail on p. 86.

Variables

Research question one examined the change in three continuous variables over the time period of 2004-05 to 2013-14: total athletics subsidies per FTE student, school funds per FTE student, and total E&R expenditures per FTE student. The change in each variable was estimated using latent growth curve modeling. Research question two involved the estimation of fixed-effects regression models (FEMs) using E&R expenditures per FTE as the dependent variable, athletics subsidies per FTE as the independent variable of interest, and three control variables. Research question three repeated the analysis for question two by including interaction terms between the primary independent variable and four categorical variables for institutional characteristics. Lastly, research questions 4-5 proceeded through the same analyses as questions 2-3 except that school funds per FTE was used in place of total athletics subsidies per FTE as the main independent variable. Each of the variables used in the analysis is described below.

Education and Related Expenditures

Education and related (E&R) expenditures per FTE served as a dependent variable for all five research questions. To obtain the total E&R expenditures variable, all

E&R expenditures were extracted from IPEDS for the time period of interest. This consisted of the instruction and academic support expense categories of the IPEDS finance survey. The IPEDS glossary defines instructional expenses as those for “general academic instruction, occupational and vocational instruction, community education, preparatory and adult basic education, and regular, special, and extension sessions” (Department of Education, n.d.b). Academic support is specified as those expenses that support instruction, research, and public service through such activities as libraries, museums, information technology, special clinics, etc. While an argument could be made for including student services expenditures as well, a number of institutions in the sample have located the athletics department under student services, which could confound the results for several reasons. First, athletics are generally not considered part of the academic mission of the university and second, athletics subsidies may be contained within the reported student services expenses. Total student FTE enrollment was also extracted from IPEDS and used to divide the total E&R expenses in creating the per student expense measure. The decision was made to use the per FTE student measure as opposed to total expenditures so that institutional size could be taken into account and thereby provide a more direct comparison between different institutions.

Athletics Subsidies and School Funds

Total athletics subsidies per FTE served as one of three dependent variables in research question one and as the primary independent variable in questions 2-3. School funds per FTE served as a dependent variable in research question one and the primary independent variable for questions 3-4. Athletics subsidies from school funds and athletics subsidies from student fees were obtained from the *USA Today Athletics*

Finance database (USA Today, 2016a). Student athletics fees, as the name suggests, are direct (mandatory) fees assessed to all students that have been earmarked for athletics. School funds consist of both direct institutional subsidies (i.e. tuition, tuition waivers, state funds, etc.) and indirect subsidies (i.e. facilities, utilities, administration services, depreciation, etc.) that have been allocated to the athletics department (USA Today, 2016b). Total athletics subsidies was taken as a sum of school funds and student fees. As with the dependent variable, total athletics subsidies and school funds were each divided by total student FTE enrollment to provide the average per-student costs of both variables for each institution.

Control Variables

FTE Enrollment

One of the control variables that was used in the statistical model for research questions 2-5 is the total full-time equivalent (FTE) student enrollment. This variable was extracted from IPEDS and provides an important measure of institutional size and complexity. An FTE variable is available directly from the IPEDS database and thus did not require any additional manipulation; however, its derivation is worth noting. Total student FTE enrollment from IPEDS represents a weighted sum of part-time and full-time undergraduate and graduate student headcounts (fall enrollment only). In the FTE formula, both undergraduate and graduate full-time students are assigned a value of one. A part-time undergraduate student is counted as the equivalent of 0.402543 FTE students, whereas a part-time graduate student is counted as 0.361702 FTE students (Department of Education, n.d.b).

FTE enrollment was included in the models for research questions 2-5 due to existing evidence that suggests colleges and universities have had some measure of success in achieving economies of scale (Brinkman, 1990). Economies of scale occur when per-unit costs decrease as additional inputs are introduced (Toutkoushian & Paulsen, 2016). In a meta-analysis by Brinkman and Leslie (1986), data aggregated from 13 studies showed that both two- and four-year institutions generally improve their per-unit costs in instruction as enrollment rises. Data also suggested that very small institutions with enrollments between 500 and 600 observe the most substantial gains in per-unit costs as their enrollments approached 2,000 – 3,000 students. Another study by Koshal and Koshal (1995) found strong evidence for economies of scale across all types of doctoral institutions, estimating that the minimum scale of efficiency ranged from 11,758 for group IV institutions (Doctoral-II) to 30,957 for group I (Research-I). Finally, in a study by Cohn, Rhine, and Santos (1989), average educational expenditures were significantly predicted by the total number of graduate and undergraduate students taught and research grants acquired for both public and private institutions. Even though the other independent and dependent variables in the model have each been divided by FTE, this merely served to provide a more consistent measure of resources with which to compare diverse types of institutions. Such "scaling" does not directly take into account economies of scale, which is why the FTE variable was also included in the statistical models for questions 2-5.

Core Revenues per FTE

Another control variable in the model for research questions 2-5 was the total core revenues per FTE student. Revenue totals by source were obtained from IPEDS for the following categories: student tuition and fees; state and local appropriations; federal, state, and local operating and non-operating grants and contracts; private gifts; private grants and contracts; investment return; and other operating revenues for 2004-05 to 2013-14. These revenue source totals were summed to create a new variable for total core revenues for each year. The core revenues variable thus provided a measure of all revenues related to educational activities of the institution and excluded revenues from hospitals, auxiliary enterprises, capital appropriations, and other sources that are not directly related to its primary mission of teaching and research. Lastly, total core revenues was divided by the number of FTE students to adjust for institutional size.

The justification for including this variable in the model is rooted in Bowen's revenue theory of costs that suggests institutions raise as much revenue as they can and spend all the capital they raise. Therefore, it is expected that institutions with more available core revenues per student FTE will expend greater amounts on all core activities, including instruction. Furthermore, Ehrenberg (2003) and Stake (2006) have suggested that USNWR and other high-profile rankings provide a direct incentive for institutions to not only maintain high levels of spending on instruction-related resources (number of full-time faculty, average faculty salaries, etc.) but to increase their spending in order to move up in the rankings. Although athletics is generally not considered a "core" activity, it also stands to reason that an institution with more revenues available will be able to allocate more institutional funds to athletics in the form of subsidies.

Lastly, there was expected to be some correlation between each of the independent variables of interest – total athletics subsidies per student and school funds per student – and core revenues per student due to the fact that athletics subsidies are derived from core revenues. However, this issue was addressed by including covariances in the fixed-effects model between each pair of independent variables. In this way, the relationships between independent variables were both estimated and controlled for.

Number of Tenure-track Faculty per 100 FTE Students

The final control variable included in the models for research questions 2-5 is the total number of tenure-track (including tenured) faculty per 100 FTE students. IPEDS provides data each year on the number of tenured, tenure-track, and non-tenure-track faculty regardless of rank for each institution. For this dissertation, only the number of faculty in the former two categories was extracted from IPEDS for the years 2004-05 to 2013-14. These headcounts were then summed for each year to create a total headcount of tenured and tenure-track faculty, which was divided by the number of FTE students. It was then necessary to scale the number of tenure track faculty per FTE students by 100 so that the resulting variable could be on a similar scale as the other variables in the models. Ill-scaled variables can lead to issues in estimating the variance-covariance matrix in structural equation models (Kline, 2011).

The faculty variable was viewed as an important control for the models in research questions 2-5 due to the inherent lack of flexibility institutions have in eliminating tenure-track positions from one budget cycle to the next (Ehrenberg, 2006). Moreover, human resource costs are known to be the largest category within college and university budgets (Smart & Paulsen, 2012). If viewed as a fixed cost within an institution's budget, the number of tenure-track faculty may impact not only education and related expenditures but also the amount of core revenues an institution has available to allocate to athletics in the form of subsidies. An institution cannot, for example, readily lay off a dozen or more faculty in order to balance an athletics budget deficit of $1.5M.

Categorical Variables

Four categorical variables were included in the dataset: Carnegie classification as a research institution, status as a flagship university, reporting location of athletics within the university budget, and level of athletics competition. These variables were not included directly in the statistical models used to investigate research questions 2-5 because time invariant predictors (fixed-effects) were already accounted for. Rather, these variables were entered as interaction terms with the primary independent variable to determine whether the relationship between athletics subsidies per FTE or school funds per FTE and E&R expenditures per FTE depended upon the institutional characteristics represented by the categorical variables. The compilation and preparation of the four categorical variables is described below.

Classification as a Research University

The Carnegie Classification system provides a framework for grouping U.S. colleges and universities according to their similarities on the basis of academic mission (Rosow, 2010). The classifications were first published in the early 1970s and have since been updated approximately every 10 years, with the most recent list being published for 2015 (IU Center for Postsecondary Research, n.d.). Because the dataset spans the time period of 2004-05 to 2013-14, each institution's 2005 Carnegie classification was used. The basic 2005 classification identifies the following types of institutions: doctoral universities; master's colleges and universities; baccalaureate colleges; baccalaureate/associate's colleges; associate's colleges; special focus institutions; and tribal colleges and universities (NCES, 2015a). Doctoral institutions are further divided into sub-classifications of highest research activity, higher research activity, and moderate research activity, often referred to as RI, RII, and RIII. Master's institutions are separated into larger, medium, and smaller programs while baccalaureate colleges are grouped according to whether they have a mission that is focused on arts and sciences or other diverse fields. Due to the nature of the institutions in the sample for this study, all are found within the doctoral, master's, and baccalaureate classes, with most falling in the first two.

For the analysis, a dummy variable was created based upon Carnegie classification to denote research institutions. This dummy variable was then multiplied with total athletics subsidies per FTE and school funds per FTE to create interaction terms for the models in research questions three and five. The reason for including these interaction terms is that prior research has shown institutions that differ in size and scope tend to exhibit important differences in their revenues, expenditures, and complexity (Brinkman, 1981; Koshal & Koshal, 1995; Sav, 2004). Moreover, while Carnegie classifications were intended as a means of identifying and studying like institutions, it has also come to signify institutional prestige (Aldersley, 1995). Therefore, it is understood that doctoral institutions tend to have different spending patterns compared to master's and baccalaureate institutions. In particular, research and doctoral institutions generally have larger per-student core revenues and educational expenditures and at the same time smaller athletics subsidies than other types of institutions. As noted above in the hypotheses for research questions three and five, it is expected that the relationship between total athletics subsidies per student (and school funds per student) and E&R expenditures per student will be stronger for non-research institutions.

Classification as a State Flagship University

Another institutional characteristic that was included in the dataset was classification as the state flagship university. A list of flagship institutions was compiled from the College Board annual publication called *Trends in College Pricing* (College Board, 2016). Using this information, a dummy variable was used to denote institutions in the dataset as "flagship" or "non-flagship." The dummy variable was then interacted with total athletics subsidies per FTE and with school funds per FTE. It was hypothesized that the relationship between the two primary independent variables and E&R expenditures per FTE may depend on status as a flagship institution. Flagship universities are unique because they generally receive the largest state appropriations, are the most selective, and often receive the most federal research support of the public institutions in their respective states (Bowser, 2017; Stocum, 2013). In addition, flagship institutions tend to compete and excel at the highest levels of athletics competition (e.g. Florida, LSU, Michigan). As noted by Thelin (2011), state flagship universities have come to embody both "big athletics" and "big science," particularly medicine. In short, flagship institutions, in addition to having access to more core revenues than other institutions, have less need to subsidize athletics due to the success and often considerable revenues generated by their athletics programs. It is therefore expected that the correlation between athletics subsidies per FTE or school funds per FTE and E&R expenditures per FTE will be smaller for flagship compared to non-flagship universities.

Athletics Reporting Structure

Division I athletics departments are often established as auxiliary units within the university reporting structure (Barr, 2004). In such cases, athletics is generally afforded a high degree of autonomy and the athletics director reports to the university president directly. A similar model that perhaps provides even greater autonomy is to establish an entirely separate athletics foundation. This arrangement has been adopted by a handful of the most successful Division I programs (e.g. Georgia and Florida). While auxiliary units may be allowed to retain all of the revenues they generate, they are also expected to be self-sufficient. The other budget reporting structure commonly used by Division I institutions is to locate the athletics department within student affairs or student services (NCES, 2015a).

Little research has been conducted to this point on the financial or structural differences between the two reporting arrangements of athletics. If auxiliary athletics departments are held to the same standards as other auxiliary units, then athletics subsidies should be very near to zero at those institutions. For athletics departments located within student services, the university may have greater difficulty containing athletics costs. The fact that athletics is located within student services may be an indication the university views athletics both as an activity worth supporting and as one that requires support in much the same way as tutoring services or a counseling center. Furthermore, athletics costs may prove difficult for administrators to track because they are contained within the larger student services budget.

Information on the location of the athletics department within the university budget structure was obtained from the IPEDS database for all institutions in the *USA Today* dataset. Each institution's response was examined from 2004-05 to 2013-14. Most institutions indicated the same reporting structure for athletics in each survey year – auxiliary, student services, or other. In cases where responses differed, the most frequent response for that institution was selected. A handful of institutions (n=10) selected the "other" category in most or all years. Institutions that select "other" when completing the IPEDS survey are required to provide an explanation. These comments were examined and used to recode institutions in the dataset as either student services or auxiliary depending upon which they were most similar to. In total, nine institutions were recoded as auxiliary and one as student services. Following this recoding, interaction terms were created for the two athletics subsidies variables with the athletics reporting structure variable.

Level of Competition

The final categorical variable in the dataset was used to indicate the level of athletics competition for each institution. This variable was created using information from two sources. The first was the Equity in Athletics Data Analysis (EADA) cutting tool provided by the U.S Department of Education (Office of Postsecondary Education, 2016). Data on the number of athletics teams and student athletes, cost of athletics scholarships, and NCAA affiliation status of all NCAA participating institutions can be obtained from EADA. After gathering information on the level of NCAA competition for the institutions in the *USA Today* dataset, it was compared against the College Football Data Warehouse (2017) records. The College Football Data Warehouse compiles detailed football data – win-loss records, bowl and conference championship outcomes, conference affiliation, and divisional status – for all Division I and Division II football programs.

In cases where the two databases did not agree, attempts were made to triangulate the information using at least one other source such as news articles or university press releases announcing, for example, a transition from Division II to Division I. Some differences were the result of an institution transitioning from a lower level of competition to a higher level over a period of several years. These institutions may have moved up one level in football first, followed by other sports later, or vice versa. The determination of which classification to use for such institutions was made based upon football affiliation due to the importance of football in shaping the overall athletics revenues and expenses. Once the data were verified and cleaned, a dummy variable was created to indicate institutional status as an FBS or FCS institution in each year between 2004-05 and 2014-15. To simplify the analysis, only the dummy variable for the level of competition in 2004-05 was used to create the interaction terms with total athletics subsidies per FTE and school funds per FTE. Institutions that were classified as Division II in 2004-05 were treated as FCS institutions because in each case these institutions transitioned to FCS during the time period of the study.

The level of athletics competition was identified as an important institutional characteristic that could shape the nature of the relationship between the two athletics subsidies variables and E&R expenditures per FTE. In terms of athletics subsidies, FBS institutions had lower average per-athlete subsidies in 2010 ($19,318) than both FCS institutions with football ($24,407) and FCS institution without football ($29,601) (Desrochers, 2013). The opposite was true for academic spending: FBS institutions had higher per-student academic spending than either FCS football or FCS non-football institutions. In other words, the portion of core revenues allocated to athletics subsidies is often larger for FCS institutions than FBS. Consequently, it was expected that a stronger correlation would be observed between total athletics subsidies per FTE or school funds per FTE and E&R expenditures per FTE for FCS compared to FBS institutions.

Analysis

Data Cleaning

The initial sample size for this study consisted of 231 public Division I institutions that had data available from IPEDS and the *USA Today Athletics Finance Database*. One institution was immediately removed because it was a multi-campus university and the financial data for all campuses had been reported in aggregate to IPEDS (Penn State University). A second institution was removed because it used the FASB accounting standards as opposed to the GASB standards used by all other institutions in the dataset during the time period of interest (University of Delaware). After removing these two institutions, the continuous variables were tested for deviations from multivariate normality. It was determined that all but one of the continuous variables (total number of tenure-track faculty per 100 FTE) exhibited skewness and kurtosis indices that exceeded the acceptable range of -3.0 to 3.0 (Abbott, 2011). Consequently, each continuous variable was log-transformed and re-checked for normality issues. Although it did not require transformation, the number of tenure track faculty per 100 FTE was log-transformed so that it was scaled in a similar manner to the other variables.

Several variables continued to exhibit deviations from multivariate normality despite the log transformation. To address this issue, variables were checked for extreme outliers that were more than 3.0 standard deviations above or below the mean. It was found that a handful of institutions (between one and seven) had outlying values for a particular variable in any given year. Rather than delete cases listwise that contained outlying values, the decision was made to treat outliers as missing values when running the analyses. The use of full-information maximum likelihood, which was the method used in this study, allows for all available data to be used when calculating estimates and does not require missing values to be imputed (Little, 2013). The final dataset consisted of 229 institutions.

Descriptive Statistics

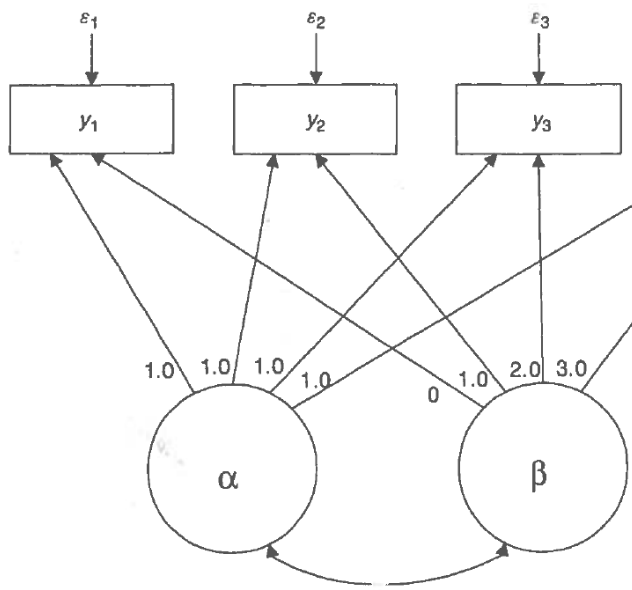
The first stage in the statistical analysis was the compilation of descriptive statistics for all of the variables in the dataset. The original, non-transformed continuous variables were used in preparing these statistics so that the data could be easily interpreted in the context of prior research. However, due to the normality issues of the original variables discussed above, the medians and interquartile ranges were reported as opposed to means and standard deviations. The median is preferred for non-normal distributions because, unlike the mean, it is not impacted by skewness (Sprinthall, 2007). In addition to compiling descriptive statistics for all institutions in the dataset, the medians and interquartile ranges for the continuous variables were compared for different types of institutions based upon Carnegie classification. Lastly, descriptive statistics for the athletics subsidies variables were provided according to the level of athletics play and location of athletics within the university budget structure.

Analysis for Research Question 1

Three separate statistical analyses were conducted to address the five research questions for this dissertation. For question one, a simple graphical analysis was first completed to compare the change over time in average athletics subsidies per FTE (log), school funds per FTE (log), and E&R expenditures per FTE (log). These three variables were compared over the time period of 2004-05 to 2013-14 in order to provide insight into the shape of the growth curves (e.g. linear, curvilinear, exhibited multiple slopes, etc). Following the graphical analysis, separate latent growth curve (LGC) models were estimated for each of the three variables using a structural equation modeling (SEM) approach. Each of these models was unconditional because exogenous variables were not included.

A basic LGC model diagram using the reticular action method (RAM) representation of variables has been provided in Fig. 3.1 for four waves of data. In the RAM framework, latent variables (unobserved) are represented as circles, observed variables as rectangles, direct effects as single-headed arrows, and covariances as two-headed arrows (McArdle & McDonald, 1984). As shown in Fig. 3.1, the intercept and slope for the time-varying dependent variable are represented as latent variables. Each time point in which the dependent variable has been measured (observed) is treated as an indicator of the two latent variables. The factor loadings from the intercept to each repeated measure is fixed to 1.0, because it is assumed that the intercept influences each time point equally (Little, 2013). The model shown in the diagram represents a linear LGC where each of the four indicators have been constrained to equal intervals between 0.0 and 3.0. Other, non-linear slope configurations can be utilized when estimating a LGC including a freed-loading approach where only the first and final loadings are fixed or a piecewise model that estimates unique slopes for different time periods (Bollen & Curran, 2006). Another option is to include additional latent slope terms representing quadratic, cubic, or other higher-order polynomials. Lastly, each of the observed variables in Fig. 3.1 has been assigned a disturbance, or error term, which represents the variance that is not accounted for by the model (Hoyle, 2012). Because disturbance terms are not measured directly they are treated as latent variables in SEM.

Figure 3.1
Path Diagram for a Linear Latent Growth Curve with Four Waves of Data



In the latent growth curve (LGC) diagram above, α represents the intercept, β the slope, and $y_1 - y_4$ the four time points for the endogenous variable y. A disturbance term ε_i has been assigned to each observation of y. Source: Bollen & Curran (2006).

The model shown in Fig. 3.1 is considered an unconditional LGC model because no additional time-invariant or time-varying variables have been included. The basic equations for unconditional LGC models involve a trajectory equation in level one and intercept and slope equations in level two (Bollen & Curran, 2006). The trajectory equation appears as follows:

$$y_{it} = \alpha_i + \lambda_t\beta_i + \varepsilon_{it} \quad \text{(eq. 3.1)}$$

In the above equation, y_{it} is the value of the dependent variable y for case i at time t, α_i is the random intercept for case i, β_i is the random slope for case i, and ε_{it} is the disturbance term for case i at time t. λ_t is the time variable – a constant that ranges between t=0 to T-1 where T is the total number of time points (observations). The level two equations are:

$$\alpha_i = \mu_\alpha + \zeta_{\alpha i} \qquad \text{(eq. 3.2)}$$

$$\beta_i = \mu_\beta + \zeta_{\beta i} \qquad \text{(eq. 3.3)}$$

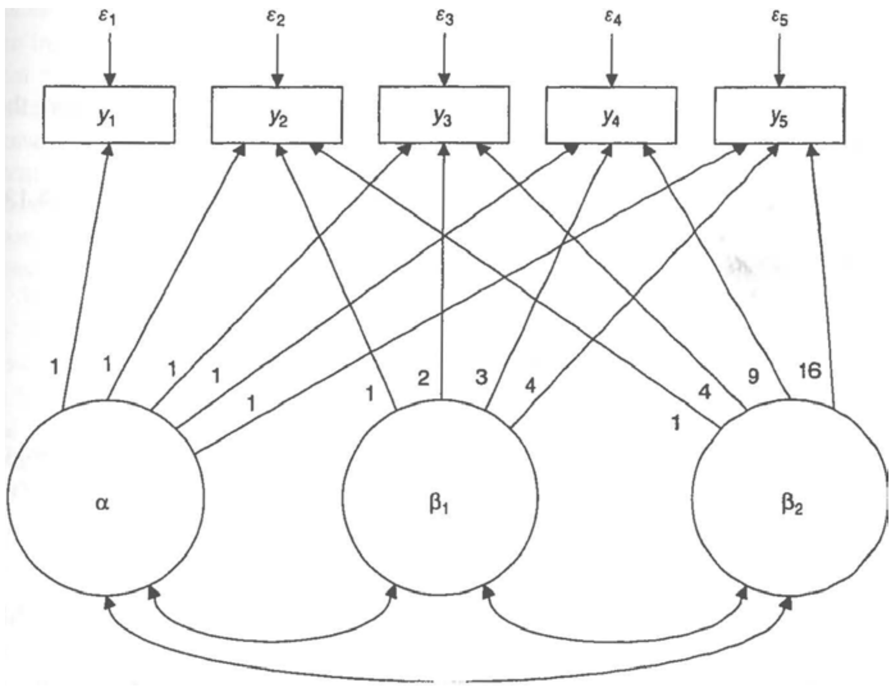
where α_i and β_i are the intercept and slope terms from the level one equation, μ_α and μ_β are the mean intercept and slope for all cases, and $\zeta_{\alpha i}$ and $\zeta_{\beta i}$ are the disturbance terms for the intercept and slope. Time-invariant covariates (TICs) or time-varying covariates (TVCs) can also be added to a LGC model. In a conditional model where only TICs have been added to the unconditional model, the level one equation remains the same and the new variables are introduced into the level two equations. In a model with only TVCs, on the other hand, the covariates appear only in the level one equation with the level two equations remaining the same as in the unconditional model.

The method used to estimate the LGC models was Full-information Maximum Likelihood (FIML). It is necessary to use FIML as opposed to traditional ML due to the presence of missing data in the dataset. Use of FIML has a number of advantages, namely that all available data can be utilized and it provides estimates that are generally less biased compared to other missing data techniques (Byrne, 2016). A number of key assumptions are made when estimating a SEM model using any form of ML. First, it is assumed that the model has been specified correctly by the researcher (Kline, 2011). Second, endogenous variables are expected to be multivariate normal and exogenous variables measured without error. Third, the error variances may differ over time, but are assumed to be the same for all individuals in a given time period (Bollen & Curran, 2006). Finally, LGC analysis also assumes that the mean of the disturbance terms are zero ($E(\varepsilon_{it}) = 0$) for all cases and time periods, the intercept and slope terms are uncorrelated with the disturbance term and the disturbances for different individuals are not correlated.

The LGC analysis for research question one proceeded through several steps. First, three initial LGC models were estimated for each dependent variable: total athletics subsidies per FTE, school funds per FTE, and E&R expenditures per FTE. These models included a no-growth model, a linear growth model similar to that shown in Fig. 3.1, and a quadratic linear growth model as shown in Fig. 3.2. Two additional LGC models were also estimated for each variable – a piecewise linear model and a piecewise non-linear model because each of the average growth curves plotted during the graphical analysis demonstrated the presence of at least two distinct slopes. Path diagrams for a piecewise linear model and a piecewise non-linear model with six waves of data are shown in Fig. 3.3 and 3.4. Initially, adjacent pairs of disturbance terms were allowed to correlate in each model (e.g. $\varepsilon_1 \leftrightarrow \varepsilon_2$). Non-significant disturbance correlations were removed iteratively until only significant correlations remained. Adjacent disturbance terms for the same indicator are often correlated in longitudinal SEM models due to the fact that one or more omitted variables may be represented within the disturbances (Bollen, 2006). After estimating all of the growth models for each variable, the model of best fit was determined using a number of fit criteria: χ^2, Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Aikaike

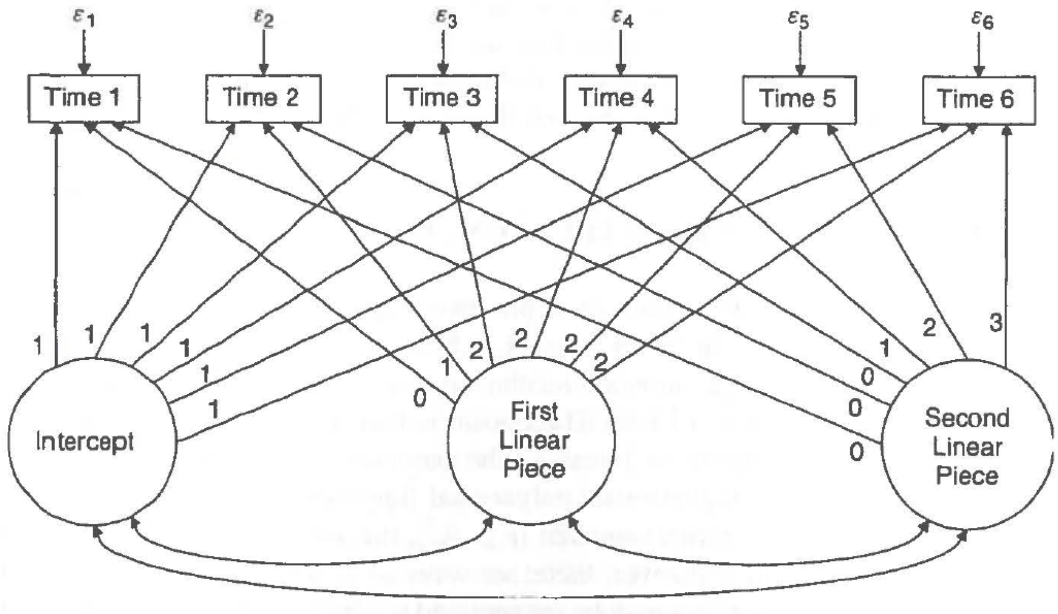
Information Criterion (AIC). The model of best fit was used to report the coefficients, standard errors, and correlations. AMOS v. 23 was used to estimate all LGC models.

Figure 3.2
Path Diagram for a Quadratic Latent Growth Curve Model with Five Waves of Data



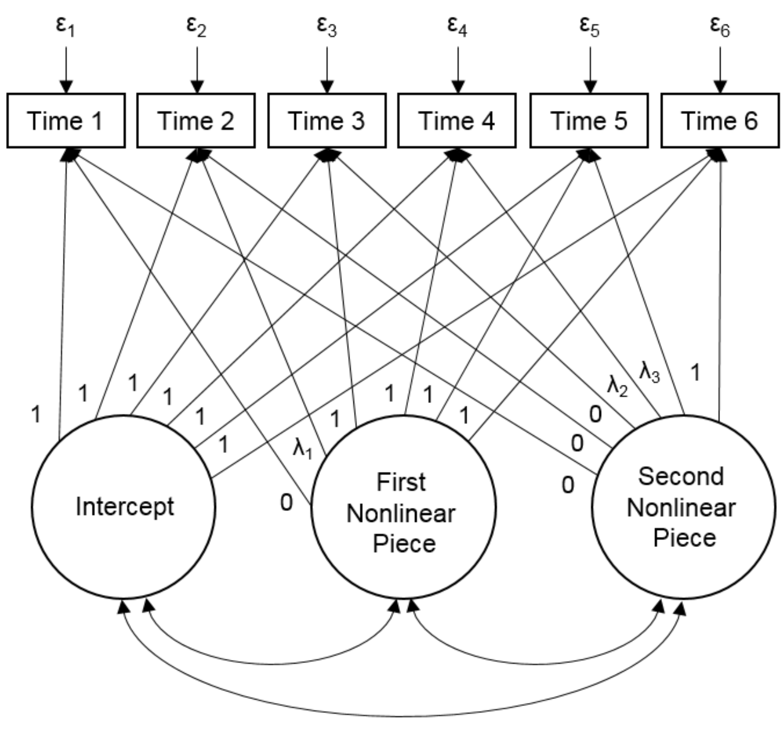
In the latent growth curve (LGC) diagram above, α represents the intercept, β_1 the first linear slope term, β_2 the second linear slope term and $y_1 - y_5$ the five time points for the endogenous variable *y*. A disturbance term ε_i has been assigned to each observation of *y*. Source: Bollen & Curran (2006).

Figure 3.3
Path Diagram for a Piecewise Linear Latent Growth Curve for Six Waves of Data



Source: Bollen & Curran (2006).

Figure 3.4
Path Diagram for a Piecewise Nonlinear Latent Growth Curve for Six Waves of Data



Analysis for Research Questions 2 through 5

The four remaining research questions for this study were investigated using fixed-effects models (FEMs). Fixed-effects modeling was selected because it is well-suited to the analysis of panel datasets and controls for time-invariant variables that have not been identified or cannot be measured (Allison, 2009). In the case of this dissertation, time fixed-effects such as institution type (public or private, land grant, HBCU, etc.), location, and mission were automatically controlled for in the FEMs. Fixed-effects models can be estimated using a number of different approaches, including ordinary least squares regression and structural equation modeling (SEM). The latter method was used for this dissertation. Advantages of using the SEM approach include the ability to estimate: hybrid fixed- and random-effects models, models with feedback loops, and models with latent variables that contain multiple indicators (Allison, 2009). Another advantage is that SEM software packages provide a wide range of model fit criteria that can be used to optimize model fit and select the best model among several viable alternatives (Bollen & Brand, 2010).

The equation for a classic FEM is as follows:

$y_{it} = B_{yx}\, x_{it} + \lambda_t\, \eta_i + \varepsilon_{it}$ (eq. 3.4)

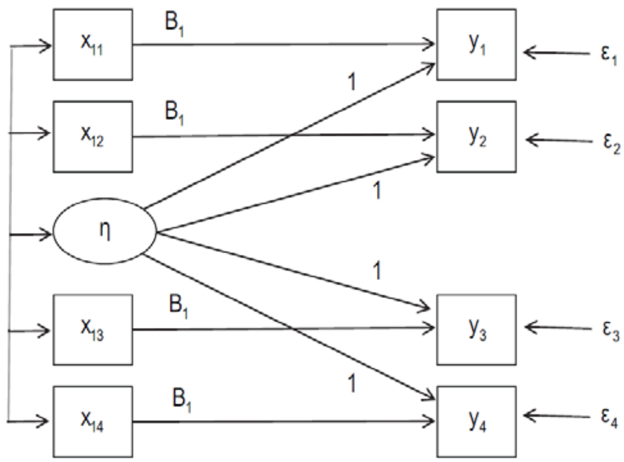
where B_{xy} is the vector of coefficients for the independent variables x, assumed to be equal across time and individuals, x_{it} is the vector of independent variables (time-varying) for case i at time t, λ_t is the coefficient for the unobserved time-invariant variable η_i at time t, η_i is an unobserved (latent) time-invariant variable that represents all time-invariant covariates that predict y_{it}, and ε_{it} is a random disturbance term for case i at time t (Bollen & Brand, 2010). The coefficient for the time-fixed effects, λ_t, is constrained to one for all waves of data because it is assumed to have a constant effect on the outcome variable. The variance of the disturbance terms ($\sigma_{\varepsilon it}$) can be constrained or allowed to vary across individuals, but is assumed to be constant with time ($\sigma_{\varepsilon it} = \sigma_{\varepsilon i}$).

A path diagram for a classic FEM using SEM is shown in Fig. 3.5 for four waves of data. As with the LGC models on p. 17-20, the FEM in 3.5 is depicted using the RAM notation. In the model shown in Fig. 3.5, none of the variables have been time-lagged. The observation of the independent variable *x* at time *t* is used to predict the corresponding observation of the dependent variable *y* at time *t*, with a constant regression weight of B_1. The time-fixed effects term, η, is treated as a latent variable and used to predict each observation of *y*, with a constant regression weight of one for each time *t*. Lastly, each observation of *x* is covaried with the three other observations of *x* as well as η.

In addition to the classic FEM in Fig. 3.5, one can estimate a FEM where the dependent variable(s) are time-lagged relative to one or more of the independent variables, where the dependent variable itself is time-lagged, or where both types of time-lagged effects are included (Bollen & Brand, 2010). A path diagram for a FEM that uses a lagged dependent variable is shown in Fig. 3.6. From the diagram, the first observation of the dependent variable, y_1, is treated as an independent variable and is used to predict the second observation of the dependent variable. It is also made to covary with each observation of the independent variable, x_{1t}, and the time-fixed effects term, η.

Figure 3.5

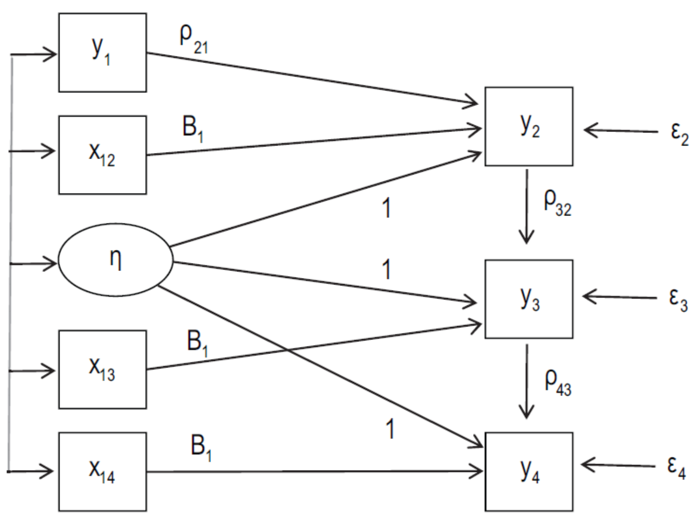
Classic Fixed Effects Model for Four Waves of Data using SEM



In the above figure, each observation of the dependent variable, x_{1t}, is used to predict the corresponding observation of the dependent variable y_t. A disturbance term, ε_t, is included for each observation of y_t, and η represents the fixed effects latent variable. Source: Bollen & Brand (2010).

Figure 3.6

Fixed Effects Model with a Time-Lagged Dependent Variable for Four Waves of Data



In the figure, the dependent variable is time-lagged such that the first observation, y_1, is treated as an exogenous variable and used to predict the second observation, y_2. Each remaining observation of y_t is used to predict the subsequent observation, y_{t+1}. The independent variable has not been time-lagged, so the first observation, x_{11}, has not been included. A disturbance term, ε_t, is included for each observation of y_t following y_1, and η represents the fixed effects latent variable. Source: Bollen & Brand (2010).

Each remaining observation of *y* is treated as a dependent variable but is also used to predict the subsequent observation of *y*. In this particular model, the independent variable is not time-lagged, which has led to the first observation of *x* being dropped from the equation (x_{11}).

For research question two, the dependent variable was E&R expenditures per FTE (log), the independent variable of interest was total athletics subsidies per FTE (log), and the control variables were core revenues per FTE (log), student FTE enrollment (log), and the number of tenure-track faculty (log). Multiple FEMs were estimated for research question two in order to identify the model of best fit. The models included: a classic FEM with no time-lagged variables, a FEM with a lagged dependent variable, a FEM with lagged independent-dependent variable effects, and a FEM with both types of lagged effects. The models were compared using several fit criteria, and the best-fitting model was used to report the results from the analysis.

Research question three re-estimated the best-fitting model from research question two after including interaction terms between the independent variable of interest and four categorical, time-invariant variables. The interaction terms were between athletics subsidies per FTE (log) and each of the following: Carnegie classification as a research university; classification as the state flagship university; reporting location of the athletics department within the university budget structure; and level of athletics competition. Four separate FEMs were estimated with one of the four interaction terms included in each model in order to determine whether the relationship between total athletics subsidies per FTE and E&R expenditures per FTE depended upon any of the categorical variables. The analyses for research questions 4-5 were identical to those for questions 2-3 except that school funds per FTE was used as the primary independent variable in place of total athletics subsidies per FTE.

As with the LGC models used to investigate research question one, the FEMs were estimated using full-information maximum likelihood estimation (FIML). FIML assumes that continuous variables are multivariate normal and exogenous variables were measured without error (Kline, 2011). It is also assumed that the disturbance terms are uncorrelated with the exogenous variables. All FEMs were estimated using AMOS v. 23. An alpha level of .05 was used to determine statistical significance for the coefficients.

Limitations

A number of important limitations have been identified for this dissertation. First and foremost, the accuracy of the *USA Today Athletics Finance Database* is somewhat suspect. In theory, institutions are required to disclose all direct and indirect subsidies to their athletics departments through the NCAA annual athletics finance data request (USA Today, 2016b). This information was acquired by *USA Today* using the Freedom of Information Act and published online. However, historically not all institutions have participated in the NCAA data collections and the accuracy of these data have been called into question (Thelin, 1996). Institutions may be providing misleading or incomplete information by, for example, excluding athletics facilities from the accounting of indirect subsidies to the athletics department.

A second limitation is the scope of this dissertation. Currently, athletics subsidies data are only available for public Division I institutions, which represent a relatively small fraction of all U.S. colleges and universities. Moreover, the findings from this study may not be applicable to private institutions or public institutions that compete at the

Division II or III levels. Additionally, only the relationship between athletics subsidies and education and related expenditures has been examined. It is possible that changes in athletics subsidies may be correlated with changes in other expenditure categories such as student services, student scholarships (non-athletic), or physical plant.

A final limitation identified for this study is the possibility of omitted variable bias in the fixed-effects models. While the models accounted for time- and year-fixed effects, there may be other time-varying covariates that affect both athletics subsidies and education and related expenditures and that have unique values for each institution. For example, changes in institutional priorities stemming from new policies in the state legislature (e.g. performance-based funding) or new academic leadership (e.g. president) may impact the allocation of financial resources.

Summary

In this chapter, the research hypotheses were presented followed by a description of the sample, data sources, and the methods used to analyze the datasets. Several limitations identified for this study have also been discussed. The research hypotheses were developed by drawing upon the economic and higher education theories presented in chapter two. Here, it has been supposed that as colleges and universities increase their intercollegiate athletics subsidies, they in turn have decreased resource allocation to other core functions that are dependent upon the general fund, controlling for other factors. Further, colleges and universities may be increasing their internal support to athletics due to belief in the indirect benefits of athletics as well as an inability to properly oversee and control athletics spending.

The size and scope of the dataset is somewhat limited for this study. However, it focuses upon arguably the most important group of institutions in terms of intercollegiate athletics: public Division I colleges and universities. With the exception of a select number of private institutions, the institutions examined in this study have the largest athletics budgets as well as athletics subsidies. Moreover, these institutions have allocated general fund revenues to intercollegiate athletics – funds that are at least in part provided from state tax revenues intended to serve the public good.

The methods used in this dissertation are a robust and proven means of analyzing panel datasets. The use of fixed-effects models allows for institutional variables that did not change during the time period of this study to be controlled for. Additionally, variables that changed over time but had a constant effect across institutions could also be controlled for. In this way, it is believed that the risk of omitted variable bias has been reduced as much as possible. The next chapter will present the results from the statistical analyses.

CHAPTER FOUR: RESULTS

Chapter four presents the results from the data analyses for this dissertation. The analyses were designed to address the following research questions:

1. How do the rates of growth in total athletics subsidies per FTE and school funds per FTE compare to the rate of growth in education and related (E&R) expenditures per FTE for public Division I institutions between 2005 and 2014?
2. What is the relationship between total intercollegiate athletics subsidies per FTE and E&R expenditures per FTE, controlling for other factors?
3. Is the relationship between total intercollegiate athletics subsidies per FTE and E&R expenditures per FTE dependent upon institutional type (research university, state flagship) or characteristics of the athletics program (reporting structure, level of play), controlling for other factors?
4. What is the relationship between athletics subsidies from school funds per FTE and E&R expenditures per FTE, controlling for other factors?
5. Is the relationship between athletics subsidies from school funds per FTE and E&R expenditures per FTE dependent upon institutional type (research university, state flagship) or characteristics of the athletics program (reporting structure, level of play), controlling for other factors?

The chapter is divided into four sections. Section one presents the descriptive statistics for all variables in the dataset. Section two provides the results from the latent growth curve (LGC) models used to estimate average growth in total athletics subsidies per FTE, athletics subsidies from school funds per FTE, and E&R expenditures per FTE for research question one. Section three presents the results from the time fixed effects models (FEMs) used to estimate the relationship between total athletics subsidies per FTE and E&R expenditures per FTE, both with and without interaction terms (research questions two and three). Similarly, section four presents the results from the time FEMs used to estimate athletics subsidies from school funds per FTE and E&R expenditures per FTE, with and without interaction terms (research questions four and five). The chapter concludes with a brief summary of key findings.

Descriptive Statistics

Descriptive statistics for all continuous variables used in the analyses are presented in Tables 4.1 and 4.2. From Table 4.1, the institutions in the dataset brought in substantially more total core revenues on average in 2014 than 2005 ($364.3M vs. $246.3M), allocated more funding to E&R activities ($167.2M vs. $116.1M), and enrolled 19 percent more students. Even after accounting for inflation, the increases to total core revenues and E&R expenditures were 22.0 and 18.8 percent, respectively. Real increases in core revenues per FTE and E&R expenditures per FTE were more modest, however, at 6.0 and 4.7 percent. This suggests that much of the growth in total core revenues and E&R expenditures was the result of expanded student enrollments. On the one hand, additional students translate into more tuition and fee dollars, while on the other hand they generally require greater expenditures on faculty, classroom facilities, technology, etc. The most conspicuous variable in the dataset is the median number of tenure-track faculty, which decreased slightly from 2005 to 2014 despite an increase in median student enrollment of nearly 2,700. This finding is consistent with other research that has shown institutions have not increased the number of tenure-track faculty commensurately with enrollment (Bunton & Mallon, 2007; McMurtry & McClelland, 1997; and Gappa, 2000).

Athletics subsidies are represented as four different measures in the dataset: total athletics subsidies, total athletics subsidies per FTE, athletics subsidies from school funds (referred to herein as school funds), and school funds per FTE. In Table 4.2, all four subsidies measures increased substantially from 2005 to 2014: between 50 and 66 percent in actual 2014 dollars. These increases in athletics subsidies far outpaced the increases in total and per-student E&R expenditures noted above. This result is consistent with previous findings by Desrochers (2013) who showed that athletics subsidies per student athlete increased by 61 percent for FBS and 42 percent for FCS institutions between 2005 and 2010. By comparison, FBS and FCS institutions saw increases of 23 and 22 percent in academic spending per FTE during that time. Even though athletics subsidies remain a relatively small portion of the overall university budget, the data in Tables 4.1 and 4.2 demonstrate that the fraction of core revenues expended on athletics subsidies has increased from 2.1 percent in 2005 to 2.7 percent in 2014.

Table 4.3 provides the frequencies for the time-invariant categorical variables. In reviewing the 2005 and 2010 Carnegie Classifications, the majority of institutions in the dataset for either year were considered research or doctoral, with very few at the baccalaureate level. While the frequency distributions of the two sets of classifications appear similar, there was considerable institutional movement from 2005 to 2010. A total of 25 institutions "moved up" one category (e.g. Research II to Research I), 2 institutions moved up two categories, and 3 institutions moved down one category. This movement may be reflective of the fact that, although not intended to serve as such, the Carnegie

Table 4.1

Medians and Interquartile Ranges for Dependent and Control Variables

	Total E&R Expenditures	E&R Expenditures /FTE	FTE Enrollment	Total Core Revenues	Core Revenues /FTE	Number of Tenure-Track Faculty	Number of Tenure-track Faculty/ 100 FTE
2014	167,257,383.0 (85,823,651.0 – 306,602,604.0)	9,905.8 (7,938.9 – 13,361.7)	16,716.0 (9,958.5 – 24,984.5)	364,269,596.0 (183,445,857.0 – 784,806,397.0)	23,089.9 (16,866.6 – 32.736.9)	542.0 (337.5 – 890.5)	3.5 (3.0 – 4.1)
2013	166,740,729.0 (82,539,480.5 – 293,029,225.5)	9,515.8 (7,639.7 – 12,653.1)	16,971.0 (10,140.5 – 24,865.5)	346,954,062.0 (179,189,896.0 – 735,658,526.0)	22,243.5 (16,306.1 – 31,697.8)	551.0 (346.0 – 879.5)	3.4 (3.0 – 4.0)
2012	159,422,442.0 (80,802,879.0 – 277,604,700.5)	9,257.6 (7,351.9 – 12,121.2)	17,104.0 (10,048.5 – 25,026.0)	338,802,494.0 (176,285,406.5 – 725,215,104.0)	21,792.0 (16,216.9 – 30,651.0)	566.0 (341.5 – 917.0)	3.6 (3.0 – 4.2)
2011	155,410,866.0 (78,512,870.0 – 274,751,562.0)	9,166.1 (7,401.8 – 11,792.7)	16,316.0 (10,016.0 – 24,284.0)	340,044,638.0 (178,775,506.5 – 691,903,543.0)	21,819.9 (16,863.0 – 31,019.3)	565.0 (342.0 – 908.2)	3.6 (3.0 – 4.3)
2010	147,616,494.0 (76,009,565.0 – 260,279,403.0)	9,224.0 (7,215.5 – 11,740.1)	16,001.0 (9,882.0 – 23,934.5)	322,300,702.0 (174,317,979.0 – 659,238,415.5)	21,874.2 (16,045.2 – 30,124.8)	576.0 (336.5 – 893.5)	3.8 (3.1 – 4.3)
2009	146,984,532.0 (78,693,239.5 – 259,524,340.5)	9,254.2 (7,492.6 – 12,309.0)	15,812.0 (9,447.5 – 23,284.0)	293,927,234.0 (168,262,175.5 – 567,376,332.0)	20,335.5 (15,425.5 – 28,637.2)	570.0 (342.5 – 898.0)	3.8 (3.2 – 4.5)
2008	140,716,561.0 (76,359,929.5 – 245,823,619.0)	9,178.0 (7,282.2 – 12,220.1)	15,155.0 (9,157.0 – 22,841.5)	291,827,553.0 (158,299,318.0 – 571,591,009.5)	20,776.4 (15,561.7 – 30,540.9)	567.0 (338.0 – 891.0)	3.8 (3.2 – 4.5)
2007	129,889,993.0 (70,796,635.5 – 226,555,130.0)	8,688.1 (6,936.6 – 11,531.4)	14,642.0 (9,205.0 – 22,403.5)	297,608,177.0 (151,778,465.5 – 573,561,615.5)	20,271.4 (14,899.8 – 29,592.6)	559.0 (324.0 – 880.5)	3.8 (3.3 – 4.6)
2006	119,983,290.0 (66,316,733.5 – 211,335,679.5)	8,292.7 (6,625.8 – 10,777.7)	14,785.0 (9,278.5 – 22,281.0)	273,026,915.0 (142,653,735.5 – 528,192,544.0)	19,117.9 (14,150.4 – 27,772.9)	549.0 (319.0 – 858.5)	3.8 (3.2 – 4.6)
2005	116,100,967.0 (62,104,268.5 – 198,449,823.5)	7,802.0 (6,295.3 – 10,294.4)	14,053.0 (9,426.0 – 22,389.0)	246,333,315.0 (132,103,002.5 – 496,054,679.0)	17,978.5 (13,217.4 – 25,654.7)	546.5 (326.0 – 854.8)	3.8 (3.2 – 4.6)

[a] A total of 229 unique institutions are included in the dataset use to report the figures above. All institutions reported data for the variables above to IPEDS for each year between 2005 and 2014. Interquartile ranges are shown in parentheses.

Table 4.2

Medians and Interquartile Ranges for Independent Variables

	N [a]	Total Athl. Subsidies	Athl. Subsidies /FTE	N[b]	School Funds	School Funds/FTE
2014	228	9,755,460.5 (6,811,373.2 – 14,788,811.5)	774.6 (466.2 – 1,084.4)	228	5,287,278.5 (2,146,248.0 – 8,963,623.8)	370.0 (114.3 – 696.5)
2013	228	9,440,802.5 (6,532,314.5 – 13,772,626.5)	736.9 (452.2 – 1,018.2)	229	5,007,224.0 (2,015,886.0 – 8,346,743.0)	343.6 (122.7 – 660.8)
2012	226	8,926,498.5 (6,128,058.0 – 13,578,986.2)	685.4 (396.4 – 989.3)	226	4,554,341.0 (1,976,627.0 – 7,757,227.5)	328.0 (102.6 – 627.8)
2011	224	8,338,475.0 (5,757,774.2 – 12,472,799.2)	658.4 (395.5 – 913.4)	224	4,228,209.5 (1,954,152.8 – 7,747,055.5)	304.2 (100.5 – 576.8)
2010	226	7,956,826.5 (5,391,245.2 – 11,568,538.5)	605.4 (385.0 – 856.8)	226	3,946,062.0 (1,834,804.2 – 7,336,244.5)	263.3 (101.5 – 532.5)
2009	224	7,543,496.0 (5,156,941.8 – 11,474,264.5)	617.8 (381.6 – 832.4)	224	3,953,725.0 (1,847,509.0 – 7,339,900.8)	275.5 (107.0 – 538.5)
2008	223	7,002,634.0 (4,708,944.0 – 10,199,008.0)	553.4 (342.3 – 771.8)	223	3,474,923.0 (1,504,908.0 – 6,687,658.0)	246.9 (95.4 – 509.1)
2007	223	6,286,050.0 (4,140,612.0 – 9,423,905.0)	498.1 (313.8 – 713.7)	223	2,942,863.0 (1,381,811.0 – 5,911,203.0_	217.2 (89.2 – 457.8)
2006	221	6,032,607.0 (3,834,108.0 – 8,459,281.5)	475.2 (277.1 – 673.0)	221	2,889,681.0 (1,208,203.5 – 5,357,919.5)	206.3 (75.5 – 441.6)
2005	222	5,233,447.0 (3,233,852.8 – 7,563,707.2)	426.2 (256.7 – 612.1)	222	2,591,236.0 (811,370.2 – 4,621,233.8)	183.3 (57.8 – 379.1)

[a] A total of 229 unique institutions are included in the dataset used to report the figures above. However, a handful of institutions did not report athletics finance data in any given year. Interquartile ranges are shown in parentheses.

Table 4.3
Frequency Distribution of Time-invariant Categorical Variables

Variable	Frequency (%)
2010 Carnegie Classification	
Research-I	65 (28.4)
Research-II	63 (27.5)
Research-III/Doctoral	21 (9.2)
Master's [a]	72 (31.4)
Baccalaureate [b]	8 (3.5)
2005 Carnegie Classification	
Research-I	56 (24.5)
Research-II	64 (27.9)
Research-III/Doctoral	21 (9.2)
Master's [a]	79 (34.5)
Baccalaureate [b]	9 (3.9)
State Flagship University	
Flagship	47 (20.5)
Non-flagship	182 (79.5)
Athletics Control	
Auxiliary/Other Unit	161 (70.3)
Student Services	68 (29.7)

[a] Includes institutions in all three masters' Basic Carnegie Classifications (larger, medium, and smaller programs)
[b] Includes institutions in all three baccalaureate Basic Carnegie Classifications (Arts & Sciences, Diverse Fields, and Baccalaureate/Associate's Colleges)

Table 4.4

Frequency Distribution of Time-varying Categorical Variable

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Level of Play										
D-I - FBS	96	98	98	98	98	99	99	99	102	104
D-I - FCS	74	72	73	74	76	77	79	80	77	76
D-I - non-football	46	47	48	50	51	49	48	48	49	49
D-II [a]	13	12	10	7	4	4	3	2	1	0

[a] A total of 13 different institutions in the dataset transitioned from D-II to D-I between 2005 and 2014. However, these institutions generally provided data only in the years for which they were a) in transition from D-II to D-I or b) already classified as D-I. As such, they were classified as either D-I - FCS or D-I - non-football for the subsequent analyses that involved level of play interaction terms.

classifications have come to be viewed as a measure of institutional prestige. A desire to "move up" from the baccalaureate to masters category or masters to doctoral may serve as an incentive for institutions to add graduate and professional programs (Iglesias, 2014). Also shown in the table is the number of flagship institutions in the dataset, 47. Flagship universities are unique for a variety of reasons, including the fact that they are among the oldest and largest institutions in their respective states and generally receive more state appropriations than public non-flagship institutions (Bowser, 2017; Stocum, 2013). The final variable, athletics control, indicates the location of the athletics' budget within the university structure. More than two-thirds of the institutions indicated that the athletics department is treated as an auxiliary/other unit, with the remaining one-third reporting that it was located within student services.

The frequency distribution for the lone time-varying categorical variable indicating the level of athletics play is provided in Table 4.4. In all years, the majority of institutions in the dataset competed at the FCS level and sponsored a football program. However, there has been a clear upward trend for institutions to move from Division II to Division I and from FCS to FBS. When combined, 21 of the 229 institutions in the dataset moved up one level of play (9.2 percent). A handful of institutions were classified as Division II in at least one year from 2005 to 2014; however, athletics subsidies data were generally not available for these institutions until they began their transition to Division I. Division II programs that did provide subsidies data were treated as Division I FCS or Division I non-football in the analyses.

The continuous variables in 2014 are reported in Table 4.5 on the basis of the 2005 Carnegie Classifications. From the table, differences exist across institution types in terms of the “horsepower” variables – total E&R expenditures, total core revenues, enrollment, and the number of tenure-track faculty. Research I institutions appear the most distinctive, with medians for each of these variables that were between 1.5 and 3.5 times those of the next closest category of institutions, Research II. Some similarities emerge, however, when comparing institution types on a per-student basis. For example, the E&R expenditures per FTE are similar for Research II and Research III and across Master’s and Baccalaureate institutions.

The athletics subsidies variables in Table 4.5 exhibit several important trends. The largest median total subsidies occurred at Research II universities followed by Research III and Master’s. However, this trend is reversed when examining the per-student variables. Baccalaureate institutions had the highest total subsidies per FTE and school funds per FTE followed by Master’s and Research III institutions. These findings suggest the possibility of certain fixed costs associated with athletics that large research universities are able to spread out over a much larger student body compared to Master’s and Baccalaureate institutions.

Table 4.6 presents the median percent change in the continuous variables from 2005 to 2014 for each of the Carnegie classifications. With the exception of the two faculty variables, all institution types saw appreciable increases in each of the continuous variables. However, there appear to be differences in the amount of growth that occurred for each class of institution. The largest increases in total and per-student core revenues and E&R expenditures were generally observed for Research I institutions. Considering that Research I institutions also had the highest core revenues and E&R expenditures among institution types in 2005 (not shown), it appears that the gap between

Table 4.5

2014 Medians and Interquartile Ranges for Continuous Variables by 2005 Carnegie Classification

	Research I	Research II	Research III/ Doctoral	Master's	Baccalaureate.
Total E&R Expenditures	458,400,349.0 (347,333,797.0 – 797,547,991.5)	167,257,383.0 (85,825,651.0 – 306,602,604.0)	124,564,898.0 (81,646,475.5 – 193,973,390.0)	79,669,792.0 (52,108,683.0 – 128,086,248.0)	40,214,517.0 (28,027,008.5 – 138,343,899.5)
E&R Expenditures/ FTE	16,263.8 (12,536.9 – 21,327.2)	10,356.8 (8,824.0 – 13,051.1)	9,226.8 (8,757.9 – 11,010.7)	7,554.5 (6,915.7 – 8,986.2)	8,531.2 (7,150.9 – 24,727.7)
FTE Enrollment	28,773.5 (24,362.8 – 39,395.8)	18,072.5 (13,017.0 – 23,163.0)	12,791.0 (8,904.5 – 18,496.5)	10,356.0 (6,890.0 – 16,449.0)	4,591.0 (2,916.0 – 6,999.0)
Total Core Revenues	1,215,874,483 (908,586,509 – 1,873,873,986)	364,269,596.0 (183,445,857.0 – 784,806,397.0)	255,164,744.0 (168,777,562.5 – 346,302,241.0)	175,500,638.0 (116,200,234.0 – 259,983,922.0)	76,967,303.0 (66,672,365.5 – 302,280,528.0)
Core Revenues/ FTE	43,691.7 (33,444.6 – 56,910.6)	25,833.4 (21,496.6 – 29,478.0)	21,126.9 (17,353.2 – 23,556.4)	16,545.2 (14,972.8 – 19,538.0)	22,697.5 (13,560.5 – 55,575.4)
Number of tenure-track faculty	1,282.5 (1,011.8 – 1,506.8)	542.0 (337.5 – 890.5)	412.0 (313.5 – 568.5)	334.0 (202.0 – 500.0)	131.0 (48.5 – 228.0)
Number of tenure-track faculty/ 100 FTE	4.0 (3.5 – 4.9)	3.5 (3.0 – 4.1)	3.5 (3.1 – 4.0)	3.2 (2.7 – 3.8)	3.0 (1.2 – 4.4)
Total Athl. Subsidies	8,026,863.0 (2,109,120.2 – 15,025,883.0)	12,640,747.5 (7,583,256.0 – 18,597,633.0)	10,041,697.0 (8,802,100.5 – 14,591,949.0)	9,432,961.0 (7,945,097.2 – 11,904,057.2)	6,037,876.0 (4,810,823.5 – 15,901,683.5)
Athl. Subsidies/ FTE	225.8 (64.6 – 652.2)	706.5 (424.2 – 994.4)	892.0 (724.5 – 1,091.4)	930.9 (703.7 – 1,217.3)	2,202.8 (1,089.6 – 2,613.9)
School funds	3,288,551.0 (251,579.0 – 9,615,525.5)	5,287.278.5 (2,146,248.0 – 8,963,623.8)	6,159,730.0 (3,308,823.0 – 8,412,618.5)	6,106,560.0 (2,922,446.5 – 8,497,718.8)	5,085,138.0 (1,946,623.5 – 13,679,943.0)
School funds/FTE	102.9 (6.8 – 395.9)	370.0 (114.3 – 696.5)	459.4 (222.0 – 856.8)	600.4 (262.4 – 811.6)	696.7 (382.0 – 2,366.9)
N	56	229	21	79	9

Interquartile ranges are shown in parentheses.

Table 4.6

Medians and Interquartile Ranges for Percent Change for Continuous Variables from 2005 to 2014 by 2005 Carnegie Classification

	Research I	Research II	Research III/ Doctoral	Master's	Baccalaureate
Total E&R Expenditures	50.9 (44.6 – 65.8)	49.7 (32.8 – 59.9)	39.7 (15.1 – 63.5)	41.0 (25.3 – 56.3)	37.6 (18.7 – 84.2)
E&R Expenditures/ FTE	37.0 (26.1 – 50.8)	26.9 (17.3 – 40.8)	21.1 (13.0 – 42.7)	26.7 (14.7 – 38.5)	29.1 (10.0 – 44.2)
FTE Enrollment	12.8 (6.8 – 17.8)	16.1 (4.1 – 23.9)	5.4 (-4.4 – (+25.6))	11.3 (0.6 – 20.9)	9.8 (0.1 – 25.9)
Total Core Revenues	50.6 (39.6 – 66.4)	47.7 (30.3 – 63.8)	41.5 (25.0 – 64.9)	45.1 (27.7 – 59.6)	32.9 (19.1 – 62.4)
Core Revenues/ FTE	35.6 (25.5 – 49.1)	27.3 (21.6 – 40.3)	30.2 (18.4 – 42.2)	30.3 (21.0 – 41.2)	37.0 (7.7 – 42.8)
Number of Tenure Track Faculty	-1.4 (-5.4 – (+6.6))	2.2 (-5.0 – (+9.8))	-1.8 (-14.4 – (+11.9))	9.8 (-8.2 – (+15.4))	6.5 (-0.8 – (+41.1))
Number of Tenure Track Faculty/ 100 FTE	-10.4 (-20.6 – (-3.9))	-10.7 (-18.8 – (-3.8))	-5.0 (-24.5 – (+0.8))	-3.5 (-17.4 – (+6.4))	-0.1 (-5.0 – (+8.2))
Total Athl. Subsidies	66.0 (-2.5 – (+110.2))	74.8 (42.8 – 120.5)	81.6 (65.6 – 141.5)	98.9 (64.1 – 150.4)	121.5 (87.1 – 158.6)
Athl. Subsidies/ FTE	42.2 (-11.0 – (+92.2))	52.9 (25.7 – 84.8)	78.8 (51.6 – 117.8)	80.2 (53.8 – 122.5)	88.2 (47.4 – 150.6)
School funds	53.4 (-42.4 – (+213.6))	74.8 (35.0 – 121.0)	81.3 (50..0 – 166.5)	96.7 (52.8 – 161.1)	220.7 (52.6 – 258.6)
School funds/FTE	28.6 (-47.2 – (+146.6))	57.3 (23.0 – 99.5)	78.7 (34.8 – 192.3)	76.9 (32.3 – 138.0)	137.8 (40.6 – 256.4)
N	56	64	21	79	9

Interquartile ranges are shown in parentheses.

Table 4.7

2005 and 2014 Medians and Interquartile Ranges for Athletics Subsidies and School Funds by Type of Athletics Control and Level of Play

	Athletics Control		Level of Play	
	Student Services	Auxiliary/ Other	FBS	FCS/ DII
2005				
Total Athl. Subsidies	5,626,437.0 (3,643,101.0 – 7,532,772.0)	5,184,678.0 (3,154,288.0 – 7,593,204.0)	5,404,062.0 (2,832,151.8 – 9,089,959.8)	5,105,512.5 (3,596,446.2 – 6,907,948.0)
Total Athl. Subsidies/ FTE	490.7 (320.8 – 666.6)	385.6 (230.1 – 586.1)	256.2 (115.7 – 484.8)	487.7 (361.8 – 685.6)
School Funds	3,374,085.0 (2,341,541.0 – 5,318,677.0)	1,929,490.0 (513,920.0 – 4,177,275.0)	2,578,354.5 (572,224.0 – 5,595,643.5)	2,591,236.0 (1,035,771.2 – 4,315,333.2)
School Funds/ FTE	353.0 (174.1 – 527.1)	130.4 (37.0 – 317.1)	108.7 (22.0 – 295.8)	254.6 (92.2 – 432.9)
2014				
Total Athl. Subsidies	11,179,898.0 (8,646,618.0 – 15,112,785.0)	9,243,641.0 (5,100,641.0 – 14,766,688.0)	9,756,739.0 (3,896,660.2 – 18,323,731.0)	9,790,183.0 (7,969,310.5 – 13,267,709.8)
Total Athl. Subsidies/ FTE	943.3 (674.9 – 1,243.9)	700.2 (291.1 – 957.9)	454.3 (112.2 – 894.6)	875.7 (678.7 – 1,182.6)
School Funds	8,218,132.0 (5,554,993.0 – 10,428,712.0)	3,911,202.0 (1,270,728.5 – 7,506,599.0)	4,981,218.0 (1,037,442.8 – 10,132,502.2)	5,360,767.5 (2,826,110.5 – 8,323,706.8)
School Funds/ FTE	696.7 (354.1 – 1,056.4)	228.2 (80.1 – 559.0)	108.7 (22.0 – 295.8)	477.7 (213.8 – 736.7)
2005- 2014 Median % Change				
Total Athl. Subsidies	94.2 (65.8 – 158.9)	76.0 (46.6 – 121.4)	66.0 (32.6 – 122.0)	92.2 (63.2 – 134.3)
Total Athl. Subsidies/ FTE	83.1 (45.5 – 134.0)	56.6 (29.5 – 100.4)	51.3 (14.6 – 100.4)	75.2 (43.4 – 111.7)
School Funds	97.8 (50.3 – 168.0)	79.1 (22.8 – 145.4)	56.2 (15.2 – 138.0)	91.7 (46.5 – 172.1)
School Funds/ FTE	77.7 (34.6 – 142.2)	54.9 (9.6 – 125.8)	49.7 (-5.0 – (+127.0))	76.9 (29.2 – 138.5)
N	68	161	96	133

Interquartile ranges are shown in parentheses.

elite research universities and all other public institutions only became wider with time. Although Research II universities had the second-largest increases in total core revenues and E&R expenditures, they ranked fourth and fifth among institutional types in per-student increases to E&R expenditures and core revenues.

Total athletics subsidies and school funds increased by more than 50 percent for all classes of institutions and more than 74 percent for all but Research I universities between 2005 and 2014. Overall, the trend in Table 4.6 is that from left to right the percent increases in total and per-student athletics subsidies and school funds grow larger. Thus, smaller institutions have expanded their athletics subsidies at a faster rate than larger institutions. As noted by Frank (2004), this could indicate an athletics arms race where the gap in revenues between the most prominent programs, namely those in power five conferences, and other FBS and FCS is widening. Smaller FBS and FCS schools have been forced to increasingly subsidize their athletics programs in order to remain competitive. It is also worth noting that the rate of increase in total athletics subsidies was highly similar to the rate of increase in school funds for each type of institution. This shows that the portion of total athletics subsidies occupied by direct and indirect institutional funds has at minimum held constant over time.

Athletics subsidies and school funds are reported in Table 4.7 according to where the athletics department reports within the university structure (athletics control) and the level of athletics play. The table shows that both athletics departments reporting within a student services unit and those within an auxiliary/other unit received large athletics subsides and school funds in 2005 and 2014. In comparing the two structures, the median total athletics subsidies was similar for the two types of institutions in 2005, but by 2014 the median total subsidies for student services-located departments was nearly $2M greater than that of auxiliary/other-located departments. Additionally, a much larger portion of the total subsidies was derived from school funds for student services-located departments (74 percent in 2014) than for auxiliary/other-located departments (42 percent in 2014). Lastly, student services-located departments tended to have much higher per-student athletics subsidies and school funds.

Several conclusions can be drawn from these data. First, it appears that athletics departments established as an auxiliary/other unit are not held to the same financial standards as other auxiliary units such as hospitals and dining services, which must generate sufficient revenues to cover their expenses. Second, although the magnitude and rate of growth for the subsidies variables is somewhat less for auxiliary/other athletics departments, there is no compelling evidence that having this type of administrative structure provides an institution with greater control in limiting athletics subsidies.

Athletics subsidies and school funds have also been reported in Table 4.7 according to the level of athletics play (FBS v. FCS). As shown, the total athletics subsidies and school funds were similar for the two types of institutions in both 2005 and 2014. When compared on a per-student basis, however, FCS institutions had total subsidies and school funds that were approximately twice those for FBS institutions. This reflects the fact that enrollment at FCS institutions was typically smaller than for FBS institutions (11,555.5 vs. 23,756.0 in 2014). Lastly, the rate of increase in total and per-student subsidies and school funds was between 20 and 30 percent greater for FCS compared to FBS institutions.

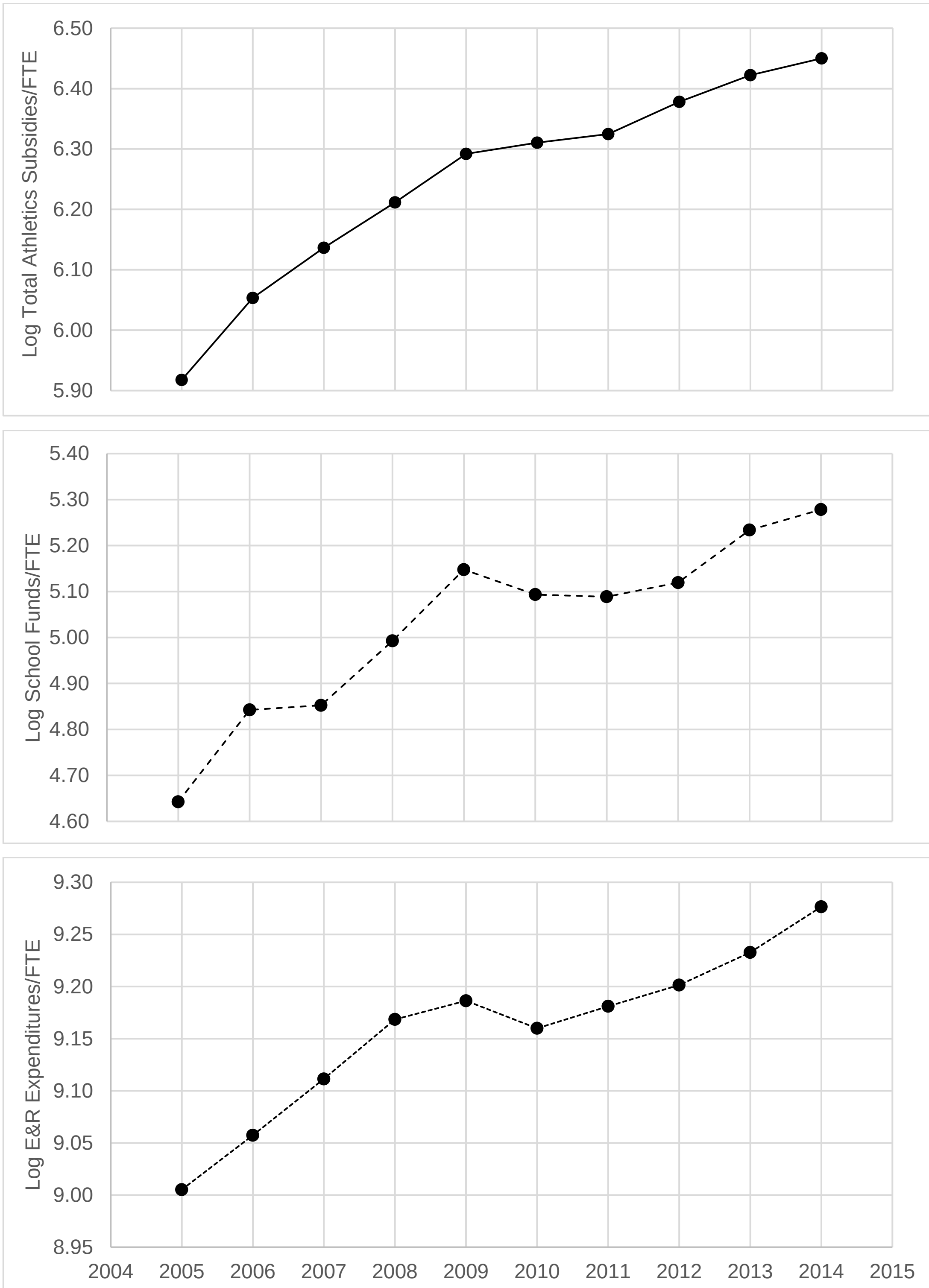
The descriptive statistics presented in this section show that differences appear to exist on the basis of institutional characteristics for the dependent variable and independent variables. Larger, more research-focused institutions typically had greater core revenues per student, E&R expenditures per student, and student enrollments and lower athletics subsidies per student than Masters and Baccalaureate institutions. Athletics departments that were aligned within a student services unit and those playing at the FCS level typically had higher total athletics subsidies per student and school funds per student than those aligned as an auxiliary/other unit or competing at the FBS level. Although the fixed-effects models (FEMs) accounted for such time-invariant institutional characteristics as the 2005 Carnegie Classifications, it was important to include interaction terms to test whether the relationship between E&R expenditures and athletics subsidies (and school funds) depended upon institutional characteristics.

Results for Research Question 1

Research question one sought to determine whether the rate of growth differed between total athletics subsidies per FTE, school funds per FTE, and E&R expenditures per FTE from 2005 to 2014. To understand the shape of the average growth curve for each variable, a simple graphical analysis was conducted by plotting the mean of each variable from 2005 to 2014. Prior to conducting the analysis, each variable was log-transformed to address deviations from multivariate normality. The results of the graphical analysis are presented in Figure 4.1.Total athletics subsidies per FTE (LOG) is shown in panel one of Figure 4.1, school funds per FTE (log) in panel two, and E&R expenditures per FTE (log) in panel three.

Figure 4.1

Mean Total Athletics Subsidies per FTE (log), School Funds per FTE (log), and E&R Expenditures per FTE (log) from 2005 to 2014



From the top panel of Figure 4.1, the total athletics subsidies per FTE (log) curve appears to exhibit three different slopes – all positive and approximately linear. The first slope occurs from 2005 to 2009, the second from 2009 to 2011, and the third from 2011 to 2014. Although less linear, the school funds per FTE (log) curve also exhibits a steep slope from 2005 to 2009, a slight decline from 2009 to 2011, and then continues to increase between 2011 and 2014. The third variable, E&R expenditures per FTE (log) increases sharply from 2005 to 2009 as well, declines briefly from 2009 to 2010, and resumes its ascent from 2010 to 2014. The different periods of growth for the three dependent variables suggested the possibility of using a piecewise linear growth model that could account for the presence of multiple slopes.

Following the graphical analysis, latent growth curve models (LGC) were estimated for total athletics subsidies per FTE (log), school funds per FTE (log), and E&R expenditures per FTE (log). The following unconditional models were fitted for each of the variables: linear, quadratic, piecewise linear, and piecewise non-linear to identify the model of best fit. A null or no growth model was also estimated to provide a baseline for comparison. The piecewise models were developed based upon the results from the graphical analysis.

Three slopes were used for the piecewise models for school funds per FTE (log) to address the time periods of 2005 to 2009, 2009 to 2011, and 2011 to 2014. Due to some uncertainty as to whether the total athletics subsidies per FTE (log) and E&R expenditures per FTE (log) piecewise models should contain two or three slope terms, both configurations were estimated and compared. The two-slope model for both total athletics subsidies per FTE (log) and E&R expenditures per FTE (log) contained slope terms from 2005 to 2009 and 2009 to 2014. The three-slope model for total athletics subsidies per FTE (log) contained slopes for 2005 to 2009, 2009 to 2011, and 2011 to 2014 whereas the model for E&R expenditures per FTE (log) had slopes for 2005 to 2008, 2008 to 2010, and 2010 to 2014. Fit criteria for each of the LGC models are provided in Table 4.8.

From Table 4.8, the χ^2 fit statistic was statistically significant for all of the LGC models. This suggests that the estimated variance-covariance matrix differed significantly from the data variance-covariance matrix, which is not the desired result. However, χ^2 tends to produce a significant result with sample sizes of 200 or larger and for variables that exhibit non-normal distributions (Schumacher & Lomax, 2016). This could explain the significance for the models in Table 4.8 because the sample size exceeds 200 and the school funds per FTE variable continued to produce kurtosis indices outside of the acceptable range after log transformation.

The two best-fitting models for total athletics subsidies per FTE (log) were the piecewise models containing two slopes. Both models had acceptable fit for total athletics subsidies per FTE and school funds per FTE based upon CFI ($\geq .95$) and TLI ($\geq .90$), but had values for RMSEA that were slightly outside of the acceptable range of $< .10$. Of these two models, the two-slope linear piecewise was selected as the best fitting model because it outperformed the three-slope nonlinear piecewise model according to χ^2/df, TLI, and RMSEA, and required fewer degrees of freedom.

For school funds per FTE (log), the linear piecewise model and quadratic model provided a similar fit to the data, and were acceptable based upon all of the fit indices. Even though the quadratic model was somewhat simpler, the piecewise model was chosen because it was favored slightly by each fit criteria and required only two additional degrees of freedom compared to the quadratic.

The final set of models, used to estimate the growth of E&R expenditures per FTE (log), exhibited similar issues to that of the total athletics subsidies per FTE (log) models. The two best fitting models were the three-slope piecewise models, and although both had acceptable fit based on the TLI and CFI indices, they were slightly outside of the desired range for RMSEA. Among the two, the linear three-slope piecewise model was selected because it required fewer degrees of freedom and the fit criteria only slightly favored the nonlinear version of the model.

The decision was made to proceed with the analysis even though the RMSEA indices for all of the models for total athletics subsidies per FTE (log) and E&R expenditures per FTE (log) were outside of the acceptable range for several reasons. First, RMSEA takes into account model parsimony and also tends to over-reject true models when the sample size is ≤ 250 (Hu & Bentler, 1998). Second, some deviations from multivariate normality continued to persist in these variables, which also negatively influences model fit. Third, a large number of models had been estimated in order to identify the best-fitting model. And fourth, the models had acceptable fit to the data based upon the TLI and CFI indices.

Tables 4.9-4.11 present the correlation matrices for the piecewise models for each of the three variables. The bivariate correlations for any two years were positive and strong to very strong in magnitude, ranging between 0.857 to 0.983 for total athletics subsidies per FTE, 0.733 to 0.963 for school funds per FTE, and 0.916 to 0.991 for E&R expenditures per FTE. As shown, the correlations for school funds per FTE over time were somewhat weaker than for the other two variables, particularly for observations that were more than 5 years apart. This suggests that past values may be better predictors of future values for total athletics subsidies per FTE and E&R expenditures per FTE than for school funds per FTE.

The results from the piecewise LGC models for each of the three variables are reported in Table 4.12. The coefficient for the intercept in each model, μ_α, is an estimate of the average value for the dependent variable in 2005. In the case of the total subsidies model, the intercept suggests that the average total athletics subsidies per FTE in 2005 was $379.9. The average school funds per FTE was estimated to be $109.2 in 2005 and the average E&R expenditures per FTE $8,184.5. In terms of growth, the slope coefficients ($\mu_{\beta 1}$, $\mu_{\beta 2}$, $\mu_{\beta 3}$) provide estimates of the increase in the dependent variable given a one-year increase during each of the three time periods. Because the variables have been log-transformed, their slope coefficients can be interpreted directly as percentages. The coefficients for the total athletics subsidies per FTE (log) estimate that a one-year increase in time is associated with a 7.7 percent increase in total athletics subsidies per FTE each year from 2005 to 2009 and a 3.1 percent increase each year from 2009 to 2014. In total, athletics subsidies per FTE (log) was expected to increase 46.3 percent during the entire time period of 2005 to 2014. Similarly, the slope coefficients for the two remaining variables suggest total increases in school funds per FTE (log) and E&R expenditures per FTE (log) of 59.3 and 25.6 percent between 2005 and 2014.

Table 4.8

Fit Criteria for LGC Models for Total Athletics Subsidies per FTE, School Funds per FTE, and E&R Expenditures per FTE

Model	χ^2	df	χ^2/df	*p*	CFI	TLI	RMSEA	AIC
Total Athl. Subsidies/ FTE (LOG)								
1. Null (no growth) [a]	682.198	36	18.950	.000	.885	.862	.246	720.198
2. Linear [b]	288.910	33	8.755	.000	.955	.943	.158	332.910
3. Quadratic [c]	199.788	31	6.445	.000	.971	.961	.130	247.788
4. Piecewise Linear 2 slopes [d, e]	180.490	33	5.482	.000	.975	.968	.118	224.490
5. Piecewise Nonlinear 2 slopes [d, e]	155.577	20	7.779	.000	.978	.966	.123	215.577
6. Piecewise Linear 3 slopes	327.905	29	11.307	.000	.948	.926	.180	379.905
7. Piecewise Nonlinear 3 slopes	-	-	-	-	-	-	-	-
School Funds/ FTE (LOG)								
1. Null (no growth) [f]	266.197	34	7.829	.000	.945	.931	.149	308.197
2. Linear [g]	156.845	34	4.613	.000	.972	.965	.106	198.845
3. Quadratic [h]	122.519	31	3.952	.000	.980	.973	.093	170.519
4. Piecewise Linear [i, j]	114.448	29	3.946	.000	.981	.974	.092	166.448
5. Piecewise Nonlinear [j, k]	-	-	-	-	-	-	-	-
E&R Expenditures/ FTE (LOG)								
1. Null (no growth)	1045.734	34	30.757	.000	.861	.827	.316	1087.734
2. Linear [f]	437.535	31	14.114	.000	.945	.926	.206	485.535
3. Quadratic [l]	389.155	28	13.898	.000	.951	.930	.201	443.155
4. Piecewise Linear, 2 slopes [m, n]	328.185	29	11.317	.000	.960	.944	.180	380.185
5. Piecewise Nonlinear, 2 slopes [n, o]	232.224	26	8.932	.000	.973	.959	.155	290.224
6. Piecewise Linear, 3 slopes [p, q]	164.742	27	6.102	.000	.982	.974	.123	220.742
7. Piecewise Nonlinear, 3 slopes [p, q]	123.713	20	6.186	.000	.987	.977	.117	193.713

[a] Correlated disturbances: $\varepsilon_{05}\leftrightarrow\varepsilon_{06}$; $\varepsilon_{06}\leftrightarrow\varepsilon_{07}$; $\varepsilon_{07}\leftrightarrow\varepsilon_{08}$; $\varepsilon_{08}\leftrightarrow\varepsilon_{09}$; $\varepsilon_{11}\leftrightarrow\varepsilon_{12}$; $\varepsilon_{12}\leftrightarrow\varepsilon_{13}$; $\varepsilon_{13}\leftrightarrow\varepsilon_{14}$

[b] Correlated disturbances: $\varepsilon_{05}\leftrightarrow\varepsilon_{06}$; $\varepsilon_{06}\leftrightarrow\varepsilon_{07}$; $\varepsilon_{07}\leftrightarrow\varepsilon_{08}$; $\varepsilon_{08}\leftrightarrow\varepsilon_{09}$; $\varepsilon_{09}\leftrightarrow\varepsilon_{10}$; $\varepsilon_{11}\leftrightarrow\varepsilon_{12}$; $\varepsilon_{13}\leftrightarrow\varepsilon_{14}$

[c] Correlated disturbances: $\varepsilon_{06}\leftrightarrow\varepsilon_{07}$; $\varepsilon_{07}\leftrightarrow\varepsilon_{08}$; $\varepsilon_{08}\leftrightarrow\varepsilon_{09}$; $\varepsilon_{09}\leftrightarrow\varepsilon_{10}$; $\varepsilon_{11}\leftrightarrow\varepsilon_{12}$

[d] Piecewise model contains two slope terms: 2005-2009 and 2009-2014

[e] Correlated disturbances: $\varepsilon_{06}\leftrightarrow\varepsilon_{07}$; $\varepsilon_{07}\leftrightarrow\varepsilon_{08}$; $\varepsilon_{11}\leftrightarrow\varepsilon_{12}$

[f] All disturbances were correlated.

[g] Correlated disturbances: $\varepsilon_{07}\leftrightarrow\varepsilon_{08}$; $\varepsilon_{08}\leftrightarrow\varepsilon_{09}$; $\varepsilon_{09}\leftrightarrow\varepsilon_{10}$; $\varepsilon_{10}\leftrightarrow\varepsilon_{11}$; $\varepsilon_{11}\leftrightarrow\varepsilon_{12}$; $\varepsilon_{13}\leftrightarrow\varepsilon_{14}$

[h] Correlated disturbances: $\varepsilon_{07}\leftrightarrow\varepsilon_{08}$; $\varepsilon_{08}\leftrightarrow\varepsilon_{09}$; $\varepsilon_{09}\leftrightarrow\varepsilon_{10}$; $\varepsilon_{10}\leftrightarrow\varepsilon_{11}$; $\varepsilon_{11}\leftrightarrow\varepsilon_{12}$

[i] Correlated disturbances: $\varepsilon_{09}\leftrightarrow\varepsilon_{10}$; $\varepsilon_{11}\leftrightarrow\varepsilon_{12}$; $\varepsilon_{12}\leftrightarrow\varepsilon_{13}$; $\varepsilon_{13}\leftrightarrow\varepsilon_{14}$

[q] Piecewise model contains three slope terms: 2005-2008; 2008-2010; and 2010-2014

[j] Piecewise model contains three slope terms: 2005-2009; 2009-2011; and 2011-2014

[k] Produced an inadmissible solution (Heywood Case)

[l] Correlated disturbances: $\varepsilon_{05}\leftrightarrow\varepsilon_{06}$; $\varepsilon_{06}\leftrightarrow\varepsilon_{07}$; $\varepsilon_{07}\leftrightarrow\varepsilon_{08}$; $\varepsilon_{08}\leftrightarrow\varepsilon_{09}$; $\varepsilon_{09}\leftrightarrow\varepsilon_{10}$; $\varepsilon_{10}\leftrightarrow\varepsilon_{11}$; $\varepsilon_{11}\leftrightarrow\varepsilon_{12}$; $\varepsilon_{12}\leftrightarrow\varepsilon_{13}$

[m] Correlated disturbances: $\varepsilon_{06}\leftrightarrow\varepsilon_{07}$; $\varepsilon_{07}\leftrightarrow\varepsilon_{08}$; $\varepsilon_{08}\leftrightarrow\varepsilon_{09}$; $\varepsilon_{10}\leftrightarrow\varepsilon_{11}$; $\varepsilon_{11}\leftrightarrow\varepsilon_{12}$; $\varepsilon_{12}\leftrightarrow\varepsilon_{13}$; $\varepsilon_{13}\leftrightarrow\varepsilon_{14}$

[n] Piecewise model contains two slope terms: 2005-2009 and 2009-2014

[o] Correlated disturbances: $\varepsilon_{06}\leftrightarrow\varepsilon_{07}$; $\varepsilon_{07}\leftrightarrow\varepsilon_{08}$; $\varepsilon_{08}\leftrightarrow\varepsilon_{09}$; $\varepsilon_{10}\leftrightarrow\varepsilon_{11}$; $\varepsilon_{11}\leftrightarrow\varepsilon_{12}$

[p] Correlated disturbances: $\varepsilon_{06}\leftrightarrow\varepsilon_{07}$; $\varepsilon_{08}\leftrightarrow\varepsilon_{09}$; $\varepsilon_{11}\leftrightarrow\varepsilon_{12}$; $\varepsilon_{12}\leftrightarrow\varepsilon_{13}$

Table 4.9

Correlation Matrix for Observed Variables in Piecewise Linear LGC Model for Total Athletics Subsidies per FTE (log)

	Total Athl. Sub./ FTE 2014 (LOG)	Total Athl. Sub./ FTE 2013 (LOG)	Total Athl. Sub./ FTE 2012 (LOG)	Total Athl. Sub./ FTE 2011 (LOG)	Total Athl. Sub./ FTE 2010 (LOG)	Total Athl. Sub./ FTE 2009 (LOG)	Total Athl. Sub./ FTE 2008 (LOG)	Total Athl. Sub./ FTE 2007 (LOG)	Total Athl. Sub./ FTE 2006 (LOG)	Total Athl. Sub./ FTE 2005 (LOG)
Total Athl. Sub./ FTE 2014 (Log)	1.000									
Total Athl. Sub./ FTE 2013 (LOG)	.976	1.000								
Total Athl. Sub./ FTE 2012 (LOG)	.968	.978	1.000							
Total Athl. Sub./ FTE 2011 (LOG)	.956	.965	.982	1.000						
Total Athl. Sub./ FTE 2010 (LOG)	.954	.966	.965	.976	1.000					
Total Athl. Sub./ FTE 2009 (LOG)	.941	.957	.959	.965	.978	1.000				
Total Athl. Sub./ FTE 2008 (LOG)	.931	.947	.949	.954	.971	.983	1.000			
Total Athl. Sub./ FTE 2007 (LOG)	.908	.923	.925	.930	.946	.953	.970	1.000		
Total Athl. Sub./ FTE 2006 (LOG)	.896	.910	.912	.917	.933	.939	.949	.957	1.000	
Total Athl. Sub./ FTE 2005 (LOG)	.857	.870	.872	.872	.891	.897	.916	.924	.906	1.000

Table 4.10

Correlation Matrix for Observed Variables in Piecewise Linear LGC Model for School Funds per FTE (log)

	School Funds/ FTE 2014 (Log)	School Funds/ FTE 2013 (Log)	School Funds/ FTE 2012 (Log)	School Funds/ FTE 2011 (Log)	School Funds/ FTE 2010 (Log)	School Funds/ FTE 2009 (Log)	School Funds/ FTE 2008 (Log)	School Funds/ FTE 2007 (Log)	School Funds/ FTE 2006 (Log)	School Funds/ FTE 2005 (Log)
School Funds/ FTE 2014 (Log)	1.000									
School Funds/ FTE 2013 (Log)	.950	1.000								
School Funds/ FTE 2012 (Log)	.905	.925	1.000							
School Funds/ FTE 2011 (Log)	.882	.908	.932	1.000						
School Funds/ FTE 2010 (Log)	.862	.889	.898	.937	1.000					
School Funds/ FTE 2009 (Log)	.840	.868	.879	.901	.963	1.000				
School Funds/ FTE 2008 (Log)	.817	.842	.850	.870	.899	.923	1.000			
School Funds/ FTE 2007 (Log)	.768	.790	.795	.811	.837	.865	.896	1.000		
School Funds/ FTE 2006 (Log)	.772	.791	.794	.807	.833	.859	.856	.851	1.000	
School Funds/ FTE 2005 (Log)	.733	.749	.749	.760	.782	.806	.813	.794	.853	1.000

Table 4.11

Correlation Matrix for Observed Variables in Piecewise Nonlinear LGC Model for E&R Expenditures per FTE (log)

	E&R exp/ FTE 2014 (Log)	E&R exp/ FTE 2013 (Log)	E&R exp/ FTE 2012 (Log)	E&R exp/ FTE 2011 (Log)	E&R exp/ FTE 2010 (Log)	E&R exp/ FTE 2009 (Log)	E&R exp/ FTE 2008 (Log)	E&R exp/ FTE 2007 (Log)	E&R exp/ FTE 2006 (Log)	E&R exp/ FTE 2005 (Log)
E&R exp/ FTE 2014 (Log)	1.000									
E&R exp/ FTE 2013 (Log)	.985	1.000								
E&R exp/ FTE 2012 (Log)	.976	.991	1.000							
E&R exp/ FTE 2011 (Log)	.968	.981	.990	1.000						
E&R exp/ FTE 2010 (Log)	.958	.975	.981	.988	1.000					
E&R exp/ FTE 2009 (Log)	.944	.960	.966	.973	.978	1.000				
E&R exp/ FTE 2008 (Log)	.932	.948	.954	.960	.965	.985	1.000			
E&R exp/ FTE 2007 (Log)	.933	.948	.953	.958	.962	.970	.981	1.000		
E&R exp/ FTE 2006 (Log)	.916	.930	.933	.938	.941	.948	.959	.980	1.000	
E&R exp/ FTE 2005 (Log)	.924	.937	.940	.943	.945	.952	.962	.978	.975	1.000

Table 4.12

Unstandardized Parameter Estimates and Asymptotic Standard Errors for Quadratic LGC Models

	Total Athl. Subsidies/ FTE (LOG)		School Funds/ FTE (Log)		E&R Expenditures/FTE (Log)	
	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.
Means						
μ_{α}	5.940***	0.053	4.693***	0.122	9.010***	0.025
$\mu_{\beta 1}$	0.077***	0.006	0.116***	0.018	0.054***	0.002
$\mu_{\beta 2}$	0.031***	0.005	-0.039	0.027	-0.003	0.003
$\mu_{\beta 3}$			0.069***	0.021	0.025***	0.002
Variances						
$\psi_{\alpha\alpha}$	0.602***	0.060	2.975***	0.336	0.140***	0.013
$\psi_{\beta 1\beta 1}$	0.006***	0.001	0.038**	0.013	0.001***	0.000
$\psi_{\beta 2\beta 2}$	0.004***	0.000	0.095***	0.025	0.002***	0.000
$\psi_{\beta 3\beta 3}$			0.056**	0.021	0.001***	0.000
Covariances						
$\psi_{\alpha\beta 1}$	0.004	0.005	-0.024	0.045	-0.002*	0.001
$\psi_{\alpha\beta 2}$	0.015***	0.004	0.011	0.050	0.001	0.001
$\psi_{\alpha\beta 3}$			-0.038	0.039	0.001+	0.001
$\psi_{\beta 1\beta 2}$	-0.001+	0.000	-0.004	0.012	0.000	0.001
$\psi_{\beta 1\beta 3}$			-0.011+	0.006	0.000*	0.000
$\psi_{\beta 2\beta 3}$			0.003	0.013	0.000	0.000
Unique Variances						
VAR(ε_{05})	0.066***	0.010	0.658***	0.151	0.000	0.001
VAR(ε_{06})	0.049***	0.004	0.524***	0.094	0.006***	0.001
VAR(ε_{07})	0.039***	0.005	0.709***	0.080	0.002***	0.000
VAR(ε_{08})	0.017***	0.002	0.333***	0.049	0.002***	0.000
VAR(ε_{09})	0.002	0.001	0.118***	0.065	0.004***	0.000
VAR(ε_{10})	0.012***	0.001	0.277**	0.039	0.001***	0.000
VAR(ε_{11})	0.052***	0.005	0.260***	0.066	0.002***	0.000
VAR(ε_{12})	0.036***	0.004	0.360***	0.054	0.002***	0.000
VAR(ε_{13})	0.023***	0.003	0.245***	0.067	0.001***	0.000
VAR(ε_{14})	0.021***	0.004	0.179**	0.134	0.003***	0.001

† $p \leq .10$; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$

Several additional insights can be gleaned from the estimates in Table 4.12. All of the intercept and slope variances ($\psi_{\alpha\alpha}$, $\psi_{\beta\beta}$) are statistically significant. This means that individual institutions differed in terms of their initial values for total athletics subsidies per FTE, school funds per FTE, and E&R expenditures per FTE in 2005. Moreover, the rate of growth in each of the three variables varied across institutions. Also of interest is the lack of statistical significance for most of the intercept-slope covariances. Evidently, there was no significant correlation between an institution's initial expenditures in total athletics subsidies per FTE, school funds per FTE, or E&R expenditures per FTE and the rate at which that variable changed over time.

The results from the LGC models presented in this section provide important insight into research question one. On the one hand, average E&R expenditures per FTE were substantially larger than total athletics subsidies per FTE or school funds per FTE in any given year. On the other hand, the rate of growth in total athletics subsidies per FTE and school funds per FTE was approximately twice that of E&R expenditures per FTE during this time period. At this pace it would require about 100 years for total athletics subsidies per FTE to exceed E&R expenditures per FTE. However, it is unclear how large athletics subsidies would need to become in order to impact resource allocation to E&R activities and other core areas of the institution. The next section investigated whether the amount of total athletics subsidies per FTE and school funds per FTE between 2005 and 2014 had a significant relationship with E&R expenditures.

Results for Research Questions 2 and 3

A series of fixed effects models (FEMs) were estimated using a structural equation modeling (SEM) framework to investigate research questions two through five.

This section provides the results for questions two and three where total athletics subsidies per FTE student was used as the primary independent variable in the models. Section four reports the results for questions four and five that used school funds per FTE as the independent variable of interest. As a first step, four different models were developed and estimated: a classic FEM with no time lag between the variables, a FEM with a lagged dependent variable, a FEM with lagged effects from the independent variables, and a FEM with both a lagged dependent variable and lagged independent variable effects. In addition, a nested model was estimated for each baseline model with the added constraint that the covariances between the time-fixed effects and the independent variables be constrained to zero.

A comparison of fit criteria for the first three FEM models is shown in Table 4.13. Fit criteria for the fourth model, which had both time-lagged effects from the independent variables and a time-lagged dependent variable, are not reported because an acceptable solution could not be obtained for either the unconstrained or constrained model. From the table, the χ^2 statistic was statistically significant for all of the models shown. Because χ^2 is a test of whether the estimated variance-covariance matrix differs from the data variance-covariance matrix, a non-statistically significant result is desired. However, χ^2 tests are sensitive to sample size such that sample sizes greater than 200 tend to generate a significant p-value (Schumacher & Lomax, 2016). Moreover, χ^2 is sensitive to departures from multivariate normality. Due to the fact that the sample size for this study exceeds 200 and several variables continued to exhibit some skewness and kurtosis after log transformation and removal of outliers, additional fit indices were considered when evaluating whether or not to reject any of the models.

From Table 4.13, only the two dependent variable (DV)-lagged models had acceptable fit based upon CFI and TLI. However, none of the tested models met the criteria for RMSEA. This is not altogether surprising given that RMSEA takes into account model parsimony and a large number of covariances have been estimated in the models. The decision was made to proceed with the reporting of results using the best fitting model (DV-lagged with COV (x_{it}, η) = 0) because its RMSEA approached .10 and the constraining of additional covariances would decrease model fit according to the other fit criteria. This DV-lagged model was then re-estimated four additional times to include interaction terms between total athletics subsidies per FTE and institutional type (land grant, research institution) and athletics program characteristics (athletics control, level of competition).

The unstandardized parameter estimates and standard errors for each of the fixed-effects models using total athletics subsidies per FTE as the primary independent variable are reported in Table 4.14. Standardized parameter estimates are provided in Table 4.15. Column two of both tables provides the estimates for model one (no interaction terms) and columns three through six provide the estimates for the four models with interaction terms. The unstandardized estimates for model one suggest that the relationship between total athletics subsidies per FTE and E&R expenditures per FTE is statistically significant ($p=0.029$). Although the magnitude of the coefficient is small, ($b=0.010$), it is positive, suggesting that increased spending on athletics subsidies is associated with greater spending on E&R expenditures per student, controlling for other factors. This runs counter to the hypothesized relationship of a negative impact of increased subsidies per student on E&R spending per student.

The three control variables in model one were all statistically significant ($p < .001$). The coefficient for the number of tenure-track faculty per 100 FTE students ($b = 0.212$) indicates that a 10 percent increase in this variable would lead to an increase in E&R expenditures per FTE of 2.1 percent, on average. Similarly, a 10 percent increase in core revenues per FTE would be associated with an increase in E&R expenditures per FTE of 1.8 percent. Therefore, both increases to the number of tenure-track faculty per 100 students and having access to additional core revenues per student, which includes tuition and fees, positively correlate with E&R spending per student.

The sign of the coefficient for the final control variable, fall FTE, is also positive, suggesting that increases in student enrollment are associated with increases in E&R expenditures per FTE, controlling for other factors. This finding is somewhat surprising because existing research has generally shown that U.S. colleges and universities have had some success in achieving economies of scale (Brinkman & Leslie, 1986; Koshal & Koshal, 1995; Laband & Lentz, 2003). However, the magnitude of the coefficient is relatively small, indicating that a 10 percent increase in student FTE is correlated with a 0.4 percent increase in E&R expenditures per FTE.

In addition to the control variables and the independent variable of interest, the preceding observation of E&R expenditures per FTE was used to predict the subsequent observation in the model. The unstandardized estimates in Table 4.14 range from $b=0.631$ to $b=0.693$ for the direct effect of E&R expenditures per FTE_{t-1} on E&R expenditures per FTE_t. This suggests that a 10 percent increase in E&R expenditures per FTE the previous year would be associated with between a 6.4 and 7.0 percent increase in E&R expenditures per FTE in the current year, controlling for other factors.

Table 4.13

Fit Comparison for Fixed Effects Models using Total Athletics Subsidies per FTE

Model	χ^2	df	χ^2/df	*p*	CFI	TLI	RMSEA	AIC
Classic FEM (No time lag)	2347.594	359	6.539	.000	.953	.853	.144	4179.594
a. COV (x_{it}, η) = 0	2687.537	399	6.736	.000	.945	.845	.148	4439.537
FEM – lagged DV	1293.700	280	4.620	.000	.974	.914	.114	2895.700
a. COV (x_{it}, η) = 0	1393.014	316	4.408	.000	.972	.918	.112	2923.014
FEM – lagged IV-DV effects	2282.889	282	8.095	.000	.946	.829	.162	3788.889
a. COV (x_{it}, η) = 0	2583.615	318	8.124	.000	.938	.825	.164	4017.615

The following constraints were imposed on all fixed effects models: $\sigma_{\varepsilon t} = \sigma_{\varepsilon}$; $\beta_{xyt} = \beta_{xy}$; $\beta_{yz}=0$; $\lambda_t=1$. Path diagrams for each of the three models are provided in Figure 3.***.

Table 4.14

Unstandardized Estimates and Asymptotic Standard Errors for SEM Fixed Effects Models using Total Athletics Subsidies per FTE (log)

	Model 1	Model 2	Model 3	Model 4	Model 5
Total athl subsidies/ FTE (log)	0.010 (0.004)*	0.008 (0.005)	0.005 (0.004)	0.010 (0.004)*	0.012 (0.004)**
Total athl subsidies/ FTE – Research (log)		0.002 (0.002)			
Total athl. subsidies/ FTE – Flagship (log)			0.001 (0.002)		
Total athl subsidies/ FTE – Auxiliary/Other Control (log)				0.000 (0.001)	
Total athl subsidies/ FTE – FBS (log)					-0.004 (0.001)**
Fall FTE (log)	0.040 (0.007)***	0.036 (0.008)***	0.037 (0.007)***	0.041 0.007)***	0.050 (0.008)***
Tenured faculty/ 100 FTE (log)	0.212 (0.020)***	0.216 (0.020)***	0.213 (0.020)***	0.212 (0.020)***	0.215 (0.020)***
Core revenues/FTE (log)	0.177 (0.011)***	0.176 (0.012)***	0.176 (0.012)***	0.178 (0.011)***	0.180 (0.011)***
06 E&R/FTE (log) ← 05 E&R/FTE (log)	0.640 (0.021)***	0.632 (0.021)***	0.639 (0.021)***	0.640 (0.021)***	0.645 (0.021)***
07 E&R/FTE (log) ← 06 E&R/FTE (log)	0.631 (0.021)***	0.623 (0.021)***	0.630 (0.021)***	0.631 (0.021)***	0.636 (0.021)***
08 E&R/FTE (log) ← 07 E&R/FTE (log)	0.631 (0.021)***	0.622 (0.021)***	0.629 (0.021)***	0.630 (0.021)***	0.636 (0.021)***
09 E&R/FTE (log) ← 08 E&R/FTE (log)	0.693 (0.020)***	0.683 (0.021)***	0.691 (0.021)***	0.693 (0.020)***	0.699 (0.020)***
10 E&R/FTE (log) ← 09 E&R/FTE (log)	0.672 (0.021)***	0.663 (0.021)***	0.670 (0.021)***	0.672 (0.021)***	0.678 (0.021)***
11 E&R/FTE (log) ← 10 E&R/FTE (log)	0.642 (0.020)***	0.633 (0.021)***	0.639 (0.020)***	0.641 (0.020)***	0.647 (0.020)***
12 E&R/FTE (log) ← 11 E&R/FTE (log)	0.682 (0.020)***	0.673 (0.021)***	0.679 (0.021)***	0.682 (0.020)***	0.688 (0.020)***
13 E&R/FTE (log) ← 12 E&R/FTE (log)	0.688 (0.020)***	0.679 (0.020)***	0.686 (0.020)***	0.688 (0.020)***	0.693 (0.020)***
14 E&R/FTE (log) ← 13 E&R/FTE (log)	0.664 (0.019)***	0.655 (0.020)***	0.661 (0.020)***	0.663 (0.019)***	0.669 (0.019)***
χ^2	1393.014	1528.166	1519.557	1541.5	1545.3
df	316	387	387	387	387
CFI	.972	.979	.978	.978	.978
TLI	.918	.926	.923	.925	.924
RMSEA	.112	.104	.103	.104	.105
AIC	2923.014	3834.166	3825.557	3847.5	3851.3

† $p \leq .10$; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$
Standard errors are provided in parentheses.

Table 4.15

Standardized Estimates for SEM fixed effects Models using Total Athletics Subsidies per FTE (log)

	Model 1	Model 2	Model 3	Model 4	Model 5
06 E&R/FTE (log) ← 06 Total athl subsidies/FTE (log)	0.022	0.017	0.013	0.023	0.027
07 E&R/FTE (log) ← 07 Total athl subsidies /FTE (log)	0.021	0.016	0.014	0.022	0.026
08 E&R/FTE (log) ← 08 Total athl subsidies /FTE (log)	0.022	0.017	0.013	0.023	0.027
09 E&R/FTE (log) ← 09 Total athl subsidies /FTE (log)	0.022	0.017	0.014	0.023	0.027
10 E&R/FTE (log) ← 10 Total athl subsidies /FTE (log)	0.021	0.017	0.014	0.022	0.027
11 E&R/FTE (log) ← 11 Total athl subsidies/FTE (log)	0.023	0.018	0.014	0.024	0.029
12 E&R/FTE (log) ← 12 Total athl subsidies /FTE (log)	0.023	0.018	0.014	0.024	0.029
13 E&R/FTE (log) ← 13 Total athl subsidies /FTE (log)	0.023	0.018	0.014	0.024	0.029
14 E&R/FTE (log) ← 14 Total athl subsidies /FTE (log)	0.024	0.019	0.015	0.025	0.030
06 E&R/FTE (log) ← 06 Total athl subsidies/ FTE – Research (log)		0.017			
07 E&R/FTE (log) ← 07 Total athl subsidies/ FTE – Research (log)		0.017			
08 E&R/FTE (log) ← 08 Total athl subsidies/ FTE – Research (log)		0.018			
09 E&R/FTE (log) ← 09 Total athl subsidies/ FTE – Research (log)		0.018			
10 E&R/FTE (log) ← 10 Total athl subsidies/ FTE – Research (log)		0.017			
11 E&R/FTE (log) ← 11 Total athl subsidies/ FTE – Research (log)		0.018			
12 E&R/FTE (log) ← 12 Total athl subsidies/ FTE – Research (log)		0.017			
13 E&R/FTE (log) ← 13 Total athl subsidies/ FTE – Research (log)		0.017			
14 E&R/FTE (log) ← 14 Total athl subsidies/ FTE – Research (log)		0.017			
06 E&R/FTE ← 06 Total athl subsidies/ FTE – Flagship (log)			0.005		
07 E&R/FTE ← 07 Total athl subsidies/ FTE – Flagship (log)			0.005		
08 E&R/FTE ← 08 Total athl subsidies/ FTE – Flagship (log)			0.005		
09 E&R/FTE ← 09 Total athl subsidies/ FTE – Flagship (log)			0.005		
10 E&R/FTE ← 10 Total athl subsidies/ FTE – Flagship (log)			0.005		
11 E&R/FTE ← 11 Total athl subsidies/ FTE – Flagship (log)			0.005		
12 E&R/FTE ← 12 Total athl subsidies/ FTE – Flagship (log)			0.005		

Table 4.15 (Continued)

	Model 1	Model 2	Model 3	Model 4	Model 5
13 E&R/FTE ← 13 Total athl subsidies/ FTE – Flagship (log)			0.005		
14 E&R/FTE ← 14 Total athl subsidies/ FTE – Flagship (log)			0.005		
06 E&R/FTE (log) ← 06 Total athl subsidies /FTE – Auxiliary/Other Control (log)				-0.002	
07 E&R/FTE (log) ← 07 Total athl subsidies /FTE – Auxiliary/Other Control (log)				-0.002	
08 E&R/FTE (log) ← 08 Total athl subsidies /FTE – Auxiliary/Other Control (log)				-0.002	
09 E&R/FTE (log) ← 09 Total athl subsidies /FTE – Auxiliary/Other Control (log)				-0.002	
10 E&R/FTE (log) ← 10 Total athl subsidies /FTE – Auxiliary/Other Control (log)				-0.002	
11 E&R/FTE (log) ← 11 Total athl subsidies /FTE – Auxiliary/Other Control (log)				-0.002	
12 E&R/FTE (log) ← 12 Total athl subsidies /FTE – Auxiliary/Other Control (log)				-0.002	
13 E&R/FTE (log) ← 13 Total athl subsidies /FTE – Auxiliary/Other Control (log)				-0.002	
14 E&R/FTE (log) ← 14 Total athl subsidies /FTE – Auxiliary/Other Control (log)				-0.002	
06 E&R/FTE (log) ← 06 Total athl subsidies /FTE – FBS (log)					-0.030
07 E&R/FTE (log) ← 07 Total athl subsidies /FTE – FBS (log)					-0.031
08 E&R/FTE (log) ← 08 Total athl subsidies /FTE – FBS (log)					-0.032
09 E&R/FTE (log) ← 09 Total athl subsidies /FTE – FBS (log)					-0.031
10 E&R/FTE (log) ← 10 Total athl subsidies /FTE – FBS (log)					-0.031
11 E&R/FTE (log) ← 11 Total athl subsidies /FTE – FBS (log)					-0.031
12 E&R/FTE (log) ← 12 Total athl subsidies /FTE – FBS (log)					-0.030
13 E&R/FTE (log) ← 13 Total athl subsidies /FTE – FBS (log)					-0.030
14 E&R/FTE (log) ← 14 Total athl subsidies /FTE – FBS (log)					-0.030
06 E&R/FTE (log) ← 06 Fall FTE (log)	0.069	0.062	0.063	0.070	0.087
07 E&R/FTE (log) ← 07 Fall FTE (log)	0.069	0.062	0.063	0.070	0.087
08 E&R/FTE (log) ← 08 Fall FTE (log)	0.071	0.064	0.065	0.072	0.089
09 E&R/FTE (log) ← 09 Fall FTE (log)	0.070	0.063	0.064	0.071	0.088
10 E&R/FTE (log) ← 10 Fall FTE (log)	0.068	0.061	0.062	0.069	0.085
11 E&R/FTE (log) ← 11 Fall FTE (log)	0.069	0.062	0.063	0.070	0.087
12 E&R/FTE (log) ← 12 Fall FTE (log)	0.068	0.061	0.062	0.069	0.085

Table 4.15 (Continued)

	Model 1	Model 2	Model 3	Model 4	Model 5
13 E&R/FTE (log) ← 13 Fall FTE (log)	0.067	0.060	0.061	0.068	0.084
14 E&R/FTE (log) ← 14 Fall FTE (log)	0.068	0.061	0.062	0.069	0.085
06 E&R/FTE (log) ← 06 Tenured faculty/ 100 FTE (log)	0.124	0.127	0.124	0.124	0.127
07 E&R/FTE (log) ← 07 Tenured faculty/ 100 FTE (log)	0.118	0.121	0.119	0.119	0.121
08 E&R/FTE (log) ← 08 Tenured faculty/ 100 FTE (log)	0.119	0.122	0.120	0.120	0.122
09 E&R/FTE (log) ← 09 Tenured faculty/ 100 FTE (log)	0.117	0.120	0.118	0.118	0.120
10 E&R/FTE (log) ← 10 Tenured faculty/ 100 FTE (log)	0.115	0.118	0.116	0.116	0.118
11 E&R/FTE (log) ← 11 Tenured faculty/ 100 FTE (log)	0.116	0.119	0.117	0.117	0.119
12 E&R/FTE (log) ← 12 Tenured faculty/ 100 FTE (log)	0.114	0.117	0.115	0.115	0.117
13 E&R/FTE (log) ← 13 Tenured faculty/ 100 FTE (log)	0.108	0.111	0.109	0.109	0.110
14 E&R/FTE (log) ← 14 Tenured faculty/ 100 FTE (log)	0.110	0.113	0.111	0.111	0.113
06 E&R/FTE (log) ← 06 Core revenues/FTE (log)	0.214	0.212	0.212	0.214	0.217
07 E&R/FTE (log) ← 07 Core revenues/FTE (log)	0.220	0.217	0.218	0.220	0.223
08 E&R/FTE (log) ← 08 Core revenues/FTE (log)	0.208	0.206	0.206	0.208	0.211
09 E&R/FTE (log) ← 09 Core revenues/FTE (log)	0.200	0.198	0.197	0.200	0.203
10 E&R/FTE (log) ← 10 Core revenues/FTE (log)	0.209	0.207	0.207	0.209	0.212
11 E&R/FTE (log) ← 11 Core revenues/FTE (log)	0.212	0.210	0.210	0.212	0.215
12 E&R/FTE (log) ← 12 Core revenues/FTE (log)	0.203	0.201	0.201	0.203	0.206
13 E&R/FTE (log) ← 13 Core revenues/FTE (log)	0.206	0.204	0.204	0.206	0.209
14 E&R/FTE (log) ← 14 Core revenues/FTE (log)	0.209	0.207	0.207	0.209	0.211
06 E&R/FTE (log) ← 05 E&R/FTE (log)	0.639	0.630	0.637	0.638	0.643
07 E&R/FTE (log) ← 06 E&R/FTE (log)	0.633	0.625	0.632	0.633	0.638
08 E&R/FTE (log) ← 07 E&R/FTE (log)	0.645	0.636	0.643	0.644	0.650
09 E&R/FTE (log) ← 08 E&R/FTE (log)	0.674	0.665	0.673	0.674	0.680
10 E&R/FTE (log) ← 09 E&R/FTE (log)	0.656	0.647	0.653	0.655	0.661
11 E&R/FTE (log) ← 10 E&R/FTE (log)	0.651	0.642	0.648	0.651	0.656
12 E&R/FTE (log) ← 11 E&R/FTE (log)	0.663	0.655	0.661	0.663	0.668

Table 4.15 (Continued)

	Model 1	Model 2	Model 3	Model 4	Model 5
13 E&R/FTE (log) ← 12 E&R/FTE (log)	0.671	0.663	0.669	0.671	0.676
14 E&R/FTE (log) ← 13 E&R/FTE (log)	0.667	0.658	0.664	0.667	0.672
06 E&R/FTE (log) ← Time fixed effects	0.130	0.134	0.132	0.130	0.124
07 E&R/FTE (log) ← Time fixed effects	0.131	0.134	0.133	0.131	0.125
08 E&R/FTE (log) ← Time fixed effects	0.134	0.137	0.135	0.134	0.128
09 E&R/FTE (log) ← Time fixed effects	0.130	0.133	0.132	0.130	0.124
10 E&R/FTE (log) ← Time fixed effects	0.127	0.130	0.129	0.127	0.121
11 E&R/FTE (log) ← Time fixed effects	0.129	0.132	0.130	0.129	0.123
12 E&R/FTE (log) ← Time fixed effects	0.125	0.128	0.127	0.125	0.119
13 E&R/FTE (log) ← Time fixed effects	0.122	0.125	0.124	0.122	0.116
14 E&R/FTE (log) ← Time fixed effects	0.123	0.126	0.124	0.123	0.117

Table 4.16

Squared Multiple Correlations for Dependent Variables in SEM Fixed Effects Models using Total Athletics Subsidies per FTE (log)

	Model 1	Model 2	Model 3	Model 4	Model 5
14 E&R expenditures per FTE (log)	.979	0.979	0.979	0.979	0.978
13 E&R expenditures per FTE (log)	.979	0.979	0.979	0.979	0.979
12 E&R expenditures per FTE (log)	.978	0.978	0.978	.978	0.978
11 E&R expenditures per FTE (log)	.977	0.977	0.977	.977	0.976
10 E&R expenditures per FTE (log)	.977	0.977	0.977	.977	0.977
09 E&R expenditures per FTE (log)	.976	0.976	0.976	.976	0.976
08 E&R expenditures per FTE (log)	.975	0.975	0.975	.975	0.974
07 E&R expenditures per FTE (log)	.976	0.976	0.976	.976	0.975
06 E&R expenditures per FTE (log)	.976	0.976	0.976	.976	0.976

The standardized coefficients in Table 4.15 can be used to compare the effect sizes of the independent variables on the outcome variables. From the table, the largest standardized coefficients are those from the preceding observations of E&R expenditures per FTE (β=0.633 to 0.671). Thus, the most important predictor of E&R spending per student is past spending on E&R activities per student. The effect sizes of the three control variables, although less than that of E&R expenditure per FTE_{t-1}, were nonetheless considerably larger than that of total athletics subsidies per FTE.

Covariances were estimated between each pair of independent variables in the fixed effects models. The covariance as well as correlation estimates between independent variable pairs are reported in Appendix A and provide important insight into the nature of the relationship between the independent variables. In all years, covariances between total athletics subsidies per FTE and each of the three control variables were negative. Correlation estimates between total athletics subsidies per FTE and core revenues per FTE were generally weak to moderate, ranging from -0.435 to -0.221. The strength of the correlation between total athletics subsidies per FTE and FTE enrollment was moderate, ranging from -0.677 to -0.634. Total athletics subsidies per FTE and the number of tenure-track faculty per 100 FTE students, although negative, was not significantly correlated in any year, even at the more liberal alpha-level of 0.10.

The existence of a negative correlation between student enrollment and total athletics subsidies per FTE is not entirely surprising given that there appear to be certain fixed costs in athletics such as facilities, scholarships, coaching staffs, etc. Smaller FCS institutions, for example, must invest in these resources in order to compete with larger institutions, but do not have large student enrollments over which to spread out athletics subsidies. The negative correlation between core revenues per student and total athletics subsidies, on the other hand, is unexpected but may be confounded by the fact that many of the wealthiest public institutions (e.g. state flagship) also tend to field the most successful athletics programs that require fewer subsidies to operate.

Results for the second FEM that included an interaction term between total athletics subsidies per FTE and classification as a research university are reported in column three of Tables 4.14 and 4.15. From Table 4.14, the interaction term for research status was not statistically significant, indicating that there is no statistical difference between research and non-research institutions with respect to the relationship between total athletics subsidies per FTE and E&R expenditures per FTE. Similarly, for models three and four the interaction terms were also non-significant. Thus, there is no evidence to suggest that the relationship between total athletics subsidies per FTE and E&R expenditures per FTE differs based upon status as a flagship institution or the reporting location of the athletics department within the university budget.

The final model in this section, model five, contained an interaction term for status as an FBS institution and total athletics subsidies per FTE. Unstandardized parameter estimates for this model are located in column six of Table 4.14 and standardized estimates in column six of Table 4.15. In this model, both the coefficient for athletics subsidies per FTE and the coefficient for the interaction term were statistically significant. This suggests that the relationship between subsidies and E&R expenditures is somewhat different for FBS and FCS institutions. It is estimated that for FCS institutions a 10 percent increase in total athletics subsidies per FTE is associated with an increase in E&R expenditures per FTE of 0.1 percent, controlling for other factors. A 10 percent increase in total athletics subsidies per FTE for FBS institutions was also expected to produce an increase in E&R expenditures per FTE, but it was slightly less than that of FCS institutions, at 0.08 percent. The interpretation of these results is somewhat unclear, but could be evidence that when either type of institution increases athletics subsidies, it increases E&R spending simultaneously in order to improve institutional prestige. Because core revenues per FTE have been controlled for in the model, these "striving" institutions may be re-allocating funds from another area not examined in this study (e.g. physical plant or student services) to increase support to both athletics and E&R activities.

Lastly, the squared multiple correlations (R-squared) are reported in Table 4.16 for each of the regression equations in the five fixed-effects models. All of the squared multiple correlations range between 0.975 and 0.979. This suggests that the estimated models were able to predict about 98 percent of the variance in E&R expenditures per student.

In summarizing section three, the relationship between total athletics subsidies per FTE and E&R expenditures per FTE was statistically significant and positive. This suggests that as an institution increases its athletics subsidies per student there is a corresponding increase in E&R expenditures per student, controlling for other factors. However, the small magnitude of the regression coefficient indicates that this effect has limited practical significance. Each of the control variables was statistically significant in the model, and estimates indicate that increases to the number of tenure-track faculty, the amount of core revenues per student, and the number of FTE students were associated with increases in E&R expenditures per student. While the signs of the first two control variables are consistent with the directions hypothesized in chapter three, the positive correlation between student FTE and E&R expenditures per student is unexpected.

It was also shown that the relationship between total athletics subsidies per FTE and E&R expenditures per student was not dependent upon status as a research or flagship institution or the reporting structure of the athletics department. Some evidence was found that the relationship between total athletics subsidies per student and E&R expenditures per student depends upon the level of athletics competition. However, the relationship was estimated to be positive for both FBS and FCS institutions and the effect size in either case was small.

Results for Research Questions 4 and 5

This section presents the results from the fixed effects models (FEMs) used to investigate research questions four and five that sought to understand the relationship between school funds per FTE and E&R expenditures per FTE. In this analysis, four baseline models were initially estimated: a classic FEM with no time-lagged variables, a FEM with a time-lagged dependent variable, a FEM with time-lagged effects from the independent variables, and a FEM with both a time-lagged dependent variable and lagged independent variable effects. After estimating each, the models were re-estimated with an additional constraint that all covariances between the time-fixed effects and the independent variables were fixed to zero. Model fit criteria are reported in Table 4.17 for each of the first three baseline and constrained models. Fit criteria for the FEM with both a lagged dependent and independent variable effects are not reported because the baseline and constrained model produced unacceptable solutions.

Consistent with the results in section three, the χ^2 statistic was statistically significant in all model specifications using school funds per FTE. Due to the limitations noted previously for the χ^2 statistic, the decision was made to proceed with the analysis and to evaluate fit based upon other fit indices. Of the models tested, only the DV-lagged models had acceptable fit for the CFI and TLI indices. All models were outside of the desired range for RMSEA of < .10, but it should again be acknowledged that RMSEA is sensitive to model parsimony as well as sample size. Because the inclusion of additional constraints would decrease model fit for the other criteria and several models had an RMSEA that approached .10, the decision was made to proceed with the analysis.

The DV-lagged FEM with the additional covariance constraint was selected as the best-fitting model because it was favored by the CFI, RMSEA, and had a lower χ^2/df. Having identified the model of best fit, four additional models were estimated that included interaction terms between school funds per FTE and institution type (research or non-research), flagship status, athletics reporting structure (student services or auxiliary/other), and level of athletics competition (FBS or FCS).

Table 4.18 reports the unstandardized parameter estimates, standard errors, and model fit information and Table 4.19 reports the standardized estimates for the models used to address research questions four and five. For the full FEM without interaction terms (model six), the coefficient for school funds per FTE (log) is zero and not statistically significant. This suggests that increases to school funds per student do not lead to significant increases or decreases in E&R expenditures per student. The three control variables were statistically significant for $p \leq .001$, which is consistent with the earlier models using total athletics subsidies per FTE. In this model it was estimated that a 10 percent increase in the number of tenure-track faculty per 100 FTE or core revenues per FTE would correspond with increases in E&R expenditures per FTE of 2.1 and 1.8 percent, controlling for other factors. Once again, the sign of the coefficient for student FTE enrollment is positive, which runs counter to the hypothesized relationship between enrollment and the dependent variable. Estimates suggest that a 10 percent increase in FTE is correlated with a 0.3 percent increase in E&R expenditures per student, controlling for other factors. Lastly, the coefficients for the preceding values of E&R expenditures per students ranged from 0.628 to 0.684, indicating that a 10 percent increase in E&R expenditures per student in year *t-1* corresponds with an increase in E&R expenditures per student in year *t* of between 6.2 and 6.8 percent.

The standardized coefficients reported in Table 4.19 can be interpreted as effect sizes, which allows the importance of each independent variable in predicting the outcome variables to be compared. From the table, the observation of E&R expenditures per FTE in year *t-1* is clearly the strongest predictor of E&R expenditures per FTE in year *t* among all of the independent variables. The weight of the standardized coefficient for E&R expenditures per FTE_{t-1} is approximately three times the weight of core revenues per FTE, six times the weight of tenure track faculty per 100 FTE, and 12 times the weight of student FTE. The effect size of each of the control variables is substantially greater than that of school funds per FTE. Even the least important control variable, student FTE, has a standardized coefficient approximately 50 times that of school funds per FTE.

Estimated covariances and correlations between each pair of independent variables have been reported in Appendix B for model six. From Table B.1, the covariances between school funds per FTE and the three control variables were negative in all years, indicating that increases to core revenues per FTE, FTE enrollment, or the number of tenure-track faculty per 100 FTE were correlated with decreases in school funds per FTE. The estimated correlations in Table B.2 show that the correlations between school funds per FTE and core revenues per FTE and the number of tenure-track faculty per 100 FTE were generally weak to very weak, between -0.250 and -0.100. Correlations between school funds per FTE and FTE enrollment were somewhat stronger, ranging from -0.475 to -0.300.

Model seven included an interaction term for school funds per FTE and status as a research institution. From Table 4.18, the coefficients indicate that some differences exist between research and non-research institutions in terms of the relationship between the independent variable of interest and dependent variable. Although the coefficient for school funds per FTE was only marginally significant, the coefficient for the interaction term was significant at a level of $p \leq .01$. The estimates indicate that, in general, the relationship between school funds per FTE and E&R expenditures per FTE is negative for non-research institutions but positive for research institutions. Nonetheless, the coefficients are quite small, indicating that the effect is limited. Interpreted at the mean using 2014 data, a 10-percent increase in school funds per FTE at research institutions ($42.6) would be correlated with an increase of 0.02 percent in E&R expenditures per FTE ($2.9). A 10-percent increase in school funds per FTE at non-research institutions ($56.1) is expected to correlate with a 0.03 percent decrease in E&R expenditures per FTE ($3.0).

Models eight, nine, and 10 included interaction terms for school funds per FTE and status as the state flagship institution, reporting structure of the athletics department, and level of athletics competition. In each of these models the coefficients for school funds per FTE as well as the interaction terms were non-significant. This implies that the relationship between school funds and E&R expenditures per FTE does not differ based upon status as the flagship university, reporting location of athletics within the university budget (student services vs. auxiliary/other unit), or level of competition (FBS vs. FCS), controlling for other factors.

The squared multiple correlations for each observation of the dependent variable in the five models using school funds per FTE have been provided in Table 4.20. These squared multiple correlations indicate the ability of the model to predict the variance in the outcomes variable, E&R expenditures per FTE. Based on Table 4.20, between 97.5 and 98.1 percent of the variance in each observation of the dependent variable was accounted for by each of the fixed-effects models.

In concluding section four, the relationship between school funds per FTE and E&R expenditures per FTE was investigated using fixed-effects models. The results indicate that increases to school funds per FTE do not affect E&R expenditures per FTE, controlling for other factors. As with the models in section three, the control variables were statistically significant in each of the models. It is estimated that a 10 percent increase to the number of tenure-track faculty per 100 FTE and total core revenues per FTE would be associated with increases of 2.1 and 1.8 in the amount of E&R expenditures per FTE, on average. A 10 percent increase in FTE enrollment would also be associated with an increase in E&R expenditures per FTE of 0.3 percent.

In the model containing an interaction term for status as a research university, it was shown that the relationship between school funds per student and E&R spending per student was positive for research institutions but negative for other types of institutions. However, the small size of the coefficients suggests that this finding has limited practical significance. The interaction terms were non-significant in the remaining fixed-effects models, which leads to the conclusion that the relationship between school funds per student and E&R expenditures per student does not depend upon status as the state flagship university, reporting structure of athletics, or the level of athletics competition.

Table 4.17

Fit Comparison for Fixed Effects Models using School Funds per FTE (log)

Model	χ^2	df	χ^2/df	*p*	CFI	TLI	RMSEA	AIC
Classic FEM (No time lag)	2354.181	359	6.558	.000	.951	.846	.144	4186.181
a. COV (x_{it}, η) = 0	2687.151	399	6.735	.000	.943	.839	.148	4439.151
FEM – lagged DV	1315.800	280	4.699	.000	.972	.909	.115	2917.800
a. COV (x_{it}, η) = 0	1418.383	316	4.488	.000	.971	.912	.113	2948.383
FEM – lagged IV-DV Effects	2283.756	282	8.098	.000	.944	.822	.162	3789.756
a. COV (x_{it}, η) = 0	2579.132	318	8.110	.000	.936	.818	.164	4013.132

The following constraints were imposed on all fixed effects models: $\sigma_{\varepsilon t} = \sigma_{\varepsilon}$; $\beta_{xyt} = \beta_{xy}$; β_{yz}=0; λ_t=1.

Table 4.18

Unstandardized Parameter Estimates and Asymptotic Standard Errors for Fixed Effects Models using School Funds per FTE

	Model 6	Model 7	Model 8	Model 9	Model 10
School funds/FTE (log)	0.000 (0.001)	-0.003 (0.002)+	0.000 (0.002)	0.001 (0.002)	0.001 (0.002)
School funds/FTE – Research (log)		0.005 (0.004)**			
School funds/FTE – Flagship (log)			0.002 (0.002)		
School funds/FTE – Auxiliary/Other Control (log)				-0.001 (0.001)	
School funds /FTE – FBS (log)					-0.002 (0.001)
Fall FTE (log)	0.033 (0.007)***	0.025 (0.007)***	0.032 (.0007)***	0.033 (0.007)***	0.037 (0.007)***
Tenured faculty/100 FTE (log)	0.214 (0.020)***	0.221 (0.020)***	0.216 (0.020)***	0.215 (0.020)***	0.216 (0.020)***
Core revenues/FTE (log)	0.176 (0.011)***	0.173 (0.011)***	0.175 (0.012)***	0.177 (0.011)***	0.177 (0.011)***
06 E&R/FTE (log) ← 05 E&R/FTE (log)	0.638 (0.021)***	0.625 (0.021)***	0.633 (0.021)***	0.637 (0.021)***	0.641 (0.021)***
07 E&R/FTE (log) ← 06 E&R/FTE (log)	0.629 (0.021)***	0.617 (0.021)***	0.625 (0.021)***	0.628 (0.021)***	0.632 (0.021)***
08 E&R/FTE (log) ← 07 E&R/FTE (log)	0.628 (0.021)***	0.616 (0.021)***	0.623 (0.021)***	0.627 (0.021)***	0.632 (0.021)***
09 E&R/FTE (log) ← 08 E&R/FTE (log)	0.690 (0.020)***	0.676 (0.021)***	0.685 (0.021)***	0.689 (0.020)***	0.693 (0.020)***
10 E&R/FTE (log) ← 09 E&R/FTE (log)	0.669 (0.021)***	0.656 (0.021)***	0.664 (0.021)***	0.668 (0.021)***	0.673 (0.021)***
11 E&R/FTE (log) ← 10 E&R/FTE (log)	0.638 (0.020)***	0.625 (0.021)***	0.633 (0.021)***	0.637 (0.020)***	0.641 (0.020)***
12 E&R/FTE (log) ← 11 E&R/FTE (log)	0.678 (0.021)***	0.665 (0.021)***	0.673 (0.021)***	0.677 (0.021)***	0.682 (0.020)***
13 E&R/FTE (log) ← 12 E&R/FTE (log)	0.684 (0.020)***	0.672 (0.020)***	0.680 (0.020)***	0.684 (0.020)***	0.688 (0.020)***
14 E&R/FTE (log) ← 13 E&R/FTE (log)	0.659 (0.020)***	0.647 (0.020)***	0.655 (0.020)***	0.659 (0.020)***	0.663 (0.019)***
χ^2	1418.383	1529.470	1548.117	1519.372	1551.455
df	316	387	387	387	387
CFI	.971	.976	.975	.977	.975
TLI	.912	.916	.914	.919	.913
RMSEA	.113	.104	.105	.103	.105
AIC	2948.383	3835.470	3854.117	3825.372	3857.455

[†] $p \leq .10$; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$

Table 4.19

Standardized Parameter Estimates for Fixed Effects Models using School Funds per FTE (log)

	Model 6	Model 7	Model 8	Model 9	Model 10
06 E&R/FTE (log) ← 06 School funds/FTE (log)	0.001	-0.017	-0.002	0.003	0.007
07 E&R/FTE (log) ← 07 School funds/FTE (log)	0.001	-0.018	-0.002	0.003	0.007
08 E&R/FTE (log) ← 08 School funds/FTE (log)	0.001	-0.018	-0.002	0.003	0.007
09 E&R/FTE (log) ← 09 School funds/FTE (log)	0.001	-0.017	-0.002	0.003	0.007
10 E&R/FTE (log) ← 10 School funds/FTE (log)	0.001	-0.017	-0.002	0.003	0.007
11 E&R/FTE (log) ← 11 School funds/FTE (log)	0.001	-0.018	-0.002	0.003	0.007
12 E&R/FTE (log) ← 12 School funds/FTE (log)	0.001	-0.018	-0.002	0.003	0.007
13 E&R/FTE (log) ← 13 School funds/FTE (log)	0.001	-0.017	-0.002	0.003	0.007
14 E&R/FTE (log) ← 14 School funds/FTE (log)	0.001	-0.017	-0.002	0.003	0.007
06 E&R/FTE (log) ← 06 School funds/FTE – Research (log)		0.033			
07 E&R/FTE (log) ← 07 School funds/FTE – Research (log)		0.034			
08 E&R/FTE (log) ← 08 School funds/FTE – Research (log)		0..035			
09 E&R/FTE (log) ← 09 School funds/FTE – Research (log)		0.034			
10 E&R/FTE (log) ← 10 School funds/FTE – Research (log)		0.033			
11 E&R/FTE (log) ← 11 School funds/FTE – Research (log)		0.034			
12 E&R/FTE (log) ← 12 School funds/FTE – Research (log)		0.034			
13 E&R/FTE (log) ← 13 School funds/FTE – Research (log)		0.033			
14 E&R/FTE (log) ← 14 School funds/FTE – Research (log)		0.033			
06 E&R/FTE ← 06 School funds/FTE – Flagship (log)			0.011		
07 E&R/FTE ← 07 School funds/FTE – Flagship (log)			0.012		
08 E&R/FTE ← 08 School funds/FTE – Flagship (log)			0.012		
09 E&R/FTE ← 09 School funds/FTE – Flagship (log)			0.012		
10 E&R/FTE ← 10 School funds/FTE – Flagship (log)			0.012		
11 E&R/FTE ← 11 School funds/FTE – Flagship (log)			0.012		
12 E&R/FTE ← 12 School funds/FTE – Flagship (log)			0.011		
13 E&R/FTE ← 13 School funds/FTE – Flagship (log)			0.011		

Table 4.19 (Continued)

	Model 6	Model 7	Model 8	Model 9	Model 10
14 E&R/FTE ← 14 School funds/FTE – Flagship (log)			0.011		
06 E&R/FTE (log) ← 06 School funds/FTE – Auxiliary/Other Control (log)				-0.005	
07 E&R/FTE (log) ← 07 School funds/FTE – Auxiliary/Other Control (log)				-0.005	
08 E&R/FTE (log) ← 08 School funds/FTE – Auxiliary/Other Control (log)				-0.006	
09 E&R/FTE (log) ← 09 School funds/FTE – Auxiliary/Other Control (log)				-0.005	
10 E&R/FTE (log) ← 10 School funds/FTE – Auxiliary/Other Control (log)				-0.005	
11 E&R/FTE (log) ← 11 School funds/FTE – Auxiliary/Other Control (log)				-0.005	
12 E&R/FTE (log) ← 12 School funds/FTE – Auxiliary/Other Control (log)				-0.005	
13 E&R/FTE (log) ← 13 School funds/FTE – Auxiliary/Other Control (log)				-0.005	
14 E&R/FTE (log) ← 14 School funds/FTE – Auxiliary/Other Control (log)				-0.005	
06 E&R/FTE (log) ← 06 School funds/FTE – FBS (log)					-0.015
07 E&R/FTE (log) ← 07 School funds/FTE – FBS (log)					-0.015
08 E&R/FTE (log) ← 08 School funds/FTE – FBS (log)					-0.016
09 E&R/FTE (log) ← 09 School funds/FTE – FBS (log)					-0.016
10 E&R/FTE (log) ← 10 School funds/FTE – FBS (log)					-0.015
11 E&R/FTE (log) ← 11 School funds/FTE – FBS (log)					-0.016
12 E&R/FTE (log) ← 12 School funds/FTE – FBS (log)					-0.015
13 E&R/FTE (log) ← 13 School funds/FTE – FBS (log)					-0.015
14 E&R/FTE (log) ← 14 School funds/FTE – FBS (log)					-0.015
06 E&R/FTE (log) ← 06 Fall FTE (log)	0.056	0.044	0.054	0.057	0.064
07 E&R/FTE (log) ← 07 Fall FTE (log)	0.057	0.044	0.054	0.057	0.064
08 E&R/FTE (log) ← 08 Fall FTE (log)	0.058	0.045	0.056	0.059	0.066
09 E&R/FTE (log) ← 09 Fall FTE (log)	0.057	0.044	0.055	0.058	0.065
10 E&R/FTE (log) ← 10 Fall FTE (log)	0.055	0.043	0.053	0.056	0.063
11 E&R/FTE (log) ← 11 Fall FTE (log)	0.056	0.043	0.054	0.057	0.064
12 E&R/FTE (log) ← 12 Fall FTE (log)	0.055	0.043	0.053	0.056	0.063
13 E&R/FTE (log) ← 13 Fall FTE (log)	0.055	0.042	0.053	0.055	0.062

Table 4.19 (Continued)

	Model 6	Model 7	Model 8	Model 9	Model 10
14 E&R/FTE (log) ← 14 Fall FTE (log)	0.056	0.043	0.054	0.056	0.063
06 E&R/FTE (log) ← 06 Tenured faculty/ 100 FTE (log)	0.125	0.129	0.126	0.125	0.127
07 E&R/FTE (log) ← 07 Tenured faculty/ 100 FTE (log)	0.119	0.123	0.120	0.120	0.121
08 E&R/FTE (log) ← 08 Tenured faculty/ 100 FTE (log)	0.120	0.124	0.121	0.121	0.122
09 E&R/FTE (log) ← 09 Tenured faculty/ 100 FTE (log)	0.118	0.122	0.119	0.119	0.120
10 E&R/FTE (log) ← 10 Tenured faculty/ 100 FTE (log)	0.116	0.119	0.117	0.117	0.118
11 E&R/FTE (log) ← 11 Tenured faculty/ 100 FTE (log)	0.117	0.120	0.118	0.118	0.119
12 E&R/FTE (log) ← 12 Tenured faculty/ 100 FTE (log)	0.115	0.118	0.116	0.116	0.117
13 E&R/FTE (log) ← 13 Tenured faculty/ 100 FTE (log)	0.109	0.112	0.109	0.109	0.110
14 E&R/FTE (log) ← 14 Tenured faculty/ 100 FTE (log)	0.111	0.115	0.112	0.112	0.113
06 E&R/FTE (log) ← 06 Core revenues/FTE (log)	0.213	0.207	0.211	0.213	0.213
07 E&R/FTE (log) ← 07 Core revenues/FTE (log)	0.218	0.213	0.217	0.219	0.219
08 E&R/FTE (log) ← 08 Core revenues/FTE (log)	0.207	0.201	0.205	0.207	0.207
09 E&R/FTE (log) ← 09 Core revenues/FTE (log)	0.199	0.193	0.197	0.200	0.200
10 E&R/FTE (log) ← 10 Core revenues/FTE (log)	0.208	0.202	0.207	0.208	0.208
11 E&R/FTE (log) ← 11 Core revenues/FTE (log)	0.211	0.206	0.209	0.211	0.211
12 E&R/FTE (log) ← 12 Core revenues/FTE (log)	0.201	0.196	0.200	0.202	0.202
13 E&R/FTE (log) ← 13 Core revenues/FTE (log)	0.204	0.199	0.203	0.205	0.205
14 E&R/FTE (log) ← 14 Core revenues/FTE (log)	0.207	0.202	0.206	0.208	0.207
06 E&R/FTE (log) ← 05 E&R/FTE (log)	0.636	0.623	0.631	0.635	0.639
07 E&R/FTE (log) ← 06 E&R/FTE (log)	0.631	0.619	0.627	0.630	0.635
08 E&R/FTE (log) ← 07 E&R/FTE (log)	0.642	0.629	0.637	0.641	0.646
09 E&R/FTE (log) ← 08 E&R/FTE (log)	0.672	0.657	0.667	0.670	0.675
10 E&R/FTE (log) ← 09 E&R/FTE (log)	0.652	0.640	0.647	0.651	0.656
11 E&R/FTE (log) ← 10 E&R/FTE (log)	0.647	0.634	0.642	0.646	0.650
12 E&R/FTE (log) ← 11 E&R/FTE (log)	0.659	0.647	0.654	0.658	0.663
13 E&R/FTE (log) ← 12 E&R/FTE (log)	0.667	0.655	0.662	0.666	0.670

Table 4.19 (Continued)

	Model 6	Model 7	Model 8	Model 9	Model 10
14 E&R/FTE (log) ← 13 E&R/FTE (log)	0.662	0.650	0.658	0.661	0.666
06 E&R/FTE (log) ← Time fixed effects	0.134	0.139	0.135	0.134	0.130
07 E&R/FTE (log) ← Time fixed effects	0.134	0.140	0.136	0.134	0.131
08 E&R/FTE (log) ← Time fixed effects	0.137	0.143	0.139	0.137	0.134
09 E&R/FTE (log) ← Time fixed effects	0.133	0.139	0.135	0.134	0.130
10 E&R/FTE (log) ← Time fixed effects	0.130	0.135	0.132	0.130	0.127
11 E&R/FTE (log) ← Time fixed effects	0.128	0.137	0.134	0.132	0.129
12 E&R/FTE (log) ← Time fixed effects	0.125	0.134	0.130	0.129	0.125
13 E&R/FTE (log) ← Time fixed effects	0.125	0.130	0.127	0.125	0.122
14 E&R/FTE (log) ← Time fixed effects	0.111	0.131	0.127	0.126	0.122

Table 4.20

Squared Multiple Correlations for Dependent Variables in SEM Fixed Effects Models using School Funds per FTE (log)

	Model 6	Model 7	Model 8	Model 9	Model 10
14 E&R expenditures per FTE (log)	.981	.979	.979	.979	.979
13 E&R expenditures per FTE (log)	.981	.979	.979	.979	.979
12 E&R expenditures per FTE (log)	.980	.978	.978	.978	.978
11 E&R expenditures per FTE (log)	.979	.977	.977	.977	.976
10 E&R expenditures per FTE (log)	.979	.978	.977	.977	.977
09 E&R expenditures per FTE (log)	.978	.977	.976	.976	.976
08 E&R expenditures per FTE (log)	.977	.975	.975	.975	.975
07 E&R expenditures per FTE (log)	.978	.976	.976	.976	.976
06 E&R expenditures per FTE (log)	.978	.976	.976	.976	.976

Summary

This chapter presented the results from the statistical analyses used to investigate the five research questions posed in this dissertation. The first section showed the descriptive statistics for each of the variables included in the dataset. Section two presented the results from the graphical analysis and latent growth curve (LGC) models used to address research question one, which sought to understand how the rate of growth compared for athletics subsidies, school funds, and education and related expenditures between 2005 and 2014. In section three, the results from a series of fixed-effects models that tested the relationship between athletics subsidies per FTE and education and related expenditures per FTE were presented in order to investigate research questions two and three. The final section provided the results for the fixed-effects models that were used to address research questions four and five, which sought to determine the nature of the relationship between school funds per FTE and education and related expenditures per FTE.

The results from the graphical analyses showed that each of the three variables of interest – total athletics subsidies per FTE, school funds per FTE, and education and related expenditures per FTE – exhibited similar patterns of growth during the time period of this study. Each variable experienced its highest rate of growth from 2005 to 2009, underwent a period of stability or decline between 2009 and 2010, and then continued to increase once again from 2011 to 2014. The LGC analysis demonstrated that each period of growth was statistically significant for the three variables. Moreover, the rate of growth was found to differ significantly across institutions, meaning that all public institutions did not experience the same growth (or decline) in any given year. The models also showed that although significant increases occurred over time for all three variables, the rate of growth in total athletics subsidies per FTE and school funds per FTE was approximately twice that for education and related expenditures per FTE between 2005 and 2014.

The results from the fixed-effects models using total athletics subsidies per FTE as the independent variable of interest offer several important conclusions. First, although increases to athletics subsidies per FTE are significantly and positively correlated with institutional spending on education and related activities per student, the effect size is small. Nonetheless, this is an important finding in light of the criticism in recent years of institutional spending on intercollegiate athletics. Second, the relationship between total athletics subsidies and education and related expenditures does not depend on the type of institution – research or flagship – or the reporting location of the athletics department within the university. There is, however, some evidence that the level of athletics competition does impact the nature of this relationship. It was shown that increased athletics subsidies per FTE was associated with an increase in education and related expenditures per FTE for both types of institutions, but with FCS institutions seeing a greater percent increase in E&R expenditures per FTE than FBS institutions. This finding has little practical significance, however, as the effect sizes were very small.

The final section of this chapter presented the results from the fixed-effects models using school funds per FTE as the primary independent variable. Unlike the models using total athletics subsidies per student, the relationship between school funds per student and education and related expenditures per student was not statistically significant. This suggests that although institutions may have greater flexibility to increase their school funds to athletics from year to year compared to student fees, any such changes do not significantly increase or decrease education and related spending. In the interaction model for research institution status, both the interaction coefficient and the school fund per student coefficient were statistically significant. It was shown that increases to school funds per student are associated with increases in E&R spending per student for research institutions and decreases in E&R spending per student for non-research institutions. In the three remaining interaction models using school funds per student, the interaction terms were consistently non-significant. Therefore, there is little evidence to suggest that the relationship between school funds per student and E&R spending per student depends upon status as the state flagship institution, reporting location of athletics, or level of athletics competition.

CHAPTER FIVE: DISCUSSION AND CONCLUSIONS

In this chapter, the purpose of the study as well as the specific research questions that were investigated are reviewed. Next, the results from the statistical analyses are briefly summarized. The chapter proceeds with the interpretation and discussion of the results within the context of existing higher education theory and research. The chapter concludes with a discussion of study limitations and implications for future research.

Purpose of the Study

Public colleges and universities have faced growing financial challenges over the past several decades. Public support for higher education has steadily declined, prompting institutions to increase their reliance upon other revenue sources, most notably student tuition and fees (American Academy of Arts & Sciences, 2016; "Federal and state funding," 2015). Not surprisingly, repeated tuition increases have sparked an outcry from parents, students, politicians, and others who have become increasingly suspicious of the management of public colleges and universities. Institutions have been accused of "gold-plating," by building suite-style dormitories and large recreational facilities and offering gourmet meal plans to students (Zemsky, Wegner, & Massy, 2005; Winston, 2000; Smart, 2007). Such concerns have led to calls for greater transparency and accountability as well as restrictions on annual tuition increases (Wollan & Lewin, 2009; Nelson, 2013). Yet, even with increases to student tuition and fees, many public institutions have faced such dramatic state budget cuts that they have been forced to furlough employees, defer maintenance, freeze or eliminate vacant positions, and in some cases close academic departments (Wollan & Lewin, 2009; Nelson, 2013; Woodhouse, 2015).

Amidst this current fiscal climate, one area that appears to be largely immune to recurring budget cuts as well as much of the public criticism is intercollegiate athletics. Despite an often-held perception that athletics generate revenues for the university, most Division I programs operate at a deficit and require support from the institution in the form of student fees and institutional funds. In addition, the dependence of athletics on institutional support appears only to have increased over the past decade (Desrochers, 2013). Bowen's revenue theory of costs suggests that, in order to fund growing athletics subsidies, institutions will seek to raise additional revenues rather than decrease spending elsewhere (Bowen, 1981). Knowing that state support has declined in many states, one possibility is that institutions have increased student tuition and fees. However, a recent study by Jones and Rudolph (2016) found that student tuition and fee charges (in-state and out-of-state) were uncorrelated with athletics subsidies. If institutions are unable or unwilling to increase their core revenues, it is possible that funds previously budgeted for another area of the university are being diverted to athletics.

This dissertation explored the relationship between spending on one of the most important areas of colleges and universities – education and related activities – and intercollegiate athletics subsidies. The study was guided by five research questions:

1. How do the rates of growth in total athletics subsidies per FTE and school funds per FTE compare to the rate of growth in education and related (E&R) expenditures per FTE for public Division I institutions between 2005 and 2014?
2. What is the relationship between total athletics subsidies per FTE and E&R expenditures per FTE, controlling for other factors?

3. Is the relationship between total athletics subsidies per FTE and E&R expenditures per FTE dependent upon institution type (research university, flagship university) or characteristics of the athletics program (reporting structure, level of play), controlling for other factors?
4. What is the relationship between school funds per FTE and E&R expenditures per FTE, controlling for other factors?
5. Is the relationship between school funds per FTE and E&R expenditures per FTE dependent upon institution type (research university, flagship university) or characteristics of the athletics program (reporting structure, level of play), controlling for other factors?

The analysis for this dissertation proceeded through three stages. First, latent growth curve (LGC) models were used to estimate and compare the rate of growth in total athletics subsidies per FTE, school funds per FTE, and E&R expenditures per FTE between 2005 and 2014 (research question one). The second stage of the analysis examined research questions two and three by estimating a series of fixed-effects models (FEMs) using a structural equation model (SEM) framework. In these models, E&R expenditures served as the dependent variable and total athletics subsidies per FTE as the independent variable of interest. The final stage repeated the analysis from the second stage using school funds per FTE as the independent variable of interest in place of total athletics subsidies per FTE. The following section provides a brief summary of the findings from each of the three stages of the analysis.

Results

Results for Research Question 1

The first part of this study sought to address research question one, which asked how the rate of growth compared for total athletics subsidies per FTE, school funds per FTE, and education and related (E&R) expenditures per FTE during the period of 2005 to 2014. To understand the nature of the growth in each variable, a graphical analysis was conducted. The graphical analysis revealed a relatively consistent pattern across the three variables: the most growth (steepest slope) occurred between 2005 and 2009, 2009 to 2010 represented a time of no growth or decline, and a new period of growth took place from 2010 to 2014. Multiple latent growth curve (LGC) models were then estimated for each of the three variables using SEM, and the model of best fit was identified using several fit criteria.

It was estimated that the average total growth between 2005 and 2014 was 46 percent for total athletics subsidies per FTE, 59 percent for school funds per FTE, and 26 percent for E&R expenditures per FTE. Thus, the rate of increase in both subsidies variables was roughly twice that of E&R expenditures. The estimates also showed that, generally, the intercept and slopes were not significantly correlated, meaning that there was little relationship between an institution's per student subsidies, school funds, or E&R expenditures in 2005 and the rate of change in that variable from 2005 to 2014. Additionally, the intercept and slope variances were each statistically significant, which suggests that there are important differences between institutions in terms of their initial spending on athletics subsidies, school funds, and E&R expenditures in 2005 and the rate at which these allocations changed over time.

Results for Research Questions 2 and 3

The second part of this study sought to understand the nature of the relationship between total athletics subsidies per FTE and E&R spending per FTE (research questions two and three). Fixed-effects structural equation models were estimated using a panel dataset of public Division I institutions for the time period of 2005 to 2014. Three time-varying control variables were included in the models: core revenues per FTE, number of tenure-track faculty per 100 FTE, and student FTE enrollment. Several FEMs were initially estimated and the models were compared using a number of different fit criteria. The best-fitting model was selected and used to report the results for research question two. This model was then re-estimated four times using one of four interaction terms in each model to address research question three. The four interaction terms were between total athletics subsidies per FTE and the following categorical variables: Carnegie classification as a research institution; status as the state flagship university; reporting location of the athletics department; and level of athletics competition.

Estimates from the FEM without interaction terms showed that the relationship between total athletics subsidies per FTE and E&R expenditures per FTE was positive and statistically significant. Although the sign of the coefficient is opposite the hypothesis, the effect size appears to be small. A 10 percent increase in total athletics subsidies per FTE was associated with a 0.1 percent increase in E&R expenditures per FTE, controlling for other factors. Interpreted at the mean using 2014 data, these would represent increases of $83 for total athletics subsidies per FTE and $12 for E&R expenditures per FTE. Each of the three control variables were positively and significantly correlated with the dependent variable. A 10 percent increase in core revenues per FTE, tenure-track faculty per 100 FTE, or FTE enrollment were associated with increases of 1.8, 2.1, and 0.4 percent in E&R expenditures per FTE, respectively. The preceding observation of the dependent variable was also a significant predictor. It was estimated that a 10 percent increase in E&R expenditures per FTE for year *t-1* was correlated with an increase in E&R expenditures in year *t* of between 6.3 and 6.9 percent.

The first three interaction models did not exhibit statistical significance in the interaction terms with total athletics subsidies per FTE. This shows that there were no differences in the relationship between athletics subsidies per FTE and E&R expenditures per FTE based upon status as a research or flagship institution or having athletics located within student services versus an auxiliary or other unit. In the model containing an interaction term for level of athletics play, however, it was found that the relationship between the dependent variable and independent variable of interest differed for FBS and FCS institutions. Interpreting the coefficients at the mean using 2014 data, an increase of $99 (10 percent) in total athletics subsidies per FTE for FCS institutions was associated with an increase in E&R expenditures per FTE of $12 (0.1 percent), controlling for other factors. An increase of $61 (10 percent) in total athletics subsidies per FTE for FBS institutions was also correlated with an increase of $12 (0.08 percent) in E&R expenditures per FTE.

Results for Research Questions 4 and 5

The final part of this study examined the relationship between athletics subsidies from school funds (referred to as school funds) per FTE and E&R expenditures per FTE. Using the same panel dataset as in part two, a series of fixed-effects models were estimated to test the relationship between the independent variable of interest and the dependent variable. Core revenues per FTE, tenure-track faculty per 100 FTE, and FTE enrollment were included as control variables in each of the models. Again the different models were compared using several fit criteria and the best-fitting model was used to report the parameter estimates. After estimating the FEM for school funds per FTE and E&R expenditures per FTE, four additional models were estimated that each included an interaction term between school funds per FTE and one of the following: classification as a research institution, status as a flagship university, reporting location of the athletics department, or level of athletics competition.

Findings from the FEM without interaction terms showed that the relationship between school funds per FTE and E&R expenditures per FTE was non-significant, controlling for other factors. Consistent with the results from part two, each of the three control variables was positive and statistically significant. A 10 percent increase in core revenues per FTE, tenure-track faculty per 100 FTE, or FTE enrollment was correlated with an increase of 1.8, 2.1, and 0.3 percent in E&R expenditures per FTE. It was also shown that a 10 percent increase in the preceding observation of E&R expenditures per FTE was associated with between a 6.3 and 6.9 percent increase in E&R expenditures per FTE in the current year, controlling for other factors.

The interaction term between classification as a research insitutition and school funds per FTE was statistically significant, indicating that the relationship between the independent variable of interest and dependent variable differed for research and non-research institutions. Interpreting the coefficients at the mean using 2014 data, a 10 percent increase in school funds per FTE for research institutions ($36) is associated with a 0.02 percent increase in E&R expenditures per FTE ($3). A 10 percent increase in school funds per FTE for non-research institutions ($74) is associated with a 0.03 percent decrease in E&R expenditures per FTE ($3). The interaction terms in each of the remaining interaction models for school funds per FTE were non-significant. This demonstrates that the relationship between school funds per FTE and E&R expenditures per FTE was approximately the same for flagship and non-flagship institutions, FBS and FCS institutions, and institutions whose athletics departments reported within student services and an auxiliary/other unit.

Interpretation and Discussion of the Findings

The findings from this dissertation shed new light on the relationship of athletics subsidies to the budget of public colleges and universities. Whereas prior research has focused on the relationship between athletics and institutional revenues, for example student tuition and fees, this study is the first to investigate whether changes in resource allocations to athletics subsidies are correlated with changes in resource allocations to other areas of the institution. Specifically, the relationship between athletics subsidies and education and related spending has been examined. In this section, an interpretation of the findings for each of the five research questions is presented.

Research Question 1

The key finding from part one of this study is the fact that the average rate of growth in athletics subsidies per FTE as well as school funds per FTE outpaced the rate of growth in E&R spending per FTE. Whereas E&R expenditures per FTE increased approximately at the rate of inflation from 2005 to 2014 (25.6 percent versus 21.2 percent), both total subsidies per FTE and school funds per FTE increased more than twice the rate of inflation (46.3 and 59.3 percent) (US Department of Labor, 2015). This finding is consistent with the hypothesis for question one as well as previous research by Desrochers (2013) who compared the average academic spending per student with the average athletic subsidy per student athlete for Division I institutions between 2005 and 2010. In that study, it was shown that academic spending per student increased by 22 and 23 percent at FBS and FCS-football institutions but only 11 percent at FCS non-football institutions. Athletics subsidies per student athlete, however, increased by 61 percent for FBS institutions, 42 percent at FCS-football institutions, and 38 percent at FCS-non football institutions.

This trend in athletics subsidies is concerning, particularly during a time when public institutions have seen declining state support, greater competition for students, and state legislatures that have grown wary of repeated increases to tuition and fees. On the one hand, athletics subsidies represent a small, albeit growing percentage of total core revenues: 2.7 percent in 2014. On the other hand, with a median total subsidy of $9.8M in 2014, athletics subsidies represent a potentially important opportunity cost for Division I colleges and universities.

Even though intercollegiate athletics programs do not generally operate in the black, they have often been justified according to a number of perceived indirect benefits. The most common indirect benefits attributed to athletics include increased student applications and enrollments, student quality, and alumni giving (Clotfelter, 2011; Clopton, 2009; French, 2004; Bok, 2003). The relationship between intercollegiate athletics and each of these areas has been widely studied over the past several decades. However, findings have generally been mixed and effect sizes small when significant correlations have been identified. Studies by Murphy and Tandel (1994) and McEvoy

(2005), for example, estimated increases in student applications of 1.3 and 6.1 percent following a season in which a team's football record had improved by 25 percent over the previous season. Although a number of early studies showed substantial increases in alumni giving following a successful football season (see Sigelman & Brookheimer, 1983 and Baade & Sundberg, 1996) more recent evidence suggests that athletics only increase alumni giving to athletics (Humphreys & Mondello, 2007; Stinson & Howard, 2007).

The lack of compelling evidence that intercollegiate athletics produce important indirect benefits raises the question as to why public Division I colleges and universities have been willing to invest institutional funds in intercollegiate athletics – an activity that many have argued is outside the scope of the mission of public higher education (Duderstadt, 2009; Sperber, 2000; French, 2004). One important theory that helps to explain this phenomenon is Bowen's revenue theory of costs, which suggests that colleges and universities are driven by a desire to increase their prestige and influence (Bowen, 1981). As such, they attempt to raise as much revenue as they can and spend all of the revenues they obtain on activities that increase their prestige. Intercollegiate athletics are a prominent feature in American higher education and have come to be viewed as the "front door" to the university due to their unique ability to attract students, alumni, and other members of the community to campus (Toma & Cross, 1998). High-profile athletics, most notably FBS institutions belonging to a power five conference (ACC, Big Ten, Big 12, Pac 10, and SEC), provide a great deal of national exposure and notoriety due to nationally televised football and basketball games and championships. It has been suggested that this exposure, and having a successful program in particular, produces a halo effect that increases institutional prestige by leading prospective students, alumni, and others to conclude that a successful athletics program is representative of a successful institution (Fisher, 2009; Quattrone, 2008).

Since colleges and universities seek to increase their prestige and athletics is viewed as an important means of acquiring prestige, Resource Dependence Theory maintains that athletics programs have obtained substantial political power on campus (Smart, 1999). This political power, in turn, allows athletics to secure important and scarce internal resources such as student scholarships, coaching and other staff positions, and facilities. Although previous research has not specifically examined political power for athletics, several studies have found that power in academic departments is largely determined by the ability to secure external funding, usually research grants, which is an external resource highly valued by the institution (Salancik & Pfeffer, 1974; Pfeffer & Moore, 1980).

A final note from the findings for research question one is the recognition, based on the graphical and statistical analyses, that multiple slopes were needed in order to effectively model the growth in the three variables from 2005 to 2014. In each variable, total athletics subsidies, athletics subsidies from school funds, and education and related spending, the period of greatest growth occurred from 2005 to 2009. This period of growth was followed by a brief period of almost no growth or even slight decline from 2009 to 2010 or 2011, until growth resumed between 2011 and 2014. This pattern is not altogether surprising in light of the economic recession that occurred in 2008 and that impacted university endowments, alumni giving, state appropriations, and other sources of university income (Brown & Hoxby, 2015). However, it appears that athletics subsidies and educational spending were not affected in the same way by the recession.

Whereas education and related spending per student declined by an average of $254 between 2005 and 2009, total athletics subsidies per student actually increased by $10 per student. This could be evidence that institutions eagerly spread money around during times of prosperity, but have a greater willingness to decrease educational spending before athletics.

Research Question 2

The hypothesis for research question two anticipated that the relationship between total athletics subsidies per FTE would be negatively and significantly correlated with E&R expenditures per FTE at public Division I colleges and universities, controlling for other factors. The results from part two of this study showed that although the two variables were significantly correlated, the relationship was in fact positive. Although the effect size was small, this is an important result. At minimum the lack of the hypothesized relationship demonstrates that institutions are not increasing athletics subsidies on the one hand and decreasing E&R spending on the other. Given that core revenues were controlled for in the model and the fact that both athletics subsidies and E&R expenditures were shown to have increased during the time period of this study, it may be that institutions have reallocated funds from another area of the institution to support the increases to both athletics subsidies and E&R activities.

If in fact institutions have selectively reallocated funds from another area to athletics subsidies and E&R activities, in all likelihood that area is one from which little to no institutional prestige is derived. Returning to the earlier discussion for research question one, Bowen's revenue theory of costs suggests that the most important goal of colleges and universities is prestige and they will invest all available revenues in activities that increase prestige (Bowen, 1981). This is further supported by Resource Dependence Theory (RDT), which states that the departments within a firm that are most successful in securing scarce and desired external resources for the organization, in this case prestige, those departments receive power in the organization which they can leverage to obtain internal resources (Salancik & Pfeffer, 1974). RDT has been applied successfully to higher education by a number of researchers, including Hackman (1985) who showed that non-academic or peripheral units that secured external funding, had high visibility, and were able to make a case that they provided important benefits to the institution received the most internal funding. Based upon this discussion one might hypothesize that less visible units and activities, especially those that are not directly rewarded by national rankings systems such as *US News and World Report*, would be particularly susceptible to budget cuts. Units such as the physical plant, student services, and community and outreach programs appear to be most at risk.

Research Question 3

The hypothesis for the third research question supposed that the relationship between total athletics subsidies per FTE and E&R expenditures per FTE would depend upon four institutional characteristics. Specifically, it was assumed that the relationship between the two variables would be stronger for non-research and non-flagship institutions compared to research and flagship institutions. It was also hypothesized that the relationship between total athletics subsidies per FTE and E&R expenditures per FTE would be stronger for institutions whose athletics departments were located within student services as opposed to an auxiliary/other unit and for those competing at the FCS versus the FBS level. The empirical findings from part two of the study showed that only one of the four interactions was statistically significant - the interaction between FBS status and total athletics subsidies per FTE.

The lack of statistical significance in the interaction terms for classification as a research university and state flagship status is somewhat surprising. Master's and baccalaureate institutions generally have lower per-student spending on E&R activities, fewer core revenues per student, and higher per-student athletics subsidies compared to research institutions (Bowen, 1981; Desrochers, 2013; Fulks, 2015). Similarly, non-flagship public institutions are in many cases less prestigious and receive far less state funding compared to flagship institutions. Furthermore, flagship institutions are disproportionately represented within the power five athletics conferences whose members generate the most athletics revenues and generally have the lowest athletics subsidies (College Football Data Warehouse, 2017; Cheslock & Knight, 2015; Denhart & Vedder, 2010). As such, one could expect that non-flagship and non-research institutions, who have access to fewer revenue sources, would be forced to re-allocate resources from another area of the institution to fund their growing athletics subsidies. This appears not to be the case for E&R expenditures; however, these institutions could be re-allocating funds from another area of the institution to athletics as discussed previously.

Examining possible institutional differences on the basis of the reporting location of the athletics department was important in part because little research has been conducted in this area. The two common structures for Division I athletics departments are to report within student services or be established as an auxiliary or other similar unit (Barr & McClellan, 2011). Most auxiliary units are required to be financially self-sufficient, meaning that they must generate sufficient revenues to cover their expenses.

Student services units, on the other hand, are generally not viewed as a source of revenue for the institution and contain such departments as career counseling, personal counseling, multicultural affairs, and other important services for students. Placement of athletics within a student services unit would seem to suggest a recognition by the university that intercollegiate athletics are both an activity that requires institutional support and one that is worth supporting. Moreover, having athletics located within a larger unit could make it more difficult for campus administrators to monitor athletics spending, which could give rise to principal-agent problems (Rodas, 1998).

Nonetheless, the results from the fixed-effects models did not indicate a difference in the relationship between athletics subsidies per FTE and E&R spending per FTE for institutions with either type of athletics reporting structure. In light of the descriptive statistics, this finding is not entirely surprising. The median total athletics subsidy for athletics departments located within student services and for those located within an auxiliary/other unit was comparable in 2014: $10.8M versus $9.2M. An important conclusion that can be drawn from these findings is that athletics departments serving as auxiliary/other units have not been held to the same level of financial accountability as other campus auxiliary units. Furthermore, there is little evidence to suggest that administrators at institutions whose athletics departments are located within an auxiliary/other unit have had greater success in holding down athletics subsidies compared with those whose athletics departments are located within student services.

The one interaction term that was found to be statistically significant in the models for total athletics subsidies per FTE and E&R expenditures per FTE was that involving the level of athletics competition (FBS or FCS). Yet, interpretation of the findings is somewhat unclear. The fact that the relationship was positive for both types of institutions was unexpected. Although the relationship between total athletics subsidies per FTE and E&R expenditures per FTE was expected to be non-significant for FBS institutions, it was hypothesized that this relationship would be negative for FCS institutions due to the fact that they typically receive fewer core revenues and yet have higher athletics subsidies.

The presence of a positive correlation between athletics subsidies and E&R expenditures for either type of institution could be evidence of institutional “striving,” where institutions have simultaneously increased both athletics subsidies and E&R spending in order to increase prestige. That the correlation is stronger for FCS institutions could be an indication that some of these institutions, which are generally less prestigious, comprehensive institutions, have experienced upward pressure to move up in the national rankings through increased educational spending and exposure through athletics.

Research Question 4

The hypothesis for research question four stated that the relationship between school funds per FTE and E&R expenditures per FTE would be significant and negative, controlling for other factors. It was argued that even though a non-significant relationship might be estimated for the total subsidies variable in research question two, the correlation between school funds and E&R expenditures would be significant. The rationale was that the school funds variable, compared to total subsidies, does not include student athletics fees. It was supposed that if school funds, at least to some degree, represent unexpected budget overages by athletics, this may have led to the re-allocation of funds from other areas of the institution during the fiscal year. Nonetheless, the estimates for part three of the analysis indicated that no statistically significant correlation existed between school funds per FTE and E&R expenditures per FTE, controlling for other factors.

One possible explanation for the absence of a significant relationship between school funds per FTE and E&R expenditures per FTE could be, as suggested for total subsidies, that colleges and universities have re-allocated funds from another area to athletics. For example, funding may have been decreased for student services or physical plant maintenance. Another, possibility is that institutions may not have reported all of the direct and indirect subsidies they provided to athletics each year. According to the *USA Today Athletics Finance* database, the school funds variable should capture all of the following: state funds and tuition dollars provided directly to athletics; federal work study students employed in athletics; administrative services provided by the university; facilities and maintenance; utilities; and debt service (USA Today, 2016b). Given the large number of resources provided to athletics that institutions are responsible for tracking, one cannot help but wonder whether institutions have done their due diligence in compiling this information or even how feasible it is for them to compile accurate information.

Research Question 5

The final research question sought to determine whether the relationship between school funds per FTE and E&R expenditures per FTE was moderated by any one of four institutional characteristics: classification as a research institution, status as the state flagship, reporting of athletics within an auxiliary/other unit or student services, and competition at the FBS or FCS level. Consistent with research question three, it was hypothesized that the correlation between the independent variable of interest and dependent variable would be negative and stronger for non-research, non-flagship, and FCS institutions as well as those whose athletics departments that were located in student services. The results showed that although the interaction terms were non-significant for three of the four characteristics, significant differences were observed between research and non-research institutions.

The overall relationship between school funds per FTE and E&R expenditures per FTE was found to be negative for non-research institutions and positive for research. As noted previously in this study, research institutions have access to more core revenues per FTE but also allocated fewer school funds per FTE to athletics compared to non-research institutions. Because school funds represent a larger portion of total core revenues at non-research institutions, it is likely that large increases to school funds, particularly unexpected increases, have a more dramatic impact on the overall budget picture. An important question that emerges is whether non-research institutions, which are already facing financial difficulty in many cases, can justify their increasing investment in athletics. Even though the estimated effect size for the correlation between school funds per FTE and E&R expenditures per FTE is small, future increases to school funds could be correlated with even larger decreases in educational spending. This in turn could lead to a decline in the quality of education provided by these institutions.

Limitations and Future Research

Several limitations have been identified for this dissertation, a number of which were raised in chapter three. Those limitations will be revisited here in part to motivate future research. The first limitation is the scope of the study. At present, athletics subsidies data are only available for public Division I colleges and universities. This means that the findings may only be applicable to that specific type of institution, which represents a limited segment of all U.S. four-year colleges and universities – about 10 percent (Department of Education, 2015). Athletics subsidies data are compiled by the NCAA for all institutions that participate in NCAA athletics; however, the NCAA has been unwilling to provide school-level data to researchers or release it publicly up to this point. An important area for future research, if one could obtain the data, would be to investigate differences in athletics subsidies on the basis of institution type – public or private. It would also be valuable to examine athletics subsidies for Division II and Division III programs. In particular it would be valuable to track athletics subsidies over time for institutions that have moved up from Division II to Division I. A number of such institutions are included in the dataset for this dissertation; however, data for these schools has generally not been included in the *USA Today Athletics Finance Database* prior to their entering Division I competition (USA Today, 2016b).

A second potential limitation for the study is the use of retrospective data from the *USA Today Athletics Database*. These data were initially collected by the NCAA and obtained by *USA Today* through the Freedom of Information Act. The accuracy and completeness of these data have been called into question, in part, because institutions have historically not been forthcoming with their athletics financial data. Moreover, it is unclear what review, if any, the NCAA conducts to ensure the data are accurate. It also seems unlikely any penalties would be imposed on an institution if the NCAA were to find discrepancies or incompleteness in the annual athletics finance survey.

Consequently, the athletics subsidies data – particularly the school funds information – may not provide a complete picture of university financial support to athletics. One can only hope that in the future, as calls for greater transparency and accountability of higher education continue, that athletics finance data become part of mandatory state or federal government data collections such as IPEDS.

Another possible limitation is the level of detail provided by the IPEDS financial data. IPEDS, although useful, provides a limited amount of information on university revenues and expenditures (Toutkoushian, 2001). As such, it is possible that the positive correlation observed between total athletics subsidies and education and related expenditures in the statistical analysis is the result of certain athletics subsidies, most likely indirect, being counted within the education and related spending category. For example, it is not uncommon for universities to provide additional academic support – tutoring, academic advising, etc. – to student athletes. It is quite likely that these expenses were counted within education and related spending in IPEDS, which may have confounded the results.

The limitations associated with both the *USA Today* and IPEDS databases could be, in many respects, overcome by obtaining microdata in future studies. For such studies, researchers may be able to obtain detailed athletics finance data for one or a handful of Division I institutions in order to obtain a more complete picture of the true scope of athletics subsidies, how (and if) the subsidies are budgeted for within the overall university budget, and whether there are certain athletics subsidies that are simply not tracked by the institution (i.e. use of central services such as travel and purchasing). Moreover, a mixed-methods approach might be utilized where the researcher could speak directly the university CFO and other administrators willing to provide financial details that to this point have not been studied in depth and are not currently captured within large national datasets.

Another limitation is the fact that data were not inflation-adjusted as part of this study. The reason data were not adjusted is due to the fact that the fixed effects models controlled for year fixed effects, rendering the adjustment statistically unnecessary. In hindsight, however, use of inflation-adjusted variables would have aided the interpretation of the results for research question one, which compared the growth in athletics subsidies to educational activities over time.

A final limitation identified for this dissertation is the possibility of omitted variable bias. Great care was taken to review the literature in order to determine what time-varying control variables should be included in the model. Moreover, time fixed effects models were used in order to control for unaccounted (or unmeasurable) time-invariant control variables, such as Carnegie classification, prestige, and location. However, the possibility exists that one or more unaccounted time-varying variables that are correlated with athletics subsidies or school funds and education and related expenditures were omitted.

In terms of future research, there are a number of ways in which this study could be extended. As noted above, if one could obtain athletics subsidies data for private Division I institutions, comparisons could be made between public and private institutions. For example, the analysis in this dissertation could be repeated using a dataset that included both types of institutions, and group differences could be tested for statistical significance. Another possibility is that a researcher could obtain athletics subsidies data for public Division II and Division III programs through the Freedom of Information Act. Differences in athletics subsidies as well as the relationship between athletics subsidies and education and related spending could be examined for the three different levels of NCAA athletics. Further, institutions that have transitioned from Division II to Division I, for example, could be investigated using a case study approach to determine how their athletics finances have changed over time, and if changes in other areas of university finances have occurred as well. Lastly, the finding of a small, positive correlation between total athletics subsidies per FTE and E&R expenditures per FTE in the analysis suggests the possibility that institutions may have re-allocated resources from other areas of the institution to both athletics and educational activities. An important future study would be to examine the correlation between athletics subsidies (and school funds) with other areas such as non-athletic scholarships, physical plant maintenance, and public service.

APPENDIX A

Table A.1

Estimated covariances for fixed effect model using total athletics subsidies per FTE (log)

			Estimate	S.E.	C.R.	*P*
Ln_CoreFTE06	<-->	TFE	.042	.008	5.123	***
Ln_FTE0506	<-->	TFE	.092	.015	6.061	***
Ln_Fac_100FTE_06	<-->	TFE	.009	.003	3.034	.002
Ln_ER_05	<-->	TFE	.043	.007	5.899	***
Ln_SubFTE_06	<-->	Ln_CoreFTE06	-.130	.026	-4.928	***
Ln_SubFTE_06	<-->	Ln_FTE0506	-.346	.042	-8.205	***
Ln_SubFTE_06	<-->	Ln_Fac_100FTE_06	-.016	.012	-1.348	.178
Ln_SubFTE_06	<-->	Ln_ER_05	-.086	.022	-3.999	***
Ln_CoreFTE06	<-->	Ln_FTE0506	.103	.020	5.082	***
Ln_CoreFTE06	<-->	Ln_Fac_100FTE_06	.072	.008	8.923	***
Ln_CoreFTE06	<-->	Ln_ER_05	.151	.015	10.028	***
Ln_FTE0506	<-->	Ln_Fac_100FTE_06	.006	.009	.691	.489
Ln_FTE0506	<-->	Ln_ER_05	.095	.017	5.552	***
Ln_Fac_100FTE_06	<-->	Ln_ER_05	.058	.007	8.676	***
Ln_SubFTE_07	<-->	TFE	-.075	.014	-5.223	***
Ln_CoreFTE07	<-->	TFE	.044	.009	5.162	***
Ln_FTE0607	<-->	TFE	.092	.015	6.076	***
Ln_Fac_100FTE_07	<-->	TFE	.008	.003	2.893	.004
Ln_SubFTE_07	<-->	Ln_SubFTE_06	.617	.060	10.258	***
Ln_FTE0607	<-->	Ln_FTE0506	.407	.038	10.641	***
Ln_Fac_100FTE_07	<-->	Ln_Fac_100FTE_06	.042	.004	10.265	***
Ln_CoreFTE07	<-->	Ln_CoreFTE06	.204	.019	10.564	***
Ln_SubFTE_07	<-->	Ln_CoreFTE07	-.129	.026	-5.029	***
Ln_SubFTE_07	<-->	Ln_CoreFTE06	-.127	.025	-5.063	***
Ln_SubFTE_07	<-->	Ln_FTE0607	-.326	.040	-8.154	***
Ln_SubFTE_07	<-->	Ln_FTE0506	-.324	.040	-8.112	***
Ln_SubFTE_07	<-->	Ln_Fac_100FTE_07	-.012	.011	-1.108	.268
Ln_SubFTE_07	<-->	Ln_Fac_100FTE_06	-.017	.012	-1.508	.131
Ln_SubFTE_07	<-->	Ln_ER_05	-.080	.021	-3.914	***
Ln_CoreFTE07	<-->	Ln_SubFTE_06	-.136	.027	-5.016	***
Ln_FTE0607	<-->	Ln_SubFTE_06	-.345	.042	-8.208	***
Ln_Fac_100FTE_07	<-->	Ln_SubFTE_06	-.012	.012	-1.079	.280
Ln_CoreFTE07	<-->	Ln_FTE0607	.112	.021	5.354	***
Ln_CoreFTE07	<-->	Ln_FTE0506	.112	.021	5.349	***
Ln_CoreFTE07	<-->	Ln_Fac_100FTE_07	.072	.008	9.052	***
Ln_CoreFTE07	<-->	Ln_Fac_100FTE_06	.072	.008	8.753	***
Ln_CoreFTE07	<-->	Ln_ER_05	.155	.015	10.042	***
Ln_FTE0607	<-->	Ln_CoreFTE06	.106	.020	5.212	***
Ln_Fac_100FTE_07	<-->	Ln_CoreFTE06	.069	.008	8.993	***
Ln_FTE0607	<-->	Ln_Fac_100FTE_07	.006	.009	.625	.532
Ln_FTE0607	<-->	Ln_Fac_100FTE_06	.009	.009	.930	.352
Ln_FTE0607	<-->	Ln_ER_05	.096	.017	5.589	***
Ln_Fac_100FTE_07	<-->	Ln_FTE0506	.006	.009	.732	.464
Ln_Fac_100FTE_07	<-->	Ln_ER_05	.057	.006	8.853	***
Ln_SubFTE_08	<-->	TFE	-.079	.015	-5.309	***
Ln_CoreFTE08	<-->	TFE	.040	.008	5.104	***
Ln_FTE0708	<-->	TFE	.093	.015	6.068	***
Ln_Fac_100FTE_08	<-->	TFE	.008	.003	2.757	.006
Ln_SubFTE_08	<-->	Ln_SubFTE_07	.621	.060	10.422	***
Ln_SubFTE_08	<-->	Ln_SubFTE_06	.631	.062	10.249	***
Ln_FTE0708	<-->	Ln_FTE0506	.409	.039	10.629	***
Ln_FTE0708	<-->	Ln_FTE0607	.411	.039	10.657	***
Ln_Fac_100FTE_08	<-->	Ln_Fac_100FTE_06	.039	.004	9.988	***

			Estimate	S.E.	C.R.	*P*
Ln_Fac_100FTE_08	<-->	Ln_Fac_100FTE_07	.041	.004	10.500	***
Ln_CoreFTE08	<-->	Ln_CoreFTE06	.187	.018	10.514	***
Ln_CoreFTE08	<-->	Ln_CoreFTE07	.192	.018	10.538	***
Ln_SubFTE_08	<-->	Ln_CoreFTE07	-.138	.026	-5.192	***
Ln_SubFTE_08	<-->	Ln_CoreFTE06	-.136	.026	-5.249	***
Ln_SubFTE_08	<-->	Ln_CoreFTE08	-.119	.024	-4.907	***
Ln_SubFTE_08	<-->	Ln_FTE0708	-.345	.042	-8.291	***
Ln_SubFTE_08	<-->	Ln_FTE0607	-.344	.041	-8.320	***
Ln_SubFTE_08	<-->	Ln_FTE0506	-.341	.041	-8.262	***
Ln_SubFTE_08	<-->	Ln_Fac_100FTE_08	-.013	.011	-1.216	.224
Ln_SubFTE_08	<-->	Ln_Fac_100FTE_07	-.013	.011	-1.198	.231
Ln_SubFTE_08	<-->	Ln_Fac_100FTE_06	-.019	.012	-1.646	.100
Ln_SubFTE_08	<-->	Ln_ER_05	-.090	.021	-4.267	***
Ln_CoreFTE08	<-->	Ln_SubFTE_07	-.113	.024	-4.767	***
Ln_FTE0708	<-->	Ln_SubFTE_07	-.326	.040	-8.114	***
Ln_Fac_100FTE_08	<-->	Ln_SubFTE_07	-.012	.011	-1.136	.256
Ln_CoreFTE08	<-->	Ln_SubFTE_06	-.117	.025	-4.722	***
Ln_FTE0708	<-->	Ln_SubFTE_06	-.346	.042	-8.172	***
Ln_Fac_100FTE_08	<-->	Ln_SubFTE_06	-.014	.011	-1.209	.227
Ln_FTE0708	<-->	Ln_CoreFTE07	.113	.021	5.351	***
Ln_Fac_100FTE_08	<-->	Ln_CoreFTE07	.069	.008	8.951	***
Ln_FTE0708	<-->	Ln_CoreFTE06	.107	.020	5.211	***
Ln_Fac_100FTE_08	<-->	Ln_CoreFTE06	.066	.008	8.807	***
Ln_CoreFTE08	<-->	Ln_FTE0708	.096	.019	4.974	***
Ln_CoreFTE08	<-->	Ln_FTE0607	.096	.019	5.014	***
Ln_CoreFTE08	<-->	Ln_FTE0506	.096	.019	5.016	***
Ln_CoreFTE08	<-->	Ln_Fac_100FTE_08	.064	.007	8.953	***
Ln_CoreFTE08	<-->	Ln_Fac_100FTE_07	.066	.007	9.016	***
Ln_CoreFTE08	<-->	Ln_Fac_100FTE_06	.066	.008	8.706	***
Ln_CoreFTE08	<-->	Ln_ER_05	.142	.014	9.990	***
Ln_FTE0708	<-->	Ln_Fac_100FTE_08	.004	.009	.466	.641
Ln_FTE0708	<-->	Ln_Fac_100FTE_07	.005	.009	.604	.546
Ln_FTE0708	<-->	Ln_Fac_100FTE_06	.009	.009	.954	.340
Ln_FTE0708	<-->	Ln_ER_05	.097	.017	5.614	***
Ln_Fac_100FTE_08	<-->	Ln_FTE0607	.005	.009	.549	.583
Ln_Fac_100FTE_08	<-->	Ln_FTE0506	.007	.009	.750	.453
Ln_Fac_100FTE_08	<-->	Ln_ER_05	.053	.006	8.590	***
Ln_SubFTE_09	<-->	TFE	-.084	.016	-5.336	***
Ln_CoreFTE09	<-->	TFE	.033	.007	4.752	***
Ln_FTE0809	<-->	TFE	.093	.015	6.068	***
Ln_Fac_100FTE_09	<-->	TFE	.007	.003	2.524	.012
Ln_SubFTE_09	<-->	Ln_SubFTE_06	.646	.064	10.145	***
Ln_SubFTE_09	<-->	Ln_SubFTE_07	.634	.062	10.314	***
Ln_SubFTE_09	<-->	Ln_SubFTE_08	.670	.064	10.474	***
Ln_FTE0809	<-->	Ln_FTE0506	.413	.039	10.614	***
Ln_FTE0809	<-->	Ln_FTE0607	.414	.039	10.645	***
Ln_FTE0809	<-->	Ln_FTE0708	.418	.039	10.655	***
Ln_Fac_100FTE_09	<-->	Ln_Fac_100FTE_06	.039	.004	9.890	***
Ln_Fac_100FTE_09	<-->	Ln_Fac_100FTE_07	.041	.004	10.379	***
Ln_Fac_100FTE_09	<-->	Ln_Fac_100FTE_08	.041	.004	10.521	***
Ln_CoreFTE09	<-->	Ln_CoreFTE06	.160	.016	9.726	***
Ln_CoreFTE09	<-->	Ln_CoreFTE07	.161	.017	9.628	***
Ln_CoreFTE09	<-->	Ln_CoreFTE08	.158	.016	9.966	***
Ln_SubFTE_09	<-->	Ln_CoreFTE07	-.144	.028	-5.222	***
Ln_SubFTE_09	<-->	Ln_CoreFTE06	-.142	.027	-5.258	***
Ln_SubFTE_09	<-->	Ln_CoreFTE08	-.124	.025	-4.905	***
			Estimate	S.E.	C.R.	*P*
Ln_SubFTE_09	<-->	Ln_CoreFTE09	-.079	.024	-3.237	.001
Ln_SubFTE_09	<-->	Ln_FTE0809	-.370	.044	-8.388	***

Ln_SubFTE_09	<-->	Ln_FTE0708	-.366	.044	-8.391	***
Ln_SubFTE_09	<-->	Ln_FTE0607	-.365	.043	-8.418	***
Ln_SubFTE_09	<-->	Ln_FTE0506	-.362	.043	-8.359	***
Ln_SubFTE_09	<-->	Ln_Fac_100FTE_09	-.015	.012	-1.264	.206
Ln_SubFTE_09	<-->	Ln_Fac_100FTE_08	-.016	.012	-1.364	.173
Ln_SubFTE_09	<-->	Ln_Fac_100FTE_07	-.016	.012	-1.343	.179
Ln_SubFTE_09	<-->	Ln_Fac_100FTE_06	-.022	.012	-1.790	.073
Ln_SubFTE_09	<-->	Ln_ER_05	-.095	.022	-4.281	***
Ln_CoreFTE09	<-->	Ln_SubFTE_08	-.076	.023	-3.269	.001
Ln_FTE0809	<-->	Ln_SubFTE_08	-.347	.042	-8.269	***
Ln_Fac_100FTE_09	<-->	Ln_SubFTE_08	-.013	.011	-1.158	.247
Ln_CoreFTE09	<-->	Ln_SubFTE_07	-.070	.023	-3.097	.002
Ln_FTE0809	<-->	Ln_SubFTE_07	-.328	.041	-8.093	***
Ln_Fac_100FTE_09	<-->	Ln_SubFTE_07	-.011	.011	-.994	.320
Ln_CoreFTE09	<-->	Ln_SubFTE_06	-.074	.024	-3.122	.002
Ln_FTE0809	<-->	Ln_SubFTE_06	-.349	.043	-8.162	***
Ln_Fac_100FTE_09	<-->	Ln_SubFTE_06	-.013	.011	-1.124	.261
Ln_FTE0809	<-->	Ln_CoreFTE07	.112	.021	5.268	***
Ln_Fac_100FTE_09	<-->	Ln_CoreFTE07	.068	.008	8.789	***
Ln_FTE0809	<-->	Ln_CoreFTE06	.106	.021	5.136	***
Ln_Fac_100FTE_09	<-->	Ln_CoreFTE06	.065	.008	8.647	***
Ln_FTE0809	<-->	Ln_CoreFTE08	.096	.019	4.912	***
Ln_Fac_100FTE_09	<-->	Ln_CoreFTE08	.064	.007	8.820	***
Ln_CoreFTE09	<-->	Ln_FTE0809	.070	.019	3.731	***
Ln_CoreFTE09	<-->	Ln_FTE0708	.071	.019	3.833	***
Ln_CoreFTE09	<-->	Ln_FTE0607	.072	.019	3.893	***
Ln_CoreFTE09	<-->	Ln_FTE0506	.072	.019	3.906	***
Ln_CoreFTE09	<-->	Ln_Fac_100FTE_09	.057	.007	8.248	***
Ln_CoreFTE09	<-->	Ln_Fac_100FTE_08	.057	.007	8.326	***
Ln_CoreFTE09	<-->	Ln_Fac_100FTE_07	.058	.007	8.372	***
Ln_CoreFTE09	<-->	Ln_Fac_100FTE_06	.058	.007	8.031	***
Ln_CoreFTE09	<-->	Ln_ER_05	.124	.013	9.287	***
Ln_FTE0809	<-->	Ln_Fac_100FTE_09	-.002	.009	-.183	.855
Ln_FTE0809	<-->	Ln_Fac_100FTE_08	.003	.009	.355	.722
Ln_FTE0809	<-->	Ln_Fac_100FTE_07	.004	.009	.501	.616
Ln_FTE0809	<-->	Ln_Fac_100FTE_06	.009	.009	.902	.367
Ln_FTE0809	<-->	Ln_ER_05	.097	.017	5.559	***
Ln_Fac_100FTE_09	<-->	Ln_FTE0708	.000	.009	-.002	.999
Ln_Fac_100FTE_09	<-->	Ln_FTE0607	.001	.009	.087	.931
Ln_Fac_100FTE_09	<-->	Ln_FTE0506	.002	.009	.273	.785
Ln_Fac_100FTE_09	<-->	Ln_ER_05	.053	.006	8.463	***
Ln_SubFTE_10	<-->	TFE	-.084	.016	-5.308	***
Ln_CoreFTE10	<-->	TFE	.044	.008	5.234	***
Ln_Fac_100FTE_10	<-->	TFE	.007	.003	2.603	.009
Ln_SubFTE_10	<-->	Ln_SubFTE_06	.646	.064	10.131	***
Ln_SubFTE_10	<-->	Ln_SubFTE_07	.631	.061	10.267	***
Ln_SubFTE_10	<-->	Ln_SubFTE_08	.666	.064	10.426	***
Ln_SubFTE_10	<-->	Ln_SubFTE_09	.708	.067	10.520	***
Ln_FTE0910	<-->	Ln_FTE0506	.409	.039	10.598	***
Ln_FTE0910	<-->	Ln_FTE0607	.411	.039	10.632	***
Ln_FTE0910	<-->	Ln_FTE0708	.415	.039	10.643	***
Ln_FTE0910	<-->	Ln_FTE0809	.420	.039	10.656	***
Ln_Fac_100FTE_10	<-->	Ln_Fac_100FTE_06	.039	.004	9.790	***
Ln_Fac_100FTE_10	<-->	Ln_Fac_100FTE_07	.040	.004	10.244	***
Ln_Fac_100FTE_10	<-->	Ln_Fac_100FTE_08	.041	.004	10.384	***
Ln_Fac_100FTE_10	<-->	Ln_Fac_100FTE_09	.042	.004	10.540	***
Ln_FTE0910	<-->	TFE	.093	.015	6.067	***
			Estimate	S.E.	C.R.	*P*
Ln_CoreFTE10	<-->	Ln_CoreFTE06	.196	.019	10.456	***
Ln_CoreFTE10	<-->	Ln_CoreFTE07	.202	.019	10.492	***

Ln_CoreFTE10	<-->	Ln_CoreFTE08	.188	.018	10.522	***
Ln_CoreFTE10	<-->	Ln_CoreFTE09	.167	.017	9.922	***
Ln_SubFTE_10	<-->	Ln_CoreFTE07	-.147	.028	-5.296	***
Ln_SubFTE_10	<-->	Ln_CoreFTE06	-.145	.027	-5.325	***
Ln_SubFTE_10	<-->	Ln_CoreFTE08	-.128	.026	-4.998	***
Ln_SubFTE_10	<-->	Ln_CoreFTE09	-.081	.024	-3.304	***
Ln_SubFTE_10	<-->	Ln_CoreFTE10	-.146	.027	-5.365	***
Ln_SubFTE_10	<-->	Ln_FTE0809	-.372	.044	-8.400	***
Ln_SubFTE_10	<-->	Ln_FTE0910	-.370	.044	-8.415	***
Ln_SubFTE_10	<-->	Ln_FTE0708	-.368	.044	-8.408	***
Ln_SubFTE_10	<-->	Ln_FTE0607	-.366	.043	-8.427	***
Ln_SubFTE_10	<-->	Ln_FTE0506	-.363	.043	-8.365	***
Ln_SubFTE_10	<-->	Ln_Fac_100FTE_10	-.018	.012	-1.482	.138
Ln_SubFTE_10	<-->	Ln_Fac_100FTE_09	-.017	.012	-1.473	.141
Ln_SubFTE_10	<-->	Ln_Fac_100FTE_08	-.018	.012	-1.551	.121
Ln_SubFTE_10	<-->	Ln_Fac_100FTE_07	-.018	.012	-1.565	.118
Ln_SubFTE_10	<-->	Ln_Fac_100FTE_06	-.025	.012	-1.980	.048
Ln_SubFTE_10	<-->	Ln_ER_05	-.097	.022	-4.353	***
Ln_CoreFTE10	<-->	Ln_SubFTE_09	-.144	.027	-5.315	***
Ln_FTE0910	<-->	Ln_SubFTE_09	-.368	.044	-8.400	***
Ln_Fac_100FTE_10	<-->	Ln_SubFTE_09	-.015	.012	-1.305	.192
Ln_CoreFTE10	<-->	Ln_SubFTE_08	-.139	.026	-5.327	***
Ln_FTE0910	<-->	Ln_SubFTE_08	-.346	.042	-8.281	***
Ln_Fac_100FTE_10	<-->	Ln_SubFTE_08	-.014	.011	-1.215	.224
Ln_CoreFTE10	<-->	Ln_SubFTE_07	-.130	.025	-5.146	***
Ln_FTE0910	<-->	Ln_SubFTE_07	-.327	.040	-8.108	***
Ln_Fac_100FTE_10	<-->	Ln_SubFTE_07	-.010	.011	-.955	.340
Ln_CoreFTE10	<-->	Ln_SubFTE_06	-.137	.027	-5.154	***
Ln_FTE0910	<-->	Ln_SubFTE_06	-.348	.043	-8.175	***
Ln_Fac_100FTE_10	<-->	Ln_SubFTE_06	-.013	.012	-1.087	.277
Ln_FTE0910	<-->	Ln_CoreFTE07	.111	.021	5.279	***
Ln_Fac_100FTE_10	<-->	Ln_CoreFTE07	.067	.008	8.647	***
Ln_FTE0910	<-->	Ln_CoreFTE06	.106	.021	5.157	***
Ln_Fac_100FTE_10	<-->	Ln_CoreFTE06	.064	.008	8.525	***
Ln_FTE0910	<-->	Ln_CoreFTE08	.095	.019	4.915	***
Ln_Fac_100FTE_10	<-->	Ln_CoreFTE08	.063	.007	8.713	***
Ln_FTE0910	<-->	Ln_CoreFTE09	.070	.019	3.733	***
Ln_Fac_100FTE_10	<-->	Ln_CoreFTE09	.057	.007	8.159	***
Ln_CoreFTE10	<-->	Ln_FTE0809	.112	.021	5.355	***
Ln_CoreFTE10	<-->	Ln_FTE0910	.110	.021	5.331	***
Ln_CoreFTE10	<-->	Ln_FTE0708	.113	.021	5.466	***
Ln_CoreFTE10	<-->	Ln_FTE0607	.113	.021	5.513	***
Ln_CoreFTE10	<-->	Ln_FTE0506	.114	.021	5.509	***
Ln_CoreFTE10	<-->	Ln_Fac_100FTE_10	.066	.008	8.663	***
Ln_CoreFTE10	<-->	Ln_Fac_100FTE_09	.066	.008	8.675	***
Ln_CoreFTE10	<-->	Ln_Fac_100FTE_08	.066	.008	8.750	***
Ln_CoreFTE10	<-->	Ln_Fac_100FTE_07	.068	.008	8.814	***
Ln_CoreFTE10	<-->	Ln_Fac_100FTE_06	.067	.008	8.469	***
Ln_CoreFTE10	<-->	Ln_ER_05	.150	.015	9.962	***
Ln_Fac_100FTE_10	<-->	Ln_FTE0809	.000	.009	-.033	.974
Ln_Fac_100FTE_10	<-->	Ln_FTE0910	-.002	.009	-.212	.832
Ln_FTE0910	<-->	Ln_Fac_100FTE_09	-.002	.009	-.272	.786
Ln_FTE0910	<-->	Ln_Fac_100FTE_08	.003	.009	.293	.770
Ln_FTE0910	<-->	Ln_Fac_100FTE_07	.004	.009	.456	.649
Ln_FTE0910	<-->	Ln_Fac_100FTE_06	.008	.009	.883	.377
Ln_FTE0910	<-->	Ln_ER_05	.097	.017	5.557	***
Ln_Fac_100FTE_10	<-->	Ln_FTE0708	.001	.009	.155	.877
			Estimate	S.E.	C.R.	*P*
Ln_Fac_100FTE_10	<-->	Ln_FTE0607	.002	.009	.252	.801
Ln_Fac_100FTE_10	<-->	Ln_FTE0506	.004	.009	.398	.691

Ln_Fac_100FTE_10	<-->	Ln_ER_05	.052	.006	8.375	***
Ln_SubFTE_11	<-->	TFE	-.089	.017	-5.334	***
Ln_CoreFTE11	<-->	TFE	.045	.009	5.294	***
Ln_FTE1011	<-->	TFE	.092	.015	6.052	***
Ln_Fac_100FTE_11	<-->	TFE	.008	.003	2.712	.007
Ln_SubFTE_11	<-->	Ln_SubFTE_06	.654	.066	9.890	***
Ln_SubFTE_11	<-->	Ln_SubFTE_07	.650	.064	10.126	***
Ln_SubFTE_11	<-->	Ln_SubFTE_08	.679	.066	10.230	***
Ln_SubFTE_11	<-->	Ln_SubFTE_09	.721	.070	10.328	***
Ln_SubFTE_11	<-->	Ln_SubFTE_10	.726	.070	10.343	***
Ln_FTE1011	<-->	Ln_FTE0506	.408	.039	10.584	***
Ln_FTE1011	<-->	Ln_FTE0607	.410	.039	10.617	***
Ln_FTE1011	<-->	Ln_FTE0708	.414	.039	10.627	***
Ln_FTE1011	<-->	Ln_FTE0809	.420	.039	10.643	***
Ln_FTE1011	<-->	Ln_FTE0910	.418	.039	10.656	***
Ln_Fac_100FTE_11	<-->	Ln_Fac_100FTE_06	.038	.004	9.732	***
Ln_Fac_100FTE_11	<-->	Ln_Fac_100FTE_07	.039	.004	10.140	***
Ln_Fac_100FTE_11	<-->	Ln_Fac_100FTE_08	.040	.004	10.285	***
Ln_Fac_100FTE_11	<-->	Ln_Fac_100FTE_09	.041	.004	10.416	***
Ln_Fac_100FTE_11	<-->	Ln_Fac_100FTE_10	.042	.004	10.521	***
Ln_CoreFTE11	<-->	Ln_CoreFTE06	.196	.019	10.458	***
Ln_CoreFTE11	<-->	Ln_CoreFTE07	.202	.019	10.495	***
Ln_CoreFTE11	<-->	Ln_CoreFTE08	.186	.018	10.482	***
Ln_CoreFTE11	<-->	Ln_CoreFTE09	.160	.016	9.685	***
Ln_CoreFTE11	<-->	Ln_CoreFTE10	.202	.019	10.600	***
Ln_SubFTE_11	<-->	Ln_CoreFTE07	-.166	.030	-5.610	***
Ln_SubFTE_11	<-->	Ln_CoreFTE06	-.163	.029	-5.633	***
Ln_SubFTE_11	<-->	Ln_CoreFTE08	-.143	.027	-5.252	***
Ln_SubFTE_11	<-->	Ln_CoreFTE09	-.091	.026	-3.524	***
Ln_SubFTE_11	<-->	Ln_CoreFTE10	-.164	.029	-5.629	***
Ln_SubFTE_11	<-->	Ln_CoreFTE11	-.169	.029	-5.793	***
Ln_SubFTE_11	<-->	Ln_FTE1011	-.381	.046	-8.260	***
Ln_SubFTE_11	<-->	Ln_FTE0809	-.384	.046	-8.269	***
Ln_SubFTE_11	<-->	Ln_FTE0910	-.382	.046	-8.278	***
Ln_SubFTE_11	<-->	Ln_FTE0708	-.380	.046	-8.276	***
Ln_SubFTE_11	<-->	Ln_FTE0607	-.378	.046	-8.288	***
Ln_SubFTE_11	<-->	Ln_FTE0506	-.374	.046	-8.204	***
Ln_SubFTE_11	<-->	Ln_Fac_100FTE_11	-.024	.012	-1.912	.056
Ln_SubFTE_11	<-->	Ln_Fac_100FTE_10	-.024	.013	-1.883	.060
Ln_SubFTE_11	<-->	Ln_Fac_100FTE_09	-.023	.012	-1.869	.062
Ln_SubFTE_11	<-->	Ln_Fac_100FTE_08	-.024	.012	-1.987	.047
Ln_SubFTE_11	<-->	Ln_Fac_100FTE_07	-.026	.013	-2.082	.037
Ln_SubFTE_11	<-->	Ln_Fac_100FTE_06	-.034	.013	-2.536	.011
Ln_SubFTE_11	<-->	Ln_ER_05	-.112	.024	-4.725	***
Ln_CoreFTE11	<-->	Ln_SubFTE_10	-.151	.027	-5.505	***
Ln_FTE1011	<-->	Ln_SubFTE_10	-.369	.044	-8.390	***
Ln_Fac_100FTE_11	<-->	Ln_SubFTE_10	-.018	.012	-1.557	.119
Ln_CoreFTE11	<-->	Ln_SubFTE_09	-.149	.027	-5.466	***
Ln_FTE1011	<-->	Ln_SubFTE_09	-.367	.044	-8.373	***
Ln_Fac_100FTE_11	<-->	Ln_SubFTE_09	-.017	.012	-1.458	.145
Ln_CoreFTE11	<-->	Ln_SubFTE_08	-.144	.026	-5.484	***
Ln_FTE1011	<-->	Ln_SubFTE_08	-.345	.042	-8.259	***
Ln_Fac_100FTE_11	<-->	Ln_SubFTE_08	-.015	.011	-1.330	.184
Ln_CoreFTE11	<-->	Ln_SubFTE_07	-.135	.025	-5.300	***
Ln_FTE1011	<-->	Ln_SubFTE_07	-.326	.040	-8.086	***
Ln_Fac_100FTE_11	<-->	Ln_SubFTE_07	-.013	.011	-1.175	.240
Ln_CoreFTE11	<-->	Ln_SubFTE_06	-.142	.027	-5.300	***

			Estimate	S.E.	C.R.	*P*
Ln_FTE1011	<-->	Ln_SubFTE_06	-.347	.043	-8.155	***
Ln_Fac_100FTE_11	<-->	Ln_SubFTE_06	-.015	.011	-1.311	.190

Ln_FTE1011	<-->	Ln_CoreFTE07	.111	.021	5.280	***
Ln_Fac_100FTE_11	<-->	Ln_CoreFTE07	.066	.008	8.543	***
Ln_FTE1011	<-->	Ln_CoreFTE06	.106	.021	5.156	***
Ln_Fac_100FTE_11	<-->	Ln_CoreFTE06	.063	.007	8.428	***
Ln_FTE1011	<-->	Ln_CoreFTE08	.095	.019	4.923	***
Ln_Fac_100FTE_11	<-->	Ln_CoreFTE08	.061	.007	8.600	***
Ln_FTE1011	<-->	Ln_CoreFTE09	.070	.019	3.754	***
Ln_Fac_100FTE_11	<-->	Ln_CoreFTE09	.055	.007	8.018	***
Ln_FTE1011	<-->	Ln_CoreFTE10	.110	.021	5.328	***
Ln_Fac_100FTE_11	<-->	Ln_CoreFTE10	.065	.008	8.583	***
Ln_CoreFTE11	<-->	Ln_FTE1011	.116	.021	5.542	***
Ln_CoreFTE11	<-->	Ln_FTE0809	.118	.021	5.610	***
Ln_CoreFTE11	<-->	Ln_FTE0910	.116	.021	5.581	***
Ln_CoreFTE11	<-->	Ln_FTE0708	.119	.021	5.721	***
Ln_CoreFTE11	<-->	Ln_FTE0607	.119	.021	5.760	***
Ln_CoreFTE11	<-->	Ln_FTE0506	.119	.021	5.753	***
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_11	.065	.008	8.632	***
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_10	.066	.008	8.666	***
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_09	.066	.008	8.685	***
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_08	.066	.008	8.768	***
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_07	.068	.008	8.832	***
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_06	.068	.008	8.524	***
Ln_CoreFTE11	<-->	Ln_ER_05	.151	.015	10.009	***
Ln_FTE1011	<-->	Ln_Fac_100FTE_11	-.003	.009	-.307	.759
Ln_FTE1011	<-->	Ln_Fac_100FTE_10	-.002	.009	-.250	.803
Ln_FTE1011	<-->	Ln_Fac_100FTE_09	-.003	.009	-.283	.777
Ln_FTE1011	<-->	Ln_Fac_100FTE_08	.003	.009	.292	.771
Ln_FTE1011	<-->	Ln_Fac_100FTE_07	.004	.009	.457	.648
Ln_FTE1011	<-->	Ln_Fac_100FTE_06	.008	.009	.855	.392
Ln_FTE1011	<-->	Ln_ER_05	.096	.017	5.535	***
Ln_Fac_100FTE_11	<-->	Ln_FTE0809	.000	.009	-.004	.997
Ln_Fac_100FTE_11	<-->	Ln_FTE0910	-.002	.009	-.184	.854
Ln_Fac_100FTE_11	<-->	Ln_FTE0708	.002	.009	.176	.860
Ln_Fac_100FTE_11	<-->	Ln_FTE0607	.002	.009	.271	.786
Ln_Fac_100FTE_11	<-->	Ln_FTE0506	.004	.009	.403	.687
Ln_Fac_100FTE_11	<-->	Ln_ER_05	.052	.006	8.346	***
Ln_SubFTE_12	<-->	TFE	-.091	.017	-5.290	***
Ln_CoreFTE12	<-->	TFE	.044	.008	5.248	***
Ln_FTE1112	<-->	TFE	.093	.015	6.036	***
Ln_Fac_100FTE_12	<-->	TFE	.007	.003	2.601	.009
Ln_SubFTE_12	<-->	Ln_SubFTE_06	.679	.068	9.953	***
Ln_SubFTE_12	<-->	Ln_SubFTE_07	.662	.066	10.084	***
Ln_SubFTE_12	<-->	Ln_SubFTE_08	.694	.068	10.203	***
Ln_SubFTE_12	<-->	Ln_SubFTE_09	.740	.072	10.318	***
Ln_SubFTE_12	<-->	Ln_SubFTE_10	.748	.072	10.363	***
Ln_SubFTE_12	<-->	Ln_SubFTE_11	.807	.077	10.468	***
Ln_FTE1112	<-->	Ln_FTE0506	.412	.039	10.566	***
Ln_FTE1112	<-->	Ln_FTE0607	.414	.039	10.599	***
Ln_FTE1112	<-->	Ln_FTE0708	.418	.039	10.612	***
Ln_FTE1112	<-->	Ln_FTE0809	.424	.040	10.630	***
Ln_FTE1112	<-->	Ln_FTE0910	.422	.040	10.643	***
Ln_FTE1112	<-->	Ln_FTE1011	.424	.040	10.656	***
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_06	.037	.004	9.479	***
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_07	.038	.004	9.961	***
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_08	.039	.004	10.129	***
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_09	.040	.004	10.238	***
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_10	.041	.004	10.369	***
			Estimate	S.E.	C.R.	*P*
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_11	.042	.004	10.526	***
Ln_CoreFTE12	<-->	Ln_CoreFTE06	.190	.018	10.398	***

Ln_CoreFTE12	<-->	Ln_CoreFTE07	.196	.019	10.424	***
Ln_CoreFTE12	<-->	Ln_CoreFTE08	.183	.017	10.484	***
Ln_CoreFTE12	<-->	Ln_CoreFTE09	.167	.017	10.015	***
Ln_CoreFTE12	<-->	Ln_CoreFTE10	.198	.019	10.584	***
Ln_CoreFTE12	<-->	Ln_CoreFTE11	.197	.019	10.573	***
Ln_SubFTE_12	<-->	Ln_CoreFTE07	-.175	.031	-5.728	***
Ln_SubFTE_12	<-->	Ln_CoreFTE06	-.171	.030	-5.719	***
Ln_SubFTE_12	<-->	Ln_CoreFTE08	-.151	.028	-5.380	***
Ln_SubFTE_12	<-->	Ln_CoreFTE09	-.098	.027	-3.659	***
Ln_SubFTE_12	<-->	Ln_CoreFTE10	-.170	.030	-5.695	***
Ln_SubFTE_12	<-->	Ln_CoreFTE11	-.176	.030	-5.852	***
Ln_SubFTE_12	<-->	Ln_CoreFTE12	-.159	.029	-5.442	***
Ln_SubFTE_12	<-->	Ln_FTE1112	-.400	.048	-8.312	***
Ln_SubFTE_12	<-->	Ln_FTE1011	-.395	.048	-8.313	***
Ln_SubFTE_12	<-->	Ln_FTE0809	-.398	.048	-8.315	***
Ln_SubFTE_12	<-->	Ln_FTE0910	-.396	.048	-8.320	***
Ln_SubFTE_12	<-->	Ln_FTE0708	-.394	.047	-8.321	***
Ln_SubFTE_12	<-->	Ln_FTE0607	-.391	.047	-8.330	***
Ln_SubFTE_12	<-->	Ln_FTE0506	-.388	.047	-8.262	***
Ln_SubFTE_12	<-->	Ln_Fac_100FTE_12	-.021	.013	-1.620	.105
Ln_SubFTE_12	<-->	Ln_Fac_100FTE_11	-.026	.013	-1.996	.046
Ln_SubFTE_12	<-->	Ln_Fac_100FTE_10	-.026	.013	-2.022	.043
Ln_SubFTE_12	<-->	Ln_Fac_100FTE_09	-.026	.013	-2.047	.041
Ln_SubFTE_12	<-->	Ln_Fac_100FTE_08	-.028	.013	-2.189	.029
Ln_SubFTE_12	<-->	Ln_Fac_100FTE_07	-.029	.013	-2.265	.024
Ln_SubFTE_12	<-->	Ln_Fac_100FTE_06	-.036	.014	-2.627	.009
Ln_SubFTE_12	<-->	Ln_ER_05	-.115	.024	-4.729	***
Ln_CoreFTE12	<-->	Ln_SubFTE_11	-.153	.028	-5.397	***
Ln_FTE1112	<-->	Ln_SubFTE_11	-.385	.047	-8.234	***
Ln_Fac_100FTE_12	<-->	Ln_SubFTE_11	-.021	.013	-1.646	.100
Ln_CoreFTE12	<-->	Ln_SubFTE_10	-.137	.027	-5.136	***
Ln_FTE1112	<-->	Ln_SubFTE_10	-.373	.045	-8.376	***
Ln_Fac_100FTE_12	<-->	Ln_SubFTE_10	-.014	.012	-1.204	.228
Ln_CoreFTE12	<-->	Ln_SubFTE_09	-.135	.027	-5.097	***
Ln_FTE1112	<-->	Ln_SubFTE_09	-.371	.044	-8.363	***
Ln_Fac_100FTE_12	<-->	Ln_SubFTE_09	-.013	.012	-1.120	.263
Ln_CoreFTE12	<-->	Ln_SubFTE_08	-.130	.025	-5.111	***
Ln_FTE1112	<-->	Ln_SubFTE_08	-.349	.042	-8.251	***
Ln_Fac_100FTE_12	<-->	Ln_SubFTE_08	-.011	.011	-1.003	.316
Ln_CoreFTE12	<-->	Ln_SubFTE_07	-.123	.025	-4.962	***
Ln_FTE1112	<-->	Ln_SubFTE_07	-.329	.041	-8.066	***
Ln_Fac_100FTE_12	<-->	Ln_SubFTE_07	-.011	.011	-1.031	.302
Ln_CoreFTE12	<-->	Ln_SubFTE_06	-.129	.026	-4.960	***
Ln_FTE1112	<-->	Ln_SubFTE_06	-.351	.043	-8.153	***
Ln_Fac_100FTE_12	<-->	Ln_SubFTE_06	-.011	.012	-.985	.324
Ln_FTE1112	<-->	Ln_CoreFTE07	.112	.021	5.233	***
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE07	.065	.008	8.457	***
Ln_FTE1112	<-->	Ln_CoreFTE06	.106	.021	5.110	***
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE06	.063	.007	8.342	***
Ln_FTE1112	<-->	Ln_CoreFTE08	.096	.020	4.876	***
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE08	.061	.007	8.528	***
Ln_FTE1112	<-->	Ln_CoreFTE09	.070	.019	3.693	***
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE09	.055	.007	7.946	***
Ln_FTE1112	<-->	Ln_CoreFTE10	.110	.021	5.264	***
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE10	.065	.008	8.534	***
Ln_FTE1112	<-->	Ln_CoreFTE11	.116	.021	5.484	***
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE11	.065	.008	8.565	***
			Estimate	S.E.	C.R.	*P*
Ln_CoreFTE12	<-->	Ln_FTE1112	.107	.021	5.186	***
Ln_CoreFTE12	<-->	Ln_FTE1011	.108	.020	5.283	***

Ln_CoreFTE12	<-->	Ln_FTE0809	.110	.021	5.353	***
Ln_CoreFTE12	<-->	Ln_FTE0910	.108	.020	5.318	***
Ln_CoreFTE12	<-->	Ln_FTE0708	.111	.020	5.461	***
Ln_CoreFTE12	<-->	Ln_FTE0607	.111	.020	5.502	***
Ln_CoreFTE12	<-->	Ln_FTE0506	.112	.020	5.509	***
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_12	.065	.008	8.676	***
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_11	.065	.007	8.669	***
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_10	.065	.008	8.704	***
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_09	.065	.007	8.715	***
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_08	.065	.007	8.800	***
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_07	.067	.008	8.828	***
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_06	.065	.008	8.429	***
Ln_CoreFTE12	<-->	Ln_ER_05	.147	.015	9.958	***
Ln_FTE1112	<-->	Ln_Fac_100FTE_12	-.006	.009	-.708	.479
Ln_FTE1112	<-->	Ln_Fac_100FTE_11	-.003	.009	-.375	.708
Ln_FTE1112	<-->	Ln_Fac_100FTE_10	-.003	.009	-.300	.764
Ln_FTE1112	<-->	Ln_Fac_100FTE_09	-.003	.009	-.327	.743
Ln_FTE1112	<-->	Ln_Fac_100FTE_08	.002	.009	.246	.806
Ln_FTE1112	<-->	Ln_Fac_100FTE_07	.004	.009	.423	.672
Ln_FTE1112	<-->	Ln_Fac_100FTE_06	.008	.010	.889	.374
Ln_FTE1112	<-->	Ln_ER_05	.097	.018	5.504	***
Ln_Fac_100FTE_12	<-->	Ln_FTE1011	-.005	.009	-.549	.583
Ln_Fac_100FTE_12	<-->	Ln_FTE0809	-.002	.009	-.222	.824
Ln_Fac_100FTE_12	<-->	Ln_FTE0910	-.004	.009	-.404	.686
Ln_Fac_100FTE_12	<-->	Ln_FTE0708	.000	.009	-.040	.968
Ln_Fac_100FTE_12	<-->	Ln_FTE0607	.001	.009	.065	.948
Ln_Fac_100FTE_12	<-->	Ln_FTE0506	.002	.009	.197	.844
Ln_Fac_100FTE_12	<-->	Ln_ER_05	.051	.006	8.215	***
Ln_SubFTE_13	<-->	TFE	-.093	.018	-5.252	***
Ln_CoreFTE13	<-->	TFE	.046	.009	5.287	***
Ln_FTE1213	<-->	TFE	.094	.016	6.024	***
Ln_Fac_100FTE_13	<-->	TFE	.006	.003	2.171	.030
Ln_SubFTE_13	<-->	Ln_SubFTE_06	.712	.071	10.086	***
Ln_SubFTE_13	<-->	Ln_SubFTE_07	.676	.067	10.070	***
Ln_SubFTE_13	<-->	Ln_SubFTE_08	.715	.070	10.242	***
Ln_SubFTE_13	<-->	Ln_SubFTE_09	.758	.073	10.325	***
Ln_SubFTE_13	<-->	Ln_SubFTE_10	.771	.074	10.403	***
Ln_SubFTE_13	<-->	Ln_SubFTE_11	.782	.077	10.179	***
Ln_FTE1213	<-->	Ln_FTE0506	.415	.039	10.548	***
Ln_FTE1213	<-->	Ln_FTE0607	.417	.039	10.582	***
Ln_FTE1213	<-->	Ln_FTE0708	.421	.040	10.595	***
Ln_FTE1213	<-->	Ln_FTE0809	.427	.040	10.614	***
Ln_FTE1213	<-->	Ln_FTE0910	.425	.040	10.628	***
Ln_FTE1213	<-->	Ln_FTE1011	.427	.040	10.643	***
Ln_FTE1213	<-->	Ln_FTE1112	.434	.041	10.657	***
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_06	.033	.004	9.082	***
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_07	.035	.004	9.586	***
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_08	.035	.004	9.755	***
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_09	.037	.004	9.890	***
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_11	.039	.004	10.214	***
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_12	.040	.004	10.366	***
Ln_SubFTE_13	<-->	Ln_SubFTE_12	.831	.080	10.359	***
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_10	.038	.004	10.022	***
Ln_CoreFTE13	<-->	Ln_CoreFTE06	.197	.019	10.377	***
Ln_CoreFTE13	<-->	Ln_CoreFTE07	.204	.020	10.418	***
Ln_CoreFTE13	<-->	Ln_CoreFTE08	.189	.018	10.432	***
Ln_CoreFTE13	<-->	Ln_CoreFTE09	.167	.017	9.795	***
			Estimate	S.E.	C.R.	*P*
Ln_CoreFTE13	<-->	Ln_CoreFTE10	.205	.019	10.567	***
Ln_CoreFTE13	<-->	Ln_CoreFTE11	.206	.019	10.590	***

Ln_CoreFTE13	<-->	Ln_CoreFTE12	.204	.019	10.614	***
Ln_SubFTE_13	<-->	Ln_CoreFTE07	-.176	.031	-5.652	***
Ln_SubFTE_13	<-->	Ln_CoreFTE06	-.172	.030	-5.648	***
Ln_SubFTE_13	<-->	Ln_CoreFTE08	-.154	.029	-5.365	***
Ln_SubFTE_13	<-->	Ln_CoreFTE09	-.103	.027	-3.761	***
Ln_SubFTE_13	<-->	Ln_CoreFTE10	-.173	.031	-5.662	***
Ln_SubFTE_13	<-->	Ln_CoreFTE11	-.177	.031	-5.773	***
Ln_SubFTE_13	<-->	Ln_CoreFTE12	-.162	.030	-5.406	***
Ln_SubFTE_13	<-->	Ln_CoreFTE13	-.170	.031	-5.467	***
Ln_SubFTE_13	<-->	Ln_FTE1213	-.422	.050	-8.416	***
Ln_SubFTE_13	<-->	Ln_FTE1112	-.416	.050	-8.402	***
Ln_SubFTE_13	<-->	Ln_FTE1011	-.411	.049	-8.395	***
Ln_SubFTE_13	<-->	Ln_FTE0809	-.413	.049	-8.398	***
Ln_SubFTE_13	<-->	Ln_FTE0910	-.411	.049	-8.409	***
Ln_SubFTE_13	<-->	Ln_FTE0708	-.408	.049	-8.392	***
Ln_SubFTE_13	<-->	Ln_FTE0607	-.406	.048	-8.404	***
Ln_SubFTE_13	<-->	Ln_FTE0506	-.403	.048	-8.354	***
Ln_SubFTE_13	<-->	Ln_Fac_100FTE_13	-.012	.013	-.903	.366
Ln_SubFTE_13	<-->	Ln_Fac_100FTE_12	-.021	.013	-1.570	.116
Ln_SubFTE_13	<-->	Ln_Fac_100FTE_11	-.026	.013	-1.983	.047
Ln_SubFTE_13	<-->	Ln_Fac_100FTE_10	-.025	.013	-1.918	.055
Ln_SubFTE_13	<-->	Ln_Fac_100FTE_09	-.026	.013	-1.976	.048
Ln_SubFTE_13	<-->	Ln_Fac_100FTE_08	-.027	.013	-2.106	.035
Ln_SubFTE_13	<-->	Ln_Fac_100FTE_07	-.028	.013	-2.090	.037
Ln_SubFTE_13	<-->	Ln_Fac_100FTE_06	-.033	.014	-2.392	.017
Ln_SubFTE_13	<-->	Ln_ER_05	-.112	.025	-4.514	***
Ln_CoreFTE13	<-->	Ln_SubFTE_12	-.168	.030	-5.525	***
Ln_FTE1213	<-->	Ln_SubFTE_12	-.404	.049	-8.313	***
Ln_Fac_100FTE_13	<-->	Ln_SubFTE_12	-.013	.012	-1.069	.285
Ln_CoreFTE13	<-->	Ln_SubFTE_11	-.163	.030	-5.510	***
Ln_FTE1213	<-->	Ln_SubFTE_11	-.387	.047	-8.220	***
Ln_Fac_100FTE_13	<-->	Ln_SubFTE_11	-.013	.012	-1.080	.280
Ln_CoreFTE13	<-->	Ln_SubFTE_10	-.145	.028	-5.210	***
Ln_FTE1213	<-->	Ln_SubFTE_10	-.376	.045	-8.369	***
Ln_Fac_100FTE_13	<-->	Ln_SubFTE_10	-.007	.011	-.587	.557
Ln_CoreFTE13	<-->	Ln_SubFTE_09	-.144	.028	-5.188	***
Ln_FTE1213	<-->	Ln_SubFTE_09	-.374	.045	-8.356	***
Ln_Fac_100FTE_13	<-->	Ln_SubFTE_09	-.007	.011	-.584	.560
Ln_CoreFTE13	<-->	Ln_SubFTE_08	-.138	.027	-5.200	***
Ln_FTE1213	<-->	Ln_SubFTE_08	-.351	.043	-8.238	***
Ln_Fac_100FTE_13	<-->	Ln_SubFTE_08	-.005	.011	-.411	.681
Ln_CoreFTE13	<-->	Ln_SubFTE_07	-.130	.026	-5.035	***
Ln_FTE1213	<-->	Ln_SubFTE_07	-.332	.041	-8.057	***
Ln_Fac_100FTE_13	<-->	Ln_SubFTE_07	-.005	.011	-.484	.628
Ln_CoreFTE13	<-->	Ln_SubFTE_06	-.136	.027	-5.022	***
Ln_FTE1213	<-->	Ln_SubFTE_06	-.355	.044	-8.152	***
Ln_Fac_100FTE_13	<-->	Ln_SubFTE_06	-.005	.011	-.436	.663
Ln_FTE1213	<-->	Ln_CoreFTE07	.114	.022	5.264	***
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE07	.059	.007	8.054	***
Ln_FTE1213	<-->	Ln_CoreFTE06	.108	.021	5.136	***
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE06	.056	.007	7.914	***
Ln_FTE1213	<-->	Ln_CoreFTE08	.097	.020	4.907	***
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE08	.055	.007	8.082	***
Ln_FTE1213	<-->	Ln_CoreFTE09	.071	.019	3.706	***
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE09	.050	.007	7.611	***
Ln_FTE1213	<-->	Ln_CoreFTE10	.112	.021	5.280	***
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE10	.059	.007	8.135	***
			Estimate	S.E.	C.R.	*P*
Ln_FTE1213	<-->	Ln_CoreFTE11	.117	.021	5.494	***
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE11	.059	.007	8.136	***

Ln_FTE1213	<-->	Ln_CoreFTE12	.108	.021	5.194	***
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE12	.059	.007	8.307	***
Ln_CoreFTE13	<-->	Ln_FTE1213	.115	.022	5.300	***
Ln_CoreFTE13	<-->	Ln_FTE1112	.114	.021	5.316	***
Ln_CoreFTE13	<-->	Ln_FTE1011	.115	.021	5.422	***
Ln_CoreFTE13	<-->	Ln_FTE0809	.118	.021	5.486	***
Ln_CoreFTE13	<-->	Ln_FTE0910	.116	.021	5.461	***
Ln_CoreFTE13	<-->	Ln_FTE0708	.119	.021	5.583	***
Ln_CoreFTE13	<-->	Ln_FTE0607	.119	.021	5.620	***
Ln_CoreFTE13	<-->	Ln_FTE0506	.119	.021	5.623	***
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_13	.062	.007	8.289	***
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_12	.068	.008	8.653	***
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_11	.067	.008	8.646	***
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_10	.068	.008	8.674	***
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_09	.067	.008	8.693	***
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_08	.068	.008	8.780	***
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_07	.069	.008	8.823	***
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_06	.068	.008	8.445	***
Ln_CoreFTE13	<-->	Ln_ER_05	.153	.015	9.970	***
Ln_FTE1213	<-->	Ln_Fac_100FTE_13	-.014	.009	-1.517	.129
Ln_FTE1213	<-->	Ln_Fac_100FTE_12	-.007	.009	-.709	.478
Ln_FTE1213	<-->	Ln_Fac_100FTE_11	-.003	.009	-.353	.724
Ln_FTE1213	<-->	Ln_Fac_100FTE_10	-.003	.009	-.288	.774
Ln_FTE1213	<-->	Ln_Fac_100FTE_09	-.003	.009	-.310	.756
Ln_FTE1213	<-->	Ln_Fac_100FTE_08	.002	.009	.275	.784
Ln_FTE1213	<-->	Ln_Fac_100FTE_07	.004	.009	.452	.651
Ln_FTE1213	<-->	Ln_Fac_100FTE_06	.009	.010	.911	.362
Ln_FTE1213	<-->	Ln_ER_05	.098	.018	5.500	***
Ln_Fac_100FTE_13	<-->	Ln_FTE1112	-.013	.009	-1.442	.149
Ln_Fac_100FTE_13	<-->	Ln_FTE1011	-.011	.009	-1.259	.208
Ln_Fac_100FTE_13	<-->	Ln_FTE0809	-.008	.009	-.926	.354
Ln_Fac_100FTE_13	<-->	Ln_FTE0910	-.010	.009	-1.117	.264
Ln_Fac_100FTE_13	<-->	Ln_FTE0708	-.006	.009	-.713	.476
Ln_Fac_100FTE_13	<-->	Ln_FTE0607	-.005	.009	-.617	.537
Ln_Fac_100FTE_13	<-->	Ln_FTE0506	-.004	.009	-.488	.626
Ln_Fac_100FTE_13	<-->	Ln_ER_05	.046	.006	7.834	***
Ln_SubFTE_14	<-->	TFE	-.096	.018	-5.237	***
Ln_CoreFTE14	<-->	TFE	.048	.009	5.381	***
Ln_FTE1314	<-->	TFE	.095	.016	6.017	***
Ln_Fac_100FTE_14	<-->	TFE	.006	.003	2.130	.033
Ln_CoreFTE14	<-->	Ln_SubFTE_13	-.186	.032	-5.842	***
Ln_FTE1314	<-->	Ln_SubFTE_13	-.426	.051	-8.401	***
Ln_Fac_100FTE_14	<-->	Ln_SubFTE_13	-.009	.013	-.723	.470
Ln_SubFTE_14	<-->	Ln_SubFTE_13	.897	.086	10.443	***
Ln_CoreFTE14	<-->	Ln_SubFTE_12	-.182	.031	-5.869	***
Ln_FTE1314	<-->	Ln_SubFTE_12	-.408	.049	-8.285	***
Ln_Fac_100FTE_14	<-->	Ln_SubFTE_12	-.011	.013	-.882	.378
Ln_SubFTE_14	<-->	Ln_SubFTE_12	.873	.084	10.421	***
Ln_CoreFTE14	<-->	Ln_SubFTE_11	-.175	.030	-5.791	***
Ln_FTE1314	<-->	Ln_SubFTE_11	-.390	.048	-8.178	***
Ln_Fac_100FTE_14	<-->	Ln_SubFTE_11	-.011	.012	-.887	.375
Ln_SubFTE_14	<-->	Ln_SubFTE_11	.824	.080	10.256	***
Ln_CoreFTE14	<-->	Ln_SubFTE_10	-.157	.028	-5.530	***
Ln_FTE1314	<-->	Ln_SubFTE_10	-.380	.046	-8.344	***
Ln_Fac_100FTE_14	<-->	Ln_SubFTE_10	-.004	.012	-.350	.727
Ln_SubFTE_14	<-->	Ln_SubFTE_10	.779	.076	10.250	***
Ln_CoreFTE14	<-->	Ln_SubFTE_09	-.155	.028	-5.508	***
			Estimate	S.E.	C.R.	*P*
Ln_FTE1314	<-->	Ln_SubFTE_09	-.377	.045	-8.319	***
Ln_Fac_100FTE_14	<-->	Ln_SubFTE_09	-.004	.012	-.346	.729

Ln_SubFTE_14	<-->	Ln_SubFTE_09	.769	.075	10.201	***
Ln_CoreFTE14	<-->	Ln_SubFTE_08	-.148	.027	-5.475	***
Ln_FTE1314	<-->	Ln_SubFTE_08	-.355	.043	-8.215	***
Ln_Fac_100FTE_14	<-->	Ln_SubFTE_08	-.002	.011	-.195	.846
Ln_SubFTE_14	<-->	Ln_SubFTE_08	.725	.072	10.111	***
Ln_CoreFTE14	<-->	Ln_SubFTE_07	-.139	.026	-5.294	***
Ln_FTE1314	<-->	Ln_SubFTE_07	-.336	.042	-8.040	***
Ln_Fac_100FTE_14	<-->	Ln_SubFTE_07	-.003	.011	-.260	.795
Ln_SubFTE_14	<-->	Ln_SubFTE_07	.688	.069	9.961	***
Ln_CoreFTE14	<-->	Ln_SubFTE_06	-.149	.028	-5.387	***
Ln_FTE1314	<-->	Ln_SubFTE_06	-.359	.044	-8.145	***
Ln_Fac_100FTE_14	<-->	Ln_SubFTE_06	-.003	.011	-.245	.806
Ln_SubFTE_14	<-->	Ln_SubFTE_06	.721	.072	9.943	***
Ln_CoreFTE14	<-->	Ln_CoreFTE07	.205	.020	10.409	***
Ln_FTE1314	<-->	Ln_CoreFTE07	.117	.022	5.336	***
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE07	.060	.007	8.011	***
Ln_SubFTE_14	<-->	Ln_CoreFTE07	-.196	.033	-5.990	***
Ln_CoreFTE14	<-->	Ln_CoreFTE06	.199	.019	10.361	***
Ln_FTE1314	<-->	Ln_CoreFTE06	.111	.021	5.202	***
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE06	.057	.007	7.874	***
Ln_SubFTE_14	<-->	Ln_CoreFTE06	-.193	.032	-6.016	***
Ln_CoreFTE14	<-->	Ln_CoreFTE08	.190	.018	10.412	***
Ln_FTE1314	<-->	Ln_CoreFTE08	.100	.020	4.964	***
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE08	.055	.007	8.032	***
Ln_SubFTE_14	<-->	Ln_CoreFTE08	-.170	.030	-5.653	***
Ln_CoreFTE14	<-->	Ln_CoreFTE09	.164	.017	9.653	***
Ln_FTE1314	<-->	Ln_CoreFTE09	.074	.019	3.791	***
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE09	.050	.007	7.518	***
Ln_SubFTE_14	<-->	Ln_CoreFTE09	-.113	.029	-3.947	***
Ln_CoreFTE14	<-->	Ln_CoreFTE10	.206	.020	10.531	***
Ln_FTE1314	<-->	Ln_CoreFTE10	.115	.022	5.345	***
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE10	.059	.007	8.084	***
Ln_SubFTE_14	<-->	Ln_CoreFTE10	-.191	.032	-5.949	***
Ln_CoreFTE14	<-->	Ln_CoreFTE11	.207	.020	10.558	***
Ln_FTE1314	<-->	Ln_CoreFTE11	.120	.022	5.557	***
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE11	.059	.007	8.089	***
Ln_SubFTE_14	<-->	Ln_CoreFTE11	-.197	.032	-6.103	***
Ln_CoreFTE14	<-->	Ln_CoreFTE12	.203	.019	10.558	***
Ln_FTE1314	<-->	Ln_CoreFTE12	.111	.021	5.256	***
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE12	.060	.007	8.261	***
Ln_SubFTE_14	<-->	Ln_CoreFTE12	-.177	.031	-5.673	***
Ln_CoreFTE14	<-->	Ln_CoreFTE13	.213	.020	10.596	***
Ln_FTE1314	<-->	Ln_CoreFTE13	.118	.022	5.354	***
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE13	.062	.008	8.252	***
Ln_SubFTE_14	<-->	Ln_CoreFTE13	-.187	.033	-5.742	***
Ln_CoreFTE14	<-->	Ln_FTE1213	.125	.022	5.638	***
Ln_FTE1314	<-->	Ln_FTE1213	.444	.042	10.653	***
Ln_Fac_100FTE_14	<-->	Ln_FTE1213	-.013	.009	-1.422	.155
Ln_SubFTE_14	<-->	Ln_FTE1213	-.428	.052	-8.286	***
Ln_CoreFTE14	<-->	Ln_FTE1112	.124	.022	5.653	***
Ln_FTE1314	<-->	Ln_FTE1112	.438	.041	10.640	***
Ln_Fac_100FTE_14	<-->	Ln_FTE1112	-.012	.009	-1.362	.173
Ln_SubFTE_14	<-->	Ln_FTE1112	-.422	.051	-8.264	***
Ln_CoreFTE14	<-->	Ln_FTE1011	.125	.022	5.747	***
Ln_FTE1314	<-->	Ln_FTE1011	.431	.041	10.622	***
Ln_Fac_100FTE_14	<-->	Ln_FTE1011	-.011	.009	-1.183	.237
Ln_SubFTE_14	<-->	Ln_FTE1011	-.416	.050	-8.254	***
			Estimate	S.E.	C.R.	*P*
Ln_CoreFTE14	<-->	Ln_FTE0809	.127	.022	5.797	***
Ln_FTE1314	<-->	Ln_FTE0809	.431	.041	10.593	***

Ln_Fac_100FTE_14	<-->	Ln_FTE0809	-.008	.009	-.912	.362
Ln_SubFTE_14	<-->	Ln_FTE0809	-.420	.051	-8.271	***
Ln_CoreFTE14	<-->	Ln_FTE0910	.125	.022	5.776	***
Ln_FTE1314	<-->	Ln_FTE0910	.430	.041	10.606	***
Ln_Fac_100FTE_14	<-->	Ln_FTE0910	-.010	.009	-1.076	.282
Ln_SubFTE_14	<-->	Ln_FTE0910	-.417	.050	-8.270	***
Ln_CoreFTE14	<-->	Ln_FTE0708	.127	.022	5.869	***
Ln_FTE1314	<-->	Ln_FTE0708	.426	.040	10.581	***
Ln_Fac_100FTE_14	<-->	Ln_FTE0708	-.007	.009	-.745	.456
Ln_SubFTE_14	<-->	Ln_FTE0708	-.416	.050	-8.279	***
Ln_CoreFTE14	<-->	Ln_FTE0607	.127	.021	5.908	***
Ln_FTE1314	<-->	Ln_FTE0607	.421	.040	10.565	***
Ln_Fac_100FTE_14	<-->	Ln_FTE0607	-.006	.009	-.634	.526
Ln_SubFTE_14	<-->	Ln_FTE0607	-.413	.050	-8.290	***
Ln_CoreFTE14	<-->	Ln_FTE0506	.127	.022	5.905	***
Ln_FTE1314	<-->	Ln_FTE0506	.419	.040	10.530	***
Ln_Fac_100FTE_14	<-->	Ln_FTE0506	-.004	.009	-.494	.622
Ln_SubFTE_14	<-->	Ln_FTE0506	-.409	.050	-8.217	***
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_13	.060	.007	8.107	***
Ln_FTE1314	<-->	Ln_Fac_100FTE_13	-.013	.009	-1.457	.145
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_13	.041	.004	10.496	***
Ln_SubFTE_14	<-->	Ln_Fac_100FTE_13	-.018	.013	-1.366	.172
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_12	.066	.008	8.458	***
Ln_FTE1314	<-->	Ln_Fac_100FTE_12	-.006	.009	-.611	.541
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_12	.040	.004	10.294	***
Ln_SubFTE_14	<-->	Ln_Fac_100FTE_12	-.028	.014	-2.036	.042
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_11	.065	.008	8.460	***
Ln_FTE1314	<-->	Ln_Fac_100FTE_11	-.002	.009	-.225	.822
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_11	.039	.004	10.139	***
Ln_SubFTE_14	<-->	Ln_Fac_100FTE_11	-.033	.014	-2.434	.015
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_10	.066	.008	8.486	***
Ln_FTE1314	<-->	Ln_Fac_100FTE_10	-.001	.009	-.160	.873
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_10	.038	.004	9.984	***
Ln_SubFTE_14	<-->	Ln_Fac_100FTE_10	-.033	.014	-2.379	.017
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_09	.066	.008	8.517	***
Ln_FTE1314	<-->	Ln_Fac_100FTE_09	-.002	.009	-.177	.860
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_09	.037	.004	9.868	***
Ln_SubFTE_14	<-->	Ln_Fac_100FTE_09	-.033	.014	-2.391	.017
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_08	.066	.008	8.610	***
Ln_FTE1314	<-->	Ln_Fac_100FTE_08	.004	.009	.410	.682
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_08	.036	.004	9.763	***
Ln_SubFTE_14	<-->	Ln_Fac_100FTE_08	-.034	.014	-2.544	.011
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_07	.068	.008	8.652	***
Ln_FTE1314	<-->	Ln_Fac_100FTE_07	.005	.009	.589	.556
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_07	.035	.004	9.581	***
Ln_SubFTE_14	<-->	Ln_Fac_100FTE_07	-.035	.014	-2.550	.011
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_06	.067	.008	8.274	***
Ln_FTE1314	<-->	Ln_Fac_100FTE_06	.010	.010	1.019	.308
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_06	.034	.004	9.067	***
Ln_SubFTE_14	<-->	Ln_Fac_100FTE_06	-.043	.015	-2.971	.003
Ln_CoreFTE14	<-->	Ln_ER_05	.154	.015	9.939	***
Ln_FTE1314	<-->	Ln_ER_05	.101	.018	5.576	***
Ln_Fac_100FTE_14	<-->	Ln_ER_05	.047	.006	7.759	***
Ln_SubFTE_14	<-->	Ln_ER_05	-.125	.026	-4.821	***
Ln_CoreFTE14	<-->	Ln_FTE1314	.127	.022	5.655	***
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_14	.061	.008	8.112	***
Ln_SubFTE_14	<-->	Ln_CoreFTE14	-.202	.033	-6.076	***
			Estimate	S.E.	C.R.	*P*
Ln_FTE1314	<-->	Ln_Fac_100FTE_14	-.013	.009	-1.441	.150
Ln_SubFTE_14	<-->	Ln_FTE1314	-.434	.052	-8.288	***

Table A.2

Estimated correlations for fixed effects model using total subsidies per FTE (log)

			Estimate
Ln_SubFTE_06	<-->	TFE	-.593
Ln_CoreFTE06	<-->	TFE	.583
Ln_FTE0506	<-->	TFE	.885
Ln_Fac_100FTE_06	<-->	TFE	.261
Ln_ER_05	<-->	TFE	.705
Ln_SubFTE_06	<-->	Ln_CoreFTE06	-.348
Ln_SubFTE_06	<-->	Ln_FTE0506	-.653
Ln_SubFTE_06	<-->	Ln_Fac_100FTE_06	-.091
Ln_SubFTE_06	<-->	Ln_ER_05	-.277
Ln_CoreFTE06	<-->	Ln_FTE0506	.358
Ln_CoreFTE06	<-->	Ln_Fac_100FTE_06	.736
Ln_CoreFTE06	<-->	Ln_ER_05	.892
Ln_FTE0506	<-->	Ln_Fac_100FTE_06	.046
Ln_FTE0506	<-->	Ln_ER_05	.397
Ln_Fac_100FTE_06	<-->	Ln_ER_05	.706
Ln_SubFTE_07	<-->	TFE	-.584
Ln_CoreFTE07	<-->	TFE	.594
Ln_FTE0607	<-->	TFE	.890
Ln_Fac_100FTE_07	<-->	TFE	.250
Ln_SubFTE_07	<-->	Ln_SubFTE_06	.945
Ln_FTE0607	<-->	Ln_FTE0506	.996
Ln_Fac_100FTE_07	<-->	Ln_Fac_100FTE_06	.935
Ln_CoreFTE07	<-->	Ln_CoreFTE06	.983
Ln_SubFTE_07	<-->	Ln_CoreFTE07	-.356
Ln_SubFTE_07	<-->	Ln_CoreFTE06	-.359
Ln_SubFTE_07	<-->	Ln_FTE0607	-.647
Ln_SubFTE_07	<-->	Ln_FTE0506	-.642
Ln_SubFTE_07	<-->	Ln_Fac_100FTE_07	-.074
Ln_SubFTE_07	<-->	Ln_Fac_100FTE_06	-.101
Ln_SubFTE_07	<-->	Ln_ER_05	-.271
Ln_CoreFTE07	<-->	Ln_SubFTE_06	-.355
Ln_FTE0607	<-->	Ln_SubFTE_06	-.653
Ln_Fac_100FTE_07	<-->	Ln_SubFTE_06	-.072
Ln_CoreFTE07	<-->	Ln_FTE0607	.380
Ln_CoreFTE07	<-->	Ln_FTE0506	.380
Ln_CoreFTE07	<-->	Ln_Fac_100FTE_07	.753
Ln_CoreFTE07	<-->	Ln_Fac_100FTE_06	.715
Ln_CoreFTE07	<-->	Ln_ER_05	.894
Ln_FTE0607	<-->	Ln_CoreFTE06	.369
Ln_Fac_100FTE_07	<-->	Ln_CoreFTE06	.745
Ln_FTE0607	<-->	Ln_Fac_100FTE_07	.042
Ln_FTE0607	<-->	Ln_Fac_100FTE_06	.062
Ln_FTE0607	<-->	Ln_ER_05	.400
Ln_Fac_100FTE_07	<-->	Ln_FTE0506	.049
Ln_Fac_100FTE_07	<-->	Ln_ER_05	.727
Ln_SubFTE_08	<-->	TFE	-.606
Ln_CoreFTE08	<-->	TFE	.577
Ln_FTE0708	<-->	TFE	.889
Ln_Fac_100FTE_08	<-->	TFE	.236
Ln_SubFTE_08	<-->	Ln_SubFTE_07	.973
Ln_SubFTE_08	<-->	Ln_SubFTE_06	.942
Ln_FTE0708	<-->	Ln_FTE0506	.993
Ln_FTE0708	<-->	Ln_FTE0607	.999
Ln_Fac_100FTE_08	<-->	Ln_Fac_100FTE_06	.889
Ln_Fac_100FTE_08	<-->	Ln_Fac_100FTE_07	.976

			Estimate
Ln_CoreFTE08	<-->	Ln_CoreFTE06	.974
Ln_CoreFTE08	<-->	Ln_CoreFTE07	.979
Ln_SubFTE_08	<-->	Ln_CoreFTE07	-.369
Ln_SubFTE_08	<-->	Ln_CoreFTE06	-.374
Ln_SubFTE_08	<-->	Ln_CoreFTE08	-.346
Ln_SubFTE_08	<-->	Ln_FTE0708	-.661
Ln_SubFTE_08	<-->	Ln_FTE0607	-.665
Ln_SubFTE_08	<-->	Ln_FTE0506	-.658
Ln_SubFTE_08	<-->	Ln_Fac_100FTE_08	-.082
Ln_SubFTE_08	<-->	Ln_Fac_100FTE_07	-.080
Ln_SubFTE_08	<-->	Ln_Fac_100FTE_06	-.111
Ln_SubFTE_08	<-->	Ln_ER_05	-.297
Ln_CoreFTE08	<-->	Ln_SubFTE_07	-.336
Ln_FTE0708	<-->	Ln_SubFTE_07	-.642
Ln_Fac_100FTE_08	<-->	Ln_SubFTE_07	-.076
Ln_CoreFTE08	<-->	Ln_SubFTE_06	-.332
Ln_FTE0708	<-->	Ln_SubFTE_06	-.649
Ln_Fac_100FTE_08	<-->	Ln_SubFTE_06	-.081
Ln_FTE0708	<-->	Ln_CoreFTE07	.380
Ln_Fac_100FTE_08	<-->	Ln_CoreFTE07	.740
Ln_FTE0708	<-->	Ln_CoreFTE06	.369
Ln_Fac_100FTE_08	<-->	Ln_CoreFTE06	.721
Ln_CoreFTE08	<-->	Ln_FTE0708	.350
Ln_CoreFTE08	<-->	Ln_FTE0607	.353
Ln_CoreFTE08	<-->	Ln_FTE0506	.353
Ln_CoreFTE08	<-->	Ln_Fac_100FTE_08	.740
Ln_CoreFTE08	<-->	Ln_Fac_100FTE_07	.748
Ln_CoreFTE08	<-->	Ln_Fac_100FTE_06	.709
Ln_CoreFTE08	<-->	Ln_ER_05	.886
Ln_FTE0708	<-->	Ln_Fac_100FTE_08	.031
Ln_FTE0708	<-->	Ln_Fac_100FTE_07	.040
Ln_FTE0708	<-->	Ln_Fac_100FTE_06	.064
Ln_FTE0708	<-->	Ln_ER_05	.402
Ln_Fac_100FTE_08	<-->	Ln_FTE0607	.037
Ln_Fac_100FTE_08	<-->	Ln_FTE0506	.050
Ln_Fac_100FTE_08	<-->	Ln_ER_05	.695
Ln_SubFTE_09	<-->	TFE	-.616
Ln_CoreFTE09	<-->	TFE	.485
Ln_FTE0809	<-->	TFE	.887
Ln_Fac_100FTE_09	<-->	TFE	.212
Ln_SubFTE_09	<-->	Ln_SubFTE_06	.923
Ln_SubFTE_09	<-->	Ln_SubFTE_07	.952
Ln_SubFTE_09	<-->	Ln_SubFTE_08	.980
Ln_FTE0809	<-->	Ln_FTE0506	.991
Ln_FTE0809	<-->	Ln_FTE0607	.996
Ln_FTE0809	<-->	Ln_FTE0708	.998
Ln_Fac_100FTE_09	<-->	Ln_Fac_100FTE_06	.874
Ln_Fac_100FTE_09	<-->	Ln_Fac_100FTE_07	.954
Ln_Fac_100FTE_09	<-->	Ln_Fac_100FTE_08	.980
Ln_CoreFTE09	<-->	Ln_CoreFTE06	.846
Ln_CoreFTE09	<-->	Ln_CoreFTE07	.831
Ln_CoreFTE09	<-->	Ln_CoreFTE08	.882
Ln_SubFTE_09	<-->	Ln_CoreFTE07	-.371
Ln_SubFTE_09	<-->	Ln_CoreFTE06	-.374
Ln_SubFTE_09	<-->	Ln_CoreFTE08	-.346
Ln_SubFTE_09	<-->	Ln_CoreFTE09	-.221
Ln_SubFTE_09	<-->	Ln_FTE0809	-.672
Ln_SubFTE_09	<-->	Ln_FTE0708	-.673
Ln_SubFTE_09	<-->	Ln_FTE0607	-.676

			Estimate
Ln_SubFTE_09	<-->	Ln_FTE0506	-.669
Ln_SubFTE_09	<-->	Ln_Fac_100FTE_09	-.085
Ln_SubFTE_09	<-->	Ln_Fac_100FTE_08	-.092
Ln_SubFTE_09	<-->	Ln_Fac_100FTE_07	-.090
Ln_SubFTE_09	<-->	Ln_Fac_100FTE_06	-.120
Ln_SubFTE_09	<-->	Ln_ER_05	-.298
Ln_CoreFTE09	<-->	Ln_SubFTE_08	-.224
Ln_FTE0809	<-->	Ln_SubFTE_08	-.659
Ln_Fac_100FTE_09	<-->	Ln_SubFTE_08	-.078
Ln_CoreFTE09	<-->	Ln_SubFTE_07	-.212
Ln_FTE0809	<-->	Ln_SubFTE_07	-.640
Ln_Fac_100FTE_09	<-->	Ln_SubFTE_07	-.067
Ln_CoreFTE09	<-->	Ln_SubFTE_06	-.213
Ln_FTE0809	<-->	Ln_SubFTE_06	-.648
Ln_Fac_100FTE_09	<-->	Ln_SubFTE_06	-.075
Ln_FTE0809	<-->	Ln_CoreFTE07	.373
Ln_Fac_100FTE_09	<-->	Ln_CoreFTE07	.719
Ln_FTE0809	<-->	Ln_CoreFTE06	.363
Ln_Fac_100FTE_09	<-->	Ln_CoreFTE06	.702
Ln_FTE0809	<-->	Ln_CoreFTE08	.345
Ln_Fac_100FTE_09	<-->	Ln_CoreFTE08	.723
Ln_CoreFTE09	<-->	Ln_FTE0809	.256
Ln_CoreFTE09	<-->	Ln_FTE0708	.263
Ln_CoreFTE09	<-->	Ln_FTE0607	.268
Ln_CoreFTE09	<-->	Ln_FTE0506	.269
Ln_CoreFTE09	<-->	Ln_Fac_100FTE_09	.655
Ln_CoreFTE09	<-->	Ln_Fac_100FTE_08	.664
Ln_CoreFTE09	<-->	Ln_Fac_100FTE_07	.669
Ln_CoreFTE09	<-->	Ln_Fac_100FTE_06	.631
Ln_CoreFTE09	<-->	Ln_ER_05	.783
Ln_FTE0809	<-->	Ln_Fac_100FTE_09	-.012
Ln_FTE0809	<-->	Ln_Fac_100FTE_08	.024
Ln_FTE0809	<-->	Ln_Fac_100FTE_07	.033
Ln_FTE0809	<-->	Ln_Fac_100FTE_06	.060
Ln_FTE0809	<-->	Ln_ER_05	.397
Ln_Fac_100FTE_09	<-->	Ln_FTE0708	.000
Ln_Fac_100FTE_09	<-->	Ln_FTE0607	.006
Ln_Fac_100FTE_09	<-->	Ln_FTE0506	.018
Ln_Fac_100FTE_09	<-->	Ln_ER_05	.680
Ln_SubFTE_10	<-->	TFE	-.614
Ln_CoreFTE10	<-->	TFE	.606
Ln_Fac_100FTE_10	<-->	TFE	.219
Ln_SubFTE_10	<-->	Ln_SubFTE_06	.921
Ln_SubFTE_10	<-->	Ln_SubFTE_07	.944
Ln_SubFTE_10	<-->	Ln_SubFTE_08	.971
Ln_SubFTE_10	<-->	Ln_SubFTE_09	.988
Ln_FTE0910	<-->	Ln_FTE0506	.988
Ln_FTE0910	<-->	Ln_FTE0607	.994
Ln_FTE0910	<-->	Ln_FTE0708	.996
Ln_FTE0910	<-->	Ln_FTE0809	.999
Ln_Fac_100FTE_10	<-->	Ln_Fac_100FTE_06	.858
Ln_Fac_100FTE_10	<-->	Ln_Fac_100FTE_07	.931
Ln_Fac_100FTE_10	<-->	Ln_Fac_100FTE_08	.955
Ln_Fac_100FTE_10	<-->	Ln_Fac_100FTE_09	.983
Ln_FTE0910	<-->	TFE	.887
Ln_CoreFTE10	<-->	Ln_CoreFTE06	.964
Ln_CoreFTE10	<-->	Ln_CoreFTE07	.970
Ln_CoreFTE10	<-->	Ln_CoreFTE08	.976
Ln_CoreFTE10	<-->	Ln_CoreFTE09	.875

			Estimate
Ln_SubFTE_10	<-->	Ln_CoreFTE07	-.377
Ln_SubFTE_10	<-->	Ln_CoreFTE06	-.380
Ln_SubFTE_10	<-->	Ln_CoreFTE08	-.353
Ln_SubFTE_10	<-->	Ln_CoreFTE09	-.226
Ln_SubFTE_10	<-->	Ln_CoreFTE10	-.383
Ln_SubFTE_10	<-->	Ln_FTE0809	-.674
Ln_SubFTE_10	<-->	Ln_FTE0910	-.675
Ln_SubFTE_10	<-->	Ln_FTE0708	-.675
Ln_SubFTE_10	<-->	Ln_FTE0607	-.677
Ln_SubFTE_10	<-->	Ln_FTE0506	-.670
Ln_SubFTE_10	<-->	Ln_Fac_100FTE_10	-.100
Ln_SubFTE_10	<-->	Ln_Fac_100FTE_09	-.099
Ln_SubFTE_10	<-->	Ln_Fac_100FTE_08	-.104
Ln_SubFTE_10	<-->	Ln_Fac_100FTE_07	-.105
Ln_SubFTE_10	<-->	Ln_Fac_100FTE_06	-.133
Ln_SubFTE_10	<-->	Ln_ER_05	-.303
Ln_CoreFTE10	<-->	Ln_SubFTE_09	-.379
Ln_FTE0910	<-->	Ln_SubFTE_09	-.674
Ln_Fac_100FTE_10	<-->	Ln_SubFTE_09	-.088
Ln_CoreFTE10	<-->	Ln_SubFTE_08	-.380
Ln_FTE0910	<-->	Ln_SubFTE_08	-.660
Ln_Fac_100FTE_10	<-->	Ln_SubFTE_08	-.081
Ln_CoreFTE10	<-->	Ln_SubFTE_07	-.366
Ln_FTE0910	<-->	Ln_SubFTE_07	-.641
Ln_Fac_100FTE_10	<-->	Ln_SubFTE_07	-.064
Ln_CoreFTE10	<-->	Ln_SubFTE_06	-.366
Ln_FTE0910	<-->	Ln_SubFTE_06	-.649
Ln_Fac_100FTE_10	<-->	Ln_SubFTE_06	-.073
Ln_FTE0910	<-->	Ln_CoreFTE07	.374
Ln_Fac_100FTE_10	<-->	Ln_CoreFTE07	.702
Ln_FTE0910	<-->	Ln_CoreFTE06	.364
Ln_Fac_100FTE_10	<-->	Ln_CoreFTE06	.687
Ln_FTE0910	<-->	Ln_CoreFTE08	.345
Ln_Fac_100FTE_10	<-->	Ln_CoreFTE08	.710
Ln_FTE0910	<-->	Ln_CoreFTE09	.256
Ln_Fac_100FTE_10	<-->	Ln_CoreFTE09	.645
Ln_CoreFTE10	<-->	Ln_FTE0809	.380
Ln_CoreFTE10	<-->	Ln_FTE0910	.378
Ln_CoreFTE10	<-->	Ln_FTE0708	.389
Ln_CoreFTE10	<-->	Ln_FTE0607	.393
Ln_CoreFTE10	<-->	Ln_FTE0506	.393
Ln_CoreFTE10	<-->	Ln_Fac_100FTE_10	.704
Ln_CoreFTE10	<-->	Ln_Fac_100FTE_09	.705
Ln_CoreFTE10	<-->	Ln_Fac_100FTE_08	.714
Ln_CoreFTE10	<-->	Ln_Fac_100FTE_07	.722
Ln_CoreFTE10	<-->	Ln_Fac_100FTE_06	.681
Ln_CoreFTE10	<-->	Ln_ER_05	.882
Ln_Fac_100FTE_10	<-->	Ln_FTE0809	-.002
Ln_Fac_100FTE_10	<-->	Ln_FTE0910	-.014
Ln_FTE0910	<-->	Ln_Fac_100FTE_09	-.018
Ln_FTE0910	<-->	Ln_Fac_100FTE_08	.019
Ln_FTE0910	<-->	Ln_Fac_100FTE_07	.030
Ln_FTE0910	<-->	Ln_Fac_100FTE_06	.059
Ln_FTE0910	<-->	Ln_ER_05	.397
Ln_Fac_100FTE_10	<-->	Ln_FTE0708	.010
Ln_Fac_100FTE_10	<-->	Ln_FTE0607	.017
Ln_Fac_100FTE_10	<-->	Ln_FTE0506	.026
Ln_Fac_100FTE_10	<-->	Ln_ER_05	.670
Ln_SubFTE_11	<-->	TFE	-.615

			Estimate
Ln_CoreFTE11	<-->	TFE	.622
Ln_FTE1011	<-->	TFE	.883
Ln_Fac_100FTE_11	<-->	TFE	.228
Ln_SubFTE_11	<-->	Ln_SubFTE_06	.882
Ln_SubFTE_11	<-->	Ln_SubFTE_07	.920
Ln_SubFTE_11	<-->	Ln_SubFTE_08	.937
Ln_SubFTE_11	<-->	Ln_SubFTE_09	.954
Ln_SubFTE_11	<-->	Ln_SubFTE_10	.956
Ln_FTE1011	<-->	Ln_FTE0506	.985
Ln_FTE1011	<-->	Ln_FTE0607	.991
Ln_FTE1011	<-->	Ln_FTE0708	.993
Ln_FTE1011	<-->	Ln_FTE0809	.996
Ln_FTE1011	<-->	Ln_FTE0910	.999
Ln_Fac_100FTE_11	<-->	Ln_Fac_100FTE_06	.849
Ln_Fac_100FTE_11	<-->	Ln_Fac_100FTE_07	.913
Ln_Fac_100FTE_11	<-->	Ln_Fac_100FTE_08	.938
Ln_Fac_100FTE_11	<-->	Ln_Fac_100FTE_09	.961
Ln_Fac_100FTE_11	<-->	Ln_Fac_100FTE_10	.980
Ln_CoreFTE11	<-->	Ln_CoreFTE06	.964
Ln_CoreFTE11	<-->	Ln_CoreFTE07	.971
Ln_CoreFTE11	<-->	Ln_CoreFTE08	.968
Ln_CoreFTE11	<-->	Ln_CoreFTE09	.839
Ln_CoreFTE11	<-->	Ln_CoreFTE10	.990
Ln_SubFTE_11	<-->	Ln_CoreFTE07	-.403
Ln_SubFTE_11	<-->	Ln_CoreFTE06	-.405
Ln_SubFTE_11	<-->	Ln_CoreFTE08	-.374
Ln_SubFTE_11	<-->	Ln_CoreFTE09	-.242
Ln_SubFTE_11	<-->	Ln_CoreFTE10	-.405
Ln_SubFTE_11	<-->	Ln_CoreFTE11	-.419
Ln_SubFTE_11	<-->	Ln_FTE1011	-.658
Ln_SubFTE_11	<-->	Ln_FTE0809	-.659
Ln_SubFTE_11	<-->	Ln_FTE0910	-.660
Ln_SubFTE_11	<-->	Ln_FTE0708	-.660
Ln_SubFTE_11	<-->	Ln_FTE0607	-.661
Ln_SubFTE_11	<-->	Ln_FTE0506	-.652
Ln_SubFTE_11	<-->	Ln_Fac_100FTE_11	-.129
Ln_SubFTE_11	<-->	Ln_Fac_100FTE_10	-.127
Ln_SubFTE_11	<-->	Ln_Fac_100FTE_09	-.126
Ln_SubFTE_11	<-->	Ln_Fac_100FTE_08	-.134
Ln_SubFTE_11	<-->	Ln_Fac_100FTE_07	-.141
Ln_SubFTE_11	<-->	Ln_Fac_100FTE_06	-.172
Ln_SubFTE_11	<-->	Ln_ER_05	-.332
Ln_CoreFTE11	<-->	Ln_SubFTE_10	-.394
Ln_FTE1011	<-->	Ln_SubFTE_10	-.672
Ln_Fac_100FTE_11	<-->	Ln_SubFTE_10	-.105
Ln_CoreFTE11	<-->	Ln_SubFTE_09	-.391
Ln_FTE1011	<-->	Ln_SubFTE_09	-.671
Ln_Fac_100FTE_11	<-->	Ln_SubFTE_09	-.098
Ln_CoreFTE11	<-->	Ln_SubFTE_08	-.393
Ln_FTE1011	<-->	Ln_SubFTE_08	-.658
Ln_Fac_100FTE_11	<-->	Ln_SubFTE_08	-.089
Ln_CoreFTE11	<-->	Ln_SubFTE_07	-.378
Ln_FTE1011	<-->	Ln_SubFTE_07	-.639
Ln_Fac_100FTE_11	<-->	Ln_SubFTE_07	-.079
Ln_CoreFTE11	<-->	Ln_SubFTE_06	-.378
Ln_FTE1011	<-->	Ln_SubFTE_06	-.647
Ln_Fac_100FTE_11	<-->	Ln_SubFTE_06	-.088
Ln_FTE1011	<-->	Ln_CoreFTE07	.374
Ln_Fac_100FTE_11	<-->	Ln_CoreFTE07	.689

			Estimate
Ln_FTE1011	<-->	Ln_CoreFTE06	.364
Ln_Fac_100FTE_11	<-->	Ln_CoreFTE06	.676
Ln_FTE1011	<-->	Ln_CoreFTE08	.346
Ln_Fac_100FTE_11	<-->	Ln_CoreFTE08	.696
Ln_FTE1011	<-->	Ln_CoreFTE09	.257
Ln_Fac_100FTE_11	<-->	Ln_CoreFTE09	.630
Ln_FTE1011	<-->	Ln_CoreFTE10	.378
Ln_Fac_100FTE_11	<-->	Ln_CoreFTE10	.694
Ln_CoreFTE11	<-->	Ln_FTE1011	.395
Ln_CoreFTE11	<-->	Ln_FTE0809	.401
Ln_CoreFTE11	<-->	Ln_FTE0910	.399
Ln_CoreFTE11	<-->	Ln_FTE0708	.410
Ln_CoreFTE11	<-->	Ln_FTE0607	.414
Ln_CoreFTE11	<-->	Ln_FTE0506	.413
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_11	.700
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_10	.704
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_09	.706
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_08	.716
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_07	.724
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_06	.687
Ln_CoreFTE11	<-->	Ln_ER_05	.889
Ln_FTE1011	<-->	Ln_Fac_100FTE_11	-.020
Ln_FTE1011	<-->	Ln_Fac_100FTE_10	-.017
Ln_FTE1011	<-->	Ln_Fac_100FTE_09	-.019
Ln_FTE1011	<-->	Ln_Fac_100FTE_08	.019
Ln_FTE1011	<-->	Ln_Fac_100FTE_07	.030
Ln_FTE1011	<-->	Ln_Fac_100FTE_06	.057
Ln_FTE1011	<-->	Ln_ER_05	.395
Ln_Fac_100FTE_11	<-->	Ln_FTE0809	.000
Ln_Fac_100FTE_11	<-->	Ln_FTE0910	-.012
Ln_Fac_100FTE_11	<-->	Ln_FTE0708	.012
Ln_Fac_100FTE_11	<-->	Ln_FTE0607	.018
Ln_Fac_100FTE_11	<-->	Ln_FTE0506	.027
Ln_Fac_100FTE_11	<-->	Ln_ER_05	.666
Ln_SubFTE_12	<-->	TFE	-.613
Ln_CoreFTE12	<-->	TFE	.607
Ln_FTE1112	<-->	TFE	.878
Ln_Fac_100FTE_12	<-->	TFE	.216
Ln_SubFTE_12	<-->	Ln_SubFTE_06	.891
Ln_SubFTE_12	<-->	Ln_SubFTE_07	.912
Ln_SubFTE_12	<-->	Ln_SubFTE_08	.931
Ln_SubFTE_12	<-->	Ln_SubFTE_09	.951
Ln_SubFTE_12	<-->	Ln_SubFTE_10	.959
Ln_SubFTE_12	<-->	Ln_SubFTE_11	.979
Ln_FTE1112	<-->	Ln_FTE0506	.982
Ln_FTE1112	<-->	Ln_FTE0607	.988
Ln_FTE1112	<-->	Ln_FTE0708	.990
Ln_FTE1112	<-->	Ln_FTE0809	.994
Ln_FTE1112	<-->	Ln_FTE0910	.996
Ln_FTE1112	<-->	Ln_FTE1011	.998
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_06	.812
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_07	.885
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_08	.912
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_09	.930
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_10	.952
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_11	.980
Ln_CoreFTE12	<-->	Ln_CoreFTE06	.953
Ln_CoreFTE12	<-->	Ln_CoreFTE07	.958
Ln_CoreFTE12	<-->	Ln_CoreFTE08	.969

			Estimate
Ln_CoreFTE12	<-->	Ln_CoreFTE09	.890
Ln_CoreFTE12	<-->	Ln_CoreFTE10	.987
Ln_CoreFTE12	<-->	Ln_CoreFTE11	.985
Ln_SubFTE_12	<-->	Ln_CoreFTE07	-.413
Ln_SubFTE_12	<-->	Ln_CoreFTE06	-.412
Ln_SubFTE_12	<-->	Ln_CoreFTE08	-.384
Ln_SubFTE_12	<-->	Ln_CoreFTE09	-.252
Ln_SubFTE_12	<-->	Ln_CoreFTE10	-.410
Ln_SubFTE_12	<-->	Ln_CoreFTE11	-.423
Ln_SubFTE_12	<-->	Ln_CoreFTE12	-.389
Ln_SubFTE_12	<-->	Ln_FTE1112	-.664
Ln_SubFTE_12	<-->	Ln_FTE1011	-.664
Ln_SubFTE_12	<-->	Ln_FTE0809	-.664
Ln_SubFTE_12	<-->	Ln_FTE0910	-.664
Ln_SubFTE_12	<-->	Ln_FTE0708	-.665
Ln_SubFTE_12	<-->	Ln_FTE0607	-.666
Ln_SubFTE_12	<-->	Ln_FTE0506	-.658
Ln_SubFTE_12	<-->	Ln_Fac_100FTE_12	-.109
Ln_SubFTE_12	<-->	Ln_Fac_100FTE_11	-.135
Ln_SubFTE_12	<-->	Ln_Fac_100FTE_10	-.136
Ln_SubFTE_12	<-->	Ln_Fac_100FTE_09	-.138
Ln_SubFTE_12	<-->	Ln_Fac_100FTE_08	-.148
Ln_SubFTE_12	<-->	Ln_Fac_100FTE_07	-.153
Ln_SubFTE_12	<-->	Ln_Fac_100FTE_06	-.178
Ln_SubFTE_12	<-->	Ln_ER_05	-.332
Ln_CoreFTE12	<-->	Ln_SubFTE_11	-.386
Ln_FTE1112	<-->	Ln_SubFTE_11	-.655
Ln_Fac_100FTE_12	<-->	Ln_SubFTE_11	-.111
Ln_CoreFTE12	<-->	Ln_SubFTE_10	-.364
Ln_FTE1112	<-->	Ln_SubFTE_10	-.671
Ln_Fac_100FTE_12	<-->	Ln_SubFTE_10	-.081
Ln_CoreFTE12	<-->	Ln_SubFTE_09	-.361
Ln_FTE1112	<-->	Ln_SubFTE_09	-.669
Ln_Fac_100FTE_12	<-->	Ln_SubFTE_09	-.075
Ln_CoreFTE12	<-->	Ln_SubFTE_08	-.363
Ln_FTE1112	<-->	Ln_SubFTE_08	-.657
Ln_Fac_100FTE_12	<-->	Ln_SubFTE_08	-.067
Ln_CoreFTE12	<-->	Ln_SubFTE_07	-.351
Ln_FTE1112	<-->	Ln_SubFTE_07	-.637
Ln_Fac_100FTE_12	<-->	Ln_SubFTE_07	-.069
Ln_CoreFTE12	<-->	Ln_SubFTE_06	-.351
Ln_FTE1112	<-->	Ln_SubFTE_06	-.647
Ln_Fac_100FTE_12	<-->	Ln_SubFTE_06	-.066
Ln_FTE1112	<-->	Ln_CoreFTE07	.370
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE07	.679
Ln_FTE1112	<-->	Ln_CoreFTE06	.360
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE06	.666
Ln_FTE1112	<-->	Ln_CoreFTE08	.342
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE08	.687
Ln_FTE1112	<-->	Ln_CoreFTE09	.253
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE09	.622
Ln_FTE1112	<-->	Ln_CoreFTE10	.373
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE10	.688
Ln_FTE1112	<-->	Ln_CoreFTE11	.391
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE11	.692
Ln_CoreFTE12	<-->	Ln_FTE1112	.367
Ln_CoreFTE12	<-->	Ln_FTE1011	.374
Ln_CoreFTE12	<-->	Ln_FTE0809	.380
Ln_CoreFTE12	<-->	Ln_FTE0910	.377

			Estimate
Ln_CoreFTE12	<-->	Ln_FTE0708	.389
Ln_CoreFTE12	<-->	Ln_FTE0607	.392
Ln_CoreFTE12	<-->	Ln_FTE0506	.393
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_12	.705
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_11	.704
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_10	.709
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_09	.710
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_08	.720
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_07	.724
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_06	.676
Ln_CoreFTE12	<-->	Ln_ER_05	.881
Ln_FTE1112	<-->	Ln_Fac_100FTE_12	-.047
Ln_FTE1112	<-->	Ln_Fac_100FTE_11	-.025
Ln_FTE1112	<-->	Ln_Fac_100FTE_10	-.020
Ln_FTE1112	<-->	Ln_Fac_100FTE_09	-.022
Ln_FTE1112	<-->	Ln_Fac_100FTE_08	.016
Ln_FTE1112	<-->	Ln_Fac_100FTE_07	.028
Ln_FTE1112	<-->	Ln_Fac_100FTE_06	.059
Ln_FTE1112	<-->	Ln_ER_05	.393
Ln_Fac_100FTE_12	<-->	Ln_FTE1011	-.036
Ln_Fac_100FTE_12	<-->	Ln_FTE0809	-.015
Ln_Fac_100FTE_12	<-->	Ln_FTE0910	-.027
Ln_Fac_100FTE_12	<-->	Ln_FTE0708	-.003
Ln_Fac_100FTE_12	<-->	Ln_FTE0607	.004
Ln_Fac_100FTE_12	<-->	Ln_FTE0506	.013
Ln_Fac_100FTE_12	<-->	Ln_ER_05	.651
Ln_SubFTE_13	<-->	TFE	-.610
Ln_CoreFTE13	<-->	TFE	.616
Ln_FTE1213	<-->	TFE	.875
Ln_Fac_100FTE_13	<-->	TFE	.173
Ln_SubFTE_13	<-->	Ln_SubFTE_06	.913
Ln_SubFTE_13	<-->	Ln_SubFTE_07	.909
Ln_SubFTE_13	<-->	Ln_SubFTE_08	.938
Ln_SubFTE_13	<-->	Ln_SubFTE_09	.952
Ln_SubFTE_13	<-->	Ln_SubFTE_10	.966
Ln_SubFTE_13	<-->	Ln_SubFTE_11	.927
Ln_FTE1213	<-->	Ln_FTE0506	.979
Ln_FTE1213	<-->	Ln_FTE0607	.985
Ln_FTE1213	<-->	Ln_FTE0708	.987
Ln_FTE1213	<-->	Ln_FTE0809	.991
Ln_FTE1213	<-->	Ln_FTE0910	.993
Ln_FTE1213	<-->	Ln_FTE1011	.996
Ln_FTE1213	<-->	Ln_FTE1112	.999
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_06	.758
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_07	.828
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_08	.853
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_09	.873
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_11	.926
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_12	.952
Ln_SubFTE_13	<-->	Ln_SubFTE_12	.958
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_10	.894
Ln_CoreFTE13	<-->	Ln_CoreFTE06	.950
Ln_CoreFTE13	<-->	Ln_CoreFTE07	.957
Ln_CoreFTE13	<-->	Ln_CoreFTE08	.960
Ln_CoreFTE13	<-->	Ln_CoreFTE09	.856
Ln_CoreFTE13	<-->	Ln_CoreFTE10	.984
Ln_CoreFTE13	<-->	Ln_CoreFTE11	.988
Ln_CoreFTE13	<-->	Ln_CoreFTE12	.992
Ln_SubFTE_13	<-->	Ln_CoreFTE07	-.406

			Estimate
Ln_SubFTE_13	<-->	Ln_CoreFTE06	-.406
Ln_SubFTE_13	<-->	Ln_CoreFTE08	-.383
Ln_SubFTE_13	<-->	Ln_CoreFTE09	-.259
Ln_SubFTE_13	<-->	Ln_CoreFTE10	-.407
Ln_SubFTE_13	<-->	Ln_CoreFTE11	-.417
Ln_SubFTE_13	<-->	Ln_CoreFTE12	-.386
Ln_SubFTE_13	<-->	Ln_CoreFTE13	-.391
Ln_SubFTE_13	<-->	Ln_FTE1213	-.675
Ln_SubFTE_13	<-->	Ln_FTE1112	-.674
Ln_SubFTE_13	<-->	Ln_FTE1011	-.673
Ln_SubFTE_13	<-->	Ln_FTE0809	-.673
Ln_SubFTE_13	<-->	Ln_FTE0910	-.674
Ln_SubFTE_13	<-->	Ln_FTE0708	-.672
Ln_SubFTE_13	<-->	Ln_FTE0607	-.674
Ln_SubFTE_13	<-->	Ln_FTE0506	-.668
Ln_SubFTE_13	<-->	Ln_Fac_100FTE_13	-.060
Ln_SubFTE_13	<-->	Ln_Fac_100FTE_12	-.105
Ln_SubFTE_13	<-->	Ln_Fac_100FTE_11	-.134
Ln_SubFTE_13	<-->	Ln_Fac_100FTE_10	-.129
Ln_SubFTE_13	<-->	Ln_Fac_100FTE_09	-.133
Ln_SubFTE_13	<-->	Ln_Fac_100FTE_08	-.142
Ln_SubFTE_13	<-->	Ln_Fac_100FTE_07	-.141
Ln_SubFTE_13	<-->	Ln_Fac_100FTE_06	-.162
Ln_SubFTE_13	<-->	Ln_ER_05	-.316
Ln_CoreFTE13	<-->	Ln_SubFTE_12	-.396
Ln_FTE1213	<-->	Ln_SubFTE_12	-.664
Ln_Fac_100FTE_13	<-->	Ln_SubFTE_12	-.072
Ln_CoreFTE13	<-->	Ln_SubFTE_11	-.395
Ln_FTE1213	<-->	Ln_SubFTE_11	-.653
Ln_Fac_100FTE_13	<-->	Ln_SubFTE_11	-.072
Ln_CoreFTE13	<-->	Ln_SubFTE_10	-.370
Ln_FTE1213	<-->	Ln_SubFTE_10	-.670
Ln_Fac_100FTE_13	<-->	Ln_SubFTE_10	-.039
Ln_CoreFTE13	<-->	Ln_SubFTE_09	-.369
Ln_FTE1213	<-->	Ln_SubFTE_09	-.669
Ln_Fac_100FTE_13	<-->	Ln_SubFTE_09	-.039
Ln_CoreFTE13	<-->	Ln_SubFTE_08	-.370
Ln_FTE1213	<-->	Ln_SubFTE_08	-.655
Ln_Fac_100FTE_13	<-->	Ln_SubFTE_08	-.028
Ln_CoreFTE13	<-->	Ln_SubFTE_07	-.357
Ln_FTE1213	<-->	Ln_SubFTE_07	-.636
Ln_Fac_100FTE_13	<-->	Ln_SubFTE_07	-.032
Ln_CoreFTE13	<-->	Ln_SubFTE_06	-.356
Ln_FTE1213	<-->	Ln_SubFTE_06	-.647
Ln_Fac_100FTE_13	<-->	Ln_SubFTE_06	-.029
Ln_FTE1213	<-->	Ln_CoreFTE07	.373
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE07	.633
Ln_FTE1213	<-->	Ln_CoreFTE06	.363
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE06	.618
Ln_FTE1213	<-->	Ln_CoreFTE08	.345
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE08	.636
Ln_FTE1213	<-->	Ln_CoreFTE09	.254
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE09	.586
Ln_FTE1213	<-->	Ln_CoreFTE10	.374
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE10	.642
Ln_FTE1213	<-->	Ln_CoreFTE11	.392
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE11	.642
Ln_FTE1213	<-->	Ln_CoreFTE12	.367
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE12	.662

			Estimate
Ln_CoreFTE13	<-->	Ln_FTE1213	.376
Ln_CoreFTE13	<-->	Ln_FTE1112	.377
Ln_CoreFTE13	<-->	Ln_FTE1011	.386
Ln_CoreFTE13	<-->	Ln_FTE0809	.391
Ln_CoreFTE13	<-->	Ln_FTE0910	.389
Ln_CoreFTE13	<-->	Ln_FTE0708	.399
Ln_CoreFTE13	<-->	Ln_FTE0607	.402
Ln_CoreFTE13	<-->	Ln_FTE0506	.402
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_13	.660
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_12	.702
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_11	.702
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_10	.705
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_09	.707
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_08	.718
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_07	.723
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_06	.678
Ln_CoreFTE13	<-->	Ln_ER_05	.883
Ln_FTE1213	<-->	Ln_Fac_100FTE_13	-.101
Ln_FTE1213	<-->	Ln_Fac_100FTE_12	-.047
Ln_FTE1213	<-->	Ln_Fac_100FTE_11	-.023
Ln_FTE1213	<-->	Ln_Fac_100FTE_10	-.019
Ln_FTE1213	<-->	Ln_Fac_100FTE_09	-.021
Ln_FTE1213	<-->	Ln_Fac_100FTE_08	.018
Ln_FTE1213	<-->	Ln_Fac_100FTE_07	.030
Ln_FTE1213	<-->	Ln_Fac_100FTE_06	.061
Ln_FTE1213	<-->	Ln_ER_05	.392
Ln_Fac_100FTE_13	<-->	Ln_FTE1112	-.096
Ln_Fac_100FTE_13	<-->	Ln_FTE1011	-.084
Ln_Fac_100FTE_13	<-->	Ln_FTE0809	-.062
Ln_Fac_100FTE_13	<-->	Ln_FTE0910	-.074
Ln_Fac_100FTE_13	<-->	Ln_FTE0708	-.047
Ln_Fac_100FTE_13	<-->	Ln_FTE0607	-.041
Ln_Fac_100FTE_13	<-->	Ln_FTE0506	-.032
Ln_Fac_100FTE_13	<-->	Ln_ER_05	.610
Ln_SubFTE_14	<-->	TFE	-.607
Ln_CoreFTE14	<-->	TFE	.637
Ln_FTE1314	<-->	TFE	.874
Ln_Fac_100FTE_14	<-->	TFE	.170
Ln_CoreFTE14	<-->	Ln_SubFTE_13	-.422
Ln_FTE1314	<-->	Ln_SubFTE_13	-.674
Ln_Fac_100FTE_14	<-->	Ln_SubFTE_13	-.048
Ln_SubFTE_14	<-->	Ln_SubFTE_13	.972
Ln_CoreFTE14	<-->	Ln_SubFTE_12	-.425
Ln_FTE1314	<-->	Ln_SubFTE_12	-.660
Ln_Fac_100FTE_14	<-->	Ln_SubFTE_12	-.059
Ln_SubFTE_14	<-->	Ln_SubFTE_12	.969
Ln_CoreFTE14	<-->	Ln_SubFTE_11	-.418
Ln_FTE1314	<-->	Ln_SubFTE_11	-.649
Ln_Fac_100FTE_14	<-->	Ln_SubFTE_11	-.059
Ln_SubFTE_14	<-->	Ln_SubFTE_11	.940
Ln_CoreFTE14	<-->	Ln_SubFTE_10	-.396
Ln_FTE1314	<-->	Ln_SubFTE_10	-.667
Ln_Fac_100FTE_14	<-->	Ln_SubFTE_10	-.023
Ln_SubFTE_14	<-->	Ln_SubFTE_10	.939
Ln_CoreFTE14	<-->	Ln_SubFTE_09	-.395
Ln_FTE1314	<-->	Ln_SubFTE_09	-.664
Ln_Fac_100FTE_14	<-->	Ln_SubFTE_09	-.023
Ln_SubFTE_14	<-->	Ln_SubFTE_09	.930
Ln_CoreFTE14	<-->	Ln_SubFTE_08	-.392

			Estimate
Ln_FTE1314	<-->	Ln_SubFTE_08	-.653
Ln_Fac_100FTE_14	<-->	Ln_SubFTE_08	-.013
Ln_SubFTE_14	<-->	Ln_SubFTE_08	.915
Ln_CoreFTE14	<-->	Ln_SubFTE_07	-.378
Ln_FTE1314	<-->	Ln_SubFTE_07	-.634
Ln_Fac_100FTE_14	<-->	Ln_SubFTE_07	-.017
Ln_SubFTE_14	<-->	Ln_SubFTE_07	.892
Ln_CoreFTE14	<-->	Ln_SubFTE_06	-.385
Ln_FTE1314	<-->	Ln_SubFTE_06	-.646
Ln_Fac_100FTE_14	<-->	Ln_SubFTE_06	-.016
Ln_SubFTE_14	<-->	Ln_SubFTE_06	.889
Ln_CoreFTE14	<-->	Ln_CoreFTE07	.955
Ln_FTE1314	<-->	Ln_CoreFTE07	.379
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE07	.629
Ln_SubFTE_14	<-->	Ln_CoreFTE07	-.435
Ln_CoreFTE14	<-->	Ln_CoreFTE06	.947
Ln_FTE1314	<-->	Ln_CoreFTE06	.368
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE06	.614
Ln_SubFTE_14	<-->	Ln_CoreFTE06	-.437
Ln_CoreFTE14	<-->	Ln_CoreFTE08	.956
Ln_FTE1314	<-->	Ln_CoreFTE08	.349
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE08	.631
Ln_SubFTE_14	<-->	Ln_CoreFTE08	-.407
Ln_CoreFTE14	<-->	Ln_CoreFTE09	.835
Ln_FTE1314	<-->	Ln_CoreFTE09	.260
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE09	.577
Ln_SubFTE_14	<-->	Ln_CoreFTE09	-.273
Ln_CoreFTE14	<-->	Ln_CoreFTE10	.977
Ln_FTE1314	<-->	Ln_CoreFTE10	.379
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE10	.637
Ln_SubFTE_14	<-->	Ln_CoreFTE10	-.432
Ln_CoreFTE14	<-->	Ln_CoreFTE11	.982
Ln_FTE1314	<-->	Ln_CoreFTE11	.397
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE11	.637
Ln_SubFTE_14	<-->	Ln_CoreFTE11	-.445
Ln_CoreFTE14	<-->	Ln_CoreFTE12	.982
Ln_FTE1314	<-->	Ln_CoreFTE12	.372
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE12	.657
Ln_SubFTE_14	<-->	Ln_CoreFTE12	-.408
Ln_CoreFTE14	<-->	Ln_CoreFTE13	.989
Ln_FTE1314	<-->	Ln_CoreFTE13	.380
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE13	.655
Ln_SubFTE_14	<-->	Ln_CoreFTE13	-.414
Ln_CoreFTE14	<-->	Ln_FTE1213	.403
Ln_FTE1314	<-->	Ln_FTE1213	.998
Ln_Fac_100FTE_14	<-->	Ln_FTE1213	-.095
Ln_SubFTE_14	<-->	Ln_FTE1213	-.660
Ln_CoreFTE14	<-->	Ln_FTE1112	.405
Ln_FTE1314	<-->	Ln_FTE1112	.996
Ln_Fac_100FTE_14	<-->	Ln_FTE1112	-.091
Ln_SubFTE_14	<-->	Ln_FTE1112	-.658
Ln_CoreFTE14	<-->	Ln_FTE1011	.413
Ln_FTE1314	<-->	Ln_FTE1011	.992
Ln_Fac_100FTE_14	<-->	Ln_FTE1011	-.079
Ln_SubFTE_14	<-->	Ln_FTE1011	-.657
Ln_CoreFTE14	<-->	Ln_FTE0809	.417
Ln_FTE1314	<-->	Ln_FTE0809	.987
Ln_Fac_100FTE_14	<-->	Ln_FTE0809	-.061
Ln_SubFTE_14	<-->	Ln_FTE0809	-.659

			Estimate
Ln_CoreFTE14	<-->	Ln_FTE0910	.415
Ln_FTE1314	<-->	Ln_FTE0910	.989
Ln_Fac_100FTE_14	<-->	Ln_FTE0910	-.072
Ln_SubFTE_14	<-->	Ln_FTE0910	-.658
Ln_CoreFTE14	<-->	Ln_FTE0708	.423
Ln_FTE1314	<-->	Ln_FTE0708	.985
Ln_Fac_100FTE_14	<-->	Ln_FTE0708	-.050
Ln_SubFTE_14	<-->	Ln_FTE0708	-.659
Ln_CoreFTE14	<-->	Ln_FTE0607	.426
Ln_FTE1314	<-->	Ln_FTE0607	.982
Ln_Fac_100FTE_14	<-->	Ln_FTE0607	-.042
Ln_SubFTE_14	<-->	Ln_FTE0607	-.661
Ln_CoreFTE14	<-->	Ln_FTE0506	.426
Ln_FTE1314	<-->	Ln_FTE0506	.975
Ln_Fac_100FTE_14	<-->	Ln_FTE0506	-.033
Ln_SubFTE_14	<-->	Ln_FTE0506	-.652
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_13	.639
Ln_FTE1314	<-->	Ln_Fac_100FTE_13	-.097
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_13	.975
Ln_SubFTE_14	<-->	Ln_Fac_100FTE_13	-.092
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_12	.679
Ln_FTE1314	<-->	Ln_Fac_100FTE_12	-.041
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_12	.940
Ln_SubFTE_14	<-->	Ln_Fac_100FTE_12	-.137
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_11	.679
Ln_FTE1314	<-->	Ln_Fac_100FTE_11	-.015
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_11	.913
Ln_SubFTE_14	<-->	Ln_Fac_100FTE_11	-.165
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_10	.682
Ln_FTE1314	<-->	Ln_Fac_100FTE_10	-.011
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_10	.888
Ln_SubFTE_14	<-->	Ln_Fac_100FTE_10	-.161
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_09	.686
Ln_FTE1314	<-->	Ln_Fac_100FTE_09	-.012
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_09	.870
Ln_SubFTE_14	<-->	Ln_Fac_100FTE_09	-.162
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_08	.697
Ln_FTE1314	<-->	Ln_Fac_100FTE_08	.027
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_08	.854
Ln_SubFTE_14	<-->	Ln_Fac_100FTE_08	-.172
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_07	.702
Ln_FTE1314	<-->	Ln_Fac_100FTE_07	.039
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_07	.827
Ln_SubFTE_14	<-->	Ln_Fac_100FTE_07	-.173
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_06	.658
Ln_FTE1314	<-->	Ln_Fac_100FTE_06	.068
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_06	.756
Ln_SubFTE_14	<-->	Ln_Fac_100FTE_06	-.202
Ln_CoreFTE14	<-->	Ln_ER_05	.878
Ln_FTE1314	<-->	Ln_ER_05	.399
Ln_Fac_100FTE_14	<-->	Ln_ER_05	.602
Ln_SubFTE_14	<-->	Ln_ER_05	-.339
Ln_CoreFTE14	<-->	Ln_FTE1314	.405
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_14	.640
Ln_SubFTE_14	<-->	Ln_CoreFTE14	-.443
Ln_FTE1314	<-->	Ln_Fac_100FTE_14	-.096
Ln_SubFTE_14	<-->	Ln_FTE1314	-.660
Ln_SubFTE_14	<-->	Ln_Fac_100FTE_14	-.077

APPENDIX B

Table B.1

Estimated covariances for fixed effects models using school funds per FTE (log)

			Estimate	S.E.	C.R.	*P*
Ln_SchFund_FTE_06	<-->	TFE	-.108	.026	-4.080	***
Ln_CoreFTE06	<-->	TFE	.041	.008	5.006	***
Ln_FTE0506	<-->	TFE	.090	.015	5.974	***
Ln_Fac_100FTE_06	<-->	TFE	.009	.003	2.930	.003
Ln_SchFund_FTE_06	<-->	Ln_CoreFTE06	-.175	.057	-3.082	.002
Ln_SchFund_FTE_06	<-->	Ln_FTE0506	-.477	.085	-5.585	***
Ln_SchFund_FTE_06	<-->	Ln_Fac_100FTE_06	-.040	.027	-1.484	.138
Ln_SchFund_FTE_06	<-->	Ln_ER_05	-.141	.047	-2.973	.003
Ln_CoreFTE06	<-->	Ln_FTE0506	.103	.020	5.062	***
Ln_CoreFTE06	<-->	Ln_Fac_100FTE_06	.072	.008	8.923	***
Ln_CoreFTE06	<-->	Ln_ER_05	.151	.015	10.025	***
Ln_ER_05	<-->	TFE	.042	.007	5.825	***
Ln_FTE0506	<-->	Ln_Fac_100FTE_06	.006	.009	.680	.497
Ln_FTE0506	<-->	Ln_ER_05	.095	.017	5.544	***
Ln_Fac_100FTE_06	<-->	Ln_ER_05	.058	.007	8.674	***
Ln_SchFund_FTE_07	<-->	TFE	-.083	.025	-3.302	***
Ln_CoreFTE07	<-->	TFE	.043	.008	5.047	***
Ln_FTE0607	<-->	TFE	.090	.015	5.987	***
Ln_Fac_100FTE_07	<-->	TFE	.008	.003	2.797	.005
Ln_SchFund_FTE_07	<-->	Ln_SchFund_FTE_06	3.060	.315	9.723	***
Ln_FTE0607	<-->	Ln_FTE0506	.407	.038	10.640	***
Ln_Fac_100FTE_07	<-->	Ln_Fac_100FTE_06	.042	.004	10.265	***
Ln_CoreFTE07	<-->	Ln_CoreFTE06	.203	.019	10.563	***
Ln_SchFund_FTE_07	<-->	Ln_CoreFTE07	-.191	.061	-3.149	.002
Ln_SchFund_FTE_07	<-->	Ln_CoreFTE06	-.175	.059	-2.965	.003
Ln_SchFund_FTE_07	<-->	Ln_FTE0607	-.383	.086	-4.443	***
Ln_SchFund_FTE_07	<-->	Ln_FTE0506	-.377	.086	-4.377	***
Ln_SchFund_FTE_07	<-->	Ln_Fac_100FTE_07	-.047	.027	-1.751	.080
Ln_SchFund_FTE_07	<-->	Ln_Fac_100FTE_06	-.050	.028	-1.759	.079
Ln_SchFund_FTE_07	<-->	Ln_ER_05	-.129	.049	-2.619	.009
Ln_CoreFTE07	<-->	Ln_SchFund_FTE_06	-.194	.058	-3.322	***
Ln_FTE0607	<-->	Ln_SchFund_FTE_06	-.482	.085	-5.653	***
Ln_Fac_100FTE_07	<-->	Ln_SchFund_FTE_06	-.038	.026	-1.479	.139
Ln_CoreFTE07	<-->	Ln_FTE0607	.111	.021	5.343	***
Ln_CoreFTE07	<-->	Ln_FTE0506	.112	.021	5.336	***
Ln_CoreFTE07	<-->	Ln_Fac_100FTE_07	.072	.008	9.051	***
Ln_CoreFTE07	<-->	Ln_Fac_100FTE_06	.072	.008	8.751	***
Ln_CoreFTE07	<-->	Ln_ER_05	.155	.015	10.039	***
Ln_FTE0607	<-->	Ln_CoreFTE06	.105	.020	5.194	***
Ln_Fac_100FTE_07	<-->	Ln_CoreFTE06	.069	.008	8.994	***
Ln_FTE0607	<-->	Ln_Fac_100FTE_07	.006	.009	.625	.532
Ln_FTE0607	<-->	Ln_Fac_100FTE_06	.009	.009	.922	.356
Ln_FTE0607	<-->	Ln_ER_05	.096	.017	5.584	***
Ln_Fac_100FTE_07	<-->	Ln_FTE0506	.006	.009	.728	.466
Ln_Fac_100FTE_07	<-->	Ln_ER_05	.057	.006	8.853	***
Ln_SchFund_FTE_08	<-->	TFE	-.103	.027	-3.855	***
Ln_CoreFTE08	<-->	TFE	.038	.008	4.991	***
Ln_FTE0708	<-->	TFE	.090	.015	5.980	***
Ln_Fac_100FTE_08	<-->	TFE	.007	.003	2.658	.008
Ln_SchFund_FTE_08	<-->	Ln_SchFund_FTE_07	3.376	.336	10.057	***
Ln_SchFund_FTE_08	<-->	Ln_SchFund_FTE_06	3.091	.316	9.789	***
			Estimate	S.E.	C.R.	*P*
Ln_FTE0708	<-->	Ln_FTE0506	.409	.039	10.627	***

Ln_FTE0708	<-->	Ln_FTE0607	.410	.039	10.656	***
Ln_Fac_100FTE_08	<-->	Ln_Fac_100FTE_06	.039	.004	9.990	***
Ln_Fac_100FTE_08	<-->	Ln_Fac_100FTE_07	.041	.004	10.499	***
Ln_CoreFTE08	<-->	Ln_CoreFTE06	.186	.018	10.514	***
Ln_CoreFTE08	<-->	Ln_CoreFTE07	.192	.018	10.537	***
Ln_SchFund_FTE_08	<-->	Ln_CoreFTE07	-.218	.061	-3.575	***
Ln_SchFund_FTE_08	<-->	Ln_CoreFTE06	-.203	.059	-3.419	***
Ln_SchFund_FTE_08	<-->	Ln_CoreFTE08	-.189	.056	-3.361	***
Ln_SchFund_FTE_08	<-->	Ln_FTE0708	-.457	.088	-5.180	***
Ln_SchFund_FTE_08	<-->	Ln_FTE0607	-.452	.087	-5.173	***
Ln_SchFund_FTE_08	<-->	Ln_FTE0506	-.444	.087	-5.079	***
Ln_SchFund_FTE_08	<-->	Ln_Fac_100FTE_08	-.054	.027	-2.049	.040
Ln_SchFund_FTE_08	<-->	Ln_Fac_100FTE_07	-.051	.027	-1.907	.057
Ln_SchFund_FTE_08	<-->	Ln_Fac_100FTE_06	-.056	.028	-1.991	.047
Ln_SchFund_FTE_08	<-->	Ln_ER_05	-.165	.050	-3.319	***
Ln_CoreFTE08	<-->	Ln_SchFund_FTE_07	-.159	.056	-2.847	.004
Ln_FTE0708	<-->	Ln_SchFund_FTE_07	-.389	.087	-4.480	***
Ln_Fac_100FTE_08	<-->	Ln_SchFund_FTE_07	-.047	.027	-1.777	.076
Ln_CoreFTE08	<-->	Ln_SchFund_FTE_06	-.154	.054	-2.872	.004
Ln_FTE0708	<-->	Ln_SchFund_FTE_06	-.488	.086	-5.681	***
Ln_Fac_100FTE_08	<-->	Ln_SchFund_FTE_06	-.040	.025	-1.560	.119
Ln_FTE0708	<-->	Ln_CoreFTE07	.112	.021	5.339	***
Ln_Fac_100FTE_08	<-->	Ln_CoreFTE07	.069	.008	8.951	***
Ln_FTE0708	<-->	Ln_CoreFTE06	.106	.020	5.192	***
Ln_Fac_100FTE_08	<-->	Ln_CoreFTE06	.066	.008	8.809	***
Ln_CoreFTE08	<-->	Ln_FTE0708	.095	.019	4.957	***
Ln_CoreFTE08	<-->	Ln_FTE0607	.096	.019	4.998	***
Ln_CoreFTE08	<-->	Ln_FTE0506	.096	.019	4.999	***
Ln_CoreFTE08	<-->	Ln_Fac_100FTE_08	.064	.007	8.953	***
Ln_CoreFTE08	<-->	Ln_Fac_100FTE_07	.066	.007	9.015	***
Ln_CoreFTE08	<-->	Ln_Fac_100FTE_06	.066	.008	8.705	***
Ln_CoreFTE08	<-->	Ln_ER_05	.142	.014	9.985	***
Ln_FTE0708	<-->	Ln_Fac_100FTE_08	.004	.009	.471	.638
Ln_FTE0708	<-->	Ln_Fac_100FTE_07	.005	.009	.604	.546
Ln_FTE0708	<-->	Ln_Fac_100FTE_06	.009	.009	.945	.345
Ln_FTE0708	<-->	Ln_ER_05	.097	.017	5.607	***
Ln_Fac_100FTE_08	<-->	Ln_FTE0607	.005	.009	.553	.580
Ln_Fac_100FTE_08	<-->	Ln_FTE0506	.007	.009	.750	.453
Ln_Fac_100FTE_08	<-->	Ln_ER_05	.053	.006	8.591	***
Ln_SchFund_FTE_09	<-->	TFE	-.106	.026	-3.995	***
Ln_CoreFTE09	<-->	TFE	.032	.007	4.680	***
Ln_FTE0809	<-->	TFE	.091	.015	5.981	***
Ln_Fac_100FTE_09	<-->	TFE	.007	.003	2.415	.016
Ln_SchFund_FTE_09	<-->	Ln_SchFund_FTE_06	2.993	.303	9.890	***
Ln_SchFund_FTE_09	<-->	Ln_SchFund_FTE_07	3.098	.314	9.859	***
Ln_SchFund_FTE_09	<-->	Ln_SchFund_FTE_08	3.290	.322	10.204	***
Ln_FTE0809	<-->	Ln_FTE0506	.413	.039	10.612	***
Ln_FTE0809	<-->	Ln_FTE0607	.414	.039	10.644	***
Ln_FTE0809	<-->	Ln_FTE0708	.418	.039	10.653	***
Ln_Fac_100FTE_09	<-->	Ln_Fac_100FTE_06	.039	.004	9.891	***
Ln_Fac_100FTE_09	<-->	Ln_Fac_100FTE_07	.041	.004	10.378	***
Ln_Fac_100FTE_09	<-->	Ln_Fac_100FTE_08	.041	.004	10.520	***
Ln_CoreFTE09	<-->	Ln_CoreFTE06	.160	.016	9.729	***
Ln_CoreFTE09	<-->	Ln_CoreFTE07	.161	.017	9.625	***
Ln_CoreFTE09	<-->	Ln_CoreFTE08	.158	.016	9.968	***
Ln_SchFund_FTE_09	<-->	Ln_CoreFTE07	-.212	.058	-3.654	***
Ln_SchFund_FTE_09	<-->	Ln_CoreFTE06	-.189	.056	-3.353	***
Ln_SchFund_FTE_09	<-->	Ln_CoreFTE08	-.176	.053	-3.298	***
			Estimate	S.E.	C.R.	*P*
Ln_SchFund_FTE_09	<-->	Ln_CoreFTE09	-.069	.052	-1.334	.182

Ln_SchFund_FTE_09	<-->	Ln_FTE0809	-.502	.086	-5.815	***
Ln_SchFund_FTE_09	<-->	Ln_FTE0708	-.498	.085	-5.829	***
Ln_SchFund_FTE_09	<-->	Ln_FTE0607	-.493	.085	-5.822	***
Ln_SchFund_FTE_09	<-->	Ln_FTE0506	-.490	.085	-5.773	***
Ln_SchFund_FTE_09	<-->	Ln_Fac_100FTE_09	-.056	.026	-2.193	.028
Ln_SchFund_FTE_09	<-->	Ln_Fac_100FTE_08	-.050	.025	-2.001	.045
Ln_SchFund_FTE_09	<-->	Ln_Fac_100FTE_07	-.047	.026	-1.850	.064
Ln_SchFund_FTE_09	<-->	Ln_Fac_100FTE_06	-.050	.027	-1.858	.063
Ln_SchFund_FTE_09	<-->	Ln_ER_05	-.146	.047	-3.103	.002
Ln_CoreFTE09	<-->	Ln_SchFund_FTE_08	-.092	.055	-1.675	.094
Ln_FTE0809	<-->	Ln_SchFund_FTE_08	-.459	.089	-5.154	***
Ln_Fac_100FTE_09	<-->	Ln_SchFund_FTE_08	-.060	.027	-2.228	.026
Ln_CoreFTE09	<-->	Ln_SchFund_FTE_07	-.064	.055	-1.180	.238
Ln_FTE0809	<-->	Ln_SchFund_FTE_07	-.391	.088	-4.460	***
Ln_Fac_100FTE_09	<-->	Ln_SchFund_FTE_07	-.048	.027	-1.780	.075
Ln_CoreFTE09	<-->	Ln_SchFund_FTE_06	-.062	.052	-1.175	.240
Ln_FTE0809	<-->	Ln_SchFund_FTE_06	-.492	.087	-5.664	***
Ln_Fac_100FTE_09	<-->	Ln_SchFund_FTE_06	-.039	.026	-1.535	.125
Ln_FTE0809	<-->	Ln_CoreFTE07	.111	.021	5.256	***
Ln_Fac_100FTE_09	<-->	Ln_CoreFTE07	.068	.008	8.789	***
Ln_FTE0809	<-->	Ln_CoreFTE06	.106	.021	5.116	***
Ln_Fac_100FTE_09	<-->	Ln_CoreFTE06	.065	.008	8.649	***
Ln_FTE0809	<-->	Ln_CoreFTE08	.095	.019	4.895	***
Ln_Fac_100FTE_09	<-->	Ln_CoreFTE08	.063	.007	8.820	***
Ln_CoreFTE09	<-->	Ln_FTE0809	.070	.019	3.726	***
Ln_CoreFTE09	<-->	Ln_FTE0708	.071	.019	3.828	***
Ln_CoreFTE09	<-->	Ln_FTE0607	.072	.019	3.890	***
Ln_CoreFTE09	<-->	Ln_FTE0506	.072	.019	3.900	***
Ln_CoreFTE09	<-->	Ln_Fac_100FTE_09	.057	.007	8.245	***
Ln_CoreFTE09	<-->	Ln_Fac_100FTE_08	.057	.007	8.323	***
Ln_CoreFTE09	<-->	Ln_Fac_100FTE_07	.058	.007	8.369	***
Ln_CoreFTE09	<-->	Ln_Fac_100FTE_06	.058	.007	8.032	***
Ln_CoreFTE09	<-->	Ln_ER_05	.124	.013	9.281	***
Ln_FTE0809	<-->	Ln_Fac_100FTE_09	-.002	.009	-.182	.856
Ln_FTE0809	<-->	Ln_Fac_100FTE_08	.003	.009	.360	.719
Ln_FTE0809	<-->	Ln_Fac_100FTE_07	.004	.009	.501	.616
Ln_FTE0809	<-->	Ln_Fac_100FTE_06	.008	.009	.893	.372
Ln_FTE0809	<-->	Ln_ER_05	.097	.017	5.552	***
Ln_Fac_100FTE_09	<-->	Ln_FTE0708	.000	.009	-.001	.999
Ln_Fac_100FTE_09	<-->	Ln_FTE0607	.001	.009	.088	.930
Ln_Fac_100FTE_09	<-->	Ln_FTE0506	.002	.009	.270	.787
Ln_Fac_100FTE_09	<-->	Ln_ER_05	.053	.006	8.463	***
Ln_SchFund_FTE_10	<-->	TFE	-.113	.028	-4.115	***
Ln_CoreFTE10	<-->	TFE	.043	.008	5.120	***
Ln_Fac_100FTE_10	<-->	TFE	.007	.003	2.492	.013
Ln_SchFund_FTE_10	<-->	Ln_SchFund_FTE_06	2.966	.306	9.698	***
Ln_SchFund_FTE_10	<-->	Ln_SchFund_FTE_07	3.044	.316	9.620	***
Ln_SchFund_FTE_10	<-->	Ln_SchFund_FTE_08	3.283	.327	10.055	***
Ln_SchFund_FTE_10	<-->	Ln_SchFund_FTE_09	3.343	.321	10.429	***
Ln_FTE0910	<-->	Ln_FTE0506	.409	.039	10.597	***
Ln_FTE0910	<-->	Ln_FTE0607	.411	.039	10.630	***
Ln_FTE0910	<-->	Ln_FTE0708	.415	.039	10.641	***
Ln_FTE0910	<-->	Ln_FTE0809	.420	.039	10.655	***
Ln_Fac_100FTE_10	<-->	Ln_Fac_100FTE_06	.039	.004	9.794	***
Ln_Fac_100FTE_10	<-->	Ln_Fac_100FTE_07	.040	.004	10.244	***
Ln_Fac_100FTE_10	<-->	Ln_Fac_100FTE_08	.040	.004	10.383	***
Ln_Fac_100FTE_10	<-->	Ln_Fac_100FTE_09	.042	.004	10.539	***
Ln_FTE0910	<-->	TFE	.091	.015	5.980	***
			Estimate	S.E.	C.R.	*P*
Ln_CoreFTE10	<-->	Ln_CoreFTE06	.195	.019	10.456	***

Ln_CoreFTE10	<-->	Ln_CoreFTE07	.201	.019	10.491	***
Ln_CoreFTE10	<-->	Ln_CoreFTE08	.187	.018	10.521	***
Ln_CoreFTE10	<-->	Ln_CoreFTE09	.167	.017	9.924	***
Ln_SchFund_FTE_10	<-->	Ln_CoreFTE07	-.213	.059	-3.573	***
Ln_SchFund_FTE_10	<-->	Ln_CoreFTE06	-.195	.058	-3.363	***
Ln_SchFund_FTE_10	<-->	Ln_CoreFTE08	-.185	.055	-3.374	***
Ln_SchFund_FTE_10	<-->	Ln_CoreFTE09	-.089	.053	-1.677	.094
Ln_SchFund_FTE_10	<-->	Ln_CoreFTE10	-.210	.058	-3.598	***
Ln_SchFund_FTE_10	<-->	Ln_FTE0809	-.536	.089	-6.021	***
Ln_SchFund_FTE_10	<-->	Ln_FTE0910	-.527	.088	-5.964	***
Ln_SchFund_FTE_10	<-->	Ln_FTE0708	-.531	.088	-6.026	***
Ln_SchFund_FTE_10	<-->	Ln_FTE0607	-.527	.087	-6.025	***
Ln_SchFund_FTE_10	<-->	Ln_FTE0506	-.520	.087	-5.953	***
Ln_SchFund_FTE_10	<-->	Ln_Fac_100FTE_10	-.064	.026	-2.434	.015
Ln_SchFund_FTE_10	<-->	Ln_Fac_100FTE_09	-.055	.026	-2.119	.034
Ln_SchFund_FTE_10	<-->	Ln_Fac_100FTE_08	-.047	.026	-1.825	.068
Ln_SchFund_FTE_10	<-->	Ln_Fac_100FTE_07	-.045	.026	-1.708	.088
Ln_SchFund_FTE_10	<-->	Ln_Fac_100FTE_06	-.050	.028	-1.827	.068
Ln_SchFund_FTE_10	<-->	Ln_ER_05	-.149	.048	-3.099	.002
Ln_CoreFTE10	<-->	Ln_SchFund_FTE_09	-.198	.057	-3.483	***
Ln_FTE0910	<-->	Ln_SchFund_FTE_09	-.493	.086	-5.762	***
Ln_Fac_100FTE_10	<-->	Ln_SchFund_FTE_09	-.062	.026	-2.416	.016
Ln_CoreFTE10	<-->	Ln_SchFund_FTE_08	-.208	.060	-3.488	***
Ln_FTE0910	<-->	Ln_SchFund_FTE_08	-.452	.088	-5.112	***
Ln_Fac_100FTE_10	<-->	Ln_SchFund_FTE_08	-.065	.027	-2.408	.016
Ln_CoreFTE10	<-->	Ln_SchFund_FTE_07	-.175	.059	-2.946	.003
Ln_FTE0910	<-->	Ln_SchFund_FTE_07	-.384	.087	-4.409	***
Ln_Fac_100FTE_10	<-->	Ln_SchFund_FTE_07	-.053	.027	-1.953	.051
Ln_CoreFTE10	<-->	Ln_SchFund_FTE_06	-.184	.057	-3.218	.001
Ln_FTE0910	<-->	Ln_SchFund_FTE_06	-.487	.086	-5.639	***
Ln_Fac_100FTE_10	<-->	Ln_SchFund_FTE_06	-.046	.026	-1.762	.078
Ln_FTE0910	<-->	Ln_CoreFTE07	.111	.021	5.265	***
Ln_Fac_100FTE_10	<-->	Ln_CoreFTE07	.067	.008	8.649	***
Ln_FTE0910	<-->	Ln_CoreFTE06	.105	.021	5.136	***
Ln_Fac_100FTE_10	<-->	Ln_CoreFTE06	.064	.008	8.530	***
Ln_FTE0910	<-->	Ln_CoreFTE08	.095	.019	4.897	***
Ln_Fac_100FTE_10	<-->	Ln_CoreFTE08	.063	.007	8.715	***
Ln_FTE0910	<-->	Ln_CoreFTE09	.070	.019	3.728	***
Ln_Fac_100FTE_10	<-->	Ln_CoreFTE09	.056	.007	8.158	***
Ln_CoreFTE10	<-->	Ln_FTE0809	.111	.021	5.341	***
Ln_CoreFTE10	<-->	Ln_FTE0910	.110	.021	5.316	***
Ln_CoreFTE10	<-->	Ln_FTE0708	.113	.021	5.452	***
Ln_CoreFTE10	<-->	Ln_FTE0607	.113	.021	5.501	***
Ln_CoreFTE10	<-->	Ln_FTE0506	.113	.021	5.494	***
Ln_CoreFTE10	<-->	Ln_Fac_100FTE_10	.066	.008	8.665	***
Ln_CoreFTE10	<-->	Ln_Fac_100FTE_09	.066	.008	8.676	***
Ln_CoreFTE10	<-->	Ln_Fac_100FTE_08	.066	.008	8.751	***
Ln_CoreFTE10	<-->	Ln_Fac_100FTE_07	.067	.008	8.813	***
Ln_CoreFTE10	<-->	Ln_Fac_100FTE_06	.067	.008	8.468	***
Ln_CoreFTE10	<-->	Ln_ER_05	.149	.015	9.956	***
Ln_Fac_100FTE_10	<-->	Ln_FTE0809	.000	.009	-.035	.972
Ln_Fac_100FTE_10	<-->	Ln_FTE0910	-.002	.009	-.215	.830
Ln_FTE0910	<-->	Ln_Fac_100FTE_09	-.002	.009	-.272	.786
Ln_FTE0910	<-->	Ln_Fac_100FTE_08	.003	.009	.296	.767
Ln_FTE0910	<-->	Ln_Fac_100FTE_07	.004	.009	.455	.649
Ln_FTE0910	<-->	Ln_Fac_100FTE_06	.008	.009	.872	.383
Ln_FTE0910	<-->	Ln_ER_05	.096	.017	5.549	***
Ln_Fac_100FTE_10	<-->	Ln_FTE0708	.001	.009	.152	.879
			Estimate	S.E.	C.R.	*P*
Ln_Fac_100FTE_10	<-->	Ln_FTE0607	.002	.009	.248	.804

Ln_Fac_100FTE_10	<-->	Ln_FTE0506	.003	.009	.389	.697
Ln_Fac_100FTE_10	<-->	Ln_ER_05	.052	.006	8.378	***
Ln_SchFund_FTE_11	<-->	TFE	-.119	.029	-4.094	***
Ln_CoreFTE11	<-->	TFE	.044	.008	5.181	***
Ln_FTE1011	<-->	TFE	.090	.015	5.965	***
Ln_Fac_100FTE_11	<-->	TFE	.007	.003	2.604	.009
Ln_SchFund_FTE_11	<-->	Ln_SchFund_FTE_06	2.975	.317	9.400	***
Ln_SchFund_FTE_11	<-->	Ln_SchFund_FTE_07	3.160	.332	9.516	***
Ln_SchFund_FTE_11	<-->	Ln_SchFund_FTE_08	3.413	.343	9.961	***
Ln_SchFund_FTE_11	<-->	Ln_SchFund_FTE_09	3.318	.329	10.082	***
Ln_SchFund_FTE_11	<-->	Ln_SchFund_FTE_10	3.551	.344	10.318	***
Ln_FTE1011	<-->	Ln_FTE0506	.408	.039	10.582	***
Ln_FTE1011	<-->	Ln_FTE0607	.410	.039	10.615	***
Ln_FTE1011	<-->	Ln_FTE0708	.414	.039	10.626	***
Ln_FTE1011	<-->	Ln_FTE0809	.420	.039	10.642	***
Ln_FTE1011	<-->	Ln_FTE0910	.418	.039	10.655	***
Ln_Fac_100FTE_11	<-->	Ln_Fac_100FTE_06	.038	.004	9.734	***
Ln_Fac_100FTE_11	<-->	Ln_Fac_100FTE_07	.039	.004	10.138	***
Ln_Fac_100FTE_11	<-->	Ln_Fac_100FTE_08	.039	.004	10.284	***
Ln_Fac_100FTE_11	<-->	Ln_Fac_100FTE_09	.041	.004	10.416	***
Ln_Fac_100FTE_11	<-->	Ln_Fac_100FTE_10	.042	.004	10.521	***
Ln_CoreFTE11	<-->	Ln_CoreFTE06	.196	.019	10.457	***
Ln_CoreFTE11	<-->	Ln_CoreFTE07	.202	.019	10.495	***
Ln_CoreFTE11	<-->	Ln_CoreFTE08	.186	.018	10.481	***
Ln_CoreFTE11	<-->	Ln_CoreFTE09	.160	.016	9.686	***
Ln_CoreFTE11	<-->	Ln_CoreFTE10	.202	.019	10.599	***
Ln_SchFund_FTE_11	<-->	Ln_CoreFTE07	-.245	.063	-3.869	***
Ln_SchFund_FTE_11	<-->	Ln_CoreFTE06	-.229	.062	-3.725	***
Ln_SchFund_FTE_11	<-->	Ln_CoreFTE08	-.210	.058	-3.602	***
Ln_SchFund_FTE_11	<-->	Ln_CoreFTE09	-.119	.057	-2.097	.036
Ln_SchFund_FTE_11	<-->	Ln_CoreFTE10	-.238	.062	-3.834	***
Ln_SchFund_FTE_11	<-->	Ln_CoreFTE11	-.241	.062	-3.891	***
Ln_SchFund_FTE_11	<-->	Ln_FTE1011	-.545	.093	-5.851	***
Ln_SchFund_FTE_11	<-->	Ln_FTE0809	-.554	.094	-5.907	***
Ln_SchFund_FTE_11	<-->	Ln_FTE0910	-.546	.093	-5.860	***
Ln_SchFund_FTE_11	<-->	Ln_FTE0708	-.550	.093	-5.926	***
Ln_SchFund_FTE_11	<-->	Ln_FTE0607	-.545	.092	-5.916	***
Ln_SchFund_FTE_11	<-->	Ln_FTE0506	-.535	.092	-5.813	***
Ln_SchFund_FTE_11	<-->	Ln_Fac_100FTE_11	-.073	.028	-2.607	.009
Ln_SchFund_FTE_11	<-->	Ln_Fac_100FTE_10	-.071	.028	-2.543	.011
Ln_SchFund_FTE_11	<-->	Ln_Fac_100FTE_09	-.061	.028	-2.209	.027
Ln_SchFund_FTE_11	<-->	Ln_Fac_100FTE_08	-.057	.027	-2.065	.039
Ln_SchFund_FTE_11	<-->	Ln_Fac_100FTE_07	-.056	.028	-2.025	.043
Ln_SchFund_FTE_11	<-->	Ln_Fac_100FTE_06	-.067	.029	-2.304	.021
Ln_SchFund_FTE_11	<-->	Ln_ER_05	-.171	.051	-3.341	***
Ln_CoreFTE11	<-->	Ln_SchFund_FTE_10	-.210	.058	-3.591	***
Ln_FTE1011	<-->	Ln_SchFund_FTE_10	-.527	.088	-5.963	***
Ln_Fac_100FTE_11	<-->	Ln_SchFund_FTE_10	-.067	.026	-2.531	.011
Ln_CoreFTE11	<-->	Ln_SchFund_FTE_09	-.200	.057	-3.517	***
Ln_FTE1011	<-->	Ln_SchFund_FTE_09	-.494	.086	-5.765	***
Ln_Fac_100FTE_11	<-->	Ln_SchFund_FTE_09	-.065	.026	-2.527	.012
Ln_CoreFTE11	<-->	Ln_SchFund_FTE_08	-.213	.060	-3.557	***
Ln_FTE1011	<-->	Ln_SchFund_FTE_08	-.452	.088	-5.109	***
Ln_Fac_100FTE_11	<-->	Ln_SchFund_FTE_08	-.068	.027	-2.527	.012
Ln_CoreFTE11	<-->	Ln_SchFund_FTE_07	-.180	.059	-3.030	.002
Ln_FTE1011	<-->	Ln_SchFund_FTE_07	-.385	.087	-4.414	***
Ln_Fac_100FTE_11	<-->	Ln_SchFund_FTE_07	-.054	.027	-2.016	.044
Ln_CoreFTE11	<-->	Ln_SchFund_FTE_06	-.187	.057	-3.268	.001
			Estimate	S.E.	C.R.	*P*
Ln_FTE1011	<-->	Ln_SchFund_FTE_06	-.491	.086	-5.681	***

Ln_Fac_100FTE_11	<-->	Ln_SchFund_FTE_06	-.046	.026	-1.780	.075
Ln_FTE1011	<-->	Ln_CoreFTE07	.111	.021	5.267	***
Ln_Fac_100FTE_11	<-->	Ln_CoreFTE07	.065	.008	8.546	***
Ln_FTE1011	<-->	Ln_CoreFTE06	.106	.021	5.136	***
Ln_Fac_100FTE_11	<-->	Ln_CoreFTE06	.063	.007	8.432	***
Ln_FTE1011	<-->	Ln_CoreFTE08	.095	.019	4.905	***
Ln_Fac_100FTE_11	<-->	Ln_CoreFTE08	.061	.007	8.602	***
Ln_FTE1011	<-->	Ln_CoreFTE09	.070	.019	3.748	***
Ln_Fac_100FTE_11	<-->	Ln_CoreFTE09	.055	.007	8.018	***
Ln_FTE1011	<-->	Ln_CoreFTE10	.110	.021	5.313	***
Ln_Fac_100FTE_11	<-->	Ln_CoreFTE10	.065	.008	8.586	***
Ln_CoreFTE11	<-->	Ln_FTE1011	.115	.021	5.528	***
Ln_CoreFTE11	<-->	Ln_FTE0809	.118	.021	5.597	***
Ln_CoreFTE11	<-->	Ln_FTE0910	.116	.021	5.567	***
Ln_CoreFTE11	<-->	Ln_FTE0708	.119	.021	5.708	***
Ln_CoreFTE11	<-->	Ln_FTE0607	.119	.021	5.748	***
Ln_CoreFTE11	<-->	Ln_FTE0506	.119	.021	5.740	***
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_11	.065	.008	8.634	***
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_10	.066	.008	8.666	***
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_09	.066	.008	8.685	***
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_08	.066	.008	8.768	***
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_07	.068	.008	8.831	***
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_06	.067	.008	8.522	***
Ln_CoreFTE11	<-->	Ln_ER_05	.151	.015	10.005	***
Ln_FTE1011	<-->	Ln_Fac_100FTE_11	-.003	.009	-.302	.763
Ln_FTE1011	<-->	Ln_Fac_100FTE_10	-.002	.009	-.252	.801
Ln_FTE1011	<-->	Ln_Fac_100FTE_09	-.003	.009	-.283	.777
Ln_FTE1011	<-->	Ln_Fac_100FTE_08	.003	.009	.296	.767
Ln_FTE1011	<-->	Ln_Fac_100FTE_07	.004	.009	.457	.648
Ln_FTE1011	<-->	Ln_Fac_100FTE_06	.008	.009	.844	.399
Ln_FTE1011	<-->	Ln_ER_05	.096	.017	5.528	***
Ln_Fac_100FTE_11	<-->	Ln_FTE0809	.000	.009	.002	.998
Ln_Fac_100FTE_11	<-->	Ln_FTE0910	-.002	.009	-.180	.857
Ln_Fac_100FTE_11	<-->	Ln_FTE0708	.002	.009	.181	.856
Ln_Fac_100FTE_11	<-->	Ln_FTE0607	.002	.009	.277	.782
Ln_Fac_100FTE_11	<-->	Ln_FTE0506	.004	.009	.405	.686
Ln_Fac_100FTE_11	<-->	Ln_ER_05	.052	.006	8.347	***
Ln_SchFund_FTE_12	<-->	TFE	-.131	.031	-4.230	***
Ln_CoreFTE12	<-->	TFE	.042	.008	5.142	***
Ln_FTE1112	<-->	TFE	.091	.015	5.949	***
Ln_Fac_100FTE_12	<-->	TFE	.007	.003	2.505	.012
Ln_SchFund_FTE_12	<-->	Ln_SchFund_FTE_06	3.041	.323	9.416	***
Ln_SchFund_FTE_12	<-->	Ln_SchFund_FTE_07	3.126	.334	9.347	***
Ln_SchFund_FTE_12	<-->	Ln_SchFund_FTE_08	3.377	.345	9.797	***
Ln_SchFund_FTE_12	<-->	Ln_SchFund_FTE_09	3.325	.333	9.989	***
Ln_SchFund_FTE_12	<-->	Ln_SchFund_FTE_10	3.485	.345	10.111	***
Ln_SchFund_FTE_12	<-->	Ln_SchFund_FTE_11	3.795	.369	10.274	***
Ln_FTE1112	<-->	Ln_FTE0506	.412	.039	10.564	***
Ln_FTE1112	<-->	Ln_FTE0607	.414	.039	10.598	***
Ln_FTE1112	<-->	Ln_FTE0708	.418	.039	10.611	***
Ln_FTE1112	<-->	Ln_FTE0809	.424	.040	10.628	***
Ln_FTE1112	<-->	Ln_FTE0910	.422	.040	10.642	***
Ln_FTE1112	<-->	Ln_FTE1011	.424	.040	10.654	***
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_06	.037	.004	9.480	***
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_07	.038	.004	9.959	***
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_08	.039	.004	10.127	***
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_09	.040	.004	10.237	***
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_10	.041	.004	10.368	***
			Estimate	S.E.	C.R.	*P*
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_11	.042	.004	10.526	***

Ln_CoreFTE12	<-->	Ln_CoreFTE06	.190	.018	10.398	***
Ln_CoreFTE12	<-->	Ln_CoreFTE07	.196	.019	10.423	***
Ln_CoreFTE12	<-->	Ln_CoreFTE08	.183	.017	10.484	***
Ln_CoreFTE12	<-->	Ln_CoreFTE09	.167	.017	10.016	***
Ln_CoreFTE12	<-->	Ln_CoreFTE10	.198	.019	10.584	***
Ln_CoreFTE12	<-->	Ln_CoreFTE11	.197	.019	10.572	***
Ln_SchFund_FTE_12	<-->	Ln_CoreFTE07	-.267	.065	-4.125	***
Ln_SchFund_FTE_12	<-->	Ln_CoreFTE06	-.249	.063	-3.950	***
Ln_SchFund_FTE_12	<-->	Ln_CoreFTE08	-.229	.060	-3.849	***
Ln_SchFund_FTE_12	<-->	Ln_CoreFTE09	-.131	.058	-2.264	.024
Ln_SchFund_FTE_12	<-->	Ln_CoreFTE10	-.249	.063	-3.930	***
Ln_SchFund_FTE_12	<-->	Ln_CoreFTE11	-.251	.063	-3.971	***
Ln_SchFund_FTE_12	<-->	Ln_CoreFTE12	-.231	.062	-3.729	***
Ln_SchFund_FTE_12	<-->	Ln_FTE1112	-.628	.098	-6.417	***
Ln_SchFund_FTE_12	<-->	Ln_FTE1011	-.621	.097	-6.421	***
Ln_SchFund_FTE_12	<-->	Ln_FTE0809	-.626	.097	-6.433	***
Ln_SchFund_FTE_12	<-->	Ln_FTE0910	-.617	.097	-6.395	***
Ln_SchFund_FTE_12	<-->	Ln_FTE0708	-.620	.096	-6.445	***
Ln_SchFund_FTE_12	<-->	Ln_FTE0607	-.613	.095	-6.421	***
Ln_SchFund_FTE_12	<-->	Ln_FTE0506	-.603	.095	-6.325	***
Ln_SchFund_FTE_12	<-->	Ln_Fac_100FTE_12	-.067	.029	-2.332	.020
Ln_SchFund_FTE_12	<-->	Ln_Fac_100FTE_11	-.072	.028	-2.545	.011
Ln_SchFund_FTE_12	<-->	Ln_Fac_100FTE_10	-.076	.029	-2.646	.008
Ln_SchFund_FTE_12	<-->	Ln_Fac_100FTE_09	-.067	.028	-2.376	.018
Ln_SchFund_FTE_12	<-->	Ln_Fac_100FTE_08	-.065	.028	-2.320	.020
Ln_SchFund_FTE_12	<-->	Ln_Fac_100FTE_07	-.068	.028	-2.396	.017
Ln_SchFund_FTE_12	<-->	Ln_Fac_100FTE_06	-.078	.030	-2.619	.009
Ln_SchFund_FTE_12	<-->	Ln_ER_05	-.184	.052	-3.521	***
Ln_CoreFTE12	<-->	Ln_SchFund_FTE_11	-.223	.061	-3.675	***
Ln_FTE1112	<-->	Ln_SchFund_FTE_11	-.549	.094	-5.825	***
Ln_Fac_100FTE_12	<-->	Ln_SchFund_FTE_11	-.067	.028	-2.393	.017
Ln_CoreFTE12	<-->	Ln_SchFund_FTE_10	-.194	.057	-3.399	***
Ln_FTE1112	<-->	Ln_SchFund_FTE_10	-.532	.089	-5.944	***
Ln_Fac_100FTE_12	<-->	Ln_SchFund_FTE_10	-.061	.027	-2.310	.021
Ln_CoreFTE12	<-->	Ln_SchFund_FTE_09	-.186	.056	-3.333	***
Ln_FTE1112	<-->	Ln_SchFund_FTE_09	-.499	.087	-5.752	***
Ln_Fac_100FTE_12	<-->	Ln_SchFund_FTE_09	-.061	.026	-2.360	.018
Ln_CoreFTE12	<-->	Ln_SchFund_FTE_08	-.199	.059	-3.396	***
Ln_FTE1112	<-->	Ln_SchFund_FTE_08	-.457	.090	-5.101	***
Ln_Fac_100FTE_12	<-->	Ln_SchFund_FTE_08	-.065	.027	-2.378	.017
Ln_CoreFTE12	<-->	Ln_SchFund_FTE_07	-.170	.058	-2.912	.004
Ln_FTE1112	<-->	Ln_SchFund_FTE_07	-.389	.088	-4.401	***
Ln_Fac_100FTE_12	<-->	Ln_SchFund_FTE_07	-.056	.027	-2.065	.039
Ln_CoreFTE12	<-->	Ln_SchFund_FTE_06	-.176	.056	-3.124	.002
Ln_FTE1112	<-->	Ln_SchFund_FTE_06	-.499	.088	-5.698	***
Ln_Fac_100FTE_12	<-->	Ln_SchFund_FTE_06	-.042	.026	-1.615	.106
Ln_FTE1112	<-->	Ln_CoreFTE07	.111	.021	5.219	***
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE07	.065	.008	8.462	***
Ln_FTE1112	<-->	Ln_CoreFTE06	.106	.021	5.089	***
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE06	.063	.007	8.348	***
Ln_FTE1112	<-->	Ln_CoreFTE08	.095	.020	4.858	***
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE08	.061	.007	8.532	***
Ln_FTE1112	<-->	Ln_CoreFTE09	.070	.019	3.688	***
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE09	.055	.007	7.946	***
Ln_FTE1112	<-->	Ln_CoreFTE10	.110	.021	5.249	***
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE10	.065	.008	8.539	***
Ln_FTE1112	<-->	Ln_CoreFTE11	.115	.021	5.470	***
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE11	.065	.008	8.570	***

			Estimate	S.E.	C.R.	*P*
Ln_CoreFTE12	<-->	Ln_FTE1112	.106	.021	5.175	***

			Estimate	S.E.	C.R.	*P*
Ln_CoreFTE12	<-->	Ln_FTE1011	.107	.020	5.272	***
Ln_CoreFTE12	<-->	Ln_FTE0809	.110	.020	5.343	***
Ln_CoreFTE12	<-->	Ln_FTE0910	.108	.020	5.307	***
Ln_CoreFTE12	<-->	Ln_FTE0708	.111	.020	5.451	***
Ln_CoreFTE12	<-->	Ln_FTE0607	.111	.020	5.493	***
Ln_CoreFTE12	<-->	Ln_FTE0506	.111	.020	5.498	***
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_12	.065	.008	8.677	***
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_11	.064	.007	8.669	***
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_10	.065	.007	8.703	***
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_09	.065	.007	8.713	***
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_08	.065	.007	8.797	***
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_07	.066	.008	8.825	***
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_06	.065	.008	8.427	***
Ln_CoreFTE12	<-->	Ln_ER_05	.147	.015	9.953	***
Ln_FTE1112	<-->	Ln_Fac_100FTE_12	-.006	.009	-.697	.486
Ln_FTE1112	<-->	Ln_Fac_100FTE_11	-.003	.009	-.368	.713
Ln_FTE1112	<-->	Ln_Fac_100FTE_10	-.003	.009	-.301	.763
Ln_FTE1112	<-->	Ln_Fac_100FTE_09	-.003	.009	-.326	.745
Ln_FTE1112	<-->	Ln_Fac_100FTE_08	.002	.009	.251	.802
Ln_FTE1112	<-->	Ln_Fac_100FTE_07	.004	.009	.424	.671
Ln_FTE1112	<-->	Ln_Fac_100FTE_06	.008	.009	.879	.380
Ln_FTE1112	<-->	Ln_ER_05	.097	.018	5.497	***
Ln_Fac_100FTE_12	<-->	Ln_FTE1011	-.005	.009	-.539	.590
Ln_Fac_100FTE_12	<-->	Ln_FTE0809	-.002	.009	-.211	.833
Ln_Fac_100FTE_12	<-->	Ln_FTE0910	-.004	.009	-.395	.693
Ln_Fac_100FTE_12	<-->	Ln_FTE0708	.000	.009	-.029	.977
Ln_Fac_100FTE_12	<-->	Ln_FTE0607	.001	.009	.077	.939
Ln_Fac_100FTE_12	<-->	Ln_FTE0506	.002	.009	.206	.837
Ln_Fac_100FTE_12	<-->	Ln_ER_05	.051	.006	8.215	***
Ln_SchFund_FTE_13	<-->	TFE	-.123	.030	-4.120	***
Ln_CoreFTE13	<-->	TFE	.045	.009	5.180	***
Ln_FTE1213	<-->	TFE	.092	.015	5.937	***
Ln_Fac_100FTE_13	<-->	TFE	.005	.003	2.089	.037
Ln_SchFund_FTE_13	<-->	Ln_SchFund_FTE_06	2.887	.312	9.248	***
Ln_SchFund_FTE_13	<-->	Ln_SchFund_FTE_07	3.116	.329	9.459	***
Ln_SchFund_FTE_13	<-->	Ln_SchFund_FTE_08	3.361	.340	9.898	***
Ln_SchFund_FTE_13	<-->	Ln_SchFund_FTE_09	3.179	.322	9.866	***
Ln_SchFund_FTE_13	<-->	Ln_SchFund_FTE_10	3.380	.336	10.070	***
Ln_SchFund_FTE_13	<-->	Ln_SchFund_FTE_11	3.604	.356	10.117	***
Ln_FTE1213	<-->	Ln_FTE0506	.415	.039	10.547	***
Ln_FTE1213	<-->	Ln_FTE0607	.416	.039	10.581	***
Ln_FTE1213	<-->	Ln_FTE0708	.421	.040	10.594	***
Ln_FTE1213	<-->	Ln_FTE0809	.427	.040	10.613	***
Ln_FTE1213	<-->	Ln_FTE0910	.425	.040	10.626	***
Ln_FTE1213	<-->	Ln_FTE1011	.427	.040	10.641	***
Ln_FTE1213	<-->	Ln_FTE1112	.433	.041	10.656	***
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_06	.033	.004	9.083	***
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_07	.035	.004	9.583	***
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_08	.035	.004	9.752	***
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_09	.036	.004	9.889	***
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_11	.039	.004	10.214	***
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_12	.040	.004	10.366	***
Ln_SchFund_FTE_13	<-->	Ln_SchFund_FTE_12	3.764	.367	10.252	***
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_10	.038	.004	10.022	***
Ln_CoreFTE13	<-->	Ln_CoreFTE06	.197	.019	10.377	***
Ln_CoreFTE13	<-->	Ln_CoreFTE07	.203	.020	10.418	***
Ln_CoreFTE13	<-->	Ln_CoreFTE08	.189	.018	10.432	***
Ln_CoreFTE13	<-->	Ln_CoreFTE09	.167	.017	9.795	***
Ln_CoreFTE13	<-->	Ln_CoreFTE10	.205	.019	10.567	***

			Estimate	S.E.	C.R.	*P*
Ln_CoreFTE13	<-->	Ln_CoreFTE11	.206	.019	10.590	***
Ln_CoreFTE13	<-->	Ln_CoreFTE12	.203	.019	10.613	***
Ln_SchFund_FTE_13	<-->	Ln_CoreFTE07	-.272	.064	-4.277	***
Ln_SchFund_FTE_13	<-->	Ln_CoreFTE06	-.251	.062	-4.060	***
Ln_SchFund_FTE_13	<-->	Ln_CoreFTE08	-.237	.058	-4.047	***
Ln_SchFund_FTE_13	<-->	Ln_CoreFTE09	-.135	.057	-2.391	.017
Ln_SchFund_FTE_13	<-->	Ln_CoreFTE10	-.253	.062	-4.074	***
Ln_SchFund_FTE_13	<-->	Ln_CoreFTE11	-.254	.062	-4.086	***
Ln_SchFund_FTE_13	<-->	Ln_CoreFTE12	-.236	.061	-3.883	***
Ln_SchFund_FTE_13	<-->	Ln_CoreFTE13	-.253	.063	-3.997	***
Ln_SchFund_FTE_13	<-->	Ln_FTE1213	-.609	.096	-6.316	***
Ln_SchFund_FTE_13	<-->	Ln_FTE1112	-.602	.095	-6.311	***
Ln_SchFund_FTE_13	<-->	Ln_FTE1011	-.594	.094	-6.303	***
Ln_SchFund_FTE_13	<-->	Ln_FTE0809	-.598	.095	-6.315	***
Ln_SchFund_FTE_13	<-->	Ln_FTE0910	-.592	.094	-6.296	***
Ln_SchFund_FTE_13	<-->	Ln_FTE0708	-.591	.094	-6.307	***
Ln_SchFund_FTE_13	<-->	Ln_FTE0607	-.585	.093	-6.295	***
Ln_SchFund_FTE_13	<-->	Ln_FTE0506	-.580	.093	-6.235	***
Ln_SchFund_FTE_13	<-->	Ln_Fac_100FTE_13	-.050	.027	-1.833	.067
Ln_SchFund_FTE_13	<-->	Ln_Fac_100FTE_12	-.065	.028	-2.306	.021
Ln_SchFund_FTE_13	<-->	Ln_Fac_100FTE_11	-.070	.028	-2.541	.011
Ln_SchFund_FTE_13	<-->	Ln_Fac_100FTE_10	-.071	.028	-2.529	.011
Ln_SchFund_FTE_13	<-->	Ln_Fac_100FTE_09	-.065	.028	-2.345	.019
Ln_SchFund_FTE_13	<-->	Ln_Fac_100FTE_08	-.064	.027	-2.333	.020
Ln_SchFund_FTE_13	<-->	Ln_Fac_100FTE_07	-.064	.028	-2.318	.020
Ln_SchFund_FTE_13	<-->	Ln_Fac_100FTE_06	-.069	.029	-2.379	.017
Ln_SchFund_FTE_13	<-->	Ln_ER_05	-.178	.051	-3.475	***
Ln_CoreFTE13	<-->	Ln_SchFund_FTE_12	-.250	.065	-3.869	***
Ln_FTE1213	<-->	Ln_SchFund_FTE_12	-.634	.099	-6.408	***
Ln_Fac_100FTE_13	<-->	Ln_SchFund_FTE_12	-.053	.028	-1.925	.054
Ln_CoreFTE13	<-->	Ln_SchFund_FTE_11	-.242	.063	-3.819	***
Ln_FTE1213	<-->	Ln_SchFund_FTE_11	-.551	.095	-5.793	***
Ln_Fac_100FTE_13	<-->	Ln_SchFund_FTE_11	-.058	.027	-2.121	.034
Ln_CoreFTE13	<-->	Ln_SchFund_FTE_10	-.213	.060	-3.570	***
Ln_FTE1213	<-->	Ln_SchFund_FTE_10	-.535	.090	-5.925	***
Ln_Fac_100FTE_13	<-->	Ln_SchFund_FTE_10	-.051	.026	-1.992	.046
Ln_CoreFTE13	<-->	Ln_SchFund_FTE_09	-.205	.058	-3.521	***
Ln_FTE1213	<-->	Ln_SchFund_FTE_09	-.503	.088	-5.738	***
Ln_Fac_100FTE_13	<-->	Ln_SchFund_FTE_09	-.058	.025	-2.294	.022
Ln_CoreFTE13	<-->	Ln_SchFund_FTE_08	-.217	.061	-3.541	***
Ln_FTE1213	<-->	Ln_SchFund_FTE_08	-.461	.090	-5.093	***
Ln_Fac_100FTE_13	<-->	Ln_SchFund_FTE_08	-.059	.026	-2.244	.025
Ln_CoreFTE13	<-->	Ln_SchFund_FTE_07	-.185	.061	-3.046	.002
Ln_FTE1213	<-->	Ln_SchFund_FTE_07	-.387	.089	-4.348	***
Ln_Fac_100FTE_13	<-->	Ln_SchFund_FTE_07	-.054	.026	-2.057	.040
Ln_CoreFTE13	<-->	Ln_SchFund_FTE_06	-.190	.059	-3.235	.001
Ln_FTE1213	<-->	Ln_SchFund_FTE_06	-.501	.088	-5.668	***
Ln_Fac_100FTE_13	<-->	Ln_SchFund_FTE_06	-.040	.025	-1.586	.113
Ln_FTE1213	<-->	Ln_CoreFTE07	.113	.022	5.250	***
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE07	.059	.007	8.062	***
Ln_FTE1213	<-->	Ln_CoreFTE06	.107	.021	5.115	***
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE06	.056	.007	7.923	***
Ln_FTE1213	<-->	Ln_CoreFTE08	.097	.020	4.889	***
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE08	.055	.007	8.089	***
Ln_FTE1213	<-->	Ln_CoreFTE09	.071	.019	3.701	***
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE09	.050	.007	7.612	***
Ln_FTE1213	<-->	Ln_CoreFTE10	.111	.021	5.264	***
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE10	.059	.007	8.144	***
Ln_FTE1213	<-->	Ln_CoreFTE11	.117	.021	5.480	***

Ln_Fac_100FTE_13	<-->	Ln_CoreFTE11	.059	.007	8.144	***
Ln_FTE1213	<-->	Ln_CoreFTE12	.108	.021	5.182	***
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE12	.059	.007	8.311	***
Ln_CoreFTE13	<-->	Ln_FTE1213	.115	.022	5.289	***
Ln_CoreFTE13	<-->	Ln_FTE1112	.114	.021	5.306	***
Ln_CoreFTE13	<-->	Ln_FTE1011	.115	.021	5.412	***
Ln_CoreFTE13	<-->	Ln_FTE0809	.117	.021	5.477	***
Ln_CoreFTE13	<-->	Ln_FTE0910	.116	.021	5.451	***
Ln_CoreFTE13	<-->	Ln_FTE0708	.118	.021	5.574	***
Ln_CoreFTE13	<-->	Ln_FTE0607	.118	.021	5.612	***
Ln_CoreFTE13	<-->	Ln_FTE0506	.119	.021	5.613	***
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_13	.062	.007	8.293	***
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_12	.068	.008	8.655	***
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_11	.067	.008	8.647	***
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_10	.068	.008	8.672	***
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_09	.067	.008	8.691	***
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_08	.068	.008	8.777	***
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_07	.069	.008	8.819	***
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_06	.068	.008	8.443	***
Ln_CoreFTE13	<-->	Ln_ER_05	.153	.015	9.966	***
Ln_FTE1213	<-->	Ln_Fac_100FTE_13	-.013	.009	-1.495	.135
Ln_FTE1213	<-->	Ln_Fac_100FTE_12	-.006	.009	-.698	.485
Ln_FTE1213	<-->	Ln_Fac_100FTE_11	-.003	.009	-.346	.729
Ln_FTE1213	<-->	Ln_Fac_100FTE_10	-.003	.009	-.288	.773
Ln_FTE1213	<-->	Ln_Fac_100FTE_09	-.003	.009	-.308	.758
Ln_FTE1213	<-->	Ln_Fac_100FTE_08	.003	.009	.281	.779
Ln_FTE1213	<-->	Ln_Fac_100FTE_07	.004	.009	.453	.650
Ln_FTE1213	<-->	Ln_Fac_100FTE_06	.009	.010	.901	.368
Ln_FTE1213	<-->	Ln_ER_05	.097	.018	5.493	***
Ln_Fac_100FTE_13	<-->	Ln_FTE1112	-.013	.009	-1.421	.155
Ln_Fac_100FTE_13	<-->	Ln_FTE1011	-.011	.009	-1.239	.215
Ln_Fac_100FTE_13	<-->	Ln_FTE0809	-.008	.009	-.904	.366
Ln_Fac_100FTE_13	<-->	Ln_FTE0910	-.010	.009	-1.096	.273
Ln_Fac_100FTE_13	<-->	Ln_FTE0708	-.006	.009	-.690	.490
Ln_Fac_100FTE_13	<-->	Ln_FTE0607	-.005	.009	-.592	.554
Ln_Fac_100FTE_13	<-->	Ln_FTE0506	-.004	.009	-.466	.641
Ln_Fac_100FTE_13	<-->	Ln_ER_05	.046	.006	7.834	***
Ln_SchFund_FTE_14	<-->	TFE	-.116	.029	-3.979	***
Ln_CoreFTE14	<-->	TFE	.046	.009	5.271	***
Ln_FTE1314	<-->	TFE	.093	.016	5.930	***
Ln_Fac_100FTE_14	<-->	TFE	.005	.003	2.059	.039
Ln_CoreFTE14	<-->	Ln_SchFund_FTE_13	-.275	.064	-4.273	***
Ln_FTE1314	<-->	Ln_SchFund_FTE_13	-.617	.098	-6.310	***
Ln_Fac_100FTE_14	<-->	Ln_SchFund_FTE_13	-.042	.027	-1.545	.122
Ln_SchFund_FTE_14	<-->	Ln_SchFund_FTE_13	3.764	.362	10.400	***
Ln_CoreFTE14	<-->	Ln_SchFund_FTE_12	-.269	.066	-4.108	***
Ln_FTE1314	<-->	Ln_SchFund_FTE_12	-.642	.100	-6.402	***
Ln_Fac_100FTE_14	<-->	Ln_SchFund_FTE_12	-.045	.028	-1.588	.112
Ln_SchFund_FTE_14	<-->	Ln_SchFund_FTE_12	3.672	.362	10.139	***
Ln_CoreFTE14	<-->	Ln_SchFund_FTE_11	-.266	.064	-4.125	***
Ln_FTE1314	<-->	Ln_SchFund_FTE_11	-.558	.096	-5.788	***
Ln_Fac_100FTE_14	<-->	Ln_SchFund_FTE_11	-.049	.028	-1.792	.073
Ln_SchFund_FTE_14	<-->	Ln_SchFund_FTE_11	3.506	.351	9.988	***
Ln_CoreFTE14	<-->	Ln_SchFund_FTE_10	-.237	.061	-3.913	***
Ln_FTE1314	<-->	Ln_SchFund_FTE_10	-.542	.092	-5.922	***
Ln_Fac_100FTE_14	<-->	Ln_SchFund_FTE_10	-.043	.026	-1.660	.097
Ln_SchFund_FTE_14	<-->	Ln_SchFund_FTE_10	3.172	.326	9.736	***
Ln_CoreFTE14	<-->	Ln_SchFund_FTE_09	-.225	.059	-3.819	***
			Estimate	S.E.	C.R.	*P*
Ln_FTE1314	<-->	Ln_SchFund_FTE_09	-.506	.089	-5.705	***

Ln_Fac_100FTE_14	<-->	Ln_SchFund_FTE_09	-.052	.025	-2.037	.042
Ln_SchFund_FTE_14	<-->	Ln_SchFund_FTE_09	3.022	.315	9.603	***
Ln_CoreFTE14	<-->	Ln_SchFund_FTE_08	-.235	.062	-3.785	***
Ln_FTE1314	<-->	Ln_SchFund_FTE_08	-.466	.092	-5.077	***
Ln_Fac_100FTE_14	<-->	Ln_SchFund_FTE_08	-.053	.027	-1.962	.050
Ln_SchFund_FTE_14	<-->	Ln_SchFund_FTE_08	3.248	.334	9.730	***
Ln_CoreFTE14	<-->	Ln_SchFund_FTE_07	-.201	.062	-3.267	.001
Ln_FTE1314	<-->	Ln_SchFund_FTE_07	-.387	.090	-4.292	***
Ln_Fac_100FTE_14	<-->	Ln_SchFund_FTE_07	-.048	.027	-1.800	.072
Ln_SchFund_FTE_14	<-->	Ln_SchFund_FTE_07	2.978	.323	9.222	***
Ln_CoreFTE14	<-->	Ln_SchFund_FTE_06	-.212	.059	-3.562	***
Ln_FTE1314	<-->	Ln_SchFund_FTE_06	-.506	.090	-5.645	***
Ln_Fac_100FTE_14	<-->	Ln_SchFund_FTE_06	-.033	.026	-1.305	.192
Ln_SchFund_FTE_14	<-->	Ln_SchFund_FTE_06	2.768	.307	9.030	***
Ln_CoreFTE14	<-->	Ln_CoreFTE07	.205	.020	10.408	***
Ln_FTE1314	<-->	Ln_CoreFTE07	.117	.022	5.322	***
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE07	.060	.007	8.019	***
Ln_SchFund_FTE_14	<-->	Ln_CoreFTE07	-.287	.064	-4.513	***
Ln_CoreFTE14	<-->	Ln_CoreFTE06	.198	.019	10.361	***
Ln_FTE1314	<-->	Ln_CoreFTE06	.111	.021	5.182	***
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE06	.057	.007	7.884	***
Ln_SchFund_FTE_14	<-->	Ln_CoreFTE06	-.272	.062	-4.401	***
Ln_CoreFTE14	<-->	Ln_CoreFTE08	.190	.018	10.412	***
Ln_FTE1314	<-->	Ln_CoreFTE08	.099	.020	4.946	***
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE08	.055	.007	8.039	***
Ln_SchFund_FTE_14	<-->	Ln_CoreFTE08	-.243	.058	-4.160	***
Ln_CoreFTE14	<-->	Ln_CoreFTE09	.164	.017	9.654	***
Ln_FTE1314	<-->	Ln_CoreFTE09	.074	.019	3.786	***
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE09	.050	.007	7.520	***
Ln_SchFund_FTE_14	<-->	Ln_CoreFTE09	-.141	.056	-2.508	.012
Ln_CoreFTE14	<-->	Ln_CoreFTE10	.206	.020	10.530	***
Ln_FTE1314	<-->	Ln_CoreFTE10	.115	.021	5.330	***
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE10	.059	.007	8.093	***
Ln_SchFund_FTE_14	<-->	Ln_CoreFTE10	-.261	.062	-4.220	***
Ln_CoreFTE14	<-->	Ln_CoreFTE11	.207	.020	10.557	***
Ln_FTE1314	<-->	Ln_CoreFTE11	.120	.022	5.543	***
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE11	.059	.007	8.097	***
Ln_SchFund_FTE_14	<-->	Ln_CoreFTE11	-.267	.062	-4.304	***
Ln_CoreFTE14	<-->	Ln_CoreFTE12	.203	.019	10.557	***
Ln_FTE1314	<-->	Ln_CoreFTE12	.111	.021	5.245	***
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE12	.060	.007	8.266	***
Ln_SchFund_FTE_14	<-->	Ln_CoreFTE12	-.245	.061	-4.035	***
Ln_CoreFTE14	<-->	Ln_CoreFTE13	.213	.020	10.595	***
Ln_FTE1314	<-->	Ln_CoreFTE13	.118	.022	5.344	***
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE13	.062	.008	8.256	***
Ln_SchFund_FTE_14	<-->	Ln_CoreFTE13	-.262	.063	-4.134	***
Ln_CoreFTE14	<-->	Ln_FTE1213	.124	.022	5.630	***
Ln_FTE1314	<-->	Ln_FTE1213	.444	.042	10.652	***
Ln_Fac_100FTE_14	<-->	Ln_FTE1213	-.013	.009	-1.401	.161
Ln_SchFund_FTE_14	<-->	Ln_FTE1213	-.573	.095	-6.024	***
Ln_CoreFTE14	<-->	Ln_FTE1112	.123	.022	5.645	***
Ln_FTE1314	<-->	Ln_FTE1112	.438	.041	10.639	***
Ln_Fac_100FTE_14	<-->	Ln_FTE1112	-.012	.009	-1.342	.180
Ln_SchFund_FTE_14	<-->	Ln_FTE1112	-.564	.094	-5.998	***
Ln_CoreFTE14	<-->	Ln_FTE1011	.124	.022	5.740	***
Ln_FTE1314	<-->	Ln_FTE1011	.431	.041	10.621	***
Ln_Fac_100FTE_14	<-->	Ln_FTE1011	-.010	.009	-1.163	.245
Ln_SchFund_FTE_14	<-->	Ln_FTE1011	-.555	.093	-5.980	***
			Estimate	S.E.	C.R.	*P*
Ln_CoreFTE14	<-->	Ln_FTE0809	.126	.022	5.790	***

Ln_FTE1314	<-->	Ln_FTE0809	.431	.041	10.591	***
Ln_Fac_100FTE_14	<-->	Ln_FTE0809	-.008	.009	-.892	.372
Ln_SchFund_FTE_14	<-->	Ln_FTE0809	-.561	.093	-6.013	***
Ln_CoreFTE14	<-->	Ln_FTE0910	.125	.022	5.769	***
Ln_FTE1314	<-->	Ln_FTE0910	.429	.041	10.604	***
Ln_Fac_100FTE_14	<-->	Ln_FTE0910	-.009	.009	-1.057	.291
Ln_SchFund_FTE_14	<-->	Ln_FTE0910	-.555	.093	-5.982	***
Ln_CoreFTE14	<-->	Ln_FTE0708	.127	.022	5.862	***
Ln_FTE1314	<-->	Ln_FTE0708	.425	.040	10.579	***
Ln_Fac_100FTE_14	<-->	Ln_FTE0708	-.006	.009	-.724	.469
Ln_SchFund_FTE_14	<-->	Ln_FTE0708	-.558	.092	-6.035	***
Ln_CoreFTE14	<-->	Ln_FTE0607	.127	.021	5.902	***
Ln_FTE1314	<-->	Ln_FTE0607	.421	.040	10.563	***
Ln_Fac_100FTE_14	<-->	Ln_FTE0607	-.005	.009	-.611	.541
Ln_SchFund_FTE_14	<-->	Ln_FTE0607	-.552	.092	-6.022	***
Ln_CoreFTE14	<-->	Ln_FTE0506	.127	.022	5.897	***
Ln_FTE1314	<-->	Ln_FTE0506	.419	.040	10.529	***
Ln_Fac_100FTE_14	<-->	Ln_FTE0506	-.004	.009	-.474	.635
Ln_SchFund_FTE_14	<-->	Ln_FTE0506	-.540	.092	-5.897	***
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_13	.060	.007	8.111	***
Ln_FTE1314	<-->	Ln_Fac_100FTE_13	-.013	.009	-1.435	.151
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_13	.041	.004	10.496	***
Ln_SchFund_FTE_14	<-->	Ln_Fac_100FTE_13	-.061	.027	-2.252	.024
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_12	.066	.008	8.459	***
Ln_FTE1314	<-->	Ln_Fac_100FTE_12	-.006	.009	-.599	.549
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_12	.040	.004	10.294	***
Ln_SchFund_FTE_14	<-->	Ln_Fac_100FTE_12	-.073	.028	-2.614	.009
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_11	.065	.008	8.460	***
Ln_FTE1314	<-->	Ln_Fac_100FTE_11	-.002	.009	-.217	.829
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_11	.039	.004	10.139	***
Ln_SchFund_FTE_14	<-->	Ln_Fac_100FTE_11	-.080	.028	-2.871	.004
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_10	.066	.008	8.483	***
Ln_FTE1314	<-->	Ln_Fac_100FTE_10	-.001	.009	-.158	.874
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_10	.038	.004	9.984	***
Ln_SchFund_FTE_14	<-->	Ln_Fac_100FTE_10	-.079	.028	-2.837	.005
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_09	.066	.008	8.514	***
Ln_FTE1314	<-->	Ln_Fac_100FTE_09	-.002	.009	-.173	.863
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_09	.037	.004	9.867	***
Ln_SchFund_FTE_14	<-->	Ln_Fac_100FTE_09	-.074	.028	-2.688	.007
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_08	.066	.008	8.607	***
Ln_FTE1314	<-->	Ln_Fac_100FTE_08	.004	.009	.418	.676
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_08	.036	.004	9.761	***
Ln_SchFund_FTE_14	<-->	Ln_Fac_100FTE_08	-.074	.027	-2.701	.007
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_07	.068	.008	8.648	***
Ln_FTE1314	<-->	Ln_Fac_100FTE_07	.005	.009	.592	.554
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_07	.035	.004	9.579	***
Ln_SchFund_FTE_14	<-->	Ln_Fac_100FTE_07	-.075	.028	-2.697	.007
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_06	.067	.008	8.271	***
Ln_FTE1314	<-->	Ln_Fac_100FTE_06	.010	.010	1.009	.313
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_06	.034	.004	9.068	***
Ln_SchFund_FTE_14	<-->	Ln_Fac_100FTE_06	-.086	.029	-2.945	.003
Ln_CoreFTE14	<-->	Ln_ER_05	.154	.015	9.935	***
Ln_FTE1314	<-->	Ln_ER_05	.100	.018	5.570	***
Ln_Fac_100FTE_14	<-->	Ln_ER_05	.047	.006	7.760	***
Ln_SchFund_FTE_14	<-->	Ln_ER_05	-.179	.051	-3.510	***
Ln_CoreFTE14	<-->	Ln_FTE1314	.127	.022	5.648	***
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_14	.061	.008	8.117	***
Ln_SchFund_FTE_14	<-->	Ln_CoreFTE14	-.282	.064	-4.385	***

			Estimate	S.E.	C.R.	*P*
Ln_FTE1314	<-->	Ln_Fac_100FTE_14	-.013	.009	-1.419	.156

Ln_SchFund_FTE_14	<-->	Ln_FTE1314	-.583	.096	-6.043	***
Ln_SchFund_FTE_14	<-->	Ln_Fac_100FTE_14	-.053	.027	-1.935	

Table B.2

Estimated correlations for fixed effects models using school funds per FTE (log)

			Estimate
Ln_SchFund_FTE_06	<-->	TFE	-.365
Ln_CoreFTE06	<-->	TFE	.573
Ln_FTE0506	<-->	TFE	.882
Ln_Fac_100FTE_06	<-->	TFE	.254
Ln_SchFund_FTE_06	<-->	Ln_CoreFTE06	-.210
Ln_SchFund_FTE_06	<-->	Ln_FTE0506	-.400
Ln_SchFund_FTE_06	<-->	Ln_Fac_100FTE_06	-.100
Ln_SchFund_FTE_06	<-->	Ln_ER_05	-.202
Ln_CoreFTE06	<-->	Ln_FTE0506	.357
Ln_CoreFTE06	<-->	Ln_Fac_100FTE_06	.736
Ln_CoreFTE06	<-->	Ln_ER_05	.892
Ln_ER_05	<-->	TFE	.703
Ln_FTE0506	<-->	Ln_Fac_100FTE_06	.045
Ln_FTE0506	<-->	Ln_ER_05	.396
Ln_Fac_100FTE_06	<-->	Ln_ER_05	.705
Ln_SchFund_FTE_07	<-->	TFE	-.272
Ln_CoreFTE07	<-->	TFE	.585
Ln_FTE0607	<-->	TFE	.887
Ln_Fac_100FTE_07	<-->	TFE	.243
Ln_SchFund_FTE_07	<-->	Ln_SchFund_FTE_06	.849
Ln_FTE0607	<-->	Ln_FTE0506	.996
Ln_Fac_100FTE_07	<-->	Ln_Fac_100FTE_06	.935
Ln_CoreFTE07	<-->	Ln_CoreFTE06	.983
Ln_SchFund_FTE_07	<-->	Ln_CoreFTE07	-.214
Ln_SchFund_FTE_07	<-->	Ln_CoreFTE06	-.201
Ln_SchFund_FTE_07	<-->	Ln_FTE0607	-.309
Ln_SchFund_FTE_07	<-->	Ln_FTE0506	-.304
Ln_SchFund_FTE_07	<-->	Ln_Fac_100FTE_07	-.117
Ln_SchFund_FTE_07	<-->	Ln_Fac_100FTE_06	-.118
Ln_SchFund_FTE_07	<-->	Ln_ER_05	-.177
Ln_CoreFTE07	<-->	Ln_SchFund_FTE_06	-.227
Ln_FTE0607	<-->	Ln_SchFund_FTE_06	-.406
Ln_Fac_100FTE_07	<-->	Ln_SchFund_FTE_06	-.099
Ln_CoreFTE07	<-->	Ln_FTE0607	.379
Ln_CoreFTE07	<-->	Ln_FTE0506	.379
Ln_CoreFTE07	<-->	Ln_Fac_100FTE_07	.753
Ln_CoreFTE07	<-->	Ln_Fac_100FTE_06	.715
Ln_CoreFTE07	<-->	Ln_ER_05	.894
Ln_FTE0607	<-->	Ln_CoreFTE06	.367
Ln_Fac_100FTE_07	<-->	Ln_CoreFTE06	.745
Ln_FTE0607	<-->	Ln_Fac_100FTE_07	.042
Ln_FTE0607	<-->	Ln_Fac_100FTE_06	.061
Ln_FTE0607	<-->	Ln_ER_05	.399
Ln_Fac_100FTE_07	<-->	Ln_FTE0506	.048
Ln_Fac_100FTE_07	<-->	Ln_ER_05	.728
Ln_SchFund_FTE_08	<-->	TFE	-.337
Ln_CoreFTE08	<-->	TFE	.568
Ln_FTE0708	<-->	TFE	.886
Ln_Fac_100FTE_08	<-->	TFE	.229
Ln_SchFund_FTE_08	<-->	Ln_SchFund_FTE_07	.899
Ln_SchFund_FTE_08	<-->	Ln_SchFund_FTE_06	.858
Ln_FTE0708	<-->	Ln_FTE0506	.993
Ln_FTE0708	<-->	Ln_FTE0607	.999
Ln_Fac_100FTE_08	<-->	Ln_Fac_100FTE_06	.889
Ln_Fac_100FTE_08	<-->	Ln_Fac_100FTE_07	.976

			Estimate
Ln_CoreFTE08	<-->	Ln_CoreFTE06	.974
Ln_CoreFTE08	<-->	Ln_CoreFTE07	.979
Ln_SchFund_FTE_08	<-->	Ln_CoreFTE07	-.245
Ln_SchFund_FTE_08	<-->	Ln_CoreFTE06	-.233
Ln_SchFund_FTE_08	<-->	Ln_CoreFTE08	-.229
Ln_SchFund_FTE_08	<-->	Ln_FTE0708	-.366
Ln_SchFund_FTE_08	<-->	Ln_FTE0607	-.366
Ln_SchFund_FTE_08	<-->	Ln_FTE0506	-.358
Ln_SchFund_FTE_08	<-->	Ln_Fac_100FTE_08	-.138
Ln_SchFund_FTE_08	<-->	Ln_Fac_100FTE_07	-.128
Ln_SchFund_FTE_08	<-->	Ln_Fac_100FTE_06	-.134
Ln_SchFund_FTE_08	<-->	Ln_ER_05	-.226
Ln_CoreFTE08	<-->	Ln_SchFund_FTE_07	-.193
Ln_FTE0708	<-->	Ln_SchFund_FTE_07	-.312
Ln_Fac_100FTE_08	<-->	Ln_SchFund_FTE_07	-.119
Ln_CoreFTE08	<-->	Ln_SchFund_FTE_06	-.195
Ln_FTE0708	<-->	Ln_SchFund_FTE_06	-.408
Ln_Fac_100FTE_08	<-->	Ln_SchFund_FTE_06	-.105
Ln_FTE0708	<-->	Ln_CoreFTE07	.379
Ln_Fac_100FTE_08	<-->	Ln_CoreFTE07	.740
Ln_FTE0708	<-->	Ln_CoreFTE06	.367
Ln_Fac_100FTE_08	<-->	Ln_CoreFTE06	.722
Ln_CoreFTE08	<-->	Ln_FTE0708	.349
Ln_CoreFTE08	<-->	Ln_FTE0607	.352
Ln_CoreFTE08	<-->	Ln_FTE0506	.352
Ln_CoreFTE08	<-->	Ln_Fac_100FTE_08	.740
Ln_CoreFTE08	<-->	Ln_Fac_100FTE_07	.748
Ln_CoreFTE08	<-->	Ln_Fac_100FTE_06	.709
Ln_CoreFTE08	<-->	Ln_ER_05	.885
Ln_FTE0708	<-->	Ln_Fac_100FTE_08	.031
Ln_FTE0708	<-->	Ln_Fac_100FTE_07	.040
Ln_FTE0708	<-->	Ln_Fac_100FTE_06	.063
Ln_FTE0708	<-->	Ln_ER_05	.401
Ln_Fac_100FTE_08	<-->	Ln_FTE0607	.037
Ln_Fac_100FTE_08	<-->	Ln_FTE0506	.050
Ln_Fac_100FTE_08	<-->	Ln_ER_05	.695
Ln_SchFund_FTE_09	<-->	TFE	-.362
Ln_CoreFTE09	<-->	TFE	.481
Ln_FTE0809	<-->	TFE	.885
Ln_Fac_100FTE_09	<-->	TFE	.204
Ln_SchFund_FTE_09	<-->	Ln_SchFund_FTE_06	.873
Ln_SchFund_FTE_09	<-->	Ln_SchFund_FTE_07	.867
Ln_SchFund_FTE_09	<-->	Ln_SchFund_FTE_08	.922
Ln_FTE0809	<-->	Ln_FTE0506	.991
Ln_FTE0809	<-->	Ln_FTE0607	.996
Ln_FTE0809	<-->	Ln_FTE0708	.998
Ln_Fac_100FTE_09	<-->	Ln_Fac_100FTE_06	.874
Ln_Fac_100FTE_09	<-->	Ln_Fac_100FTE_07	.954
Ln_Fac_100FTE_09	<-->	Ln_Fac_100FTE_08	.980
Ln_CoreFTE09	<-->	Ln_CoreFTE06	.846
Ln_CoreFTE09	<-->	Ln_CoreFTE07	.831
Ln_CoreFTE09	<-->	Ln_CoreFTE08	.883
Ln_SchFund_FTE_09	<-->	Ln_CoreFTE07	-.250
Ln_SchFund_FTE_09	<-->	Ln_CoreFTE06	-.229
Ln_SchFund_FTE_09	<-->	Ln_CoreFTE08	-.225
Ln_SchFund_FTE_09	<-->	Ln_CoreFTE09	-.089
Ln_SchFund_FTE_09	<-->	Ln_FTE0809	-.418
Ln_SchFund_FTE_09	<-->	Ln_FTE0708	-.420
Ln_SchFund_FTE_09	<-->	Ln_FTE0607	-.419

			Estimate
Ln_SchFund_FTE_09	<-->	Ln_FTE0506	-.415
Ln_SchFund_FTE_09	<-->	Ln_Fac_100FTE_09	-.147
Ln_SchFund_FTE_09	<-->	Ln_Fac_100FTE_08	-.134
Ln_SchFund_FTE_09	<-->	Ln_Fac_100FTE_07	-.124
Ln_SchFund_FTE_09	<-->	Ln_Fac_100FTE_06	-.125
Ln_SchFund_FTE_09	<-->	Ln_ER_05	-.211
Ln_CoreFTE09	<-->	Ln_SchFund_FTE_08	-.112
Ln_FTE0809	<-->	Ln_SchFund_FTE_08	-.364
Ln_Fac_100FTE_09	<-->	Ln_SchFund_FTE_08	-.150
Ln_CoreFTE09	<-->	Ln_SchFund_FTE_07	-.079
Ln_FTE0809	<-->	Ln_SchFund_FTE_07	-.310
Ln_Fac_100FTE_09	<-->	Ln_SchFund_FTE_07	-.119
Ln_CoreFTE09	<-->	Ln_SchFund_FTE_06	-.079
Ln_FTE0809	<-->	Ln_SchFund_FTE_06	-.407
Ln_Fac_100FTE_09	<-->	Ln_SchFund_FTE_06	-.103
Ln_FTE0809	<-->	Ln_CoreFTE07	.372
Ln_Fac_100FTE_09	<-->	Ln_CoreFTE07	.719
Ln_FTE0809	<-->	Ln_CoreFTE06	.361
Ln_Fac_100FTE_09	<-->	Ln_CoreFTE06	.702
Ln_FTE0809	<-->	Ln_CoreFTE08	.344
Ln_Fac_100FTE_09	<-->	Ln_CoreFTE08	.723
Ln_CoreFTE09	<-->	Ln_FTE0809	.255
Ln_CoreFTE09	<-->	Ln_FTE0708	.263
Ln_CoreFTE09	<-->	Ln_FTE0607	.267
Ln_CoreFTE09	<-->	Ln_FTE0506	.268
Ln_CoreFTE09	<-->	Ln_Fac_100FTE_09	.655
Ln_CoreFTE09	<-->	Ln_Fac_100FTE_08	.664
Ln_CoreFTE09	<-->	Ln_Fac_100FTE_07	.669
Ln_CoreFTE09	<-->	Ln_Fac_100FTE_06	.631
Ln_CoreFTE09	<-->	Ln_ER_05	.783
Ln_FTE0809	<-->	Ln_Fac_100FTE_09	-.012
Ln_FTE0809	<-->	Ln_Fac_100FTE_08	.024
Ln_FTE0809	<-->	Ln_Fac_100FTE_07	.033
Ln_FTE0809	<-->	Ln_Fac_100FTE_06	.059
Ln_FTE0809	<-->	Ln_ER_05	.397
Ln_Fac_100FTE_09	<-->	Ln_FTE0708	.000
Ln_Fac_100FTE_09	<-->	Ln_FTE0607	.006
Ln_Fac_100FTE_09	<-->	Ln_FTE0506	.018
Ln_Fac_100FTE_09	<-->	Ln_ER_05	.680
Ln_SchFund_FTE_10	<-->	TFE	-.379
Ln_CoreFTE10	<-->	TFE	.597
Ln_Fac_100FTE_10	<-->	TFE	.211
Ln_SchFund_FTE_10	<-->	Ln_SchFund_FTE_06	.843
Ln_SchFund_FTE_10	<-->	Ln_SchFund_FTE_07	.831
Ln_SchFund_FTE_10	<-->	Ln_SchFund_FTE_08	.896
Ln_SchFund_FTE_10	<-->	Ln_SchFund_FTE_09	.959
Ln_FTE0910	<-->	Ln_FTE0506	.988
Ln_FTE0910	<-->	Ln_FTE0607	.994
Ln_FTE0910	<-->	Ln_FTE0708	.996
Ln_FTE0910	<-->	Ln_FTE0809	.999
Ln_Fac_100FTE_10	<-->	Ln_Fac_100FTE_06	.859
Ln_Fac_100FTE_10	<-->	Ln_Fac_100FTE_07	.931
Ln_Fac_100FTE_10	<-->	Ln_Fac_100FTE_08	.955
Ln_Fac_100FTE_10	<-->	Ln_Fac_100FTE_09	.983
Ln_FTE0910	<-->	TFE	.884
Ln_CoreFTE10	<-->	Ln_CoreFTE06	.964
Ln_CoreFTE10	<-->	Ln_CoreFTE07	.970
Ln_CoreFTE10	<-->	Ln_CoreFTE08	.976
Ln_CoreFTE10	<-->	Ln_CoreFTE09	.876

			Estimate
Ln_SchFund_FTE_10	<-->	Ln_CoreFTE07	-.244
Ln_SchFund_FTE_10	<-->	Ln_CoreFTE06	-.229
Ln_SchFund_FTE_10	<-->	Ln_CoreFTE08	-.230
Ln_SchFund_FTE_10	<-->	Ln_CoreFTE09	-.112
Ln_SchFund_FTE_10	<-->	Ln_CoreFTE10	-.246
Ln_SchFund_FTE_10	<-->	Ln_FTE0809	-.436
Ln_SchFund_FTE_10	<-->	Ln_FTE0910	-.431
Ln_SchFund_FTE_10	<-->	Ln_FTE0708	-.436
Ln_SchFund_FTE_10	<-->	Ln_FTE0607	-.436
Ln_SchFund_FTE_10	<-->	Ln_FTE0506	-.430
Ln_SchFund_FTE_10	<-->	Ln_Fac_100FTE_10	-.164
Ln_SchFund_FTE_10	<-->	Ln_Fac_100FTE_09	-.142
Ln_SchFund_FTE_10	<-->	Ln_Fac_100FTE_08	-.122
Ln_SchFund_FTE_10	<-->	Ln_Fac_100FTE_07	-.114
Ln_SchFund_FTE_10	<-->	Ln_Fac_100FTE_06	-.122
Ln_SchFund_FTE_10	<-->	Ln_ER_05	-.210
Ln_CoreFTE10	<-->	Ln_SchFund_FTE_09	-.238
Ln_FTE0910	<-->	Ln_SchFund_FTE_09	-.414
Ln_Fac_100FTE_10	<-->	Ln_SchFund_FTE_09	-.163
Ln_CoreFTE10	<-->	Ln_SchFund_FTE_08	-.238
Ln_FTE0910	<-->	Ln_SchFund_FTE_08	-.361
Ln_Fac_100FTE_10	<-->	Ln_SchFund_FTE_08	-.162
Ln_CoreFTE10	<-->	Ln_SchFund_FTE_07	-.200
Ln_FTE0910	<-->	Ln_SchFund_FTE_07	-.307
Ln_Fac_100FTE_10	<-->	Ln_SchFund_FTE_07	-.131
Ln_CoreFTE10	<-->	Ln_SchFund_FTE_06	-.219
Ln_FTE0910	<-->	Ln_SchFund_FTE_06	-.405
Ln_Fac_100FTE_10	<-->	Ln_SchFund_FTE_06	-.118
Ln_FTE0910	<-->	Ln_CoreFTE07	.373
Ln_Fac_100FTE_10	<-->	Ln_CoreFTE07	.702
Ln_FTE0910	<-->	Ln_CoreFTE06	.363
Ln_Fac_100FTE_10	<-->	Ln_CoreFTE06	.688
Ln_FTE0910	<-->	Ln_CoreFTE08	.344
Ln_Fac_100FTE_10	<-->	Ln_CoreFTE08	.710
Ln_FTE0910	<-->	Ln_CoreFTE09	.256
Ln_Fac_100FTE_10	<-->	Ln_CoreFTE09	.645
Ln_CoreFTE10	<-->	Ln_FTE0809	.379
Ln_CoreFTE10	<-->	Ln_FTE0910	.377
Ln_CoreFTE10	<-->	Ln_FTE0708	.388
Ln_CoreFTE10	<-->	Ln_FTE0607	.392
Ln_CoreFTE10	<-->	Ln_FTE0506	.392
Ln_CoreFTE10	<-->	Ln_Fac_100FTE_10	.704
Ln_CoreFTE10	<-->	Ln_Fac_100FTE_09	.705
Ln_CoreFTE10	<-->	Ln_Fac_100FTE_08	.714
Ln_CoreFTE10	<-->	Ln_Fac_100FTE_07	.722
Ln_CoreFTE10	<-->	Ln_Fac_100FTE_06	.681
Ln_CoreFTE10	<-->	Ln_ER_05	.881
Ln_Fac_100FTE_10	<-->	Ln_FTE0809	-.002
Ln_Fac_100FTE_10	<-->	Ln_FTE0910	-.014
Ln_FTE0910	<-->	Ln_Fac_100FTE_09	-.018
Ln_FTE0910	<-->	Ln_Fac_100FTE_08	.020
Ln_FTE0910	<-->	Ln_Fac_100FTE_07	.030
Ln_FTE0910	<-->	Ln_Fac_100FTE_06	.058
Ln_FTE0910	<-->	Ln_ER_05	.396
Ln_Fac_100FTE_10	<-->	Ln_FTE0708	.010
Ln_Fac_100FTE_10	<-->	Ln_FTE0607	.017
Ln_Fac_100FTE_10	<-->	Ln_FTE0506	.026
Ln_Fac_100FTE_10	<-->	Ln_ER_05	.670
Ln_SchFund_FTE_11	<-->	TFE	-.376

			Estimate
Ln_CoreFTE11	<-->	TFE	.613
Ln_FTE1011	<-->	TFE	.881
Ln_Fac_100FTE_11	<-->	TFE	.220
Ln_SchFund_FTE_11	<-->	Ln_SchFund_FTE_06	.800
Ln_SchFund_FTE_11	<-->	Ln_SchFund_FTE_07	.816
Ln_SchFund_FTE_11	<-->	Ln_SchFund_FTE_08	.881
Ln_SchFund_FTE_11	<-->	Ln_SchFund_FTE_09	.900
Ln_SchFund_FTE_11	<-->	Ln_SchFund_FTE_10	.939
Ln_FTE1011	<-->	Ln_FTE0506	.985
Ln_FTE1011	<-->	Ln_FTE0607	.991
Ln_FTE1011	<-->	Ln_FTE0708	.993
Ln_FTE1011	<-->	Ln_FTE0809	.996
Ln_FTE1011	<-->	Ln_FTE0910	.999
Ln_Fac_100FTE_11	<-->	Ln_Fac_100FTE_06	.850
Ln_Fac_100FTE_11	<-->	Ln_Fac_100FTE_07	.913
Ln_Fac_100FTE_11	<-->	Ln_Fac_100FTE_08	.938
Ln_Fac_100FTE_11	<-->	Ln_Fac_100FTE_09	.961
Ln_Fac_100FTE_11	<-->	Ln_Fac_100FTE_10	.980
Ln_CoreFTE11	<-->	Ln_CoreFTE06	.964
Ln_CoreFTE11	<-->	Ln_CoreFTE07	.971
Ln_CoreFTE11	<-->	Ln_CoreFTE08	.968
Ln_CoreFTE11	<-->	Ln_CoreFTE09	.840
Ln_CoreFTE11	<-->	Ln_CoreFTE10	.990
Ln_SchFund_FTE_11	<-->	Ln_CoreFTE07	-.266
Ln_SchFund_FTE_11	<-->	Ln_CoreFTE06	-.255
Ln_SchFund_FTE_11	<-->	Ln_CoreFTE08	-.246
Ln_SchFund_FTE_11	<-->	Ln_CoreFTE09	-.141
Ln_SchFund_FTE_11	<-->	Ln_CoreFTE10	-.263
Ln_SchFund_FTE_11	<-->	Ln_CoreFTE11	-.267
Ln_SchFund_FTE_11	<-->	Ln_FTE1011	-.421
Ln_SchFund_FTE_11	<-->	Ln_FTE0809	-.426
Ln_SchFund_FTE_11	<-->	Ln_FTE0910	-.422
Ln_SchFund_FTE_11	<-->	Ln_FTE0708	-.428
Ln_SchFund_FTE_11	<-->	Ln_FTE0607	-.427
Ln_SchFund_FTE_11	<-->	Ln_FTE0506	-.418
Ln_SchFund_FTE_11	<-->	Ln_Fac_100FTE_11	-.176
Ln_SchFund_FTE_11	<-->	Ln_Fac_100FTE_10	-.172
Ln_SchFund_FTE_11	<-->	Ln_Fac_100FTE_09	-.149
Ln_SchFund_FTE_11	<-->	Ln_Fac_100FTE_08	-.139
Ln_SchFund_FTE_11	<-->	Ln_Fac_100FTE_07	-.136
Ln_SchFund_FTE_11	<-->	Ln_Fac_100FTE_06	-.155
Ln_SchFund_FTE_11	<-->	Ln_ER_05	-.228
Ln_CoreFTE11	<-->	Ln_SchFund_FTE_10	-.246
Ln_FTE1011	<-->	Ln_SchFund_FTE_10	-.431
Ln_Fac_100FTE_11	<-->	Ln_SchFund_FTE_10	-.171
Ln_CoreFTE11	<-->	Ln_SchFund_FTE_09	-.240
Ln_FTE1011	<-->	Ln_SchFund_FTE_09	-.414
Ln_Fac_100FTE_11	<-->	Ln_SchFund_FTE_09	-.171
Ln_CoreFTE11	<-->	Ln_SchFund_FTE_08	-.243
Ln_FTE1011	<-->	Ln_SchFund_FTE_08	-.361
Ln_Fac_100FTE_11	<-->	Ln_SchFund_FTE_08	-.171
Ln_CoreFTE11	<-->	Ln_SchFund_FTE_07	-.206
Ln_FTE1011	<-->	Ln_SchFund_FTE_07	-.307
Ln_Fac_100FTE_11	<-->	Ln_SchFund_FTE_07	-.136
Ln_CoreFTE11	<-->	Ln_SchFund_FTE_06	-.223
Ln_FTE1011	<-->	Ln_SchFund_FTE_06	-.408
Ln_Fac_100FTE_11	<-->	Ln_SchFund_FTE_06	-.120
Ln_FTE1011	<-->	Ln_CoreFTE07	.373
Ln_Fac_100FTE_11	<-->	Ln_CoreFTE07	.690

			Estimate
Ln_FTE1011	<-->	Ln_CoreFTE06	.363
Ln_Fac_100FTE_11	<-->	Ln_CoreFTE06	.676
Ln_FTE1011	<-->	Ln_CoreFTE08	.344
Ln_Fac_100FTE_11	<-->	Ln_CoreFTE08	.696
Ln_FTE1011	<-->	Ln_CoreFTE09	.257
Ln_Fac_100FTE_11	<-->	Ln_CoreFTE09	.630
Ln_FTE1011	<-->	Ln_CoreFTE10	.377
Ln_Fac_100FTE_11	<-->	Ln_CoreFTE10	.694
Ln_CoreFTE11	<-->	Ln_FTE1011	.394
Ln_CoreFTE11	<-->	Ln_FTE0809	.400
Ln_CoreFTE11	<-->	Ln_FTE0910	.398
Ln_CoreFTE11	<-->	Ln_FTE0708	.409
Ln_CoreFTE11	<-->	Ln_FTE0607	.413
Ln_CoreFTE11	<-->	Ln_FTE0506	.412
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_11	.700
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_10	.704
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_09	.706
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_08	.717
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_07	.724
Ln_CoreFTE11	<-->	Ln_Fac_100FTE_06	.687
Ln_CoreFTE11	<-->	Ln_ER_05	.888
Ln_FTE1011	<-->	Ln_Fac_100FTE_11	-.020
Ln_FTE1011	<-->	Ln_Fac_100FTE_10	-.017
Ln_FTE1011	<-->	Ln_Fac_100FTE_09	-.019
Ln_FTE1011	<-->	Ln_Fac_100FTE_08	.020
Ln_FTE1011	<-->	Ln_Fac_100FTE_07	.030
Ln_FTE1011	<-->	Ln_Fac_100FTE_06	.056
Ln_FTE1011	<-->	Ln_ER_05	.395
Ln_Fac_100FTE_11	<-->	Ln_FTE0809	.000
Ln_Fac_100FTE_11	<-->	Ln_FTE0910	-.012
Ln_Fac_100FTE_11	<-->	Ln_FTE0708	.012
Ln_Fac_100FTE_11	<-->	Ln_FTE0607	.018
Ln_Fac_100FTE_11	<-->	Ln_FTE0506	.027
Ln_Fac_100FTE_11	<-->	Ln_ER_05	.667
Ln_SchFund_FTE_12	<-->	TFE	-.404
Ln_CoreFTE12	<-->	TFE	.600
Ln_FTE1112	<-->	TFE	.876
Ln_Fac_100FTE_12	<-->	TFE	.209
Ln_SchFund_FTE_12	<-->	Ln_SchFund_FTE_06	.802
Ln_SchFund_FTE_12	<-->	Ln_SchFund_FTE_07	.791
Ln_SchFund_FTE_12	<-->	Ln_SchFund_FTE_08	.855
Ln_SchFund_FTE_12	<-->	Ln_SchFund_FTE_09	.885
Ln_SchFund_FTE_12	<-->	Ln_SchFund_FTE_10	.904
Ln_SchFund_FTE_12	<-->	Ln_SchFund_FTE_11	.931
Ln_FTE1112	<-->	Ln_FTE0506	.982
Ln_FTE1112	<-->	Ln_FTE0607	.988
Ln_FTE1112	<-->	Ln_FTE0708	.990
Ln_FTE1112	<-->	Ln_FTE0809	.994
Ln_FTE1112	<-->	Ln_FTE0910	.996
Ln_FTE1112	<-->	Ln_FTE1011	.998
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_06	.812
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_07	.884
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_08	.911
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_09	.930
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_10	.952
Ln_Fac_100FTE_12	<-->	Ln_Fac_100FTE_11	.980
Ln_CoreFTE12	<-->	Ln_CoreFTE06	.954
Ln_CoreFTE12	<-->	Ln_CoreFTE07	.958
Ln_CoreFTE12	<-->	Ln_CoreFTE08	.969

			Estimate
Ln_CoreFTE12	<-->	Ln_CoreFTE09	.890
Ln_CoreFTE12	<-->	Ln_CoreFTE10	.987
Ln_CoreFTE12	<-->	Ln_CoreFTE11	.985
Ln_SchFund_FTE_12	<-->	Ln_CoreFTE07	-.285
Ln_SchFund_FTE_12	<-->	Ln_CoreFTE06	-.272
Ln_SchFund_FTE_12	<-->	Ln_CoreFTE08	-.264
Ln_SchFund_FTE_12	<-->	Ln_CoreFTE09	-.152
Ln_SchFund_FTE_12	<-->	Ln_CoreFTE10	-.270
Ln_SchFund_FTE_12	<-->	Ln_CoreFTE11	-.273
Ln_SchFund_FTE_12	<-->	Ln_CoreFTE12	-.255
Ln_SchFund_FTE_12	<-->	Ln_FTE1112	-.470
Ln_SchFund_FTE_12	<-->	Ln_FTE1011	-.471
Ln_SchFund_FTE_12	<-->	Ln_FTE0809	-.472
Ln_SchFund_FTE_12	<-->	Ln_FTE0910	-.468
Ln_SchFund_FTE_12	<-->	Ln_FTE0708	-.473
Ln_SchFund_FTE_12	<-->	Ln_FTE0607	-.471
Ln_SchFund_FTE_12	<-->	Ln_FTE0506	-.462
Ln_SchFund_FTE_12	<-->	Ln_Fac_100FTE_12	-.157
Ln_SchFund_FTE_12	<-->	Ln_Fac_100FTE_11	-.172
Ln_SchFund_FTE_12	<-->	Ln_Fac_100FTE_10	-.179
Ln_SchFund_FTE_12	<-->	Ln_Fac_100FTE_09	-.160
Ln_SchFund_FTE_12	<-->	Ln_Fac_100FTE_08	-.156
Ln_SchFund_FTE_12	<-->	Ln_Fac_100FTE_07	-.161
Ln_SchFund_FTE_12	<-->	Ln_Fac_100FTE_06	-.177
Ln_SchFund_FTE_12	<-->	Ln_ER_05	-.241
Ln_CoreFTE12	<-->	Ln_SchFund_FTE_11	-.252
Ln_FTE1112	<-->	Ln_SchFund_FTE_11	-.419
Ln_Fac_100FTE_12	<-->	Ln_SchFund_FTE_11	-.161
Ln_CoreFTE12	<-->	Ln_SchFund_FTE_10	-.232
Ln_FTE1112	<-->	Ln_SchFund_FTE_10	-.429
Ln_Fac_100FTE_12	<-->	Ln_SchFund_FTE_10	-.155
Ln_CoreFTE12	<-->	Ln_SchFund_FTE_09	-.227
Ln_FTE1112	<-->	Ln_SchFund_FTE_09	-.413
Ln_Fac_100FTE_12	<-->	Ln_SchFund_FTE_09	-.159
Ln_CoreFTE12	<-->	Ln_SchFund_FTE_08	-.232
Ln_FTE1112	<-->	Ln_SchFund_FTE_08	-.360
Ln_Fac_100FTE_12	<-->	Ln_SchFund_FTE_08	-.160
Ln_CoreFTE12	<-->	Ln_SchFund_FTE_07	-.198
Ln_FTE1112	<-->	Ln_SchFund_FTE_07	-.306
Ln_Fac_100FTE_12	<-->	Ln_SchFund_FTE_07	-.139
Ln_CoreFTE12	<-->	Ln_SchFund_FTE_06	-.213
Ln_FTE1112	<-->	Ln_SchFund_FTE_06	-.410
Ln_Fac_100FTE_12	<-->	Ln_SchFund_FTE_06	-.108
Ln_FTE1112	<-->	Ln_CoreFTE07	.369
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE07	.680
Ln_FTE1112	<-->	Ln_CoreFTE06	.359
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE06	.666
Ln_FTE1112	<-->	Ln_CoreFTE08	.341
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE08	.688
Ln_FTE1112	<-->	Ln_CoreFTE09	.253
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE09	.622
Ln_FTE1112	<-->	Ln_CoreFTE10	.372
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE10	.689
Ln_FTE1112	<-->	Ln_CoreFTE11	.390
Ln_Fac_100FTE_12	<-->	Ln_CoreFTE11	.692
Ln_CoreFTE12	<-->	Ln_FTE1112	.366
Ln_CoreFTE12	<-->	Ln_FTE1011	.374
Ln_CoreFTE12	<-->	Ln_FTE0809	.379
Ln_CoreFTE12	<-->	Ln_FTE0910	.376

			Estimate
Ln_CoreFTE12	<-->	Ln_FTE0708	.388
Ln_CoreFTE12	<-->	Ln_FTE0607	.392
Ln_CoreFTE12	<-->	Ln_FTE0506	.392
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_12	.705
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_11	.704
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_10	.708
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_09	.710
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_08	.720
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_07	.724
Ln_CoreFTE12	<-->	Ln_Fac_100FTE_06	.676
Ln_CoreFTE12	<-->	Ln_ER_05	.880
Ln_FTE1112	<-->	Ln_Fac_100FTE_12	-.046
Ln_FTE1112	<-->	Ln_Fac_100FTE_11	-.025
Ln_FTE1112	<-->	Ln_Fac_100FTE_10	-.020
Ln_FTE1112	<-->	Ln_Fac_100FTE_09	-.022
Ln_FTE1112	<-->	Ln_Fac_100FTE_08	.017
Ln_FTE1112	<-->	Ln_Fac_100FTE_07	.028
Ln_FTE1112	<-->	Ln_Fac_100FTE_06	.059
Ln_FTE1112	<-->	Ln_ER_05	.392
Ln_Fac_100FTE_12	<-->	Ln_FTE1011	-.036
Ln_Fac_100FTE_12	<-->	Ln_FTE0809	-.014
Ln_Fac_100FTE_12	<-->	Ln_FTE0910	-.026
Ln_Fac_100FTE_12	<-->	Ln_FTE0708	-.002
Ln_Fac_100FTE_12	<-->	Ln_FTE0607	.005
Ln_Fac_100FTE_12	<-->	Ln_FTE0506	.014
Ln_Fac_100FTE_12	<-->	Ln_ER_05	.651
Ln_SchFund_FTE_13	<-->	TFE	-.389
Ln_CoreFTE13	<-->	TFE	.608
Ln_FTE1213	<-->	TFE	.873
Ln_Fac_100FTE_13	<-->	TFE	.168
Ln_SchFund_FTE_13	<-->	Ln_SchFund_FTE_06	.778
Ln_SchFund_FTE_13	<-->	Ln_SchFund_FTE_07	.806
Ln_SchFund_FTE_13	<-->	Ln_SchFund_FTE_08	.870
Ln_SchFund_FTE_13	<-->	Ln_SchFund_FTE_09	.865
Ln_SchFund_FTE_13	<-->	Ln_SchFund_FTE_10	.896
Ln_SchFund_FTE_13	<-->	Ln_SchFund_FTE_11	.904
Ln_FTE1213	<-->	Ln_FTE0506	.979
Ln_FTE1213	<-->	Ln_FTE0607	.985
Ln_FTE1213	<-->	Ln_FTE0708	.987
Ln_FTE1213	<-->	Ln_FTE0809	.991
Ln_FTE1213	<-->	Ln_FTE0910	.993
Ln_FTE1213	<-->	Ln_FTE1011	.996
Ln_FTE1213	<-->	Ln_FTE1112	.999
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_06	.758
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_07	.827
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_08	.852
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_09	.873
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_11	.926
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_12	.952
Ln_SchFund_FTE_13	<-->	Ln_SchFund_FTE_12	.925
Ln_Fac_100FTE_13	<-->	Ln_Fac_100FTE_10	.894
Ln_CoreFTE13	<-->	Ln_CoreFTE06	.950
Ln_CoreFTE13	<-->	Ln_CoreFTE07	.957
Ln_CoreFTE13	<-->	Ln_CoreFTE08	.959
Ln_CoreFTE13	<-->	Ln_CoreFTE09	.856
Ln_CoreFTE13	<-->	Ln_CoreFTE10	.984
Ln_CoreFTE13	<-->	Ln_CoreFTE11	.988
Ln_CoreFTE13	<-->	Ln_CoreFTE12	.992
Ln_SchFund_FTE_13	<-->	Ln_CoreFTE07	-.296

			Estimate
Ln_SchFund_FTE_13	<-->	Ln_CoreFTE06	-.280
Ln_SchFund_FTE_13	<-->	Ln_CoreFTE08	-.279
Ln_SchFund_FTE_13	<-->	Ln_CoreFTE09	-.161
Ln_SchFund_FTE_13	<-->	Ln_CoreFTE10	-.281
Ln_SchFund_FTE_13	<-->	Ln_CoreFTE11	-.282
Ln_SchFund_FTE_13	<-->	Ln_CoreFTE12	-.267
Ln_SchFund_FTE_13	<-->	Ln_CoreFTE13	-.275
Ln_SchFund_FTE_13	<-->	Ln_FTE1213	-.461
Ln_SchFund_FTE_13	<-->	Ln_FTE1112	-.460
Ln_SchFund_FTE_13	<-->	Ln_FTE1011	-.460
Ln_SchFund_FTE_13	<-->	Ln_FTE0809	-.461
Ln_SchFund_FTE_13	<-->	Ln_FTE0910	-.459
Ln_SchFund_FTE_13	<-->	Ln_FTE0708	-.460
Ln_SchFund_FTE_13	<-->	Ln_FTE0607	-.459
Ln_SchFund_FTE_13	<-->	Ln_FTE0506	-.454
Ln_SchFund_FTE_13	<-->	Ln_Fac_100FTE_13	-.123
Ln_SchFund_FTE_13	<-->	Ln_Fac_100FTE_12	-.155
Ln_SchFund_FTE_13	<-->	Ln_Fac_100FTE_11	-.171
Ln_SchFund_FTE_13	<-->	Ln_Fac_100FTE_10	-.170
Ln_SchFund_FTE_13	<-->	Ln_Fac_100FTE_09	-.158
Ln_SchFund_FTE_13	<-->	Ln_Fac_100FTE_08	-.157
Ln_SchFund_FTE_13	<-->	Ln_Fac_100FTE_07	-.156
Ln_SchFund_FTE_13	<-->	Ln_Fac_100FTE_06	-.160
Ln_SchFund_FTE_13	<-->	Ln_ER_05	-.237
Ln_CoreFTE13	<-->	Ln_SchFund_FTE_12	-.266
Ln_FTE1213	<-->	Ln_SchFund_FTE_12	-.469
Ln_Fac_100FTE_13	<-->	Ln_SchFund_FTE_12	-.129
Ln_CoreFTE13	<-->	Ln_SchFund_FTE_11	-.262
Ln_FTE1213	<-->	Ln_SchFund_FTE_11	-.416
Ln_Fac_100FTE_13	<-->	Ln_SchFund_FTE_11	-.143
Ln_CoreFTE13	<-->	Ln_SchFund_FTE_10	-.244
Ln_FTE1213	<-->	Ln_SchFund_FTE_10	-.427
Ln_Fac_100FTE_13	<-->	Ln_SchFund_FTE_10	-.134
Ln_CoreFTE13	<-->	Ln_SchFund_FTE_09	-.241
Ln_FTE1213	<-->	Ln_SchFund_FTE_09	-.412
Ln_Fac_100FTE_13	<-->	Ln_SchFund_FTE_09	-.154
Ln_CoreFTE13	<-->	Ln_SchFund_FTE_08	-.242
Ln_FTE1213	<-->	Ln_SchFund_FTE_08	-.359
Ln_Fac_100FTE_13	<-->	Ln_SchFund_FTE_08	-.151
Ln_CoreFTE13	<-->	Ln_SchFund_FTE_07	-.207
Ln_FTE1213	<-->	Ln_SchFund_FTE_07	-.302
Ln_Fac_100FTE_13	<-->	Ln_SchFund_FTE_07	-.138
Ln_CoreFTE13	<-->	Ln_SchFund_FTE_06	-.221
Ln_FTE1213	<-->	Ln_SchFund_FTE_06	-.407
Ln_Fac_100FTE_13	<-->	Ln_SchFund_FTE_06	-.106
Ln_FTE1213	<-->	Ln_CoreFTE07	.372
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE07	.634
Ln_FTE1213	<-->	Ln_CoreFTE06	.361
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE06	.619
Ln_FTE1213	<-->	Ln_CoreFTE08	.343
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE08	.637
Ln_FTE1213	<-->	Ln_CoreFTE09	.254
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE09	.586
Ln_FTE1213	<-->	Ln_CoreFTE10	.373
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE10	.643
Ln_FTE1213	<-->	Ln_CoreFTE11	.390
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE11	.643
Ln_FTE1213	<-->	Ln_CoreFTE12	.366
Ln_Fac_100FTE_13	<-->	Ln_CoreFTE12	.662

			Estimate
Ln_CoreFTE13	<-->	Ln_FTE1213	.375
Ln_CoreFTE13	<-->	Ln_FTE1112	.376
Ln_CoreFTE13	<-->	Ln_FTE1011	.385
Ln_CoreFTE13	<-->	Ln_FTE0809	.390
Ln_CoreFTE13	<-->	Ln_FTE0910	.388
Ln_CoreFTE13	<-->	Ln_FTE0708	.398
Ln_CoreFTE13	<-->	Ln_FTE0607	.401
Ln_CoreFTE13	<-->	Ln_FTE0506	.401
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_13	.660
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_12	.703
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_11	.702
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_10	.705
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_09	.707
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_08	.718
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_07	.723
Ln_CoreFTE13	<-->	Ln_Fac_100FTE_06	.678
Ln_CoreFTE13	<-->	Ln_ER_05	.882
Ln_FTE1213	<-->	Ln_Fac_100FTE_13	-.100
Ln_FTE1213	<-->	Ln_Fac_100FTE_12	-.046
Ln_FTE1213	<-->	Ln_Fac_100FTE_11	-.023
Ln_FTE1213	<-->	Ln_Fac_100FTE_10	-.019
Ln_FTE1213	<-->	Ln_Fac_100FTE_09	-.021
Ln_FTE1213	<-->	Ln_Fac_100FTE_08	.019
Ln_FTE1213	<-->	Ln_Fac_100FTE_07	.030
Ln_FTE1213	<-->	Ln_Fac_100FTE_06	.060
Ln_FTE1213	<-->	Ln_ER_05	.392
Ln_Fac_100FTE_13	<-->	Ln_FTE1112	-.095
Ln_Fac_100FTE_13	<-->	Ln_FTE1011	-.083
Ln_Fac_100FTE_13	<-->	Ln_FTE0809	-.060
Ln_Fac_100FTE_13	<-->	Ln_FTE0910	-.073
Ln_Fac_100FTE_13	<-->	Ln_FTE0708	-.046
Ln_Fac_100FTE_13	<-->	Ln_FTE0607	-.039
Ln_Fac_100FTE_13	<-->	Ln_FTE0506	-.031
Ln_Fac_100FTE_13	<-->	Ln_ER_05	.610
Ln_SchFund_FTE_14	<-->	TFE	-.369
Ln_CoreFTE14	<-->	TFE	.628
Ln_FTE1314	<-->	TFE	.871
Ln_Fac_100FTE_14	<-->	TFE	.165
Ln_CoreFTE14	<-->	Ln_SchFund_FTE_13	-.296
Ln_FTE1314	<-->	Ln_SchFund_FTE_13	-.460
Ln_Fac_100FTE_14	<-->	Ln_SchFund_FTE_13	-.103
Ln_SchFund_FTE_14	<-->	Ln_SchFund_FTE_13	.950
Ln_CoreFTE14	<-->	Ln_SchFund_FTE_12	-.283
Ln_FTE1314	<-->	Ln_SchFund_FTE_12	-.469
Ln_Fac_100FTE_14	<-->	Ln_SchFund_FTE_12	-.106
Ln_SchFund_FTE_14	<-->	Ln_SchFund_FTE_12	.907
Ln_CoreFTE14	<-->	Ln_SchFund_FTE_11	-.285
Ln_FTE1314	<-->	Ln_SchFund_FTE_11	-.416
Ln_Fac_100FTE_14	<-->	Ln_SchFund_FTE_11	-.120
Ln_SchFund_FTE_14	<-->	Ln_SchFund_FTE_11	.883
Ln_CoreFTE14	<-->	Ln_SchFund_FTE_10	-.269
Ln_FTE1314	<-->	Ln_SchFund_FTE_10	-.427
Ln_Fac_100FTE_14	<-->	Ln_SchFund_FTE_10	-.111
Ln_SchFund_FTE_14	<-->	Ln_SchFund_FTE_10	.845
Ln_CoreFTE14	<-->	Ln_SchFund_FTE_09	-.262
Ln_FTE1314	<-->	Ln_SchFund_FTE_09	-.409
Ln_Fac_100FTE_14	<-->	Ln_SchFund_FTE_09	-.137
Ln_SchFund_FTE_14	<-->	Ln_SchFund_FTE_09	.826
Ln_CoreFTE14	<-->	Ln_SchFund_FTE_08	-.260

			Estimate
Ln_FTE1314	<-->	Ln_SchFund_FTE_08	-.358
Ln_Fac_100FTE_14	<-->	Ln_SchFund_FTE_08	-.132
Ln_SchFund_FTE_14	<-->	Ln_SchFund_FTE_08	.845
Ln_CoreFTE14	<-->	Ln_SchFund_FTE_07	-.223
Ln_FTE1314	<-->	Ln_SchFund_FTE_07	-.298
Ln_Fac_100FTE_14	<-->	Ln_SchFund_FTE_07	-.121
Ln_SchFund_FTE_14	<-->	Ln_SchFund_FTE_07	.774
Ln_CoreFTE14	<-->	Ln_SchFund_FTE_06	-.244
Ln_FTE1314	<-->	Ln_SchFund_FTE_06	-.405
Ln_Fac_100FTE_14	<-->	Ln_SchFund_FTE_06	-.087
Ln_SchFund_FTE_14	<-->	Ln_SchFund_FTE_06	.749
Ln_CoreFTE14	<-->	Ln_CoreFTE07	.955
Ln_FTE1314	<-->	Ln_CoreFTE07	.378
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE07	.630
Ln_SchFund_FTE_14	<-->	Ln_CoreFTE07	-.314
Ln_CoreFTE14	<-->	Ln_CoreFTE06	.947
Ln_FTE1314	<-->	Ln_CoreFTE06	.366
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE06	.615
Ln_SchFund_FTE_14	<-->	Ln_CoreFTE06	-.305
Ln_CoreFTE14	<-->	Ln_CoreFTE08	.956
Ln_FTE1314	<-->	Ln_CoreFTE08	.348
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE08	.632
Ln_SchFund_FTE_14	<-->	Ln_CoreFTE08	-.287
Ln_CoreFTE14	<-->	Ln_CoreFTE09	.835
Ln_FTE1314	<-->	Ln_CoreFTE09	.260
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE09	.577
Ln_SchFund_FTE_14	<-->	Ln_CoreFTE09	-.169
Ln_CoreFTE14	<-->	Ln_CoreFTE10	.977
Ln_FTE1314	<-->	Ln_CoreFTE10	.378
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE10	.638
Ln_SchFund_FTE_14	<-->	Ln_CoreFTE10	-.292
Ln_CoreFTE14	<-->	Ln_CoreFTE11	.982
Ln_FTE1314	<-->	Ln_CoreFTE11	.396
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE11	.638
Ln_SchFund_FTE_14	<-->	Ln_CoreFTE11	-.298
Ln_CoreFTE14	<-->	Ln_CoreFTE12	.982
Ln_FTE1314	<-->	Ln_CoreFTE12	.371
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE12	.657
Ln_SchFund_FTE_14	<-->	Ln_CoreFTE12	-.278
Ln_CoreFTE14	<-->	Ln_CoreFTE13	.989
Ln_FTE1314	<-->	Ln_CoreFTE13	.379
Ln_Fac_100FTE_14	<-->	Ln_CoreFTE13	.656
Ln_SchFund_FTE_14	<-->	Ln_CoreFTE13	-.285
Ln_CoreFTE14	<-->	Ln_FTE1213	.403
Ln_FTE1314	<-->	Ln_FTE1213	.998
Ln_Fac_100FTE_14	<-->	Ln_FTE1213	-.094
Ln_SchFund_FTE_14	<-->	Ln_FTE1213	-.435
Ln_CoreFTE14	<-->	Ln_FTE1112	.404
Ln_FTE1314	<-->	Ln_FTE1112	.996
Ln_Fac_100FTE_14	<-->	Ln_FTE1112	-.090
Ln_SchFund_FTE_14	<-->	Ln_FTE1112	-.433
Ln_CoreFTE14	<-->	Ln_FTE1011	.412
Ln_FTE1314	<-->	Ln_FTE1011	.992
Ln_Fac_100FTE_14	<-->	Ln_FTE1011	-.078
Ln_SchFund_FTE_14	<-->	Ln_FTE1011	-.432
Ln_CoreFTE14	<-->	Ln_FTE0809	.416
Ln_FTE1314	<-->	Ln_FTE0809	.987
Ln_Fac_100FTE_14	<-->	Ln_FTE0809	-.059
Ln_SchFund_FTE_14	<-->	Ln_FTE0809	-.435

			Estimate
Ln_CoreFTE14	<-->	Ln_FTE0910	.414
Ln_FTE1314	<-->	Ln_FTE0910	.989
Ln_Fac_100FTE_14	<-->	Ln_FTE0910	-.070
Ln_SchFund_FTE_14	<-->	Ln_FTE0910	-.432
Ln_CoreFTE14	<-->	Ln_FTE0708	.422
Ln_FTE1314	<-->	Ln_FTE0708	.985
Ln_Fac_100FTE_14	<-->	Ln_FTE0708	-.048
Ln_SchFund_FTE_14	<-->	Ln_FTE0708	-.436
Ln_CoreFTE14	<-->	Ln_FTE0607	.426
Ln_FTE1314	<-->	Ln_FTE0607	.982
Ln_Fac_100FTE_14	<-->	Ln_FTE0607	-.041
Ln_SchFund_FTE_14	<-->	Ln_FTE0607	-.435
Ln_CoreFTE14	<-->	Ln_FTE0506	.425
Ln_FTE1314	<-->	Ln_FTE0506	.975
Ln_Fac_100FTE_14	<-->	Ln_FTE0506	-.032
Ln_SchFund_FTE_14	<-->	Ln_FTE0506	-.425
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_13	.640
Ln_FTE1314	<-->	Ln_Fac_100FTE_13	-.096
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_13	.975
Ln_SchFund_FTE_14	<-->	Ln_Fac_100FTE_13	-.151
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_12	.679
Ln_FTE1314	<-->	Ln_Fac_100FTE_12	-.040
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_12	.939
Ln_SchFund_FTE_14	<-->	Ln_Fac_100FTE_12	-.176
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_11	.679
Ln_FTE1314	<-->	Ln_Fac_100FTE_11	-.014
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_11	.913
Ln_SchFund_FTE_14	<-->	Ln_Fac_100FTE_11	-.194
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_10	.682
Ln_FTE1314	<-->	Ln_Fac_100FTE_10	-.011
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_10	.888
Ln_SchFund_FTE_14	<-->	Ln_Fac_100FTE_10	-.192
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_09	.686
Ln_FTE1314	<-->	Ln_Fac_100FTE_09	-.012
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_09	.870
Ln_SchFund_FTE_14	<-->	Ln_Fac_100FTE_09	-.181
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_08	.697
Ln_FTE1314	<-->	Ln_Fac_100FTE_08	.028
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_08	.854
Ln_SchFund_FTE_14	<-->	Ln_Fac_100FTE_08	-.182
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_07	.702
Ln_FTE1314	<-->	Ln_Fac_100FTE_07	.039
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_07	.827
Ln_SchFund_FTE_14	<-->	Ln_Fac_100FTE_07	-.182
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_06	.658
Ln_FTE1314	<-->	Ln_Fac_100FTE_06	.067
Ln_Fac_100FTE_14	<-->	Ln_Fac_100FTE_06	.756
Ln_SchFund_FTE_14	<-->	Ln_Fac_100FTE_06	-.200
Ln_CoreFTE14	<-->	Ln_ER_05	.877
Ln_FTE1314	<-->	Ln_ER_05	.398
Ln_Fac_100FTE_14	<-->	Ln_ER_05	.602
Ln_SchFund_FTE_14	<-->	Ln_ER_05	-.240
Ln_CoreFTE14	<-->	Ln_FTE1314	.404
Ln_CoreFTE14	<-->	Ln_Fac_100FTE_14	.640
Ln_SchFund_FTE_14	<-->	Ln_CoreFTE14	-.304
Ln_FTE1314	<-->	Ln_Fac_100FTE_14	-.095
Ln_SchFund_FTE_14	<-->	Ln_FTE1314	-.437
Ln_SchFund_FTE_14	<-->	Ln_Fac_100FTE_14	-.130

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VITA

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Education

2011	Indiana University - Bloomington M.S. in Physical Chemistry (Nuclear)
2008	University of the Cumberlands B.S. in Chemistry

Professional Experience

2016-present	Assistant Professor and Director of Assessment, School of Pharmacy Marshall University, Huntington, WV
2014-16	Director of Assessment & Planning, School of Pharmacy Marshall University, Huntington, WV
2012-14	Assistant Director of Institutional Research & Effectiveness, Academic Affairs Bellarmine University, Louisville, KY
2011-12	Academic Advisor, College of Arts and Sciences University of Kentucky, Lexington, KY
2008-11	Associate Instructor, Department of Chemistry Indiana University, Bloomington, IN
2008-11	Research Assistant, Department of Chemistry Indiana University, Bloomington, IN

Professional and Scholastic Honors

2015	Recipient, Leslie L. Martin Endowed Fellowship, University of Kentucky
2008	Recipient, First-year Graduate Chemistry Fellowship, Indiana University

Professional Publications

Jones, W.A. & Rudolph, M.J. Athletics subsidies and college costs: Are students paying for rising costs in intercollegiate athletics spending? (Under Review).

Rockich-Winston, N., Train, B.C., Rudolph, M., & Gillette, C. Perceptions of active learning among pharmacy educators. (Under Review).

Rudolph, M., Rice, K.M., Nandini, D.P.K., & Blough, E.R. Application of PCOA-derived content weighting for curriculum content assessment in a new pharmacy school. (Under Review).

Gillette, C., Stanton, R.B., Rockich-Winston, N., Rudolph, M., & Anderson, H.G. The cost-effectiveness of standardized patients versus traditional in-class activities within a pharmacy communication module utilizing the flipped classroom: A decision-analytic approach. *American Journal of Pharmaceutical Education* (In Press).

Lebovitz, L., Shuford, V.P., DiVall, M., Daugherty, K.K., & Rudolph, M.J. Creating an arms race? Examining school costs and motivations for providing NAPLEX and PCOA preparation. *American Journal of Pharmaceutical Education* (In Press).

Gillette, C., Rudolph, M., Rockich-Winston, N., Stanton, R., & Anderson, H.G. Improving pharmacy student communication outcomes using standardized patients. *American Journal of Pharmaceutical Education* (In Press).

Gillette, C., Rudolph, M., Rockich-Winston, N. *et al*. (2017). Predictors of student performance on the Pharmacy Curriculum Outcomes Assessment at a new school of pharmacy using admissions and demographic data. *Currents in Pharmacy Teaching and Learning*, 9(1), 84-89.

Steinbach, T. K., Rudolph, M.J., Gosser, Z.Q. *et al*. (2014). Measuring the fusion cross-section of light nuclei with low-intensity beams. *Nuclear Instruments and Methods A*, *743*, 5-13.

Rudolph, M.J., Gosser, Z.Q., Brown, K. *et al*. (2012). Near- and sub-barrier fusion of ^{20}O incident ions with ^{12}C target nuclei. *Physical Review C*, 2012, 85, 024605.

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Professional Presentations

Daugherty, K. & Rudolph, M. (2017). *Chicken or the egg? Exploring the link between assessment resources and culture of assessment*. Proposal accepted to present at the 2017 Association for the Assessment of Learning in Higher Education conference, Louisville, KY.

Jones, W.A. & Rudolph, M. (2016). *Athletics subsidies and college costs: Are students paying the price for the rising costs in intercollegiate athletics?* Presentation at the 41st Annual Association for the Study of Higher Education Conference, Columbus, OH.

Rudolph, M., Lee, K., & Daugherty, K. (2016). *Understanding the current structure, resources, and culture towards assessment in U.S. colleges/schools of pharmacy*. Session presentation at the 2016 IUPUI Assessment Institute, Indianapolis, IN.

DiVall, M. V., Daugherty, K. & Rudolph, M. (2016). *Preparation for NAPLEX and PCOA exams: Results of a national study*. Mini-session presentation at the 2016 American Association of Colleges of Pharmacy Annual Meeting, Anaheim, CA.

Rudolph, M., Ellis, G., George, W., & Siegel, A. (2013) *Using focus groups to assess a peer-mentored first-generation student program*. Presentation made at the 2013 Southern Association of Colleges and Schools Commission on Colleges Annual Meeting, Atlanta, GA.

Professional Posters

Rudolph, M.J., Maerten-Rivera, J.L., Winston, N.R., Yang, H., Gillette, C., Train, B. (2017). *How much are they learning? Modeling pharmacy student content knowledge growth on the PCOA.* Poster presentation accepted for the 2017 American Association of Colleges of Pharmacy Annual Meeting, Nashville, TN.

Rudolph, M.J., Anderson, H.G, Yingling, K.W. (2017). *A quantitative approach to school/college of pharmacy peer selection using K-nearest neighbor analysis*. Poster presentation accepted for the 2017 American Association of Colleges of Pharmacy Annual Meeting, Nashville, TN.

Gortney, J.S., Rudolph, M.J., Augustine, J.M., Sease, J.M., Bray, B.S., Pavuluri, N., Wong, S. (2017). *Pharmacy Curriculum Outcomes Assessment use for remediation across the academy: Results of a national survey.* Poster presentation accepted for the 2017 American Association of Colleges of Pharmacy Annual Meeting, Nashville, TN.

Gortney, J.S., Rudolph, M.J., Maerten-Rivera, J.L., Bray, B.S., Shah, S., Buring, S.M., Coyle, E.A., Hein, B.S. (2017). *An examination of the relationships between PCOA and NAPLEX subtopic and total scores*. Poster presentation accepted for the 2017 American Association of Colleges of Pharmacy Annual Meeting, Nashville, TN.

Winston, N.R., Rudolph, M.J., Gillette, C., Train, B. (2017). *What motivates pharmacy practice faculty to use active learning? Results of a national study.* Poster presentation accepted for the 2017 American Association of Colleges of Pharmacy Annual Meeting, Nashville, TN.

Alkhateeb, F.M., White, A., Rudolph, M.J. (2017). *What qualifications and skills are important for pharmacy assessment deans and directors? A job advertisement analysis.* Poster presentation accepted for the 2017 American Association of Colleges of Pharmacy Annual Meeting, Nashville, TN.

Rudolph, M., Rice, K.M., Anderson, H.G., Manne, N.D.P.K., & Blough, E.R. (2016). *A process for curricular improvement using the PCOA and post-course reviews*. Poster presented at the 2016 American Association of Colleges of Pharmacy Annual Meeting, Anaheim, CA.

Lebovitz, L., Shuford, V.P., DiVall, M.V., Daugherty, K.D., & Rudolph, M. (2016). *Creating an arms race? Examining school costs and motivations for providing NAPLEX and PCOA preparation.* Poster presented at the 2016 American Association of Colleges of Pharmacy Annual Meeting, Anaheim, CA.

Gillette, C.G., Rudolph, M., Rockich-Winston, N., Kimble, C., & Broedel-Zaugg, K. *A cost- and meta-analysis of the effectiveness of the flipped classroom in pharmacy education*. Poster presented at the 2016 American Association of Colleges of Pharmacy Annual Meeting, Anaheim, CA.

Train, B., Rockich-Winston, N., Gillette, C., & Rudolph, M. (2016). *Comparison of fill-in-the-blank quizzes versus multiple choice quizzes and performance on a K-type final exam*. Poster presented at the 2016 American Association of Colleges of Pharmacy Annual Meeting, Anaheim, CA.

Kimble, A., Long, T.E., Williams, J., Kimble, C., & Rudolph, M. (2014). *Improving the First Offering of an Infectious Disease Module that Utilized a Flipped Classroom*. Poster presented at the 2014 American Association of Colleges of Pharmacy Annual Meeting, Grapevine, TX.

Professionally Funded Grant Proposals

Rudolph, M., Rockich-Winston, N., Jones, W.A., Rudolph, L., & Gillette, C. (2016). *Diminishing returns? A study of the effects of pharmacy school expansion on student demand and quality.* A project funded by the Marshall University School of Pharmacy Faculty Research Support Program. Award of $4,000.

Kimble, C.A, Davis, T.M., Babcock, C., Kimble, A., Rudolph, M., & Koc H. (2016). *Epinephrine (EpiPen®) exposures to extremes in environmental conditions: Validating consumer and pharmacist perceptions, knowledge, and counseling practices and product stability to ensure patient safety.* A project funded by the Marshall University School of Pharmacy Faculty Research Support Program. Award of $10,634.

Rockich-Winston, N., Train, B., Rudolph, M., & Gillette, C. (2015). *Pharmacy faculty perceptions of active learning in U.S. pharmacy education*. A project funded by the Marshall University School of Pharmacy Faculty Research Support Program. Award of $3,000.

Jones, W.A. & Rudolph, M.J. (2015). *Athletics subsidies and college costs: Are students paying for rising costs in intercollegiate athletics?* A project funded by the Knight

Commission on Intercollegiate Athletics. Award of $5,000 to support research on intercollegiate athletic finance by the University of Kentucky.