# THE ECONOMIC ROLE OF UNIVERSITIES IN MEDIUM-SIZED CITIES: A CASE STUDY OF THE MEDICAL COLLEGE OF GEORGIA IN AUGUSTA, GEORGIA

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THE ECONOMIC ROLE OF UNIVERSITIES IN MEDIUM-SIZED CITIES: A CASE STUDY OF THE MEDICAL COLLEGE OF GEORGIA IN AUGUSTA, GEORGIA

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# SUMMARY

The literature on knowledge economies does not offer analysis specific to medium-sized cities despite their distinct economic characteristics. More specifically, the role of universities in medium-sized cities is not documented. This study attempts to add to the body of knowledge on both medium-sized cities and knowledge economies by conducting a case study of the current efforts of a medium-sized city in Georgia. The Augusta-Richmond MSA and the Medical College of Georgia are analyzed. It is hypothesized that the university is the major driver to initiating the construction of a technology transfer infrastructure within the city, a necessary component to a knowledge economy. It is found that the Medical College of Georgia and the Georgia Medical Center Authority, a state entity, are the initiators of developing a technology transfer infrastructure while the local government has made less effort in contributing to the process. Findings show that the lack of visibility of both the Medical College of Georgia and the Augusta region, lack of existing industry in the region, lack of financial resources and lack of venture capital and entrepreneurs in the region are the greatest barriers to efforts to transition the region into successful knowledge-based economy.

# INTRODUCTION

There has been relatively little research about economic development specific to medium-sized cities. Furthermore, in the studies that do focus on medium-sized cities, little work has been done documenting the participation of a medium-sized city in the new knowledge economy.

Traditional economic development policies within medium-sized cities in the United States have often utilized strategies such as tax incentives to attract businesses to their location and to offset their perceived or real inability to provide agglomeration and/or economies of scale often available in a larger metropolitan area. In the South, such strategies have often encouraged a profusion of branch plants in and around medium-sized cities and have heightened intra-state competition within the United States (Youtie and Shapira, 2005). With the rise of the new knowledge economy and globalization, these strategies, although previously successful, have currently resulted in stagnate economies in medium-sized cities as specific industries have become marginalized and other countries undermine the competitive advantage of medium-sized cities' ability to attract business. The results are lagging economies within the medium-sized cities exhibiting industrial decline, lower wage jobs and competitive versus collaborative economic development traditions (Youtie and Shapira, 2005).

To counteract the stagnation, medium-sized cities often resort to replication of economic development policies that have created successful innovative economies within larger metropolitan areas during the new era of globalization. Youtie and Shapira document the learning process involved in the state of Georgia's internationally

collaborative Midsized Cities Technology Development Initiative, a project aimed at promoting innovation within the cities studied. Although they focus on the *learning* process of creating innovative economies in medium-sized cities, they did find that lack of a skilled labor force, lack of a technology transfer infrastructure and lack of organizational and networking capabilities inhibited medium-sized cities from creating a successful knowledge economy. Furthermore, they identify the potential inherent in medium-sized cities to transition into regional knowledge economies despite the cities' lack of historic research universities (Youtie and Shapira, 2005). Henderson, although addressing rural regions, notes the problems such areas have in attracting entrepreneurs, a component necessary to innovation in a knowledge economy. The size, remoteness, lack of access to venture capital and technology, and the low skill levels of the population contribute to the inability of rural areas to sufficiently attract entrepreneurs (Henderson, 2002). Applying Henderson's study to the experience of medium-sized cities seems appropriate because Henderson fails to define rural areas and implies that they are characterized by a small size and remoteness, characteristics inherent to some medium-sized cities. Rosentraub and Helmke conduct a case study of Fort Wayne, Indiana, which they define as a medium-sized city, to support their hypothesis which combines aspects of both the growth pole theory and the coalition theory into one evolutionary process (Rosentraub and Helmke, 1996). Although other studies in financial management specify their unit of analysis to medium-sized cities (Klase et al., 2001; Greene, 1996), to date, no other studies distinguish medium-sized cities in their economic development efforts, much less as a component in a region's efforts to produce knowledge economies.

Several studies have documented the role of *second-tier* cities and their role in the *global* economy. For example, Markusen et al. (1999) describe four distinct types of second-tier cities – the traditional Marshallian and Italianate industrial districts, hub-and-spoke industrial districts, satellite platforms, and the state-centered industrial district. The study proceeds by emphasizing the nonlocal embeddedness of firms within an innovative economy and conducts several international case studies to support their broader definition of second-tier cities and their role in a knowledge economy. Furthermore, O'Connor predicts that second-tier cities have been underestimated in their role in globalization because important variables of measuring a region's role in the process have been excluded in previous studies. He documents a case study of Melbourne, Australia to support his hypothesis (O'Connor, 2003).

It is important to include a discussion on second-tier cities and their role in globalization when addressing both the size and economic development strategies of medium-sized cities. Firstly, if medium-sized cities are characterized through their economic development strategies and, more importantly, industrial make-up (as shown in Youtie and Shapira, 2005), medium-sized cities prove to be highly similar to second-tier cities. For example, if medium-sized cities previously focused on attraction of branch plants, depending on the industry present, it is logical that they may perfectly resemble the satellite platforms defined in Markusen et al.

Secondly, implicit in the current studies on medium-sized cities of interest is the distinction between medium-sized cities and edge cities. Presumably, the economies of the medium-sized cities studied struggle because of the lack of a surrounding infrastructure more adept to knowledge economies. Notably, this distinction is also made

in Markusen et al. between second-tier cities and edge cities, further blurring the line between medium-sized cities and second-tier cities. Also, this characteristic resembles the problems inherent in the rural areas studied by Henderson.

Lastly and most importantly, current literature lacks a consistent definition for medium-sized cities. The name implicitly denotes a definition based on size yet what size should be considered? Should the size be determined geographically or by population size? Definitions based on a population size within the literature on medium-sized cities range from zero to 50,000 (Klase et al., 2001), 45,000 to 150,000 (Greene, 1996), and 100,000 to 500,000 (Youtie and Shapira, 2005; Rosentraub and Helmke, 1996) and no attempt has been made to define medium-sized cities by their geographic size. Furthermore, within the literature no distinct methodology has been outlined in determining these population ranges. If the maximum population count for medium-sized cities is considered 500,000, than the cities defined as second-tier cities in Markusen et al. (all with populations nearing 1 million) would not qualify as medium-sized cities. But, without clearly defining medium-sized cities, second-tier cities must be included in the discussion due to their other similarities with medium-sized cities. Without a clear definition of medium-sized cities and an explicit outline of why they are studied, several relevant definitions could be correctly proposed. Without a clear unit of analysis, a sufficient and applicable body of knowledge would be difficult to compose.

The transition of *regional* economies into knowledge economies is abundant within literature on economic development. More specifically, the literature has outlined technology transfer as a major component of knowledge economies and has analyzed the

role of research-intensive universities within these regions as major drivers of the process.

Overall, universities produce several positive economic impacts to their surrounding region, benefiting both private and public investors. For example, private investors generate higher revenues through the new products sold to universities and receive capital investment through new license agreements generated with universities. Furthermore, universities promote human capital creation for private investors through trained graduates. They also encourage start up companies and contribute knowledge spillover through knowledge creation, technological innovation and transfer of existing know-how. Overall, private investors benefit from universities through a higher growth rate in revenues. Public investors also benefit from new jobs created by universities and the secondary impact of worker's spending to the local economy, both of which create higher tax revenues for the local government. More generally, universities also co-produce the knowledge infrastructure and regional milieu of a region and increase regional creativity and economic development capacity (Audretsch and Lehmann, 2005; Bessette, 2003; Goldstein and Renault, 2004; Lichty and Jesswein, 1978; Fernand, 1998).

As previously noted, the focus within the literature has moved to the economic impacts of universities through knowledge and technology transfer. Proper implementation of policies encouraging these activities not only increases a region's ability to compete globally (Rip, 2002) but also effect the funding sources of the universities as state governments have increasingly focused on funding universities that optimize such transfers (Feller, 2004). Therefore, encouraging knowledge and

technology transfer at the university level has great potential as a tool for economic development in lagging regions.

Several variables affect the success of technology transfer between universities and their surrounding region. These variables generally include characteristics of firms present in the region around the university, characteristics of the university, the relationship between these firms and the university, and the university's policy on technology transfer. For example, the innovativeness of a firm as measured through high quality employees and higher proportions of research and development personnel was found to be directly correlated with technology transfer (Diez, 2002). Furthermore, the presence of an anchor tenant firm (defined through patenting capacity) within the region was also found to be positively associated with technology transfer (Agrawal and Cockburn, 2003). Characteristics of universities that have been found to positively affect technology transfer include university eminence and availability of research grants. Furthermore and surprisingly, the experience of the offices of technology transfer within universities was found to be negatively correlated with technology transfer (DiGregorio and Shane, 2003; Markman, et al., 2004). Lastly, the presence of fields of technology within universities has been found to affect technology transfer as specific fields have a higher incidence of the phenomena (Graft, et al., 2002).

Several variables of the relationship between firms and universities promote or discourage technology transfer. The amount of networking between firms and universities has been found to affect technology transfer where the more networking present, the higher incidence of technology transfer (Diez, 2002; Lindelof and Lofsten, 2004). Networking is often affected by both collaborative relationships between faculty

and industry as well as university graduates employed within surrounding industry. Furthermore, both the type of relationship and level of trust within that relationship has been found to affect technology transfer. Collaborative relationships that include sharing the cost of research and development encourage technology transfer (Lee and Win, 2003) while the firm's view of the technology (Graft, et al., 2002) and trust of the university (Santoro and Saparito, 2003) also affect the process.

Lastly, a university's policy on technology transfer affects the success of technology transfer within the region. For example, several studies have found that the financial gain for the inventor of the technology is either negatively correlated or ineffective in promoting technology transfer (Colyvas, et al., 2002; DiGregorio and Shane, 2003; Markman, et al., 2004). Even sharing license proceeds with the inventor's department has been found to be negatively correlated with successful technology transfer (Markman, et al., 2004). Furthermore, the success of technology transfer is correlated with the property rights used by the university. More specifically, property rights are only effective with inventions that are "embryonic" or less developed (Colyvas, et al., 2002). Lastly, a university's use of incubators, use of internal venture capital funds or willingness to use equity as a property right to the technology has been found to be positively correlated with start-ups within the region, an accepted measurement of technology transfer (DiGregorio and Shane, 2003).

Despite the proliferation of literature on universities, technology transfer and knowledge economies, to the knowledge of the author, none of the case studies or quantitative studies have explicitly analyzed the process using the size of cities within regions as the unit of analysis even despite the identified economic stagnation and the

potential growth of medium-sized cities. The literature focuses on regions often much larger than medium-sized cities. Therefore, the dual purpose of this paper is to offer a clearer definition of medium-sized cities both through population size and economic characteristics to contribute to the current body of knowledge and to also specifically analyze the economic process for medium-sized cities in evolving into regions with knowledge economies by focusing on the current attempts of a medium-sized city in the state of Georgia.

# THEORETICAL FRAMEWORK

This study attempts to answer four important questions:

1) What is a medium-sized city?
2) Can all medium-sized cities be characterized economically?
3) Within medium-sized cities, who initiates the building of an infrastructure that supports technology transfer?
4) Why do certain entities or institutions initiate the building of a technology transfer infrastructure in medium-sized cities?

It is hypothesized that, after clearly defining medium-sized cities by using the median population of all metropolitan areas within the United States, medium-sized cities can also be characterized economically by the presence of the manufacturing industry within the region. This industry is chosen because of its traditional partiality to tax incentives, an economic tradition characteristic of medium-sized cities as outlined by Youtie and Shapira. Although the study conducted by Youtie and Shapira focuses on regions in the South, all regions will be included in the analysis to determine whether or not this characteristic can be generalized to all medium-sized cities. Furthermore, it is hypothesized that medium-sized cities can be characterized by the low skill level of their populations which will be reflected by both the educational attainment of the population within medium-sized cities as well as the historically low per capita personal income of the cities. Also, it is hypothesized that medium-sized cities will have a higher than average unemployment rate due to their ineffective economic initiatives.

It is also hypothesized that major universities within medium-sized cities initiate the building of an infrastructure necessary to support technology transfer in order to increase their own extramural funding. The variables of a successful technology transfer infrastructure outlined in the literature will be analyzed and include a research-intensive

university, a network between the university and existing industries, and a presence of industry conducive to technology transfer as well as the availability of venture capital within the region. Both the presence of these variables as well as the efforts to increase their occurrence will be analyzed. This analysis will contribute to the literature on knowledge economies by outlining the transition process specific to medium-sized cities. This specification proves necessary if medium-sized cities do in fact share distinct economic characteristics. If so, detailing the process for these cities will prevent inappropriate replication of the process in higher profile and larger regions proliferate in the literature that may not share similar economies.

The university is chosen as the major driver of initiating the rebuilding of the necessary infrastructure for several reasons. First, in the current literature on knowledge economies, it appears that the university is naturally inclined to support technology transfer within these economies. Furthermore, universities may have the economic incentive to promote technology transfer in order to increase extramural funding of their institution.

It is not readily apparent that the local or state governments initiate the rebuilding of the economy to support technology transfer within medium-sized cities. First, the local government is politically motivated to appease the already present economy through such initiatives as tax incentives. If the present economy does not support technology transfer, the local government is not politically motivated to enhance the infrastructure necessary to conduct technology transfer. Secondly, both the local and state governments are also more strained than a university. For example, other economic issues such as homelessness require the attention of government making its focus on issues more

difficult to implement (such as changing the composition of the entire economy) or, for the state government, specific initiatives for a regional economy may be a smaller priority. Lastly, the local and state governments may not readily know about knowledge economies or technology transfer where as the university recognizes the process as a means of achieving higher funding. Finally, it is obvious that industry will not initiate a rebuilding of the economic infrastructure to support technology transfer as industry is attracted to areas that already have the infrastructure available.

A case study of the Medical College of Georgia in Augusta, Georgia is conducted to test the hypotheses. The following section outlines the methodology of the study and is followed by a section defining medium-sized cities. Next, the recent economic and research initiatives of Augusta, the state of Georgia and the Medical College of Georgia are analyzed. Finally, results of the semi-structured interviews used in the case study are outlined and conclusions are drawn.

# METHODOLOGY

First, medium-sized cities are defined using data from the 2000 U.S. Census, the 1997 U.S. Economic Census and data from both the Bureau of Economic Analysis and the Bureau of Labor Statistics. Cities are defined as metropolitan statistical areas (MSAs). It is important to note that this definition eliminates micropolitan statistical areas, effectively eliminating smaller cities from the analyzed population. MSAs within Puerto Rico are also eliminated from the population. All MSAs are used in the statistical analysis except the three most populated MSAs. These MSAs are eliminated from the statistical analysis as they are outliers of the population. They include the New York-Northern New Jersey-Long Island, NY-NJ-PA MSA , the Los Angeles-Long Beach-Santa Ana, CA MSA, and the Chicago-Naperville-Joliet, IL-IN-WI MSA. There are no lower outliers. The statistical analysis will include average population size, median population size, quartiles and standard deviations. Then, the presence of medium-sized cities according to the written definition is calculated to determine the importance of medium-sized cities in the overall national economy.

Next, a random sample of 30 medium-sized cities is drawn from the population of medium-sized cities as defined through the statistical analysis of the 2000 Census and specified economic characteristics are measured. The percent of the total labor force dedicated to the manufacturing industry as well as the average wage rate of manufacturing employees in the sample will be used to reveal the presence of the manufacturing industry as well as the demand for manufacturing employees. Educational attainment and per capita personal income are used as indicators of skill level and are

measured using data from the 2000 Census and the Bureau of Economic Analysis. The population within the sample cities that is 25 years or older will be analyzed on three different levels according to educational attainment - the percent of the population with less than a 9th grade education, the percent of the population with a high school degree or higher, and the percent of the population with a bachelor's degree or higher. The average change per year in per capita personal income of the sample over a 10 year time period (1993-2003) will be calculated. These numbers are then compared to the national averages of all MSAs of the same variables to determine if medium-sized cities can in fact be characterized economically. Lastly, unemployment rates from 1995 to 2004 are analyzed to determine the success of the economic traditions of medium-sized cities. Data is used from the Bureau of Labor Statistics and the average unemployment rate for the sample is also compared to the national average.

Next, the MSA of Augusta-Richmond County, GA-SC is analyzed according to its population size, the presence of the manufacturing industry, its per capita income, its population's educational attainment and its unemployment rate using the same data set used to define medium-sized cities. The information will be used to identify whether or not the region is a medium-sized city. The information is then supplemented with the current economic initiatives of the region as well as economic initiatives of the state to determine the overall economic goals of the MSA. Information on the economic goals of Augusta is derived from the economic incentives provided by the Augusta-Richmond local government. These incentives act as indicators of the ultimate economic goals of the region. Information from the Development Authority of Richmond County, "the single point of contact for economic development projects in Augusta-Richmond

County," (Augusta Business Information: Economic Development) will also be used. State and national economic initiatives specific to technology transfer will also be analyzed. The information is used to identify the political priorities of the region in accordance with economic development and to determine whether or not the region is actively pursuing a transition into a knowledge economy.

Fourthly, the history of the Medical College of Georgia is provided from the recent library exhibit at the university entitled *The History of the Medical College of Georgia: 175 Years of Teaching, Discovering and Caring* as a context to the study and an overview of the university. This history will also allude to the evolution of the economic role of the university within the city of Augusta. Next, the priorities of the university are deducted from both the evolution of the university's mission and the current goals and strategic initiatives being implemented by the university administration. This information is supplemented with quantitative data pulled from the Institutional Research Information System of the Medical College of Georgia and is used to prove or disprove the explicit priorities of the institution. All data is analyzed over a time period of approximately 10 years. Data on research funding, research funding sources, faculty publications and location of MCG alumni complete the data set. Also, patenting data from the U.S. Patent and Trademark Office is analyzed to determine the current activity of technology transfer. The above information will be used to determine whether or not the Medical College of Georgia is actively pursuing technology transfer in order to indirectly aid the region in transitioning into a knowledge economy.

Lastly, semi-structured interviews are conducted. Persons interviewed include relevant political authorities and administrators, planners and faculty within the Medical

College of Georgia. The interviews will be used to determine if in fact the region is transitioning into a knowledge economy and, if so, how the process began and why. Interview questions used can be found in Appendix A. Finally, conclusions are drawn from the information and important implications of the study are discussed.

## DEFINING MEDIUM-SIZED CITIES

This section attempts to not only quantify the definition of a medium-sized city through 2000 Census information but also offers further clarification by analyzing the specific indicators of their economic traditions previously outlined.

First, the appropriate population range for medium-sized cities must be determined. According to the 2000 Census, there are 362 metropolitan statistical areas. The data range of the MSAs (not including outliers) is 52,457 (Carson City, NV) to 5,687,147 (Philadelphia-Camden-Wilmington, PA-NJ-DE) with a difference in population totaling 5,634,690. The median population of the sample is 222,368. The upper and lower quartiles of the sample are 478,962.5 and 129,605 respectively. Interestingly, the average population is well above the median population at 537,028, delineating a skew in the data even after the removal of upper outliers. Because of this skew, standard deviations are unusable as the first standard deviation offers a negative population size. By allowing for a margin of error, the appropriate range of population size to qualify a city as medium-sized is 100,000 to 500,000 according to the upper and lower quartiles of the data. Notably, this is the size range chosen by Youtie and Shapira. Surprisingly, medium-sized cities compromise a significant portion of the national population and contain 23.21% of the total national population (including the outliers previously omitted). Furthermore, of the 362 U.S. metropolitan statistical areas, 260 qualify as medium-sized cities denoting that medium-sized cities compromise an astounding 72% of U.S. MSAs, (Population in Metropolitan and Micropolitan Statistical

Areas Ranked by 2000 Population for the United States and Puerto Rico: 1990-2000). This fact emphasizes the need for further study specific to medium-sized cities.

Next, the presence of the manufacturing industry in a sample of medium-sized cities is measured and compared to the respective national averages to determine whether or not tax incentives as economic development tools are characteristic of medium-sized cities. Within a random sample of 30 medium-sized cities, manufacturing employees make up an average of 15.67% of the labor force 16 years of age and older while manufacturing employees 16 years of age and older compose an average of only 14.1% of the national labor force, (Occupation, Industry, and Class of Worker of Employed Civilians 16 years and Over: 2000). Furthermore, within the sample of medium-sized cities, the average wage per a production employee in the manufacturing sector in 1997 dollars was $14.77 compared to the national average of $13.98, (Sector 31: Manufacturing: Subject Series: Industry Statistics for Metropolitan Areas: 1997). These numbers reveal a higher than average demand and a higher than average presence of a manufacturing labor force in medium-sized cities. Therefore, it seems logical that medium-sized cities can be characterized according to the presence of the manufacturing industry.

Thirdly, the skill level of the population in medium-sized cities as well as their per capita income overtime is analyzed to determine the quality of potential employees within these regions. According to the 2000 U.S. Census, the average percent of the population between 25 years old and over with a bachelor's degree or higher within the same sample of the 30 medium-sized cities was 19%. This percentage is significantly lower the national MSA average in 2000 which was 24.4%. Further analysis shows that

the average percent of the population within the sample that is 25 years or older with less than a 9th grade education is 7% while the average percent of the same population within the sample that is 25 years or older with a high school degree or higher is 81%. Interestingly, these numbers are approximately equal to the national MSA average which is 7.5% and 80.4% respectively, (Language, School Enrollment, and Educational Attainment: 2000). These findings show that the population within medium-sized cities, although on par with the national average for the population with secondary education, is lacking in postsecondary graduates, implying that the cities lack a higher skilled population. This implication supports the hypothesis that medium-sized cities can be characterized by the low skill levels of their population. Furthermore, the average percent change in per capita personal income per year from 1993 to 2003 for the sample of medium-sized cities was approximately 3.86% while the national average percent change in per capita personal income per year for the same time period was 4%, revealing that medium-sized cities do in fact have a lower historical per capita personal income growth than other areas, (Local Area BEARFACTS). In 2000, the sample of medium-sized cities had an average per capita personal income of $19,356 compared to the national average of MSAs which as $22,729, showing that the cities also have a lower per capita personal income as well as a lower change in per capita personal income, (Income and Poverty in 1999: 2000). These findings support the original hypothesis that medium-sized cities will have a historically lower per capita personal income.

Interestingly, some of these variables are linked in important ways. For example, while the presence of the manufacturing industry in medium-sized cities reflects their economic incentives (tax incentives), it also reflects the low skill level of their

population. Manufacturing jobs are often blue collar jobs that do not require postsecondary educations. Although this phenomenon decreases the quality of life for a population, to determine the effectiveness of the economy, other variables must be examined. Therefore, the unemployment rate over a 10 year period of the sample is compared to the national average to determine if the economic initiatives of medium-sized cities are effective. Overall, between 1995 and 2004, the medium-sized cities within the sample exhibited an average unemployment rate slightly above the national average as depicted in Figure 1, (Economy at a Glance).

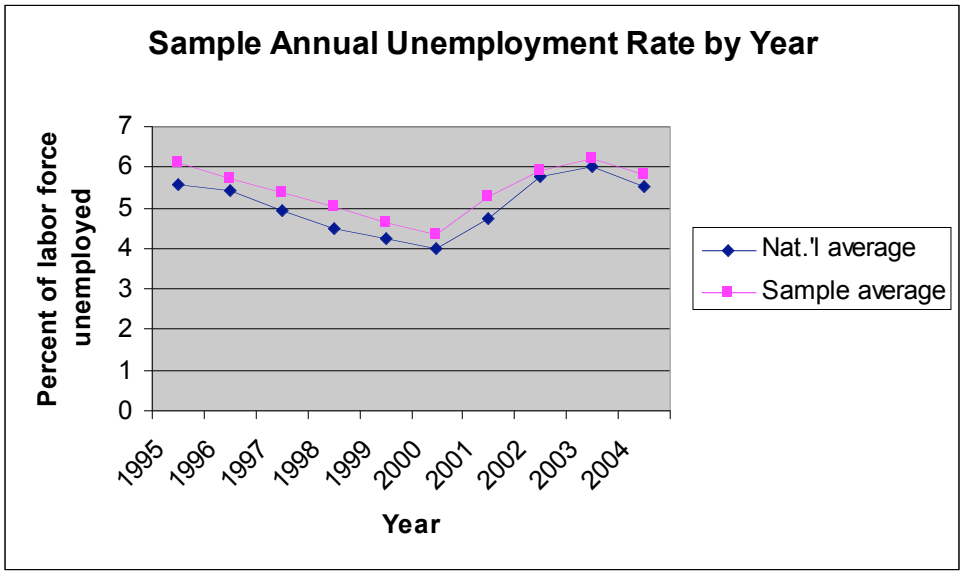


**Figure 1: Sample Annual Unemployment Rate by Year**

These findings prove the hypothesis that medium-sized cities do in fact have a higher than average unemployment rate. This conclusion emphasizes the weaker economies of medium-sized cities possibly due to their economic traditions.

In summary, a medium-sized city is defined as a metropolitan statistical area with a population ranging from 100,000 to 500,000 persons with an above average presence of

the manufacturing industry, a lower skilled population, a lower historical per capita personal income and a higher than average unemployment rate.

## AUGUSTA AS A MEDIUM-SIZED CITY

The city selected for this study, Augusta, Georgia, qualifies as a medium-sized city. As previously noted, a medium-sized city is defined as a metropolitan statistical area with a population size ranging from 100,000 to 500,000 persons with an above average presence of the manufacturing industry, a lower skilled population, a lower historical per capita personal income and a higher than average unemployment rate. Firstly, the Augusta-Richmond, GA-SC MSA has a population of 499,684 according to the 2000 Census (Population in Metropolitan and Micropolitan Statistical Areas Ranked by 2000 Population for the United States and Puerto Rico: 1990-2000). This population size qualifies the city as a medium-sized city. Secondly, the Augusta-Richmond MSA appears to have a high presence of the manufacturing industry. According to the 1997 Economic Census, the Augusta-Richmond MSA manufacturing labor force makes up 14.8% of the labor force (Occupation, Industry, and Class of Worker of Employed Civilians 16 years and Over: 2000) while the average wage per manufacturing production employee of $17.13 (in 1997 dollars), (Sector 31: Manufacturing: Subject Series: Industry Statistics for Metropolitan Areas: 1997). These numbers indicate a high presence of the manufacturing industry.

Several other factors also reveal a high presence of the manufacturing industry in the Augusta-Richmond MSA. Firstly, according to the Bureau of Labor Statistics, the manufacturing industry was consistently the third highest non-agricultural employer of the region from 1995 to 2000, (Economy at a Glance). (Government and trade were the top employers employing approximately 19% and 18% of the labor force respectively.)

Despite this high presence, the manufacturing employment of the Augusta-Richmond MSA has consistently declined since 2000 as shown in Figure 2 (only the top 5 industries by employment are represented). This finding implies that the region is experiencing economic change. Notably, the educational and health services industry has consistently ranked in the top 5 industries of the Augusta-Richmond MSA during the same period.

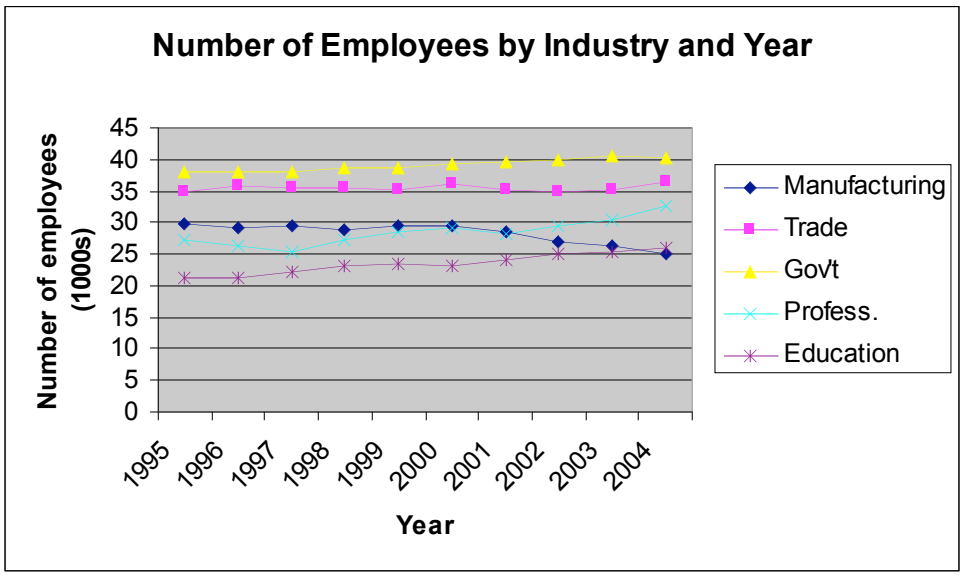


**Figure 2: Augusta-Richmond MSA Number of Employees by Industry and Year**

Secondly, despite the decline of the manufacturing industry since 2000, the Augusta-Richmond MSA was named as "one of America's Hottest Cities for Manufacturing Expansion and Retention in 2005" according to *Expansion Management* magazine, ranking 36 out of 362 cities. The ranking depended upon the business environment, workforce quality, operating costs, incentive programs, worker training programs, ease of government regulations and professionalism of the economic development offices, (Press Release, Richmond County Development Authority). Due to the variables considered when ranking, this recognition does not seem to contradict the decline of the

manufacturing industry as industry presence was not a considered factor. The recognition does reveal the significant effort of the region to appeal to the manufacturing industry, implying that the local government and economic development officials are actively pursuing the economic incentives traditional to medium-sized cities in order to attract the manufacturing industry. Therefore, Augusta meets the requirement of the traditional economic initiatives of medium-sized cities. This information also supports the idea that medium-sized cities' governments are catering to the traditional industries within their region.

Augusta also represents a medium-sized city in the skill level of its population. In 2000 the percent of the population of the Augusta-Richmond MSA 25 years and older with less than a 9$^{th}$ grade education was 7.3%. The percent of population of the same age with a high school degree or higher was 78.9% and the percent of the same population with a bachelor's degree or higher was 20.9%, (Language, School Enrollment, and Educational Attainment: 2000). Consistent with medium-sized cities, the Augusta-Richmond MSA matches the national average in secondary educational attainment but is significantly lower than the national average in postsecondary educational attainment (24.4%). Therefore, the Augusta-Richmond MSA is lacking in a higher skilled labor force. Furthermore, the average annual growth rate of the per capita personal income between 1993 and 2003 of the Augusta-Richmond MSA was 3.6%. This number is also below the national average (4.0%), (Local Area BEARFACTS). Also, in 2000, the per capita personal income of the Augusta-Richmond MSA was $18,744, again lower than the national average ($22,729), (Income and Poverty in 1999: 2000). In summary, the

Augusta-Richmond MSA *on average* exhibits a low skilled population, an economic characteristic of medium-sized cities.

Lastly, the historic unemployment rate of the Augusta-Richmond MSA is analyzed. According to the Bureau of Labor Statistics, the Augusta-Richmond MSA unemployment rate was above the national average from 1995 to 2000, characterizing the region as a medium-sized city. Interestingly, simultaneous to the decline of the manufacturing industry in the region in 2000, the unemployment rate began to decrease, (Economy at a Glance). These findings are exhibited in Figure 3.

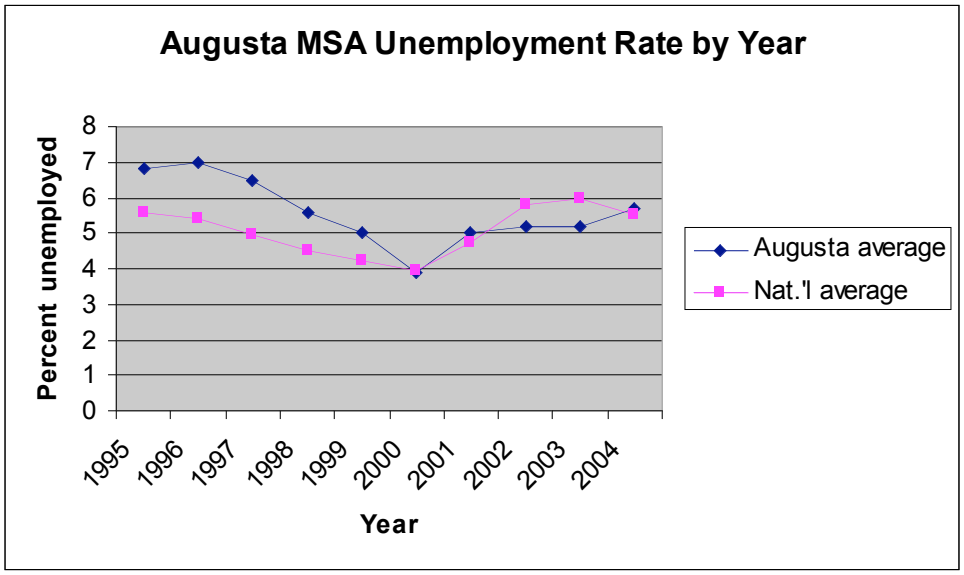


**Figure 3: Augusta-Richmond MSA Unemployment Rate by Year**

Again, this data reveals that, around 2000, the Augusta-Richmond MSA assumedly experienced economic change that positively reflected on the economy. This finding will be further probed in the remaining chapters of this paper.

Because Augusta meets the population range of a medium-sized city and also exhibits a high presence of the manufacturing industry, a low skilled population and a

higher than average unemployment rate (up until 2000), the Augusta-Richmond MSA qualifies as a medium-sized city. Notably, Augusta also does not qualify as an edge city as it is approximately 80 miles away from the closest MSA (Columbia, SC) (Mapquest).

# ECONOMIC INITIATIVES OF AUGUSTA

The Augusta-Richmond MSA currently has five major economic development initiatives as well as several tax incentive programs. The nature of these economic development tools implies that the major focuses of the region are retaining current manufacturing business as well as revitalizing the housing available in specific sections of the city. These programs are offered through the Augusta-Richmond County Housing and Economic Development department, an entity charged "to create positive change by promoting self-sufficiency through partnership in economic development, quality housing and neighborhood reinvestment…[Furthermore,] the department strives to enhance the physical environment and improve the quality of life in Augusta and [supports] the diversity of the city's population," (August Housing and Economic Development: Mission Statement). Notably, the department was, until recently, only known as the Department of Housing.

The first program is funded through the Community Development Block Grant Funds of the United States Department of Housing and Urban Development. Captured in two parts, the CDBG funds the Economic Development Loan Fund of the city as well as the Re-Captured Urban Development Action Grant Loan Funds program. The Economic Development Loan Fund "was created to reduce the historically high unemployment rate and low per capita income of Augusta-Richmond County." The "loans are provided to for-profit businesses to finance development projects, establish new businesses and/or expansion of existing businesses, [and] to create employment opportunities and/or retain existing jobs for low and moderate-income persons." The Re-Captured Urban

Development Action Grant Loan Funds program was developed to "assist severely distressed large and small cities containing pockets of poverty in alleviating economic deterioration," (Augusta Business Information: Economic Development).

The second program promotes similar economic initiatives. Entitled the Laney Walker Enterprise Zone Tax Abatement Program, the program is designed to revitalize the economies of areas (enterprise zones) "suffering from disinvestment, underdevelopment, and general economic distress." The program allows for tax exemptions for eligible businesses. Eligible industries include manufacturing, warehousing and distribution, processing, telecommunications, tourism, research and development, new residential construction, residential rehabilitation and finance, insurance and real estate, (Augusta Housing and Economic Development: Laney Walker Enterprise Zone Tax Abatement Program). The program is a part of the Georgia Enterprise Zone Employment Act of 1997 and is further supplemented by the Mayor's Business Investment Grant which provides a $2,500 reimbursement grant to eligible new businesses in the Laney Walker Enterprise Zone (Augusta Housing and Economic Development: Mayor's Grant).

The third program offered by the Augusta-Richmond local government is the Target Area Master Plan which "offers opportunities of residential revitalization, public-private partnerships, and employment possibilities…The main components of the plan include parks and open space, new and renovated housing, canal improvements, commercial and mixed use areas, removal of the CSX railroad tracks, a biomedical park, and street improvements," (Augusta Business Information: Economic Development). Other programs focus solely on housing issues in the region and include the Emergency

Shelter Grant Program, the Home Investment Partnerships Program, and the Housing Opportunities for Persons with AIDS Program.

Along with the several economic initiatives of the Augusta-Richmond region, several tax incentives are offered. The region participates in Georgia's Business Expansion and Support Act of 1994 (BEST) which offers the following tax credits:

1) Job Tax Credits (eligible businesses include manufacturing, warehouse distribution, telecommunications, processing, tourism and research and development)
2) Investment Tax Credits (available to existing manufacturers or telecommunications companies)
3) Retraining Tax Credits
4) Corporate Headquarters Tax Credit
5) Ports Job Tax Credit
6) Research and Development Tax Credit
7) Child Care Credit
8) Small Company Business Growth Tax Credit
9) Sales Tax Exemptions

Furthermore, the plan "allows new or existing manufacturers that invest $1 million or more in capital improvements to exempt the county portion of property taxes for five years." The region also offers the assistance of several finance programs including the Industrial Revenue Bond Financing available through the Development Authority of Richmond County and the Georgia Business Development Corporation which offers loans "for qualified companies unable to obtain conventional financing," and loan guarantees through the U.S. Economic Development Administration. Augusta is also eligible for funds through OneGeorgia Funds which "channels one third of the state's tobacco settlement to economic development projects," (Incentives and Taxes).

Organizationally, the Augusta-Richmond MSA has four economic development authorities – their city Department of Housing and Economic Development, the

Development Authority of Richmond County, the Development Authority of Columbia County and the Georgia Medical Center Authority. Overall, it appears that the city department has focused on the housing initiatives of the city while the economic development authorities (other than the GMCA) focus on the acquisition of industry regardless of type. These authorities are mainly concerned with bringing jobs and wages to the region. The GMCA is the only economic development authority dedicated to the acquisition of biomedical or biotechnology companies.

It appears that the local economic initiatives of the Augusta-Richmond MSA mainly focus on housing and economic diversification of inner city areas. Furthermore, it is apparent that local government also promotes the retention of manufacturing companies through the specific initiatives offered to the industry. These findings imply that the main focus of the MSA is still on traditional economic development strategies. More specific information on the goals of these economic initiatives will be probed in the interview section of this case study.

## ECONOMIC INITIATIVES IN THE STATE OF GEORGIA

The Augusta-Richmond MSA participates in several state and regional programs aimed at promoting knowledge economies. This section elaborates on the programs being offered through the state and nation which are being initiated in the region. There are five major programs through the state and national governments that focus on the creation of knowledge economies – several programs through the Savannah River Site, the Georgia Centers of Innovation, Georgia's Intellectual Capital Partnership Program, Goergia's Quick Start program and, most importantly, Georgia's Medical Center Authority.

The Savannah River Site is a branch of the U.S. Department of Energy who's mission is to "serve the nation through safe, secure, cost-effective management of [the] nuclear weapons stockpile, nuclear materials, and the environment," (Team SRS Mission Statement). The site was constructed in the early 1950s "to produce the basic materials used in the fabrication of nuclear weapons," (Savannah River Site: History Highlights). Significantly, the Savannah River Site in combination with the military presence in the Augusta-Richmond MSA (through Fort Gordon and the Veterans Affairs Hospital) offer medical research as a major component of their programs. Together their budgets total $3.1 billion with $127 million going to research (Georgia Medical Center Authority: *Message from the Executive Director*). Although not specifically aimed at promoting knowledge economies or technology transfer, the SRS offers three prominent programs that do support such initiatives.

First, there is the Savannah River Regional Diversity Initiative. The SRRDI was established by Congress in 1993 "for the purpose of mitigating the impact of downsizing of the [SRS] through support of regional adjustment, planning and promotion of area economic diversification." (Presumably, the SRS is downsizing due to the end of the Cold War.) The mission of the initiative "is to create an environment conducive to tech-based start-ups, business expansion, and the attraction of new ventures to the SRRDI region," (Savannah River Regional Diversification Initiative). Implicitly, the mission of SRRDI promotes technology transfer. The SRRDI focuses on Richmond and Columbia counties as well as Aiken, Allendale and Barnwell counties in South Carolina.

Secondly, the SRS houses the Westinghouse Savannah River Company. This entity "is responsible for transferring technologies developed in pursuit of its mission at the Savannah River Site to the private sector so that these technologies may have the collateral benefit of enhancing U.S. economic competitiveness," (Westinghouse Savannah River Company). Therefore, technology transfer is a direct mission of sectors at the SRS.

Lastly, the SRS offers the Savannah River National Laboratory which is "recognized as a world-class center of excellence for the development and application of unique and innovative sciences and technology solutions," (Savannah River National Laboratory). Although not specifically aimed at technology transfer, the laboratory obviously conducts high quality research and may potentially serve as a source of technology development that can be transferred for profit to the private sector.

As previously noted, the state of Georgia offers several programs aimed at promoting knowledge economies and technology transfer. Firstly, the state runs a

program called the Intellectual Capital Partnership Program. Created in 1995 by the Board of Regents, the "ICAPP staff and a team of economic development leaders from each campus help Georgia businesses tap into the University System of Georgia for, college-educated employees, access to latest research, access to latest technology transfer and access to business and operations advice," (Intellectual Capital Partnership Program). This access is accomplished through the several resources offered through the program such as a database of potential employees or a database of research institutions within the state. Furthermore, programs are offered such as the ICAPP Advantage which "provides customized, accelerated education for knowledge workers in high demand but short supply," (ICAPP Advantage). Therefore, the program overall offers access to research and access to a workforce or workforce training aimed at research in order to promote knowledge economies. Furthermore, the state also offers high-quality training through the Quick Start program at no cost to existing or expanding businesses (Quick Start).

The state of Georgia has also recently implemented a program entitled Georgia's Centers for Innovation. The program was "designed to enhance the long-term economic opportunities for Georgians, nourish the state's homegrown industries, and encourage new opportunities to invest and build in Georgia," (Centers of Innovation). The program has established five centers of innovation throughout the state and, most significantly, established a Life Science Innovation Center in 2004 as a joint venture between the state and the Life Sciences Business Development Center at the Medical College of Georgia. This venture "encourages interaction between life science companies from around the State, and offers these companies access to MCG's unique resources." Furthermore, "the ultimate goal is to expand research and development programs, supply new business

networking opportunities, create new educational programs, and expand the life science community's influence throughout the state," (Life Science Innovation Center). Significantly, the program is managed through the Office of Technology Transfer and Economic Development at the Medical College of Georgia.

Lastly and most significant of the state programs is the establishment of the Georgia Medical Center Authority. Established by the General Assembly in 2000, GMCA is "working to make Augusta a premier location for both new and established biomedical and biotechnology firms." The authority works with the several research institutions, hospitals, educational institutions and businesses within the region to reach their goals. "The [GMCA] is building the infrastructure to support growing…companies out of the intellectual property residing at [the] local research institutions, hospital, and local companies [in Augusta], as well as recruiting companies to the area," (Georgia Medical Center Authority: *Message from the Executive Director*). The GMCA has already established an Augusta Biobusiness Center as an incubator for biomedical or biotechnology firms and is working to create a Research and Technology Park in the city of Augusta. Notably, the GMCA was initially established under the Medical College of Georgia although it has since become an independent entity. More recently, through funding by the SRRDI, the GMCA has established the Augusta Life Sciences Coalition which includes GMCA, the Richmond and Columbia County Development Authorities, the Augusta Metro Chamber of Commerce and the Life Sciences Business Development Center at the Medical College of Georgia. The coalition works at attracting life science businesses to the Augusta region. Overall, the GMCA also acts as a liaison for the city of

Augusta and the other state and national entities charged with economic development of the region.

These national and state programs are significant contributors to the Augusta economy and offer the most innovative programs in the region aimed at promoting technology transfer. Obviously, the state and national government have more specific and accelerated programs for technology transfer than the local government.

# HISTORY OF THE MEDICAL COLLEGE OF GEORGIA

This section outlines the history of the Medical College of Georgia in order to determine the context of the university's role in the Augusta region. The Medical College of Georgia was established as the Medical Academy of Georgia on December 20, 1828 through a charter passed by the Georgia Legislature. The charter resulted from a petition by Dr. Milton Antony and Dr. Joseph Eve – two Augusta doctors who began unofficially teaching in Augusta's City Hospital two years earlier. The school began as a one year instructional school where students graduated with a bachelor's degree and would later complete their medical degrees at another medical school although the Georgia Legislature empowered the trustees of the school to confer a doctorate of medicine one year after its establishment. Doors to the school opened on October 1st, 1829 to seven students and three faculty members. A year after opening, the school's name changed to the Medical Institute of Georgia only to be changed again in December 1833 to the Medical College of Georgia "to depict the school's true status and mission." The first commencement was held on April 7, 1833.

The 1830's and 1840's marked years of growth for the school. The library was built and established in 1834 and was enlarged a year later. The first academic lecture hall was built in January 1835. Also, in 1836, founding father Dr. Milton Antony began the *Southern Medical and Surgical Journal* although it temporarily ceased publication upon his death in 1839. By 1840 the number of students grew from 27 to 54 and alumni numbered at 100.

Dr. Lewis Ford acted as the first dean of the school from 1829 to 1836. Dr. Ford started a tradition of community activity for subsequent deans both in the city of Augusta as well as within the medical community. Ford served as the president of Augusta's Board of Health and later served on the August city council as well as mayor of Augusta in 1846. He also was the first president of the Georgia Medical Association established in 1849. Dr. Paul Fitzsimmons Eve served as dean to the school between 1836 and 1844. Although he was not explicitly active in the Augusta community, he later served as President to the American Medical Association in 1857 and also served as the Centennial Representative in the Medical Congress of Nations in 1876.

Although the school continued to grow up to the Civil War, the 1840s also marked a period of faculty changes and financial trouble for the school. Despite these problems, the student population within the school continued to grow and by 1844 the school had 39 graduates compared to only 18 in 1841. By 1856, the school had 73 students graduate. Further more, the *Southern Medical and Surgical Journal* revived publication in 1844 at the request of the students.

Dr. George Madison Newton served as dean to the school from 1844 to 1857 and continued the tradition of activity within the Augusta community by offering philanthropic care to orphans in the Augusta Orphanage Asylum. Dr. Ignatius Poltney Garvin acted as dean for the Medical College of Georgia from 1857 to 1861. He also served the Augusta community as mayor in 1848. Furthermore, he served as treasurer of Augusta for over 15 years. On February 15, 1861, the school was forced to close two weeks early due to the Civil War. The school would not reopen until November 1865.

The 1860s to the 1900s marked years of innovative growth for both the Medical College of Georgia and the medical community. Not only did the city of Augusta open several new hospitals (New City Hospital, 1869; Freedman's Hospital, 1871; Wilhenford Hospital, 1910), but the educational requirements of students at the Medical College of Georgia was extensively extended mainly due to social pressures on physicians to acquire a more adequate education. In 1878, the school extended its courses to cover a five month period, "a step that reflected growing national concern over glaring inadequacies in medical education." Although the school reverted to the four-month semester a year later "because few other U.S. medical schools followed example", an extended 3-year curriculum was developed by 1893. In 1888 the first residency program of the school began and by January 1891 the school acquired control over its first hospital (City Hospital) after entering into an agreement with the Augusta city council. This acquisition marks a continued expansion of the university into the regional industry. In 1894 a program for training nurses began at the hospital and, by 1900, the school curriculum was extended to become a 4-year program. Notably, the school's name changed to the Medical Department of the University of Georgia (although the Board of Trustees still retained some control of the school) beginning a tenuous relationship with the Athens university that would extend for the next 80 years.

After the reign as dean of Dr. Louis Alexander Dugas from 1861 to 1876 (who also served the Augusta city council), Dr. Henry William DeSaussure Ford acted as dean throughout the later half of the 19$^{th}$ century. He served as dean from 1876 to 1880, 1893 to 1894, and 1903 to 1906 with Col. George Washington Rains, Dr. Edward Geddings, Dr. Thomas Russell Wright, and Dr. Eugene Foster serving the intermittent terms

respectively. Each dean served both the Augusta community and the medical community with such activities as serving as city council members, designing sewage facilities to improve public health in the city of Augusta, and developing Augusta's University Hospital.

The school's efforts to become a nationally prominent medical school paid off in 1907 when the Medical Department was awarded a Class A designation by the Council on Medical Education. Unfortunately, one year later, Abraham Flexner of the Carnegie Foundation inspected the school and recommended in 1909 "that the University of Georgia no longer be affiliated with the department, and [that] the school should close its doors or move to Athens due to inadequate financial support and the tenuous affiliation with the university." Therefore, by 1911, Georgia's General Assembly passed a bill removing control of the Medical Department from the original Board of Trustees and allowing the University of Georgia full control of the school. The school's Board of Trustee's met for the last time in March of 1912.

Despite the organizational changes, the school was again given Class A designation in February 1913 making it eligible for membership in the Association of American Medical Colleges. Furthermore, the school gained financial momentum resulting in the acquisition of the Newton Building as well as a $30,999 appropriation from the General Assembly in 1913 and a 5-year $10,000 match grant from the General Education Board and the Carnegie Foundation in 1920. Unfortunately, the financial position of the school deteriorated along with the rest of the nation in 1929 due to the Depression which almost caused the closure of the school. Deans during this time

included Dr. Joseph Eve Allen (1906-1910), Dr. William Henry Doughty, Jr. (1910-1923) and Dr. William Henry Goodrich (1923-1931).

In 1931, the Georgia Legislature altered the history of the Medical College of Georgia by creating the University System of Georgia and establishing the Board of Regents. Within two years, the Board of Regents included the Medical Department in a list of schools to be closed listing lack of funds, inadequate equipment, not enough classrooms and clinical areas, and an insufficient number of full-time teachers as their reasoning. Fortunately, the public rallied to reopen the school and Governor Eugene Talmadge voted to overturn the decision. The Board of Regents then reinstated the school and renamed the Medical Department as the University of Georgia's School of Medicine. Although publicly supported, the inadequacy of the school was evident and cumulated in Febrary 1934 when the Council of Medical Education and Hospitals as well as the Association of American Medical Colleges took away the Class A rating of the school resulting in the Board of Regents request of resignation from Dean William Moss (dean from 1931 to 1934). Dr. George Lombard Kelly replaced Dr. Moss and would later become the first president of the independent Medical College of Georgia. The school reacted to the negative ratings with a massive program to correct its inadequacies. By May 1936, the school was restored to the Council's approval list but was placed on probation. It was removed from probation one year later. Presumably recovering from the Depression, the school began to grow with the addition of the Dugas Building in 1937 and the Murphey Building in 1939 (both funded by the Public Works Administration).

The University of Georgia's School of Medicine continued to grow both during and after World War II and has been growing ever since. In 1942, the library received a

$10,000 grant from the Rockefeller Foundation and by 1947 both *The Cadaver* and the *Aesculapian* (school yearbook) were being published by the students and have continued publication up to date. Most importantly, on January 18th, 1950 the Board of Regents made the school an independent entity within the University System and restored the school as the Medical College of Georgia. With Dr. George Kelly as newly named President, the school "embarked on a 20-year mission, not only to save the school from extinction, but also to put it on a strong foundation that would assure its continued existence and growth," beginning the school's continuous focus on growth and expansion. The first major step occurred in February 1951 when Governor Herman Talmadge signed a bill authorizing a state hospital in Augusta. By 1954, under President Dr. Edgar R. Pund (1953-1958) the Board of Regents assumed control of the Talmadge Hospital. The hospital is currently under indirect control of the Medical College of Georgia and has seen several expansions since its inception including additional wings and the addition of a Pediatric Intensive Care Unit in 1983. Also, in 1956, the Board of Regents approved moving the School of Nursing from the University of Georgia in Athens to the Medical College of Georgia, marking the addition of several new schools over the next decade.

Educational topics within the school further expanded with President Pund's successor, Dr. Harry B. O'Rear. Upon the request of President O'Rear, the Board of Regents approved the School of Graduate Studies at the Medical College of Georgia in 1965. Furthermore, the School of Allied Health was formed in 1968 and the School of Dentistry admitted its first students in 1969. Soon after, both schools acquired buildings. President O'Rear was also instrumental in acquiring 26 acres of land for the school's

additional growth both during his presidency and in the future. In the early 1970s, the Carl T. Sanders Research and Education Building was established and, in 1972, the Medical College of Georgia's Sickle Cell Center was also established. The growth of the school continued under the reign of President William Moretz (1972-1983) during which the number of graduates almost doubled and the university expended a budget of over $25 million on building expansion. In 1980, the Medical College of Georgia established the MCG Research Institute that still functions today, expanded its library and, in 1981, Student Health Services opened under the direction of Dr. William Henderson. The expansion initiatives during this period reveal the expanding role of the university in not only contributing to the health care system of Georgia but also contributing to both the local and national medical communities through research intitiatives.

Expansion and growth of the Medical College of Georgia has continued under the last three presidents of the school. Dr. Jesse Leonard Steinfield served as President from 1983 to 1987 and "developed a master plan that involved setting priorities and goals to ensure a strong future for the university." Dr. Francis J. Tedesco served as President from 1988 to 2001. "During his presidency, the university continued to expand with more research programs, clinical care centers and buildings." Under President Tedesco, several centers were established including the Ambulatory Care Center and Specialized Car Center (1993; expansion of Talmadge Hospital), the Institute of Molecular Medicine and Genetics (1993), and the Children's Medical Center (1998). Again, these changes mark the university's recent focus on research.

Expansion has continued under the current president, Dr. Daniel Rahn. Since 2001, the school has recruited over 150 faculty members and has developed a 10-year

physical master plan to consolidate the university campus (History of the Medical College of Georgia: 175 Years of Teaching Discovering and Caring). This master plan includes the establishment of the university's Wellness Center (2003), the Interdisciplinary Research Building, the Cancer Research Center, and the Health Sciences Building among many others. Furthermore, President Rahn, along with several other faculty members, has formulated a strategic initiatives plan for the Medical College of Georgia which is discussed in the following section (MCG: Planning). It is clear from the new plan that expansion of the Medical College of Georgia will continue well into the future.

Currently, the Medical College of Georgia has 5 schools (Schools of Allied Health Sciences, Dentistry, Graduate Studies, Medicine and Nursing), 17 academic/research centers, 7 clinical centers, 2 institutes and 12 core facilities and research laboratories. There are 2,000 enrolled students, 834 faculty members, 1,200 adjunct faculty members, and 6,000 total employees. Notably, they have expanded their research space 320,000 additional square feet since 1996 (MCG Overview).

This review of the history of the Medical College of Georgia shows the extensive growth of the university since its establishment. It appears that initiatives to expand and, more specifically, to expand research within the university have begun only in the last five decades. This expansion reveals the literal attempts of the university to not only to become more prominent nationally but to also become more prominent in the region of Augusta. Assumedly, this expansion is accompanied with more specific goals of the university. The next section outlines these goals to determine what role the promotion of technology transfer plays in the overall goals of the university.

## MISSIONS AND GOALS OF THE MEDICAL COLLEGE OF GEORGIA

Although the history of the Medical College of Georgia exhibits the past and current expansion of the institution, it does little to reveal the goals and priorities of the institutional faculty and staff. Both the history of the missions of the institution and current initiatives reviewed below offer a better view of the direction and goals of the past and current administrations. The university is moving towards a more research-oriented institution and faculty with an overarching goal of increasing funds through technology transfer which is evident through the analysis of their current initiatives.

The first statement of goals of the Medical College of Georgia was written in 1962 by President O'Rear. President O'Rear offered a traditional list of objectives for the school including commitments in providing education, promoting scholarly inquiry, applying new knowledge and technology and supplementing and complementing health services both in the state and surrounding region. These objectives were later revised in June of 1973 to include a commitment to exercise leadership in the development of new educational approaches. Notably, although the school was dedicated to economic development as a state school under the University System of Georgia, a specific objective on either economic development or technology transfer within the Medical College of Georgia was not present in the first institutional missions. Emphasis on this category did not emerge until a second revision of the statement of purpose of the Medical College of Georgia was issued in November 1990. Within this statement, the commitment to knowledge and technology was significantly expanded to include the role of the university in "biomedical technology transfer into the health care delivery system."

Since the issue of this statement, the Medical College of Georgia has significantly expanded their role to promote this objective. Although the current mission of the institution (resulting from a directive by the University System of Georgia in 1996 and later revised in 1998) does not specifically mention technology transfer, it explicitly states a commitment to "collaborative relationships with…business and industry" and the "development of a fully-integrated and cost efficient health care system that provides leading edge clinical *innovation and technology* (italics added)," (MCG Mission Statements: A Brief History).

Currently, the Medical College of Georgia is working for approval of a new mission that accounts for their recent strategic initiatives mainly attributed to the work of current president, Dr. Daniel Rahn. In October 2001, the President's Cabinet and other guests created 20 strategic initiatives "to guide the growth and development of the institution." These initiatives were later streamlined in January 2003 into six core institution directions with specific goals. Most recently, the President's Council has moved to combine the issues with financial management in 2004. With the recent revision, the following 10 initiatives and strategies were identified:

- Enhance educational environment and update educational programs
- *Enhance the research enterprise* (italics added)
- Improve access to clinical services
- Continuously enhance the quality of faculty and staff
- Continuously enhance the quality of the student body
- Increase the diversity of the campus community
- Enhance institutional communications
- Enhance institutional physical infrastructure
- Enhance institutional technology infrastructure
- Enhance institution business and administrative infrastructure

(MCG: Priorities and Intiatives)

Within the objective of the Medical College of Georgia to enhance its research enterprise, it is apparent that the institution has mainly focused on two things. Firstly, they have continued the physical expansion of the school following the tradition began in the 1960s by President O'Rear. Secondly, and most importantly, the school has focused on the "recruitment of national caliber researchers and clinical scientists" to enhance their research enterprise. This objective has resulted in $5 million special funding from the state of Georgia, approved by Governor Purdue "to partially underwrite the recruitment of nationally recognized physician scientists," (MCG: Philosophy).

Not only has the Medical College of Georgia refined its purpose and mission, but it has also enhanced its research enterprise over the past two decades with the establishment of significant organizational supplements to not only research but also technology transfer. These supplements include a research incentive program through the Medical College of Georgia's Research Institute, an office of technology transfer, a business incubator, and, most significantly, a Biomedical Research Council.

The Medical College of Georgia's Research Institute's Research Incentive Program was established in 1982 "to stimulate MCG faculty to seek extramural support." The program is funded by a portion of the Facilities and Administrative Costs recovered by MCGRI through extramural awards and is basically a monetary incentive to conduct research. Ten percent of facility and administration costs for individual grants are awarded to principal investigators and their collaborators (through a pro-rated system) as a salary supplement, as funds in a standard incentive account or a combination of the two. The incentive program is available to faculty with the ranking of assistant, associate or research scientist, instructor or assistant/associate professor and also allows for certain

transfer of unused funds back to MCGRI or to other researchers within the university. Notably, the MCGRI also provides a Combined Intramural Grants Program to "assist Medical College of Georgia faculty members in competing successfully for major research funding from external sponsors" and also collaborates with an organization with a similar purpose, Health Research Associates. The MCGRI Research Incentive program along with the other assistance available through MCGRI reiterates the Medical College of Georgia's priority in enhancing their research enterprise, (Research Incentive Program).

The Medical College of Georgia recently implemented an Office of Technology Transfer and Economic Development, again, designating the school's commitment to the technology transfer process. The OTTED functions similarly to other offices of technology transfer and offers 35% revenue sharing to the inventor, 35% to MCG, 10% to the department of the inventor and 20% to MCGRI, (Technology Transfer "101"). Most recently, the office has begun development of the Life Sciences Building Development Center on the MCG campus. The center functions as a business incubator with "the overall intent…to transfer technology out of a laboratory and into the commercial sector with a benefit to society." To participate in the incubator, the company must be a "technology-based enterprise researching, developing or commercializing innovative new products or services in the life sciences area" and will be admitted on "the promise of its research and development, the existence of a definable market for the potential product or technology, and adequacy of funding." Again, the incubator functions as other business incubators by offering administrative infrastructure

and advisement through a designated mentoring group, (Business Incubator at the Medical College of Georgia).

The most notable initiative towards an "enhanced research enterprise" is the five year strategic plan outlined by the university's Biomedical Research Council. Developed in February of 2000, the plan outlines the emphasized research areas of the institution and outlines the necessary components to implement the overall plan. The specific aims of the plan are to promote a new model for faculty recruitment (a main emphasis overall of the university), to stimulate programmatic research in 10 research areas, to initiate a plan for financing the research investment and to develop an administrative structure for the 10 research areas that will allow for continuous evaluation, refinement and improvement. The 10 research areas identified by the council include biomaterial tissue interaction, clinical cancer research, cardiovascular research, developmental biology, epithelial cell biology, gene regulation, molecular immunology, neuroscience (with a focus on epilepsy), sickle cell disease and vision. These 10 research areas fall under five different umbrellas: cardiovascular diseases, neurological diseases, cancer, infection and inflammation and biomedical technology, which serves as the main overarching umbrella. The council states that these areas were chosen due to both "existing strengths and excellent opportunities." According to the council, the ultimate component in achieving excellence in these research areas is recruitment of specific faculty. Furthermore, the council explicitly states that they "believe that it will be to [the] competitive advantage [of the university] to continue to create and support these facilities." They go on to state that "technology transfer is a high priority for the state of Georgia (Georgia Research Alliance), and is an excellent investment for MCG and the

state….The presence of an active technology transfer program is…important to the future recruitment of first-rate faculty." This direct statement links the university's focus on enhancing research to the ultimate goal of achieving successful technology transfer. The council concludes their report by stating that "the funds allocated to support this plan should be viewed as an investment in both the State of Georgia and the city and environs of Augusta. If [the plan] is successful, [it] will generate dozens of new jobs…as a direct result of new research grants and contracts coming to MCG…will increase the patient population, resulting in increased hospital personnel [and that] the increase in tax base resulting directly and indirectly from implementation of this plan should eventually lead to more [research and investment] dollars to support continued growth at MCG," (Biomedical Research Council).

Through the analysis of past missions and current initiatives at the Medical College of Georgia, it is obvious that the university has and is continuing a proactive effort to transition into a research-intensive university with a successful technology transfer program. It appears that the process was mainly initiated by past presidents and has really become a focus under President Rahn although the true initiators will be probed within the semi-structured interviews. Furthermore, it appears that research is being emphasized in order to increase extramural funding to the university, supporting the original hypothesis of this study. The next section supplements this analysis with quantitative data.

SELECTED STATISTICS ON THE MEDICAL COLLEGE OF GEORGIA

Although the Medical College of Georgia is philosophically striving to become a research-intensive university with a successful technology transfer program, it is important to supplement their recent initiatives with quantitative statistics in order to measure both the effectiveness and promotion of their efforts. Furthermore, it is important to measure the phenomena of other contributing variables of technology transfer such as the presence of graduates in the surrounding region. This section outlines these quantitative measurements.

Overall, the Medical College of Georgia has consistently seen an increase in overall funding since 1998 as shown in Figure 1. Overall, funding of the university has increased from $109,242,277 in 1998 to $222,460,760 in 2004 with an astounding 104% change in total in only six years.

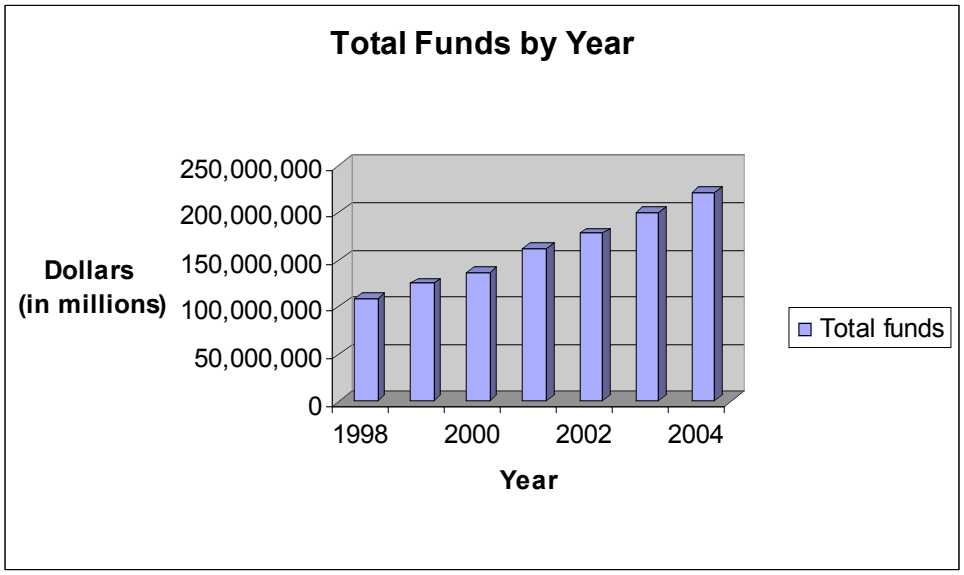


**Figure 4: Total Funds to MCG by Year**

Furthermore, the overall funding specific to research has increased over the same time period. Funding specific to research has increased by approximately 200% since 1998 from $25,614,748 to $76,623,439 in 2004. Figure 2 depicts this change.

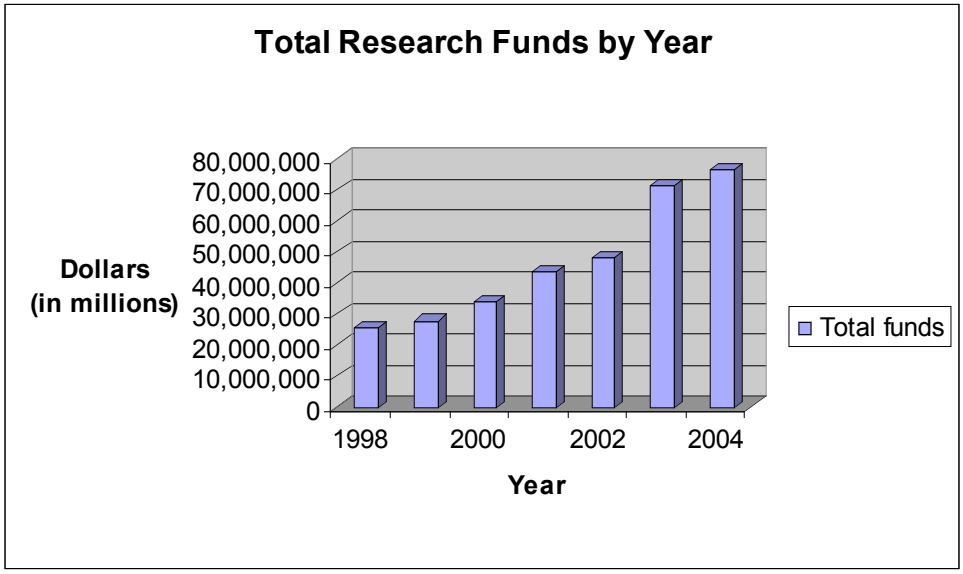


**Figure 5: Total Research Funds to MCG by Year**

Research funding has also become a higher percentage of the total funds allocated to the Medical College of Georgia. Funding specific to research as a percent of total funds increased from 23.45% in 1998 to 34.44% in 2004 and is depicted in Figure 3.

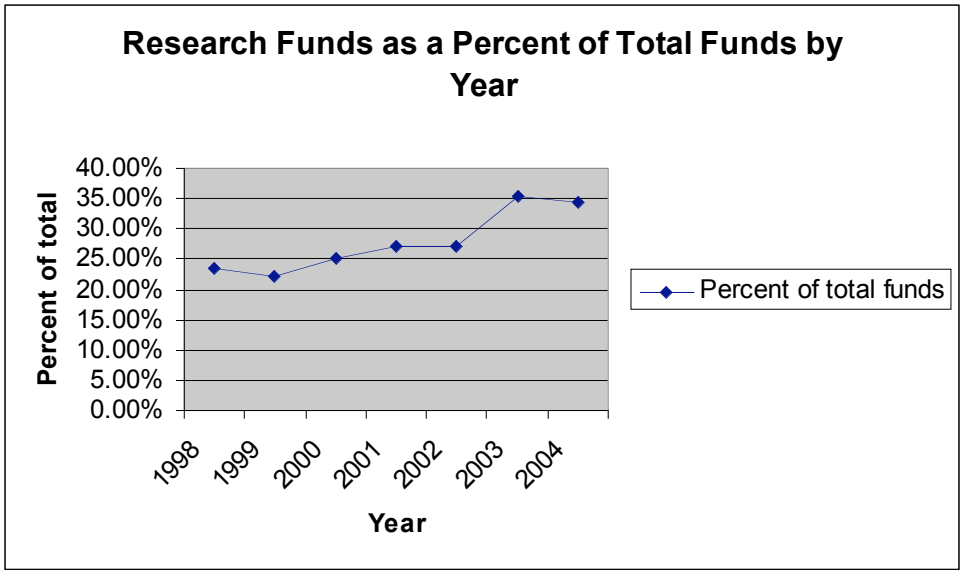


**Figure 6: MCG Research Funds as a Percentage of Total Funds by Year**

This data clearly identifies the university's emphasis on research and is further supported by the type of awards being sponsored. Figure 4 depicts a consistent increase in the amount of money being allocated to the Medical College of Georgia through sponsored awards from 1996 to 2004. The dollar amount of the awards sponsored has also shown significant gain with an approximately 200% increase from $22,289,877 in 1996 to $67,268,160 in 2004.

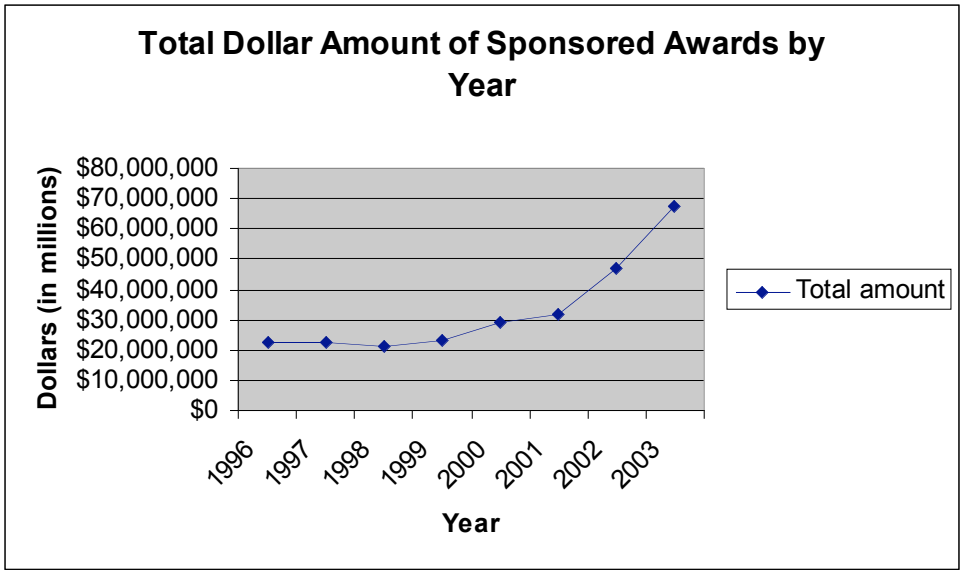


**Figure 7: Total Dollar Amounts of MCG Sponsored Awards by Year**

Furthermore, the result of the increase of this amount is *solely* due to the increased dollar amount of research sponsored awards as shown in Figure 5. The dollar amount of research sponsored awards has increased by 283% compared to an only 17.6% increase for instructional awards, 20.1% increase for public service awards and 122% for other awards (although this statistic may be skewed due to a possible definition change in 2002 where the dollar amount jumps from approximately $500,000 to $4.5 million).

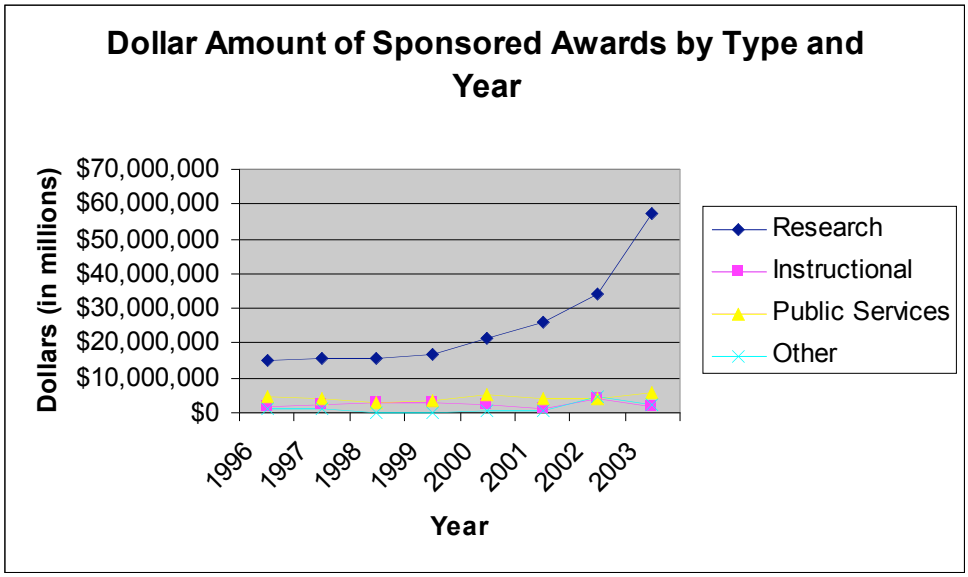


**Figure 8: Total Dollar Amount of MCG Sponsored Awards by Type and Year**

Additionally, the dollar amount of research sponsored awards has obviously increased as a percentage of the total dollar amount of research sponsored awards from 67.37% in 1996 to 85.56% in 2004. Figures 6 and 7 depict this change in percentage.

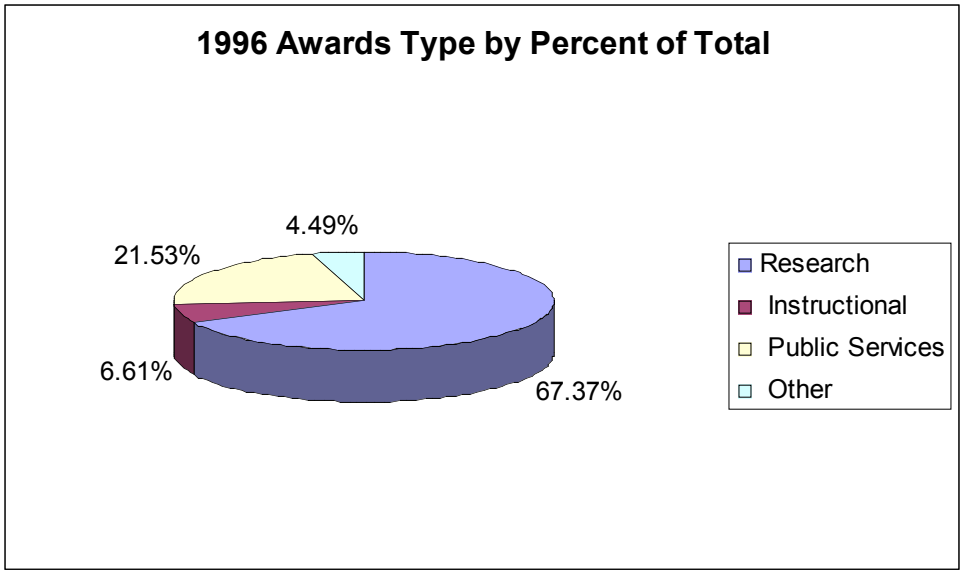


**Figure 9: 1996 Award Types as Percent of Total**

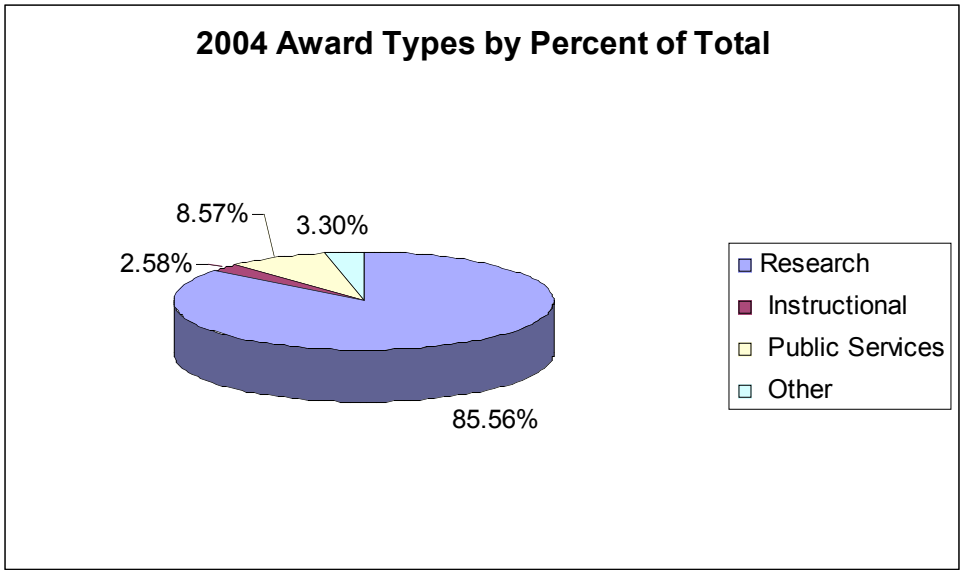


**Figure 10: 2004 Award Types as Percent of Total**

It appears that the majority of the sponsored funding is coming from government entities as the funding from government has increased from $14,935,733 in 1998 to $47,060,469 in 2004. Even more interesting is that the 2nd most significant increase in funding by source comes from industry which increased sponsored funding from $3,361,476 in 1998 to approximately triple that amount at $9,927,977 in 2004. Figure 8 depicts the change in sponsored funding by source from 1998 to 2004.

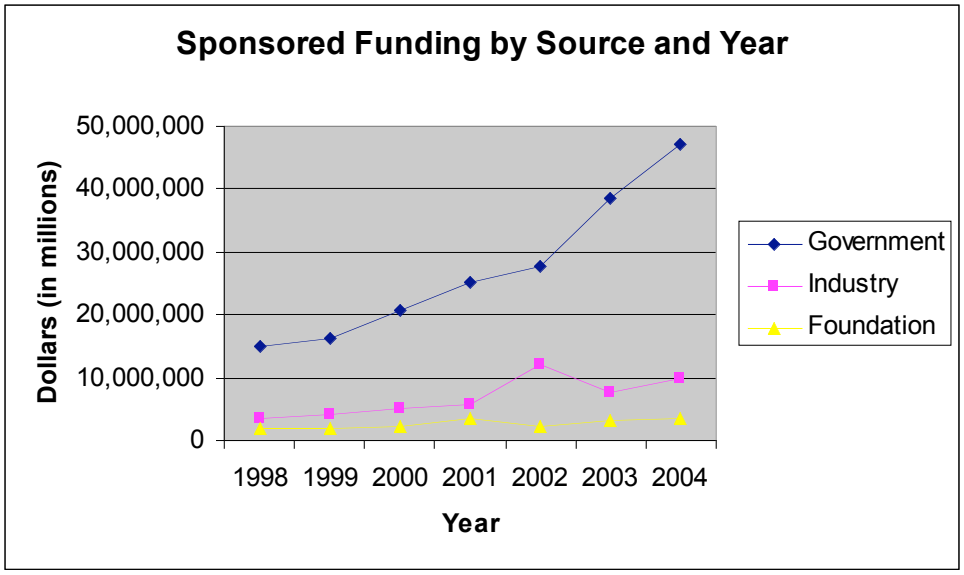


**Figure 11: MCG Sponsored Funding by Source and Year**

From the above data, it is obvious that the Medical College of Georgia has made significant gains in research funding emphasizing their commitment to enhance their research enterprise. Interestingly, all increases in the data begin approximately in 2001 corresponding with the administration of President Rahn (IRIS: Research).

Several other variables other than research funding directly indicate an increase of technology transfer and the building of an infrastructure to support the process. According to the U.S. Patent and Trademark Office, 18 patents list the Medical College of Georgia or its research institute as an assignee of the patent in all patents since 1975. Of these patents, approximately 44% have been filed since 2000 and an astounding 83% have been filed since 1997 (U.S. Patent and Trademark Office). These statistics indicate an increase in patenting by the university over the last 8 years. Interestingly, despite this increase, the number of publications by faculty has decreased over the same time period (although not significantly) and offers the only evidence that the university is not completely focused on research and technology transfer. The total number of faculty

publications has decreased from 1326 in 1996 to 1179 in 2004 with a majority of those publications coming from the faculty of School of Medicine which produced 77.10% of the publications in 2004. Figure 9 depicts this decline (IRIS: Research).

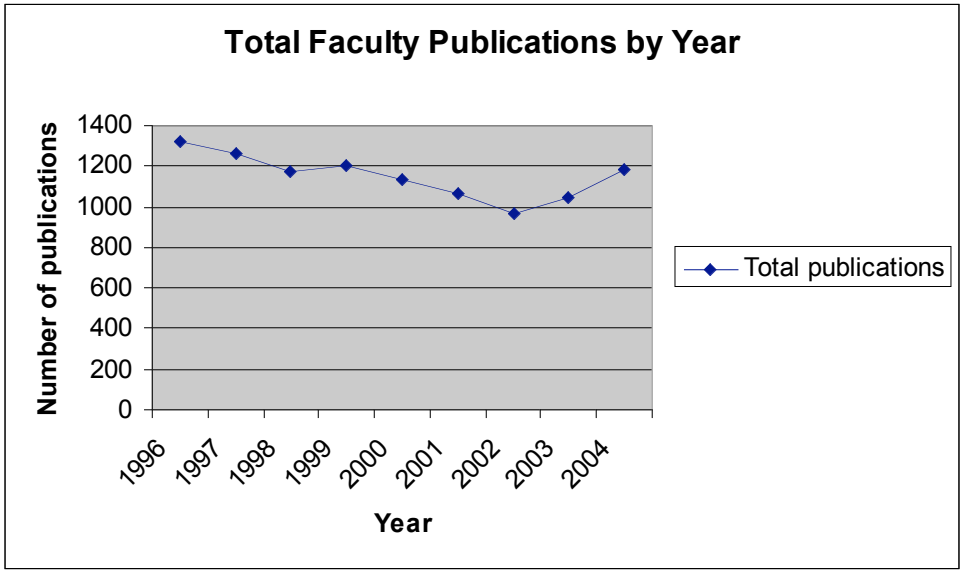


**Figure 12: Total MCG Faculty Publications by Year**

Lastly, although out of control of the university, it is important to analyze the location of MCG graduates to determine if networking with graduates in industry collaboration is possible. As the student population has increased, so have the number of alumni graduating from the Medical College of Georgia. Notably, the majority of the alumni are located in the state of Georgia. In 2004, 13,294 or 64.93% of the Medical College of Georgia's alumni were located in the state of Georgia. These statistics are depicted by Figures 10 and 11 (IRIS: Graduates/Alumni).

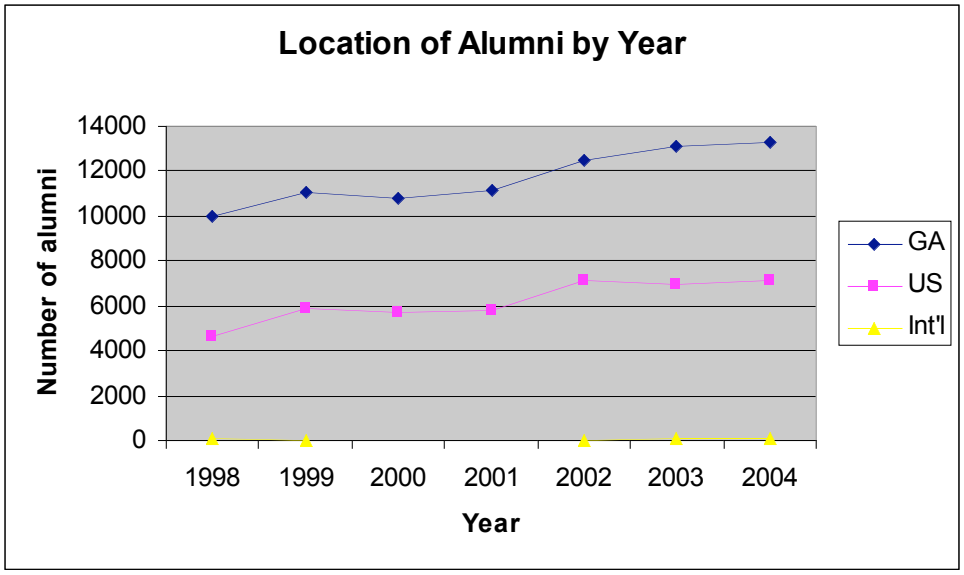


**Figure 13: Locations of MCG Alumni by Year**

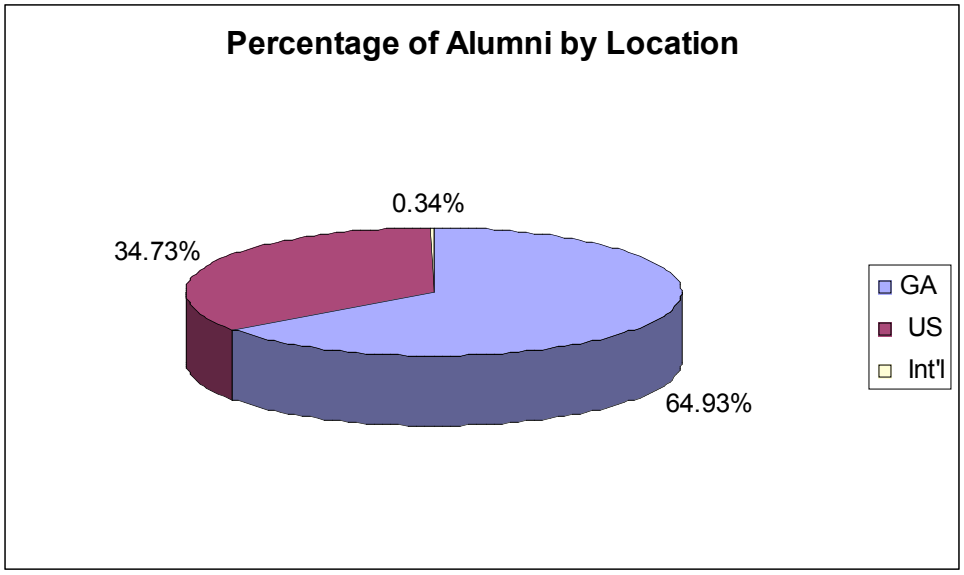


**Figure 14: Percentage of MCG Alumni by Location**

Further analysis shows that a majority of these alumni are located in either the Augusta-Richmond area or the Atlanta area. Approximately 24.13% of MCG alumni are located in the Augusta-Richmond area. Figure 12 depicts the location of MCG alumni by city.

Only the top ten cities according to number of MCG alumni residents are listed (MCG's Impact).

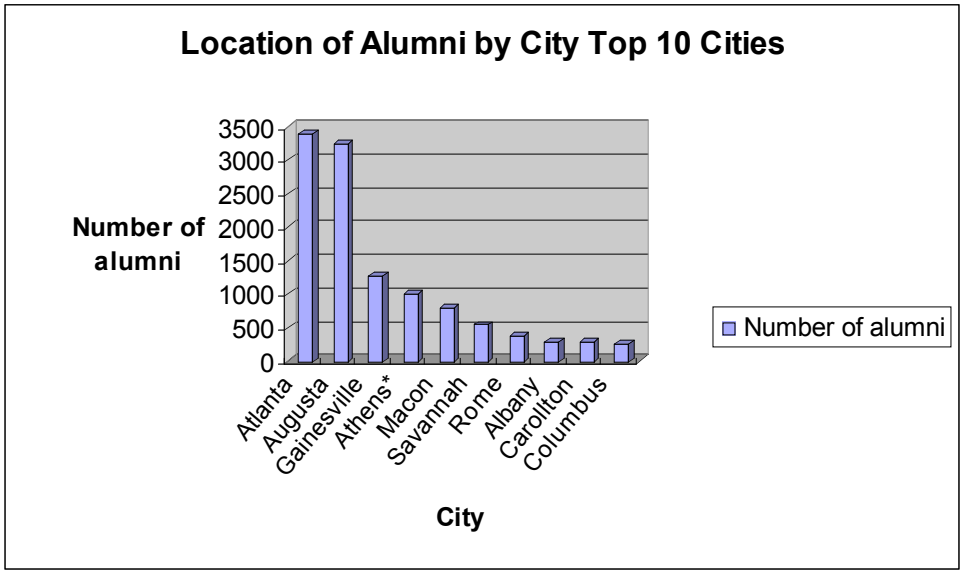


**Figure 15: MCG Alumni Location by City**

For the above data, it is obvious that the Medical College of Georgia is making gains in research funding and the frequency of technology transfer. Furthermore, it appears that the networking infrastructure of alumni is available and capable of providing a link between industry and the university. The next section supplements the quantitative data with qualitative information on the priorities and goals of both the university and region to determine who is initiating the building of this infrastructure and why.

## RESULTS FROM INTERVIEWS

This section outlines the results of the interviews conducted with relevant personnel in the Augusta-Richmond MSA. MCG technology transfer officers, MCG faculty members, MCG administrators, regional economic development authorities and county officials of the MSA were interviewed. Interviews lasted from thirty minutes to an hour and the interview questions can be found in Appendix A. The interviews were semi-structured to allow for probing of issues specific to the building of the technology transfer infrastructure in the region. Generally, the interview questions focused around the current direction of the university and region, the current infrastructure available to support technology transfer (both what is available and what is lacking) and the barriers necessary to overcome in achieving an adequate technology transfer infrastructure.

Overall, the Medical College of Georgia and the Georgia Medical Center Authority are the main drivers in building the technology transfer infrastructure in the Augusta region. The local government has offered relatively little to no support in the construction. These findings support the original hypothesis that the universities within medium-sized cities would be a main driver in building the infrastructure. Furthermore, these findings support the hypothesis regarding the minimal or nonexistent role of the local government. The role of state authorities was not expected and it was found that the GMCA was the *main* driver in initiating the construction of a technology transfer infrastructure within the region.

In the interviews, it was found that the MCG technology transfer officers have noticed an increase in the university's research enterprise and regard this change as

positive. Furthermore, the technology transfer officers identified this new found emphasis as a means for the university to achieve a more nationally prominent reputation. Interestingly, one technology transfer officer alluded to a tension within the university leadership between the research director and the director of the affiliated hospital over the direction of the school (a research school vs. a medical school) although no other interviewees identified this specific tension. Correspondingly, the technology transfer officers did identify an increase in the incidence of technology transfer at the university and marked this academic year as an all time high in the incidence with 32 inventions submitted by faculty members. Overall, technology transfer officers viewed their financial policy on technology transfer as effective although they would change the policy by attributing a portion of the revenues received through technology transfer into a research account for participating faculty members. (This policy was successfully utilized at another institution that previously employed a MCG technology transfer officer). The technology transfer office does not offer any incentives to MCG graduates to remain located in the Augusta region but the officers did regard the business incubator as a tool that makes it easier for the graduates to stay within the region.

The technology transfer officers stated that the university generally does not recognize the full potential of technology transfer although one officer noted that the university has regarded commercialization of research as more reputable in the past few years. This recognition may allude to why the technology transfer program at the Medical College of Georgia was only recently instated. Furthermore, the technology transfer officers, although recognizing an increased interest in technology transfer on behalf of industry, thought the industry within the region was too young to really exploit

the resources offered by the university. Overall, the technology transfer officers viewed lack of visibility of the potential of the Augusta region, lack of appropriate industry within the Augusta region, lack of university awareness of the potential of technology tranfer and lack of venture capital and regional entrepreneurs as barriers to the technology transfer process. The officers identified marketing of the Augusta region and the business incubator at the Medical College of Georgia as well as a significant community effort as components necessary to overcome these barriers to the process. Notably, the MCG technology transfer officers felt that they could have a closer relationship with the local government.

The MCG faculty also recognized the increased emphasis on research by the university. More specifically, the faculty felt that this emphasis was a means of achieving more extramural funding with the ultimate goal of the university receiving more prominent recognition nationally. Notably, the faculty viewed this change as a branching of the Medical College of Georgia's mission, pointing to a fundamental change in the university's traditional objectives. The faculty at MCG did identify collaboration with industry although they felt the nature of this collaboration was more focused and conducive to the training of university students versus collaboration in product development. Furthermore, the faculty revealed that collaboration with industry (versus with clinics) mainly involved industry located outside the Augusta region. Notably, the faculty also revealed that the majority of MCG graduates are being employed in clinical services. This fact seems significant as clinics are not typically involved in product development and, conversely, that alumni employed by industry may be lacking sufficient numbers. This lack of industry alumni may inhibit the university's ability to

set up the networking structures necessary for a successful technology transfer program. Overall, MCG faculty viewed technology transfer as positive and regarded time and financial resources as the largest barrier to the process. More specifically, the faculty felt that product development in collaboration with industry would detriment their teaching schedule. Similar to the MCG technology transfer officers, the faculty felt that marketing and, therefore, a higher visibility of the resources and research available at the Medical College of Georgia was necessary to overcome these barriers.

The MCG administration also recognized the new found emphasis on its research enterprise as a branching of the mission of the university, identifying the new role of the university to provide adequate healthcare and healthcare training as well as a sufficient research enterprise. Again, this shift marks a significant change in the role of the university. Interestingly, the university administration revealed that, due to financial strain in 2001 (mainly due to the attacks of September 11$^{th}$ that altered the entire national economy) an early retirement package was offered to faculty that same year. A majority of eligible faculty members accepted the package which, according to the university administration, gave the university a unique opportunity to "re-engineer" itself. The university administration seized this opportunity by targeting more research-oriented academics in its faculty recruitment effort. This strategy was also supplemented by the goals of the university president. The administration also identified a more nationally prominent reputation for the Medical College of Georgia as the ultimate goal of their emphasis on research. The university administration stated that they did have a relationship with the local government but revealed that the relationship was more focused on such issues as land acquisition than on general economic goals of the region.

The administration did show an interest in technology transfer and identified lack of compatible regional industries as the ultimate barrier to the process. Notably, none of the interviewees at the Medical College of Georgia identified any workforce development programs specific to high-skilled training at the university (although they obviously offer training through their academic courses) or any programs aimed at increasing the university's networking capability with surrounding industry.

Of the economic development authorities interviewed, the Georgia Medical Center Authority was the only authority focused on the recruitment of biomedical and biotechnology companies to the Augusta region. Although not specifically probed, it is deduced that these industries are the most conducive to the research currently being conducted at the Medical College of Georgia. The other economic development authorities would channel leads on such industries to the GMCA and focused themselves on all other industries. These authorities were typical economic development authorities in that they did not attract specific industries but focused mainly on the number of jobs and the wages that a potential business would bring to the region, revealing that only the GMCA is in a position to build the technology transfer infrastructure within the Augusta-Richmond MSA.

The GMCA spent the first years of its establishment (established in 2000) organizing itself structurally as well as establishing a substantial financial base and has only recently shifted its focus to marketing the Augusta region to relevant industries. The GMCA director identified other local universities (such as the Augusta Technical College) and state programs (such as Quick Start) as the main provider of workforce development programs specific to higher-skilled training. Also, the GMCA revealed that,

although they network with industries in Atlanta and plan to implement a clinical trials network in the Augusta region, do not otherwise supplement any networking infrastructure. The GMCA is actively trying to bring venture capital to the region but have only successfully brought in a couple businesses. The GMCA is also focusing on community collaboration which is most recently revealed through the establishment of the August Life Sciences Coalition. Furthermore, the GMCA noted that the local government has offered financial support in their efforts but identified that the local government could offer more support. Specifically, the GMCA identified financial support as well as logistical simplicity (i.e. making permit acquisition easier for potential businesses) as the overall role of the local government. The GMCA identified lack of financial resources, lack of visibility of the Augusta region and the Medical College of Georgia and the lack of entrepreneurs as the biggest barriers to the technology transfer process and felt that marketing of the region was the best way to overcome these barriers. Notably, the GMCA regarded the Medical College of Georgia as one of the region's biggest assets and revealed a close working relationship with the director of the Office of Technology Transfer and Economic Development at the university.

The Augusta region city officials offered the most distinct opinion on the economic direction of the region. The city officials identified an active move away from manufacturing industries as a direct result of globalization and generally regarded the sports entertainment industry as the current economic focus of the local government (although they did remark on the diversity of the Augusta economy). City officials identified the regional economic goals as continuing the traditionally low tax rate of the area as well as continuing the high level of services available to the regional population.

The city officials also identified the workforce efforts of the local universities and the local business incubators as the prominent workforce development programs of the region. Although city officials promote venture capital in the Augusta area, these efforts are only in regards to constructional development. The city officials did describe the Medical College of Georgia as a big asset to the region and identified the need to have a stronger relationship with the university but were not familiar with technology transfer. Lastly, city officials regarded organizational structuring specific to economic development within the city administration as the largest barrier to achieving the region's economic goals.

Table 1 reveals the strengths and weaknesses of the technology transfer infrastructure in the Augusta-Richmond MSA as identified by the interviewees. Overall, the largest barriers to technology transfer identified by the interviewees were lack of visibility of both the Medical College of Georgia and the Augusta region, lack of existing industry in the region, lack of financial resources and lack of venture capital and entrepreneurs in the region. Interestingly, none of the interviewees identified a sufficient networking structure as a barrier to a successful technology transfer infrastructure despite the nonexistence of this component. Furthermore, workforce development programs aimed at developing a higher skilled labor force was not addressed by any of the entities analyzed and was generally regarded as the role of other local universities and of the state government. The only existing component of a technology transfer infrastructure indirectly identified by the interviewees was the increased research occurring at the Medical College of Georgia.

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**Table 1: Strengths and Weaknesses in the Augusta Region Technology Transfer Infrastructure as Identified by Interviewees**

| Interviewees | Strengths | Weaknesses | Important Points |
|---|---|---|---|
| Technology Transfer Officers | * Increased interest within university<br>* Increased interest of industry<br>* Increased incidence of technology transfer | * Lack of sufficient industry interest<br>* Lack of industry availability<br>* Lack of visibility of Augusta region<br>* Lack of venture capital/entrepreneurs<br>* Lack of awareness of university over potential of technology transfer | * Major strategy: marketing<br>* Could have closer relationship w/ city gov.'t |
| Faculty | * Increased research helps with university prominence<br>* Infrastructure to collaborate with industry available (but more for training students vs. development) | * Timing constraints with faculty in collaborating with industry<br>* Lack of visibility of resources<br>* Lack of visibility of the Augusta region | * Views marketing as best way to overcome |
| University Administration | * Increased research helps with university prominence | * Lack of industry availability | * Interested in technology transfer but not main goal; more focused on university reputation<br>* Could have closer relationship w/ city gov.'t |
| Economic Development Authorities | * Presence of Medical College of Georgia<br>* Community collaboration | * Lack of resources<br>* Lack of visibility of Augusta region<br>* Lack of industry availability<br>* Lack of venture capital/entrepreneurs | * Major strategy: marketing<br>* Could have closer relationship w/ city gov.'t |

Currently, only the Medical College of Georgia and the Georgia Medical Center Authority are working to build a regional technology transfer infrastructure. Their strategy is purely to market the region to attract the necessary industry, including biomedical and biotechnology companies as well as venture capitalists. Furthermore, it is apparent that the GMCA is making a consistent effort to increase the financial resources available to the region in order to promote its effort. Without a sufficient presence of industry, it is not surprising that a major technology transfer does not exist. Also, it is not surprising that there is little effort to promote networking within the region as there is not a sufficient presence of industry to network with.

# IMPLICATIONS AND CONCLUSIONS

In conclusion, it was found that medium-sized cities can be characterized economically through a high presence of the manufacturing industry, the low skill levels of the population and the historically low per capita personal income and high unemployment rate. Furthermore, it was found that although universities are a major driver in building the technology transfer infrastructures in medium-sized cities, their efforts are supplemented by state programs. It was also found that universities do not pursue this avenue as a means of achieving funding but that the universities recognize increased research and, therefore, increased technology transfer as a means of achieving national recognition.

Overall, the Augusta-Richmond MSA has great potential to transition into a knowledge-based economy due to the presence of the Medical College of Georgia, the initiatives of the Medical College of Georgia and the efforts of the Georgia Medical Center Authority. Their largest infrastructure obstacles appear to be the attraction of conducive industry, a sufficient presence of venture capitalists and entrepreneurs and, more generally, national recognition as an area capable of technology transfer. Furthermore, there is an apparent disconnect between the need of more resources in order to build the infrastructure and the goal of the city government to keep the tax rate low.

From this study, it is apparent that medium-sized cities are both trying to create and have the ability to create technology transfer infrastructures. The educational universities within medium-sized cities have the ability to reorient themselves into a more research intensive university and to be major drivers of creating the necessary technology

transfer infrastructure. From this study, the biggest need of medium-sized cities in creating a technology transfer infrastructure is the support of the local government in providing the necessary resources and in promoting the city as a potential location for the necessary entities (such as conducive industries and venture capitalists).

Surprisingly, the role of path dependency does not seem to inhibit medium-sized cities from transitioning into knowledge economies. The already prevalent move away from the manufacturing industry allows these cities to focus on other economic initiatives. Furthermore, with the case of Augusta, the universities in medium-sized cities are also recognizing their potential. Interestingly, this recognition is occurring simultaneously yet separately. It is important that medium-sized cities recognize this ability early on so that, when reconstructing their economies, they can begin to establish the necessary economic initiatives to support the process. The city of Augusta has a very great potential and, although the local government has not been a major component of the process, the Medical College of Georgia and the Georgia Medical Center Authority have recognized this potential and have begun the necessary construction.

Because this is a case study, it is important that other studies focus on the economic efforts of medium-sized cities to contribute to the current knowledge. Medium-sized cities are prevalent throughout the nation and, if each city made a successful move toward a knowledge economy, the national economy will offer a more competitive advantage in the new era of globalization.

# APPENDIX A

## INTERVIEW QUESTIONS

*Questions for presidential administration:*

What is your position within the administration?
How long have you held this position?
What are your main responsibilities?
What are the major priorities of the presidential administration?
Why are these issues priorities?
What are the ultimate goals of these initiatives?
    Probe priorities/initiatives relevant to technology transfer (increase in research, change in faculty, business incubator, etc.)
What have been the major barriers to achieving these goals?
    What is necessary to overcome these barriers?
Are these traditional goals of the university or have the direction of the university recently changed?
    If it has changed, when did this change occur?
    Why did this change occur?
Has the university collaborated with the local government or economic development authorities to achieve these goals?
    If so, what is the nature of this collaboration?
    What department or institutions of government were involved in the collaboration?
    How often does the university collaborate with these entities?
    When did the collaborative relationship begin?
Is the university interested in increasing technology transfer with surrounding industry?
    Why or why not?
    How is this being achieved?
    What are the major barriers?
    What is necessary to overcome these barriers?

*Questions for technology transfer officers:*

When was this office established?
What is your position in the office?
How long have you held this position?
What are your main responsibilities?
Have you noticed significant changes in university policies or priorities in the past 10 years?
    What kind of changes?
    Have they affected this office?
        How have they affected this office?
    Do you view the changes as positive or negative?
Does the university offer any incentives to MCG graduates to stay in the region upon graduation?
    Why or why not?
Does the university stay in contact with regional alumni?

If so, how?
Does this office make any effort to stay in touch with regional alumni?
How often does the university participate in technology transfer?
Has the university increased its participation in technology transfer?
If so, why? If not, why?
Describe a specific incidence of technology transfer.
Is this a typical incident?
If not, describe a typical incident.
Describe the university policy on technology transfer?
Do you think this policy is effective?
Why or why not?
Would you change the policy?
If so, how?
How often does the university collaborate with industry?
Is there typically a financial collaboration also?
If so, describe this financial collaboration.
Describe a specific instance of industry collaboration.
Is this a typical instance?
If not, describe a typical instance.
How interested is industry in collaboration?
Why is this interest high or low?
What industries are most interested in collaboration?
Do these industries have a large presence in the region?
What are the barriers of collaborating with industry?
What is necessary to overcome these barriers?
Is there a large availability of venture capital in the region?
Does the university use venture capital in its promotion of technology transfer?
If not, why?
Are there any local government or economic development authorities' incentives promoting technology transfer?
If so, describe these incentives.
What departments or institutions implement these incentives.
Have they produced an increase in technology transfer?
Why or why not?
Does this office collaborate with these entities?
If so, how? If not, why not?
What are the barriers of technology transfer?
What is necessary to overcome these barriers?

*Questions for university faculty:*

What is your position in the office?
How long have you held this position?
What are your main responsibilities?
Have you noticed significant changes in university policies or priorities in the last 10 years?

What kind of changes?
Do you view them as positive or negative?
Do you collaborate with industry?
If so, how often? If not, why not?
Describe a specific instance of industry collaboration.
Is this a typical instance?
If not, describe a typical instance.
Was your collaboration positive or negative?
Why?
How interested are you in collaborating with industry?
Why is this interest high or low?
How interested is the industry in collaboration?
Why is this interest high or low?
What are the barriers of collaborating with industry?
What is necessary to overcome these barriers?
Do you collaborate with regional alumni?
If so, how often? If not, why not?
Describe a specific instance of collaboration with regional alumni.
Is this a typical instance?
If not, describe a typical instance.
Was your collaboration positive or negative?
Why?
How interested are you in collaborating with regional alumni?
Why is this interest high or low?
How do you define technology transfer?
Have you participated in technology transfer?
If so, how often? If not, why not?
Describe a specific instance of technology transfer you participated in.
Is this a typical instance?
If not, describe a typical instance.
Did you utilize the resources of the office of technology transfer?
Was your relationship with the office positive or negative?
Why?
Did you use any venture capital resources?
Why or why not?
What are the barriers to technology transfer?
What is necessary to overcome these barriers?

*Questions for city authorities:*

(When was this institution established?)
What is the mission or purpose of this institution?
What is your position?
How long have you held this position?
What are your main responsibilities?
How would you describe the current industrial make-up of the city?

Has this changed in the past 10 years?
    If so, how?
    Why?
Does the city/institution attempt to attract specific industries?
    Why or why not?
    If so, what industries are attracted?
    Why?
Describe the current economic goals of the city/institution.
Why are these issues the current focus of the city/institution?
How are these goals being attained?
Have the general direction of the initiatives changed in the past 10 years?
    If so, how?
    Why?
What have been the barriers in achieving the economic goals of the city/institution?
    What is necessary to overcome these barriers?
Does the city/institute promote any workforce development programs?
    If not, why? If so, describe them.
    What is the ultimate goal of these programs?
    Are any of these programs specific to increasing research skills within the workforce?
        Why or why not?
Does the city/institution promote any venture capital programs?
    If not, why? If so, describe them.
    What is the ultimate goal of these programs?
Are you familiar with technology transfer?
    If so, define technology transfer.
    Has the city/institution made any initiatives to promote technology transfer?
    Why or why not?
        Describe these initiatives.
        Are they a high priority of the local government?
            Why or why not?
        Does the city work with present universities to promote technology transfer?
            With the Medical College of Georgia?
What is the city's/institutions relationship with the Medical College of Georgia?
Has there been an attempt to collaborate with the university in achieving the economic goals of the city/institution?
    If so, what?
What other entities are charged with the economic development of this city?
When were they established?
What are they charged to do?
Do you think they are effective?
    Why or why not?
    What must change to make them more effective?

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