# THE FLORIDA LEGISLATURE

## INVITATION TO NEGOTIATE (ITN) #859
## TWO-PART GAMING STUDY

### PART II TECHNICAL REPLY (ITN #859)

Submitted To:

Jeannie Evans
Purchasing Program Administrator
Office of Legislative Services
111 West Madison St., Room 874,
Tallahassee, FL 32399-1400

Submitted By:

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The Balmoral Group

March 19, 2013

Jeannie Evans
Purchasing Program Administrator
Office of Legislative Services
111 West Madison St., Room 874
Tallahassee, FL 32399-1400

RE: INVITATION TO NEGOTIATE (ITN) #859 - Two Part Gaming Study

Dear Ms. Evans,

The Balmoral Group is pleased to submit the attached response to The Florida Legislature's Invitation to Negotiate for Part Two of the Two-Part Gaming Study. Our firm is authorized to conduct business in Florida, and has been since 2004. As President of the firm, I have read, understand, agree with and intend to comply with all provisions of this ITN. I am authorized to bind the firm in contractual arrangements relative to all matters contained in our attached Response.

Our Federal Tax ID number is 03-0546876. Best of luck with the solicitation, and we look forward to the opportunity to further demonstrate The Balmoral Group's capabilities to The Legislature.

Best Regards,

Valerie Seidel

Valerie Seidel

President



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## 2. Executive Summary

As the debate over Gaming in Florida resurfaces, the Florida Legislature is poised to redefine the role of gaming in the State's economy. Following a recession that caused Floridians to question certain assumptions about the state's long-term growth, the Legislature faces unusual circumstances, and is in need of reliable information on which to base decisions regarding the future. This original research will help to facilitate the assessment of opportunities and risks in the gaming space.

The Balmoral Group is pleased to present this proposal to the Florida Legislature. We have assembled a solid team of experts with the capabilities, knowledge, and availability to produce a timely and useful analysis to the Legislature. In addition, we highly value our reputation for sound statistical and GIS analysis that can withstand scrutiny, and can assure your Project Management that this important project will be our number one priority until it is complete.

A successful outcome of this project will provide the Florida Legislature with reliable results from a properly executed statistical model; reference materials and GIS maps (if approved for inclusion) which explain findings; and clearly documented support materials. The Legislature will be able to use this package to assess its policies related to gaming at the statewide and local levels. A critical element of statistical evaluation is the ability to "hold constant" the factors that could skew or distort the effects of gaming due to outside factors for example, a community that was already in decline when gaming was introduced is likely to see different impacts than a community that was experiencing steady growth. Our team has the necessary expertise in these critical areas:

- Solid research skills to compile, compare, and validate data from diverse sources;
- Construction and proper modeling of Panel datasets;
- Robust data management skills, including database organization for large datasets;
- Economic analysis of local economic development (LED) factors, including geographical constraints that influence Florida markets at the community level;
- Statistical modeling of employment, wages, and tax revenues, including IMPLAN;
- Research and interpretation of Florida market data;
- Use of GIS geodatabases, maps, and shapefiles; and
- Excellent technical writing skills to summarize complex topics in laymen's terms.

The Balmoral Group team's overall capabilities are a sum of its individual members' accomplishments, which are impressive. Our Key Personnel offer deep experience in each of the critical areas, as well as specific skills in providing statistical support for policy analysis. The specific experience and skills each team member brings to this Study and a list of relevant recent projects is included in Section 3, Qualifications.

### Approach

Our project plan includes a comprehensive package of data and analysis, including NETS historical data for gaming communities across regions on which to compare and predict market outcomes. The analysis incorporates opening and operating dates for gaming facilities, new gaming facilities by type (racino vs.

card rooms vs. tribal casino etc.) and proximity to competing facilities. Consideration of the impacts of associated economic and demographic characteristics of each community will be included, as the incremental impacts of different types of new gaming facilities are likely to vary by type and surroundings. Finally, GIS maps supporting the current and historical business composition for example communities, and the expected future business composition for similarly situated Florida markets, will provide ongoing reference data for the Legislature's use. Throughout this process, we will apply The Balmoral Group's experience assessing business composition of Florida's markets, and the insights of our technical advisors and peer-reviewed literature as applicable.

Within Section 4, the Project Plan, we provide greater detail as to our approach to this study, including the research objectives, data sources, deliverables, and timelines for each critical task.

### Summation

Our team is excited for this opportunity, and dedicated to its success. This is the type of project our team members specialize in, enjoy, and are known for. Each of our team members is committed to making this our highest priority, and will dedicate our resources to generating ***a quality report*** that will address all of the Legislature's requests, and withstand critique and ***the test of time***.

# 3. Organizational Background, Experience, and Capabilities

The challenge facing lawmakers is the wide gulf between the opposing notions of gaming's effects on the economy. A successful outcome of this project will provide:

- Objective, scientific analysis of the "with" and "without" state of the local economy for communities that have adopted gaming;
- A clear and comprehensive understanding of the fundamental economic drivers that link business activity related to gaming;
- Statistical expertise that accommodates the need for management of large datasets with the professional judgment required to interpret results in appropriate context; and
- Results that can be replicated and tested, due to strict quality control processes.

This section describes our background and qualifications for conducting this study. Information is organized as follows:

- The Firm
- Qualifications of Key Personnel
- Similar Projects

## The Firm

**A credible analysis in Part II of this study will allow policymakers to discern the quantitative estimate of gaming's impacts on communities.** The most measureable economic outcomes of gaming will be reflected in local impacts on employment, wages and tax revenue, which are important drivers of most policy decisions. Employment, wages and tax revenue are routinely measured, in a defined and consistent manner, by researchers and statisticians in publicly available datasets, allowing for meaningful comparison over time and across regions. As a result, the measures can be identified and analyzed to identify correlations associated with the presence and economic scale of gaming.

The Balmoral Group has performed similar analyses of many Florida policy alternatives. Our Project Manager, **Valerie Seidel,** has led similar projects for clients at local, state and international agencies, and has 30 years of public and private sector experience; her Geographic Information Systems (GIS) and data modeling skills are particularly well-suited to this scope of work. Ms. Seidel completed her graduate work in Economics at the University of Sydney, in Sydney, Australia, and founded The Balmoral Group after returning to Florida.

**Our economists are respected for their ability to provide objective analysis of complex topics.** We use rigorous statistical methods based on sound science and reasoned professional judgment. The firm's focus on engineering as well as economics and policy analysis is reflected in the precision of our processes, including

- Data management, particularly for large datasets;
- Quality control processes;
- Regular consultation with subject matter experts from industry and academia, and
- Balanced approach to formulating hypotheses for statistical testing.

The firm has developed a reputation for strong modeling and GIS skills to support economic decisions and policy analysis. Included in the firm's investments in software for projects like this are the following applications:

| *Software* | *Application in this Project* | *Key Project Personnel* |
|---|---|---|
| ESRI ArcInfo 9.3, 10.1 Spatial Analyst | Generating maps, generating and editing geodatabase tables for export to Access, creating visual displays for public meetings, reports and documentation | Valerie Seidel<br>Paul Yacobellis<br>Alicia Barker<br>Craig Diamond |
| STATA, LIMDEP, Winks SDA | Statistical modeling software for analyzing trends and identifying significant contributing variables in economic studies and forecasts | Valerie Seidel<br>Paul Yacobellis<br>Alicia Barker |
| IMPLAN | Regional Economic Modeling | Valerie Seidel<br>Paul Yacobellis |
| Microsoft Access; Excel | Performing queries to aggregate data and analyze data similarities between groups, over time or by source | Valerie Seidel<br>Paul Yacobellis<br>Alicia Barker<br>Craig Diamond |
| Microsoft Project | Monitoring task assignments and budget weekly to maintain schedule and cost control | Valerie Seidel<br>Evelyn Ruiz |

The Balmoral Group was founded in 2004, is headquartered in Winter Park, and has offices in Tallahassee, and Sydney, Australia. The firm is registered as a Florida Professional Engineering firm with 8 P.E's currently, and is a Woman-owned Small Business and registered DBE firm. Clients include several State agencies and Universities, Water Management Districts, local governments (County and City) and public-private consortia. 88% of our staff holds an advanced degree or professional certification (P.E.).

## Qualifications of Key Personnel

**Valerie Seidel**, Project Manager, will oversee the management and administrative services for this project. Ms. Seidel has a broad array of previous project management experience in economic projects, including coordination, generation and quality control on large datasets between multiple users and reviewers. Prior management assignments included the coordination of simultaneous asset reviews and information exchanges between bank regulators, potential purchasers and the management staff of failing financial institutions. This work was often completed under absolute confidentiality and extreme time restraints. Ms. Seidel will be responsible for preparation of the final report, coordinating task schedules, field reviews, and oversight of budgeting.

**Lance deHaven-Smith, Ph.D** has extensive experience in statistical modeling and specific expertise in gaming data. Dr. deHaven-Smith has worked closely with TBG staff in research projects, including 5 of the publications listed in Dr. deHaven-Smith's resume. Dr. deHaven-Smith served as Director of the Social Science Research Lab at Florida Atlantic University for ten years overseeing statistical studies, and more recently served as Director of Research at Florida State University's Center for Excellence in local government. In 1999, he was asked to serve on the National Public Sector Gaming Study Commission for a study completed the following year. He is well positioned to provide peer review input as model results are generated.

Technical Advisor **David Rivenbark, Ph.D**. will provide additional peer review input in data management, model construction, and interpretation of statistical results during report preparation. Periodic meetings with Dr. Rivenbark will be scheduled to review summary data, identify issues requiring further analysis, and present statistical calculations for review and concurrence by Dr. Rivenbark throughout Phase 1 and Phase 2 of the project (detail provided in Section 4). During Phase 4 of the project, a series of meetings will occur to test any assumptions underlying the findings and finalize reporting of statistical methodology. Dr. Rivenbark is respected for his statistical modeling expertise; he has a deep understanding of microeconomics and decision-making at the individual/business owner level. He completed his Masters in Economics at FSU in 2002, his Ph.D. at UCF in 2010, and has published in the *Journal of Risk and Insurance*on modeling uncertainty in individual decision-making. Dr. Rivenbark has participated in several economic development and statistical modeling projects with TBG, and will provide additional peer review input in data management, model construction, and interpretation of statistical results during report preparation.

Our proposed Deputy Project Manager, **Craig Diamond** also has strong GIS and modeling skills, with over 30 years' experience managing projects with statewide implications and local impacts. Mr. Diamond is an accomplished GIS analyst and econometrician, and has been retained by numerous academic clients over the years to support projects that require strong statistical skills. Mr. Diamond completed his undergraduate work as a Math major and obtained his Masters at University of Florida's Engineering School. He worked with Technical Advisor Dr. deHaven-Smith at the FAU/FIU Joint Center for Urban and Environmental Problems for 6 years.

Research Economist **Paul Yacobellis** holds a Masters in Statistics specializing in Data Mining, and has just completed a TBG project for the Australian Office of Environment and Heritage involving GIS and statistical analysis of over 20 million datapoints. Statistical and GIS Support is further offered by Policy Analyst, **Hunter Richards** and Staff Economist **Alicia Barker**; both have provided support to data collection, GIS analysis, technical writing, and econometric modeling for projects completed by the firm, including those listed in Table 2 under Similar Projects**. Hunter Richards** has completed original research in statistical modeling as part of his graduate studies at the University of Arizona. In addition, as a legislative aide in the U.S. Senate and U.S. House of Representatives, he developed strong writing skills and routinely provided briefs of policy issues from committee hearings.

This management plan serves to use each team member's time and expertise efficiently. Table 1 summarizes the Key Personnel, assigned tasks and time allocated to each.

**Table 1. Key Personnel and Assigned Tasks**

| Name | Specific Tasks | % Time Allocated | Firm |
|---|---|---|---|
| Valerie Seidel | Project Management and Research Plan; Economic Analysis | 30% | The Balmoral Group |
| Lance deHaven-Smith | Model Review, Economic Findings | 10% | FSU |
| David Rivenbark | Model Implementation, Statistical Interpretation | 20% | David Rivenbark Consulting |
| Craig Diamond | Model Construction, GIS Analysis | 60% | The Balmoral Group |
| Paul Yacobellis | Model Construction, GIS Analysis | 60% | The Balmoral Group |
| Alicia Barker | Data Collection, Compilation and Validation | 70% | The Balmoral Group |
| Hunter Richards | Data Validation, Report Preparation | 70% | The Balmoral Group |

Table 2 provides a summary of information regarding The Balmoral Group's experience in data collection and management, statistical modeling and analysis, and the use of GIS (where applicable) Further detail of specific models for selected projects are included in Table 3.

## Table 2. Demonstrated Experience Matrix

| Areas of Demonstrated Experience | FDOT Strategic Resource Evaluation Study | DEO – Coastal Resiliency Cost Benefit Analysis | SJRWMD Urban Water Use Estimates/USGS Mega-Model | OEH (AU) Socioeconomic profiles and GIS | Avon Park AFR/ Highlands County Economic Impact | FGCU Salary Compression and Inversion Study | DACS Annual Gasoline & Diesel Consumption | Orange County Public Works Optimization | Mt. Dora Predictive Economic Impact | Seminole County Business Resource Inventory | City of Palm Bay Econ Development Plan | Pompano Beach Econ Dev .Strategy | Tampa Bay Water 20-Year Plan | TBEP 50-Year Compensatory Mitigation Plan | Wekiva River Basin Land Use Predictor Model | EPA Wetland Valuation Study |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Statistical modeling; data collection, model construction and interpretation | • | • | • | • | • | • | • | • | • | | • | • | • | | • | • |
| GIS modeling and optimization | • | • | • | • | | | | • | • | | • | • | | • | • | • |
| GIS Analysis of business composition by annual employment, industry growth prospects, and firm size | | | | • | • | | | | • | • | • | • | | • | | |
| Data management, database organization and QC of large datasets | • | • | • | • | | | • | • | | • | | | • | | • | • |
| Collaboration with academic and industry subject matter experts | • | • | | | • | | | • | | | | | • | • | • | • |
| Statistical modeling of employment, wages and tax revenues, including IMPLAN | • | • | | • | • | • | | | • | | • | • | • | | | • |
| Preparation of technical reports and executive summaries | • | • | • | • | • | • | • | • | • | | • | • | • | | • | • |
| Economic analysis of local economic development factors | • | • | | • | • | | | | • | • | • | • | | • | • | |

## Similar Projects

The Balmoral Group has been retained by public agencies and public-private consortia to provide modeling and statistical support for a variety of similar projects. Clients seek our assistance in resolving complex policy issues of sustaining economic growth and managing public resources, such as infrastructure, natural resources, and funding.

Our economists have successfully completed assignments evaluating the impacts of various approaches to procurement for highway construction materials for FDOT (originally under then-Chief Engineer, now Secretary Ananth Prasad), including controversial matters pertaining to materials specifications for asphalt pavement, aggregate, and concrete pavement. Professional staff prepared GIS analysis and econometric modeling using 14 years of data for variables potentially affecting FDOT's costs, including changes in raw materials markets, changes in legislation, variation in levels of competition among suppliers in different FDOT districts, global and national events affecting shipping and energy costs, and competing industry sectors using similar workers and materials. The dataset included over 2 million data points. Ultimately, key factors were identified that had substantial impacts from both a fiscal and statistical standpoint, and corresponding recommendations were made at the client's request. In this case, a critical element of the project's success was an understanding of the underlying statistical models for estimating (1) changes in competition, (2) dynamic supply and demand forecasting, and (3) technological change. Our recommendations were implemented by management.

Another example includes modeling completed for the Florida Department of Economic Opportunity for Counties facing contentious land use decisions in coastal zones and military encroachment areas. Our economists prepared GIS maps and developed algorithms to calculate the costs and benefits of different strategies for mitigating loss of life and property damage over a 50-year period. Model calculations were completed at the parcel level, for approximately 14,000 properties. All strategies were found to be cost-effective in some locations, but the results were very location-specific. In order to convey the technically complex results in terms that were useful to planners and policymakers, our GIS specialists prepared maps showing the number of strategies that were viable by parcel, over a county-wide scale. The graphics allowed for immediate recognition of trends and patterns in cost-effectiveness, which permitted further discussion of the critical decisions, rather than fixation on a specific parcel or single strategy.

Table 3. Detailed Project Descriptions

| Project | Description of relevant Statistical and/or GIS modeling application |
|---|---|
| **Avon Park Air Force Range Economic Impact of Runway Certification** | Statistical modeling of the impacts on wages, retail expenditures, employment, tax revenues and property values due to military expenditures and conservation efforts, and the direct, indirect and induced and values attributable to a potential expansion of runway services and associated troops. Impacts were estimated for Highlands County, Florida. |
| **FGCU Salary Compression and Inversion Modeling** | Panel data regression analysis was used to statistically assess the presence and extent of salary compression and inversion among faculty at Florida Gulf Coast University (FGCU). Rank ratio analysis was used to identify potential compression and inversion at the 2-digit Classification of Instructional Programs (CIP) code level for each of FGCU's 25 disciplines, , incorporating peer group salary levels using survey results of 78 peer institutions. |
| **Office of Environment and Heritage, State of New South Wales, Australia** | TBG was retained to prepare robust datasets of economic, social and demographic data to identify regions of NSW that potentially represented the highest risks from various aspects: health, educational attainment, storm surge, etc. A GIS dataset was generated containing over 1,000 individual variables (age structure, housing, workforce, etc.). Modeling was completed using GIS algorithms to populate and map socio-economic profiles of regional and metropolitan areas at various scales of census data, for approximately 18,000 communities; the resulting dataset contains over 23 million data points. |
| **Economic Analysis of the Effects of Land Conservation, Parks and Open Spaces on Residential Property Values** | Statistical modeling of economic impacts to residential properties of parks and open space in Orange County, Florida. The hedonic model was a panel-regression of GIS data that controlled for all unobservable property and macroeconomic characteristics that have direct effects on property values and whose omission would otherwise have introduced biased statistical results. The study included over 121,000 observations and controlled for 38 variables. GIS analysis was used to map the distribution of economic impacts on surrounding property values. |
| **Tampa Bay Water – Integrated Water Resource Protection Plan** | Statistical modeling was performed to identify underlying attributes of over 300 source water protection strategies, based on professional judgment of subject matter experts in various sciences. Using probit and cluster analysis modeling, key factors of effective options were identified, including the agency's perceived ability to implement the final recommendations effectively, whether the plan elements were expected to have disparate impacts on different groups of constituents, and whether scientific experts expected the benefits of a particular option to be manifest in the short-term and/or long-term time horizon. A full cost-benefit analysis was performed on the 18 options identified as most effective, allowing policy-makers to base decisions on the relative environmental, social, scientific and financial implications of each alternative, while incorporating stakeholder priorities and preferences. |
| **Development of a** | Economic modeling of GIS attributes and various biological, hydrologic and |

| | |
|---|---|
| **Coordinated Watershed Approach for Linking Compensatory Mitigation and Tampa Bay Habitat Restoration Goals** | economic growth scenarios was performed to iteratively forecast land use changes, based on future land values rather than ecological values, and determine appropriate targets and locations for sustainable mitigation. Partners from private industry, mitigation banks, government agencies and regulators were engaged to incorporate federal, state and local wetland regulatory requirements into the long-term plan. |
| **Capital Projects Needs Assessment, Orange County** | With a new administration facing a backlog of over 1,000 approved capital projects with no clear prioritization method, TBG identified project benefits that could be estimated across project types - e.g. avoided costs of reduced future maintenance, environmental or water quality improvement, etc. - and generated GIS algorithms for project-specific factors. Natural breaks in benefits were modeled, allowing for logical prioritization points. Projects were prioritized in groups, allowing for resource allocation by benefit category, and rapid reallocation if available resources change, or the importance of a specific criterion changes. |
| **Predictive Economic Impact Study for the Mount Dora to Seminole Wekiva Trail** | Estimates of trail users and trips per trail user were produced using a two-stage statistical modeling process and combined with a survey of trail spending by retail goods/services sector, such as Restaurants, Lodging, Rentals, etc. Economic impacts calculated included local components of gross domestic product, employment, personal income and wages, property values impacts and subsequent fiscal benefits due to projected increases in the local tax base. The purpose was to predict the economic impacts that could reasonably be expected to accrue to the City of Mount Dora, Florida, as a result of a proposed trail running through downtown Mount Dora and connecting to the proposed Wekiva Parkway Trail, the Seminole Wekiva Trail and eventually the West Orange Trail. |
| **Econometric Forecasting to Support Models of Ecological Impacts** | An econometric model was developed to predict individual landowner decisions for the Wekiva River Basin area, a rural section, using 18 variables reflecting property values, projected roadway paths and GIS data. The forecast land use maps predicted with 91% accuracy which 480+ of 1500 parcels would convert from rural to developed land use over a five year period. Using results to forecast future activity, projected development was overlaid with known biological diversity hotspots, priority wetlands and most effective recharge areas to identify sources of conflict. The identified outcomes allow for mitigation of fragmented habitat, management of development in environmentally sensitive areas and increased efficiency in transportation design. |
| **Modeling of Seagrass Habitat Vulnerability** | GIS and statistical modeling of the likely impacts of projected sea level rise on seagrass habitat. Using ecological assessments of historical seagrass habitat conditions and geological assessments of lagoon bathymetry, future scenarios of seagrass coverage are modeled in GIS to reflect the combined impact of (a) incremental sea level rise over three time scenarios, (b) regulatory efforts to improve water quality, and (c) adjacent land uses, which may act as a physical boundary for seagrass migration. Mapping and calculation of fragmentation indices for seagrass patches under alternative scenarios were prepared for use by policymakers in addressing local regulations and/or alternatives. |

### Required Work Product

As specified in the ITN, we have included a sample report from a similar project. Most of our projects of similar scope and size employ statistical modeling and analysis in support of policy recommendations. As the ITN for Part II is focused purely on statistical modeling, rather than policy analysis or recommendations, we have included a purely statistical report. The work product attached is for a recent study we completed for Florida Gulf Coast University. A copy of the Final Report, which is 17 pages long without appendices, can be found under Required Exhibits.

## 4. Project Plan

This Section explains the proposed approach and methodology to be used to perform Part II of the Study. A detailed schedule is provided which sets forth a timeline for accomplishing significant interim steps in Part II of the Two-Part Study.

### Technical Approach: Data Sources

The Balmoral Group approach to measurement of Changes in Economic Outcomes will define measurement variables, employ econometric modeling to estimate coefficients for the economic drivers of local changes in the variables, and interpret the parameters in the context of a draft and final report.

The ITN specifies the universe of observations to include counties nationwide where new gaming facilities have opened and operated. Further, the ITN specifies that a dataset such as the National Establishment Time Series database (NETS) or other geospatially identified data should be used in the formulation of the model. While others, such as Environmental Systems Research Institute (ESRI), offer comprehensive geocoded business datasets, there are no comparable geospatial datasets to NETS, for purposes of time series analysis, allowing for comparison of various businesses and economic sectors over time.

The American Gaming Association reports 39 states with commercial gaming activity in 2011, the most recent year for which complete data is available. Including card rooms, race tracks, electronic gaming, tribal casinos, and riverboat casinos, up to 350 counties across the U.S. have legal gaming facilities. The 50 largest counties have 486 total gaming facilities, while 220 counties have only one authorized facility each. These facts are important because comparing the effects of gaming on a community's overall economic impact is likely to be affected by the scale of gaming operations, as well as proximity to other gaming operations; just as with other industries, agglomeration of suppliers, etc., is more likely to be detectable where a critical mass of activities exists. Further, Florida is more urbanized compared to many of the states with limited gaming facilities. This offers to opportunity to conduct analyses and comparisons of the more populated areas.

The NETS dataset is compiled from the number of businesses in a County. For example, if ABC Locksmith opens in Hillsborough County, it is recorded as a business "birth" for that County; if later the firm relocates to Orange County and Orange County experiences a business transfer, then both counties are now included in the dataset. If ABC closes down, it will register as a business "death" within the

county where it occurs. As such, accurately tracking the formation of businesses is possible by following an individually identified firm each year of its existence. Business growth generally occurs when firms have reached 4+ employees and is past the fragile start-up phase and more stable. A consideration in analysis would be whether to include firms with 0-3 employees (or 1-3 depending on definition of "owner" status); firms with fewer than 4 employees have very high business birth and death rates, and could add "noise" to any statistical model and limit the reliability of any results. This is a decision that could be discussed at Project Kickoff, along with the pros and cons of said decision.

Published research also has shown that border counties are affected by gaming legislation: county borders may mean little in adjacent areas like Orange and Seminole County, where residents cross county lines multiple times a day to commute, shop, and conduct business. Spatial analysis (using GIS) will allow for testing of the effects of gaming on counties adjacent to gaming counties, or within larger regional areas, if determined to be of statistical interest. Determination of geographic extent for data consideration is another modeling decision that warrants discussion at Project Kickoff.

For the 350 counties with casinos registered, the current cost of the NETS dataset ranges from $40,000 to $90,000, depending on the exact data requested.

### Statistical Modeling: Panel Data and Economic Outcomes

The most measureable economic outcomes of gaming will be reflected in local impacts on employment, wages and tax revenue, which are important drivers of most policy decisions. There is a perception that when casinos or gaming parlors open in a community, other businesses lose revenue and decline. A quantitative assessment will compare the "state of affairs" in a community prior to the introduction of gaming venues to the business landscape some time period thereafter. This type of analysis requires building a data set that recognizes indicators of demographic and economic variation between communities and over time. A community that was already in an economic decline when gaming was introduced is likely to see different impacts than a community that was experiencing steady growth. Consequently, a critical element of statistical evaluation is the ability to "hold constant" the factors that could skew or distort the effects of gaming due to outside factors. At the same time, other factors introduced into the analysis can introduce statistical distortion issues, which experienced statisticians typically address through careful consideration of the model's design and appropriate data sources. Panel (or longtitudinal) datasets also require careful management to ensure that valuation of monetary factors over time are adjusted to constant dollars, to avoid introducing variation that may be erroneously attributed to some other factor. Finally, assessment of any variable over time requires a recognition that socio-economic outcomes may occur gradually, rather than instantaneously. The magnitude of such lags may be affected by factors such as the size of the market in which they occur and larger (regional or national) trends.

The Balmoral Group has extensive experience evaluating the impacts of business activity on markets. Recently completed analyses include the impact of competition on local markets in the asphalt pavement and concrete products sectors in Florida, which evaluated the net impact from changing ownership of production plants on the costs FDOT paid for highway materials. Total production measures by plant and by owner in each County were estimated from publicly available DEP monitoring

reports and used to adjust aggregated ownership changes over a fourteen year period. Other factors in local markets were isolated to allow for apples-to-apples comparison of competition as a factor. Because of The Balmoral Group's intimate knowledge of Florida's local markets, our professional economists quickly spot anomalies in data or results that warrant further research, adjustment, or interpretation. Our staff has also completed analysis of panel datasets involving 33 U.S. states and their oil revenue taxation (royalty) rates; 20 states and their agricultural irrigation water demand; state university professor salaries across 26 disciplines, and price elasticity by markets.

## GIS Analysis

The Balmoral Group believes that location (i.e., geography) matters in all economic matters. When asked to consider economic development prospects in a community, one routine check our firm performs is whether emerging jobs are more lucrative than the jobs being lost or replaced. GIS analysis is a valuable tool that we routinely use for this type of modeling. An important component of the analysis is whether any shift in business composition (if one is found) affects the growth outlook for the community. GIS analysis will be performed to allow for comparison of industry composition by sector before and after introduction of gaming facilities. Cities comparable to Florida locations will be identified by business composition and other factors, and used to simulate results for Florida locations in GIS.

A technique that can be employed in this situation is the modeling of potential outcomes - likely incremental economic impact - under a most beneficial and least beneficial scenario. Using the output generated from the panel dataset in changes in the number of going concern businesses, employment, tax revenues, and household consumption can be modeled to illustrate the likely economic picture, after gaming, for Florida communities.

The Balmoral Group recently performed similar modeling for a project involving several counties and cities facing a potential regulatory change, and needing a formal agreement to address mitigating measures. The options for mitigation would have very different outcomes for the seven different counties and five cities based on their existing state of development. To demonstrate the potential outcomes, two scenarios were modeled, allowing local government officials and other stakeholders to see the impacts of their decision under a high growth and low growth scenario – some aspects varied only slightly under the two different scenarios, while others magnified the potential effects of regulatory change. The net effect of this simulation was to "bookend" the impacts that everyone could agree were reasonably likely. Since no one can predict the future in absolute terms, a solid understanding of the upper and lower bounds of likely outcomes sets the stage for useful discussion by policymakers.

## Final Report

The final Phase of the project will entail generation of the Final Written Report for the Legislature. We understand that the critical issues are:

1. Is there statistical support for expecting a change in economic outcomes when gaming facilities are introduced to a community?
2. If so, what are the likely incremental economic impacts?

3. What would similar impacts be expected to look like in Florida?

Our report will harness the collective knowledge and experience of our team to address the results of statistical modeling, any assumptions that are critical to use of the report, and the strengths or weaknesses of the model results.

Deliverables would include:

- Written Report on Model Results
  - Detailed descriptions of county-specific (or regional, as deemed appropriate) results from statistical modeling of local impacts across the U.S.
  - Comprehensive analysis of expected market responses in Florida, including upper and lower bounds
- GIS Maps and supporting database
- Excel spreadsheet of quantitative data on gaming counties nationally

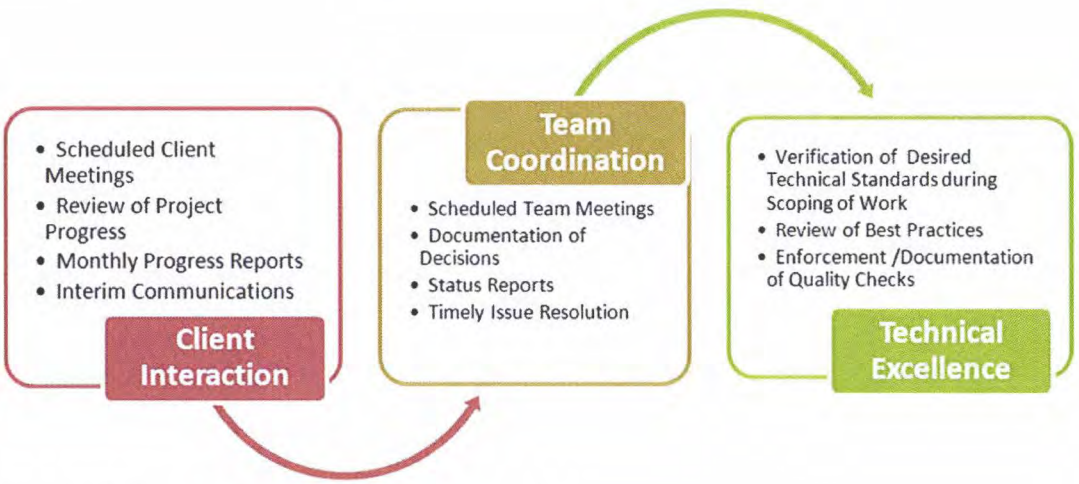
Our Work Plan provides for a review by the Legislature of our Final Report with a period for Comments and Revisions prior to the stated Final Due Date of October 1, 2013.

## Milestones

The Balmoral Group staff is experienced in managing large and small projects within budget and on time. Our first step upon award of this project would be to meet with the Project Manager to compare schedules, and verify that our expectations as to deliverables, proposed data sources, and software choices for providing data and reports are acceptable. Our project manager will assemble the team, verify tasks for each individual and finalize the project plan.

Meeting minutes would be prepared and circulated to ensure agreement on technical and housekeeping points before technical work was undertaken. Figure 1 shows our internal processes used to ensure project schedules and budgets are maintained and timely production of deliverables that achieve objectives.

**Figure 1. Internal Process**



Because of the expedited schedule required of this project, the project plan will be reviewed and/or updated every Monday to reflect progress on assigned tasks. The updated project plan is used to keep task lists for each week current, identify obstacles to timely completion of any task, and determine if additional resources are needed. In addition to listed staff, we have additional full-time and part-time staff available to assist in the event that a staff member requires support or data takes longer than anticipated to compile, necessitating a greater dedication of resources to meet deadlines. The project plan also tracks budget performance, which will provide advance notice of variances in budgeted time or materials for each task.

All external calls are logged with Call Notes; correspondence bookkeeping is logged in a Document Log tracking all documents received or distributed. Matters which require a decision to be made among alternatives are logged in Project Notes as they arise, and issues which require resolution before progress can be made are logged as Project Issues. Outstanding issues which may delay progress are brought to the Project Manager's attention at the earliest time, while non-urgent issues are reviewed with the Project Manager on a predetermined schedule, as appropriate. The outcome of all decisions is documented in the Project Issues Log to serve as a permanent record of the justification for chosen alternatives, and also as backup documentation for staff, and/or should additional input be needed at a later date.

At each Project Milestone, documentation of completed steps and important decisions made to that point are formally documented for the Legislature and TBG's records. In addition, because our work product is our reputation, we have scheduled ample time for quality reviews of each step. This allows for errors or omissions to be identified and corrected before final steps are taken, and a final review of work product to occur prior to submission to the Legislature. A qualified team member who is familiar with, but was not responsible for preparation of, the specific data or report draft will review every report component for accuracy. The Balmoral Group has a formal Quality Assurance/Quality Control Policy, and all employees recently completed a training session to refresh their knowledge of requirements under this policy.

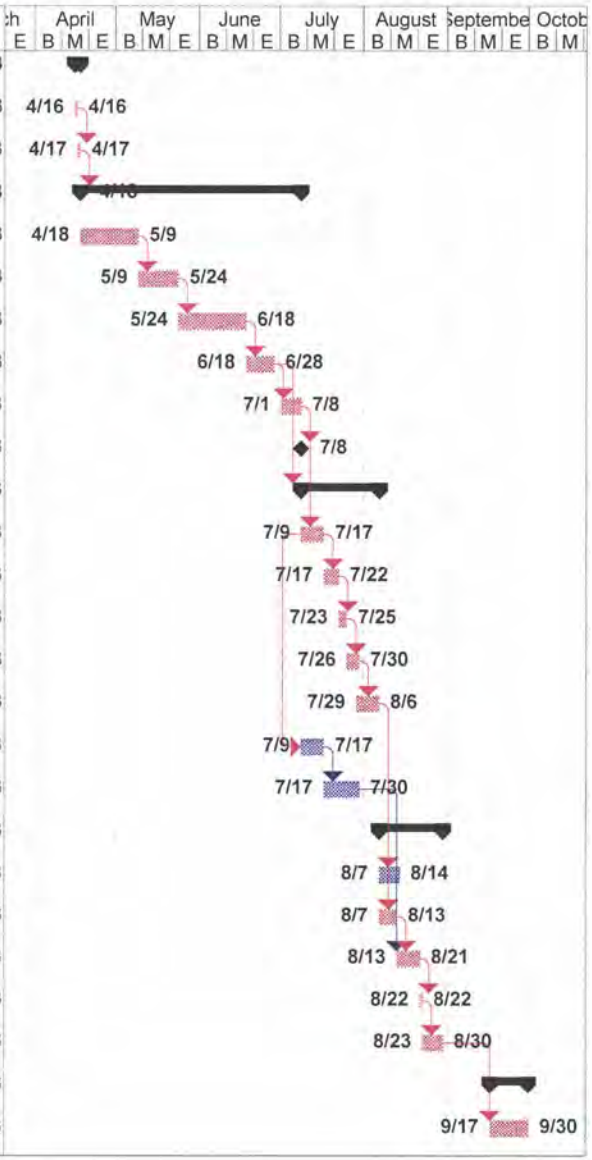
The Balmoral Group's technical approach will be performed as a series of related Tasks. Milestones are provided in Table 3 below. A detailed Project Plan follows on the next page.

**Table 3. Task Descriptions and Milestones**

| Task | Description | Milestone |
|---|---|---|
| I | Kickoff; Define Measurement Variables; Confirm data sources | 7/8/2013 |
| II | Prepare Panel dataset, QC; Model preliminary statistical and GIS Results; Status Meeting | 8/6/13 |
| III | Finalize Model; Draft Report, Maps, QC; Submit | 8/30/13 |
| IV | Produce Final Report, GIS Maps and all supporting documentation | 9/30/13 |

# ITN # 859: Part II of Two-Part Gaming Study

| ID | Task Name | Start | Finish |
|---|---|---|---|
| 1 | **Kick off meeting with Project Manager** | **Tue 4/16/13** | **Wed 4/17/13** |
| 2 | Review proposed contact schedule, sources and timeline | Tue 4/16/13 | Tue 4/16/13 |
| 3 | Prepare meeting minutes, staff assignments and distribute | Wed 4/17/13 | Wed 4/17/13 |
| 4 | **Conduct interviews with industry sources** | **Thu 4/18/13** | **Mon 7/8/13** |
| 5 | Compile Data set; confirm availability of variables | Thu 4/18/13 | Thu 5/9/13 |
| 6 | Validate data; perform descriptive statistics | Thu 5/9/13 | Fri 5/24/13 |
| 7 | Assemble Panel dataset; construct preliminary model | Fri 5/24/13 | Tue 6/18/13 |
| 8 | Review model, identify any issues for further review | Tue 6/18/13 | Fri 6/28/13 |
| 9 | Prepare prelininary results for Status Meeting/Progress Report | Mon 7/1/13 | Mon 7/8/13 |
| 10 | Status Meeting | Mon 7/8/13 | Mon 7/8/13 |
| 11 | **Model Preliminary statistical and GIS results** | **Tue 7/9/13** | **Tue 8/6/13** |
| 12 | Run Panel model for changes in business composition, economic | Tue 7/9/13 | Wed 7/17/13 |
| 13 | Model effects on business composition | Wed 7/17/13 | Mon 7/22/13 |
| 14 | Review results against published literature; document differences | Tue 7/23/13 | Thu 7/25/13 |
| 15 | Identify upper and lower bounds of effects | Fri 7/26/13 | Tue 7/30/13 |
| 16 | Prepare IMPLAN model using bounds; review with Technical | Mon 7/29/13 | Tue 8/6/13 |
| 17 | Geocode data to identify business composition by market | Tue 7/9/13 | Wed 7/17/13 |
| 18 | Prepare GIS algorithms for upper and lower bounds; map effects | Wed 7/17/13 | Tue 7/30/13 |
| 19 | **Finalize Model; Draft Report** | **Wed 8/7/13** | **Fri 8/30/13** |
| 20 | Identify Key findings; summarize; draft text | Wed 8/7/13 | Wed 8/14/13 |
| 21 | Prepare analysis of incremental impacts on employment, wages | Wed 8/7/13 | Tue 8/13/13 |
| 22 | Compile all gathered data in compatible format, coordinate GIS | Tue 8/13/13 | Wed 8/21/13 |
| 23 | Meeting with Technical Advisors to review findings | Thu 8/22/13 | Thu 8/22/13 |
| 24 | Draft and QC Final Report, submit for review | Fri 8/23/13 | Fri 8/30/13 |
| 25 | **Final Report** | **Tue 9/17/13** | **Mon 9/30/13** |
| 26 | Review Comments; QC and submit Final Report | Tue 9/17/13 | Mon 9/30/13 |



## *Technical Discussion*

The following is a description of the proposed general model for this study for those so inclined.

### *A. Measurement Variables*

- Employment
- per capita personal income
- average wages
- per capita consumption

Note: Taxable consumption may be more appropriate to model than actual tax collection, since tax rates would otherwise require treatment as an independent variable, which introduces other issue of interpretation. For a particular location, tax collections can then be quantified from the taxable consumption estimates. This is a technical issue which would be discussed on award.

### *B. Model*

Let $y_{it}$ be the measurement outcome for counties i = 1,..., N at time t = 1,..., T. A simple unrestricted regression model would be

$$y_{it} = \sum_{i=1}^{N} \alpha_i a_i + \sum^{T} \gamma_t g_t + \delta d_{it} + \mu n_{it} + \sum^{K} \beta_j x_{jit} + \varepsilon_{it},$$

where:

- $a_i = \{1,0\}$ are county-level indicator variables to capture the effects of county characteristics that don't vary (e.g., geographic location, geographic size, neighboring economies, etc.);
- $g_t = \{0,1\}$ are time specific indicators that capture seasonal effects, national time-varying (economic cyclical and structural, and environmental) effects, and global time-varying effects;
- $d_{it} = \{0,1\}$ is an indicator that varies by both time and county where $d_{it} = 1$ may indicate that gaming is legal in county i;
- $n_{it}$ is a count variable for the number of casinos open in county *i* in time period *t*;
- $x_{kit}$ for $k = 1,...,K$ are county-level economic variables that vary over both time and county (effects for variables $x_{kit} = x_{ki}$ are captured in the coefficients $\alpha_i$); and
- $\varepsilon_{it}$ is the random disturbance term.

### *C. Parameter Interpretations*

- $\delta$ has the interpretation of the effect of the law itself, separate from the gaming industry strength (assume gaming is legal, where $d_{it} = 1$, while the presence of gaming establishments has not happened, where $n_{it} = 0$ );
    - The parameter $\delta$ can be modeled as a function of time, $\delta(t, \boldsymbol{z}_{it})$ , that allows the data to determine whether $\delta$ changes with time and $\boldsymbol{z}_{it}$ are county-level characteristics that influence the impacts of the legislation;
    - $\delta$ could also be modeled as a random coefficient to obtain a distribution of expected impacts and model the probability that legalization has an

impact above some hypothesized values – speaks to the difference between model uncertainty and parameter uncertainty;

- $\mu\hat{}$ is the marginal effect of increasing the number of gaming establishments;
    - Could even be modeled as a random coefficient to obtain the distribution of impacts and model the probability that adding a new establishment has an impact above some hypothesized value
    - If $x_k$ incudes average gaming employment, then $\hat{\beta}_k$ is an establishment "size" effect, separate from the establishment effect $\mu\hat{}$.

ATTACHMENT "A"

THE FLORIDA LEGISLATURE

**DISCLOSURE INFORMATION**

## PARTNERSHIP OR INDIVIDUAL

I hereby certify that I, if an individual, or each of us, if a partnership, doing business as _____
(Name of Individual or Partnership)
is not now involved in nor have I ever engaged in any private business venture or enterprise, directly or indirectly, with the Florida Senate, the Florida House of Representatives, or any Member of employee of either the Florida Senate or the Florida House of Representatives.

I further certify that neither I, nor any partner, if a partnership, nor anyone acting in my or our behalf has requested that any of the above designated persons or any other employee of the Florida Legislature exert any influence to secure the appointment of _____ under this proposed agreement.
(Name of Individual or Partnership)

If partnership, each partner must sign and execute.

Signature: _____ Title: _____

Signature: _____ Title: _____

Signature: _____ Title: _____

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## COMPANY OR CORPORATION

I hereby certify that neither I, nor any owner, officer, director, or shareholder of The Balmoral Group, LLC
(Name of Corporation/Company)
are presently engaged in or have ever been engaged in any private business venture or enterprise, directly or indirectly, with the Florida Senate, the Florida House of Representatives, or any Member of employee of either the Florida Senate or the Florida House of Representatives.

I further certify that neither I, nor any owner, officer, director, or shareholder of this company/corporation, nor anyone acting on its behalf, has requested that any of the above designated persons or any other employee of the Florida Legislature exert any influence to secure the appointment of The Balmoral Group, LLC under this proposed agreement.
(Name of Corporation/Company)

Signature: _____ Title: President

ATTACHMENT "B"

THE FLORIDA LEGISLATURE

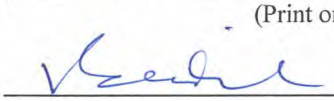
**NON-COLLUSION STATEMENT**

I certify that this ITN Reply is made without prior understanding, agreement, or connection with any corporation, firm or person submitting a reply for the same ITN and is in all respects fair and without collusion or fraud. I agree to abide by all conditions of this ITN and certify that I am authorized to sign this ITN for the represented Vendor and that the Vendor is in compliance with all requirements of the Invitation to Negotiate including, but not limited to, certification requirements. In submitting a Reply to the Florida Legislature, the Vendor offers and agrees that, upon the ITN's acceptance, the Vendor is deemed to have sold, assigned, and transferred to the Florida Legislature all rights, title, and interest in and to all causes of action it may now or hereafter acquire under the antitrust laws of the United States and the State of Florida relating to the particular commodities or services purchased or acquired by the State of Florida or its political subdivisions.

Vendor Name: The Balmoral Group, LLC

Certified by: Valerie Seidel

(Print or type name of owner, officer, or authorized agent)

Signature:  Title: President

ATTACHMENT "C"

THE FLORIDA LEGISLATURE

**WARRANTIES**

The Respondent represents that it is professionally qualified and possesses the requisite skills, knowledge, qualifications and experience to provide the required services specified. The following are warranty certification requirements that must be certified in writing using Attachment C. If the Respondent cannot so certify to any of the following, the Respondent must submit with its Response a written explanation of why it cannot do so within the Administrative Documents Required.

1. The Respondent or any other organization associated with the ITN is not currently under suspension or debarment by the State or any other governmental authority.

2. To the best knowledge of the person signing the Response, the Respondent, its affiliates, subsidiaries, directors, officers, employees of any other organization associated with this ITN are not currently under investigation by any governmental authority and have not in the last ten years been convicted or found liable for any act prohibited by law in any jurisdiction involving conspiracy or collusion with respect to bidding on any public contract.

3. To the best knowledge of the person signing the Response, the Respondent, its affiliates, subsidiaries, directors, officers or any other organization associated with this ITN have no delinquent obligations to the State, including a claim by the State for liquidated damages under any other contract.

4. To the best knowledge of the person signing the Response, the Respondent, its affiliates, subsidiaries, directors, officers or any other organization associated with this ITN have not within the preceding three years been convicted of or had a civil judgment rendered against them or is presently under indictment for or otherwise criminally or civilly charged for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain or performing a federal, state, or local government transaction or public contract; violation of federal or state antitrust statutes; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property.

5. To the best knowledge of the person signing the Response, the Respondent, its affiliates, subsidiaries, directors, officers or any other organization associated with this ITN have not within a three-year period preceding this certification had one or more federal, state, or local government public transactions terminated for cause or default.

Certified by: Valerie Seidel

(Print or type name of owner, officer, or authorized agent)

Signature: _____ Title: President

ATTACHMENT "D"

THE FLORIDA LEGISLATURE

**REFERENCES for** The Balmoral Group, LLC
(Name of Respondent)

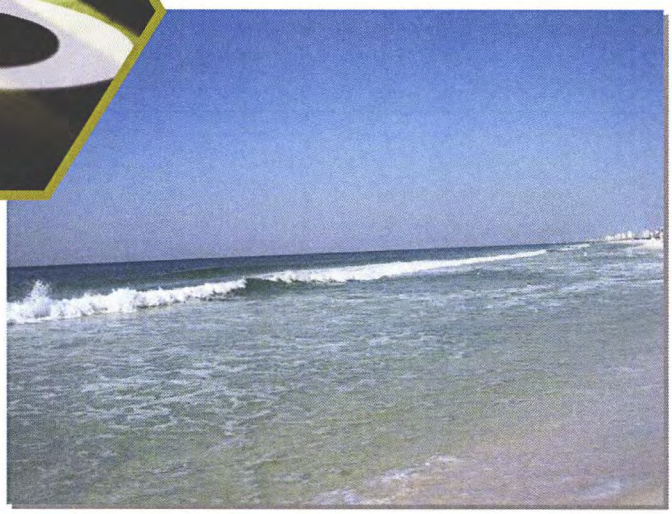
Provide the following reference information for a minimum of three businesses
where services of similar size and scope have been completed.
Make additional copies as necessary to provide a maximum of five business references.

| | |
|---|---|
| Business Name | Florida Department of Transporation |
| Address | 5007 NE 39th Avenue, Gainesville, FL 32609 |
| Contact Person | John Petty (Officially Secretary Prasad can also speak for our work) |
| Phone Number | (352) 955-6630 |
| Fax Number | (850) 412-8020 |
| Email Address | john.petty@dot.state.fl.us |
| Date and Description of Services | Performed statistical modeling to assess effects of competition, regulation, energy costs and other factors on FDOT's critical highway materials<br>2007-2012 |

| | |
|---|---|
| Business Name | Florida Gulf Coast University |
| Address | Modular 2 0501 FGCU Blvd S. |
| Contact Person | Hudson Rogers, Ph.D. |
| Phone Number | (239) 590-7329 |
| Fax Number | N/A |
| Email Address | hrogers@fgcu.edu |
| Date and Description of Services | Performed statistical modeling of faculty salaries, literature review, and analysis of FGCU salaries versus peer group institution.<br>2011-2012 |

| | |
|---|---|
| Business Name | Department of Economic Opportunity |
| Address | 107 E. Madison Street, Caldwell Building |
| Contact Person | Julie Dennis |
| Phone Number | (850) 717-8478 |
| Fax Number | N/A |
| Email Address | julie.dennis@dep.myflorida.com |
| Date and Description of Services | Performed GIS and economic modeling of economic development impacts of various land use planning and mitigation programs for statewide coastal areas<br>2011 |

# FGCU Faculty
# Salary Compression and Inversion Study



**Submitted to:**
Steve Belcher
Special Assistant for Faculty Affairs
Office of Academic Affairs
Florida Gulf Coast University

**Submitted by:**
The Balmoral Group, LLC


**Responsible Office:**
341 North Maitland Avenue, Suite 100
Maitland, FL 32751
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Cell: 407.415.2964

**Contact Person:** Valerie Seidel
vseidel@balmoralgroup.us


December 2011
***(Revised January 2012)***

# Table of Contents



## List of Tables and Figures

# FGCU Faculty Salary Compression and Inversion Study

The Balmoral Group is pleased to present this Executive Summary Report for the analysis of salary compression and inversion at Florida Gulf Coast University (FGCU). Our analysis has relied on two separate but complementary modeling approaches: rank ratio analysis and regression analysis. The rank ratio analysis was used to identify potential compression and inversion at the 2-digit Classification of Instructional Programs (CIP) code level for each of FGCU's 25 2-digit CIP codes[1]. Peer group salary levels throughout this report are determined using CUPA survey results of 78 peer institutions. The regression analysis was used to statistically test whether identified compression and inversion were significant. Before summarizing the results of our analysis we briefly discuss the literature related to compression and inversion studies in section I. In section II we summarize our rank ratio analysis. In section III and IV we discuss our regression models and present their results.

## I. Literature Review

For the past two decades researchers have focused on the role of salary compression and its effects on wage differentials in higher learning institutions. Salary compression occurs when newly hired, or junior, faculty members receive a rate of pay that approaches, or is approximately equal to, the rate paid to faculty of higher, or senior, professional rank. A more extreme version of salary compression, salary inversion, arises when junior faculty members earn higher salaries than senior employees. Although in some instances salary compression, and particularly salary inversion, may be a form of wage discrimination, salary compression is not in itself a problem. Assuming that institutions value human capital, it is defensible to grant junior employees with specialized skills and teaching qualifications a higher salary than those with fewer credentials.

The classification of junior and senior faculty members is an important factor in constructing an appropriate compression model. A rather narrow definition by Snyder et al. (1992) defined junior members as individuals with less than one year of experience at a university, while Toutkoushian (1998) classified junior faculty as assistant professors with less than three years of service at a university and fewer than six years of professional experience in academia. Twigg et al. (2002), on the other hand, defined a junior faculty member as someone with fewer than three years university experience and fewer than three years professional experience before being hired. Another way to define members as junior faculty is to include not only assistant professors but also newly promoted associate professors and full professors. This process allows for both between-rank and within-rank comparisons. It should be noted, however, that tenure was a factor in these studies and only three faculty ranks, Assistant Professor, Associate Professor and Professor, were considered. These conditions differ from those at FGCU, which does not have a tenure system and includes four faculty ranks, Instructor, Assistant Professor, Associate Professor and Professor.

[1] CIP codes are codes assigned to classify instructional areas for benchmarking against national statistics, and are tracked by CUPA (College and University Professional Association for Human Resources).

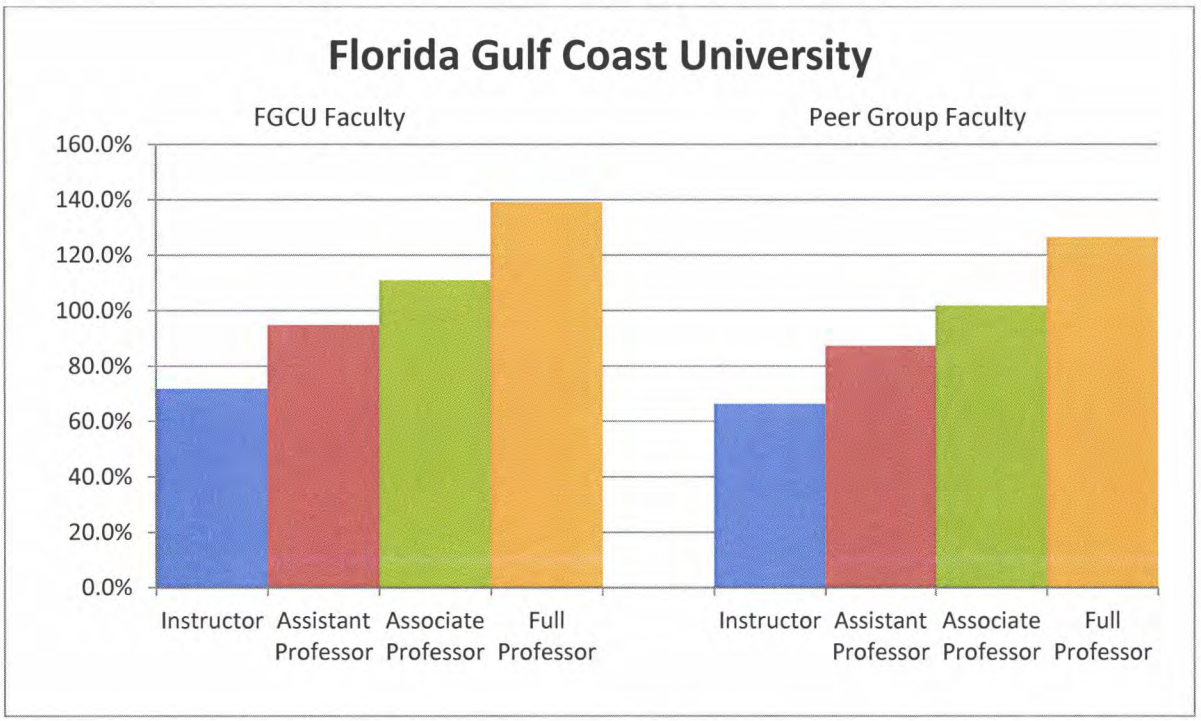
There are two methods of analysis most common to this type of study, rank ratio analysis and regression analysis. The rank ratio method compares mean salaries between ranks. Salary ratios are calculated by dividing the mean salary of each rank by the mean salary in a given discipline. Since the ratios are normalized with the same denominator, they can be compared to check for compression. Any ratio of a lower rank that approaches (or is greater than) the ratio of a higher rank displays symptoms of compression (or inversion). However, factors such as time in rank and tenure that may be significant determinants of salary differences are not included in the rank ratio analysis.

The regression method is able to control for these other factors when testing for salary compression or inversion. The independent variables determining salary that are typically incorporated into regression equations include rank, time in rank, and tenure. However, since FGCU does not have a tenure system, the tenure variable will not be included in statistical analysis. Market conditions can be represented by discipline and year of hire, while merit components are considered to be "institutionalized" into the measures of discipline, rank, and time in rank as by Snyder et al. (1992). CIP codes at the two digit level can be used as dummy independent variables to control for average salary differences across academic fields.

## II. Rank Ratio Analysis

Rank ratios were compared at the University level and by 2-digit CIP code. As shown in figure 1 below, a comparison of salaries by rank (Instructor, Assistant Professor, Associate Professor, and Full Professor) for all FGCU faculty members, without accounting for CIP, suggests salaries progressively increase as faculty members rise through the university ranks. Average salaries for Instructors and Assistant Professors are less than the overall average of all faculty members combined. Instructors earn less (on average) than Assistant professors. Average Salaries for Associate Professors and Full Professors are above the university average, with Full Professors earning (on average) more than Associate Professors.

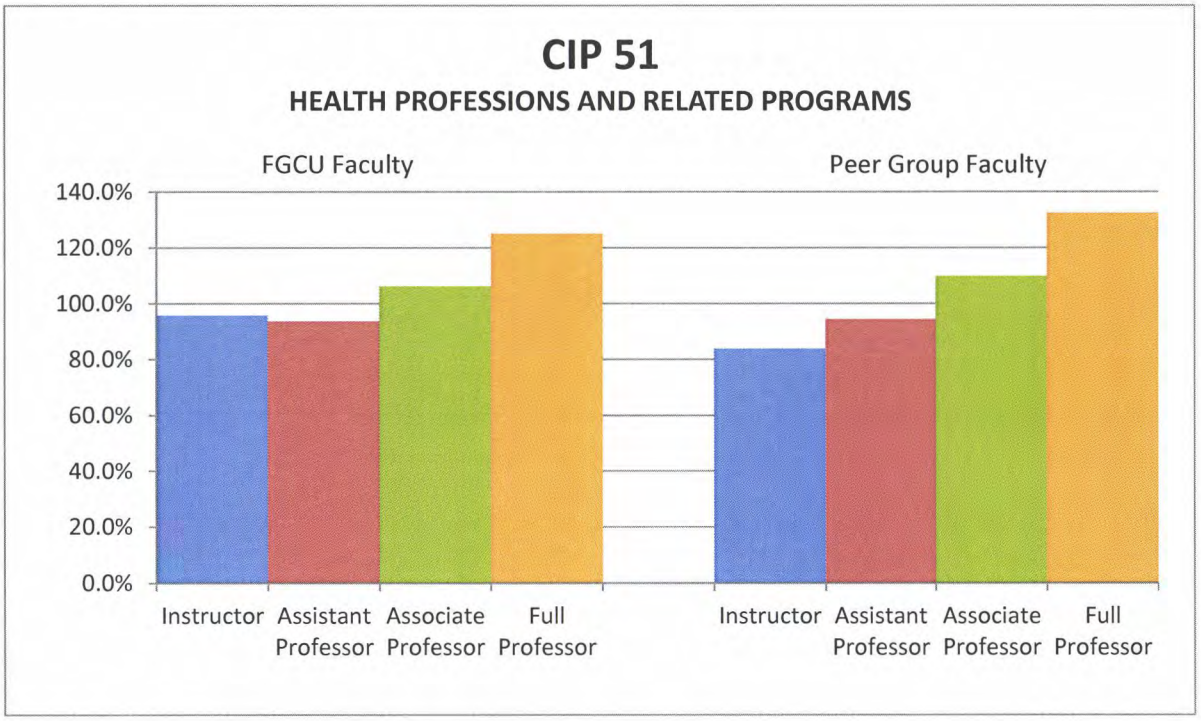
**Figure 1. FGCU Rank Ratio Analysis**




Comparing FGCU rank ratios to the faculty peer group data obtained through CUPA tells a similar story. Each successive university rank for faculty in the peer group earns (on average) a higher percentage of the group average salary, with Full Professors earning the highest salaries. Making these rank ratio comparisons at the 2-digit CIP tells a similar story for 23 out of the 25 CIP FGCU 2-digit CIP categories (see Appendix A).

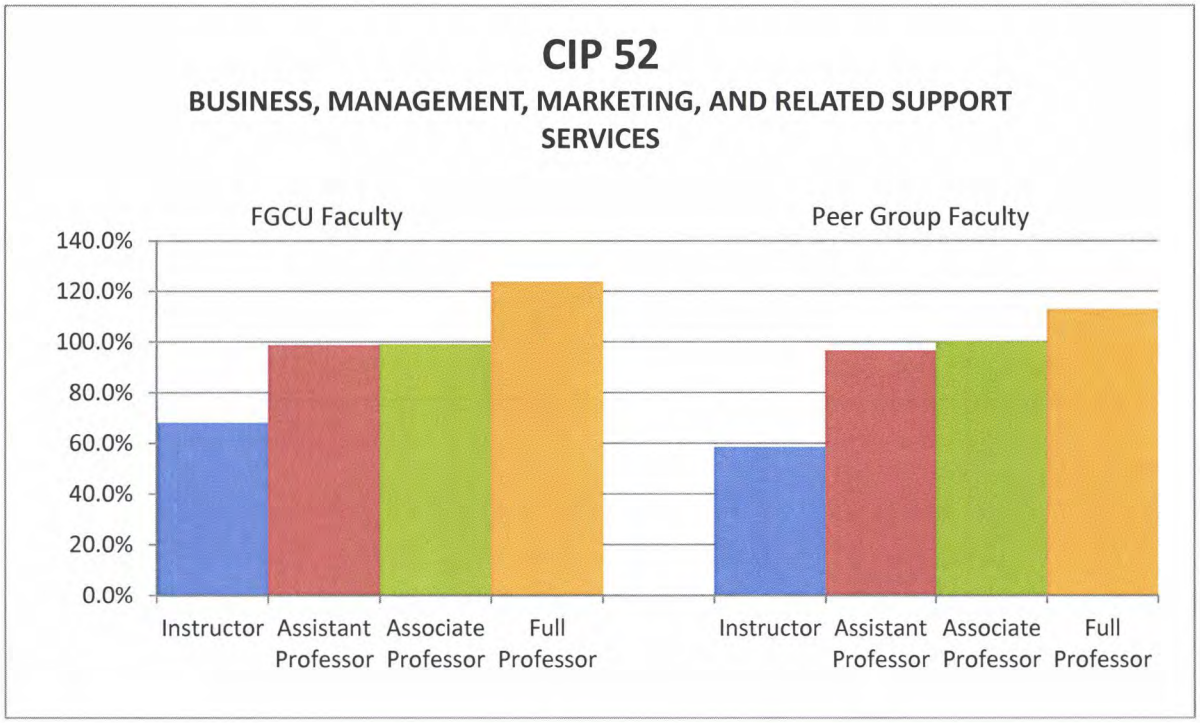
Rank ratio analysis for faculty in CIP 51, Health Professionals and Related Programs, shown in figure 2 below, suggests salary inversion is occurring at the ranks of Instructor and Assistant Professor, where instructors are (on average) earning a higher percentage of the CIP 51 average salary than faculty members at the rank of Assistant professor. The peer group comparison does not show this inversion, which suggests the FGCU differences in salary are not market driven.

**Figure 2. CIP 51 Rank Ratio Analyses**




Faculty salaries in the Business College, CIP 52, are not showing signs of inversion; however, as indicated in figure 3 below, there are signs of compression at the ranks of Assistant Professor and Associate Professor. Salary compression is also revealed in the peer group data for these faculty ranks, suggesting the compression at FGCU is market driven.

**Figure 3. CIP 52 Rank Ratio Analyses**




The salaries for FGCU faculty members in the remaining 23 2-digit CIP categories and Librarians do not appear to show signs of either compression or inversion. Peer group data are available through CUPA for many of these CIP codes. However, peer group comparisons cannot be made for faculty members in Agriculture, Agricultural Operations, and Related Services; Legal professions and Studies; and Multi/Interdisciplinary Studies. All rank ratios are presented in Appendix A.

## III. Data and Models

Data was assembled for all faculty, librarian reference staff and advisor staff at FGCU as of August 26, 2011. The following data was included in the analysis:

- Date of hire and years of FGCU service
- Current rank
- Years at rank
- Current 9-month salary

Descriptive statistics were generated to review any data anomalies and identify outliers or unusual trends that may require further investigation. Several rounds of data preparation were conducted to

ensure that all CIP code assignments and other classification processes were consistently applied to all data used.

Regression modeling was conducted to estimate linear and log models. Estimated models included a simple pooled model without controlling for faculty CIP; one-way fixed effects models that control for either faculty CIP, rank, or college that faculty belong; and two-way fixed effects models that controlled for either faculty CIP and rank, colleges faculty belong to and rank, and faculty CIP and college. The results of the best-fit model are summarized below.

## IV. Results

Based on the results of the rank ratio comparisons, the following regression was estimated:

$$Y = \alpha C + BX + \gamma Z + \varepsilon$$

Where Y is actual 9-month equivalent salary, C is a vector of 25 CIP specific constants, X is vector of university-wide independent variables that explain salary differences at the University level, and Z is vector of independent variables for subcategories of CIP fields that may differ from University-wide salary patterns. Table 1 shows the specific CIP codes used as constants (vector C) in the regression analysis.

The regression model to identify statistical evidence of salary compression and inversion was estimated using appropriate fixed-effects controls for salary differences by 2-digit CIP, controls for additional differences in salary depending on years at rank, and specific controls for the rank of faculty members in the health professions (CIP 51) and Business College (CIP 52). The definitions for variables used in our model are described below.

**Table 1. FGCU CIP Codes**

| CIP-Two Digit Code | CIP Name |
|---|---|
| 01 | AGRICULTURE, AGRICULTURE OPERATIONS, AND RELATED SCIENCES |
| 03 | NATURAL RESOURCES AND CONSERVATION |
| 05 | AREA, ETHNIC, CULTURAL, GENDER AND GROUP STUDIES |
| 09 | COMMUNICATION, JOURNALISM AND RELATED PROGRAMS |
| 11 | COMPUTER AND INFORMATION SCIENCES AND SUPPORT SERVICES |
| 13 | EDUCATION |
| 14 | ENGINEERING |
| 16 | FOREIGN LANGUAGES, LITERATURES, AND LINGUISTICS |
| 22 | LEGAL PROFESSIONS AND STUDIES |
| 23 | ENGLISH LANGUAGE AND LITERATURE/LETTERS |
| 24 | LIBERAL ARTS AND SCIENCES, GENERAL STUDIES AND HUMANITIES |
| 26 | BIOLOGICAL AND BIOMEDICAL SCIENCES |
| 27 | MATHEMATICS AND STATISTICS |
| 30 | MULTI/INTERDISCIPLINARY STUDIES |
| 31 | PARKS, RECREATION, LEISURE AND FITNESS STUDIES |
| 38 | PHILOSOPHY AND RELIGIOUS STUDIES |
| 40 | PHYSICAL SCIENCES |
| 42 | PSYCHOLOGY |
| 43 | HOMELAND SECURITY, LAW ENFORCEMENT, FIREFIGHTING AND RELATED PROTECTIVE SERVICE |
| 44 | PUBLIC ADMINISTRATION AND SOCIAL SERVICE PROFESSIONS |
| 45 | SOCIAL SCIENCES |
| 50 | VISUAL AND PERFORMING ARTS |
| 51 | HEALTH PROFESSIONS AND RELATED PROGRAMS |
| 52 | BUSINESS, MANAGEMENT, MARKETING, AND RELATED SUPPORT SERVICES |
| 54 | HISTORY GENERAL |

Table 2 shows the university-wide variables used in the regression model: rank and years at rank. Based on the rank ratio analysis described in the previous Section, two CIP codes show the possibility of salary compression. These two CIP codes are 51 (Health Professions) and 52 (Business). Because these CIP codes coincide with two specific colleges with 46 and 62 faculty members respectively, it is possible to test whether salary patterns in these two CIP codes differ from the University as a whole. The goal is to ensure that any possible compression issues in these specific CIP codes are not masked by University-wide trends. Table 3 shows the variables that are used to analyze these two subgroups.

**Table 2. University Wide Explanatory Variables**

| Variable | Description |
|---|---|
| **DVASST** | Assistant Professor |
| **DVASOC** | Associate Professor |
| **DVPROF** | Full Professor |
| **YRSAR** | Years of Experience at Rank |
| **YRAST** | Assistant Professor Years of Experience at Rank |
| **YRASOC** | Associate Professor Years of Experience at Rank |
| **YRPROF** | Full Professor Years of Experience at Rank |
| **JRAST** | Junior Assistant Professor |

**Table 3. Health and Business Explanatory Variables**

| Variable | Description |
|---|---|
| **HASST** | Health (51) Assistant Professor Years at Rank |
| **HASOC** | Health (51) Associate Professor Years at Rank |
| **HPROF** | Health (51) Full Professor Years at Rank |
| **HJASST** | Health (51) Junior Assistant Professor |
| **BASST** | Business (52) Assistant Professor Years at Rank |
| **BASOC** | Business (52)Associate Professor Years at Rank |
| **BPROF** | Business (52) Full Professor Years at Rank |
| **BJASST** | Business (52) Junior Assistant Professor |
| **DBUSHI** | High Salaried Business Subgroups (5203, 5208) |

The results of the regression model are shown in table 4 at the end of this section. The model's explanatory variables and estimates are further divided into five detailed groupings of factors that were hypothesized to affect faculty salaries:

- University wide faculty rank variables,
- University wide years at rank variables,
- Rank variables for faculty in CIP 51 (Health professions),
- Rank variables for faculty in CIP 52 (Business), and
- Variables indicating "junior" assistant professors with 3 years of experience or less.

Our results are discussed separately for:

1. Faculty members in disciplines other than business and health professions,
2. Faculty members in health professions, and
3. Faculty members in business disciplines.

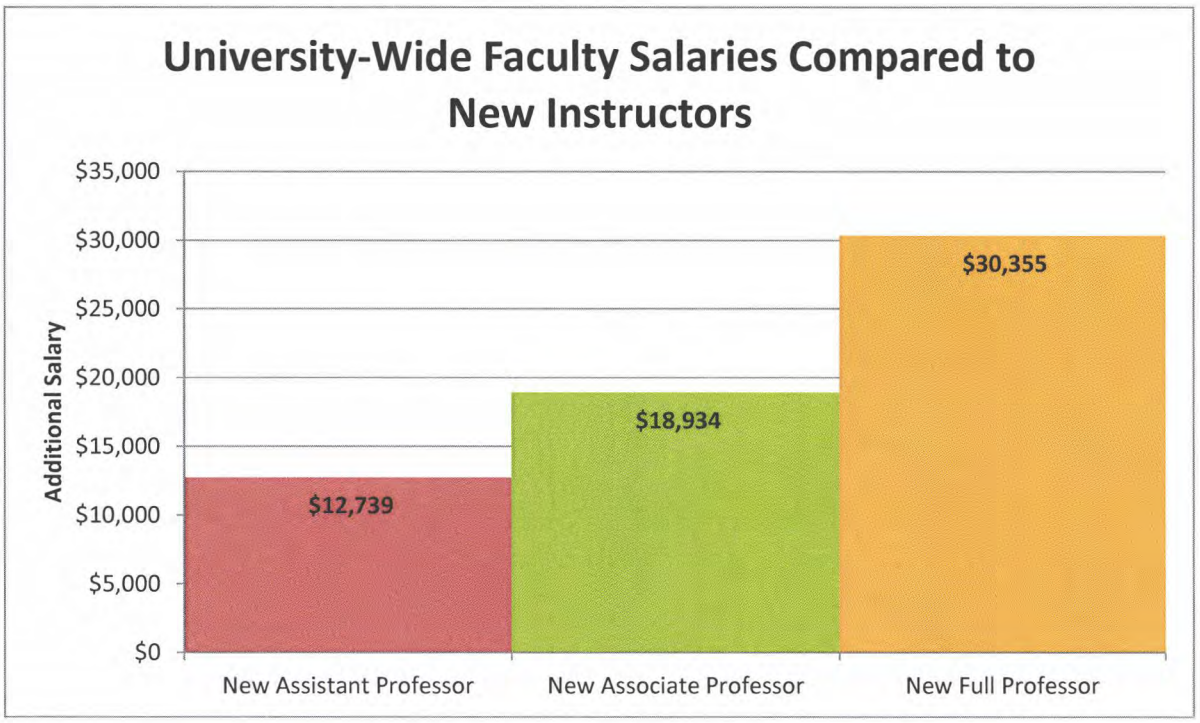
The effects of junior faculty status are discussed with each respective faculty cohort.

Separate regression models for Librarians and Advisors were also estimated. The regression models are discussed at the end of this section.

***Model results for FGCU Faculty in Disciplines other than Health Professions and Business***

Comparisons of rank variables alone are similar to rank ratio comparisons, with the added benefit of statistical measures of significance. Our faculty rank variables include indicators for each faculty member's CIP classification, and variables indicating each faculty member's rank above instructor. The model also includes a separate variable for the number of years each faculty member has held their current rank. The coefficients for the CIP classification measure the average salary of new instructors. The variable indicating that a faculty member is an assistant professor (DVASST) plus the variable indicating junior status (JRAST) measures the additional salary that new assistant professors make above instructors. Adding these two coefficient values $14,177 and $-1,438 suggests that, on average, new assistant professors make $12,739 more than instructors. The variable indicating that a faculty member is an associate professor (DVASOC) measures the additional salary that new associate professors make above instructors. The regression results suggest that associate professors make $18,934 more than instructors. Subtracting the coefficient for new assistant professors ($12,739) from $18,934 suggests that new associates earn $6,195 more than new assistant professors. The variable indicating that a faculty member is a full professor (DVPROF) measures the additional salary that new full professors make above instructors. On average, full professors starting salaries are $30,355 above instructors, $17,616 above new assistant professors, and $11,421 above new associate professors. These salary differences are illustrated in figure 4 below. Each of these differences is statistically significant at the conventional 5% level, indicating that salaries across ranks are not compressed at the university level, when experience is not considered.

**Figure 4. Salary Comparison University-Wide**

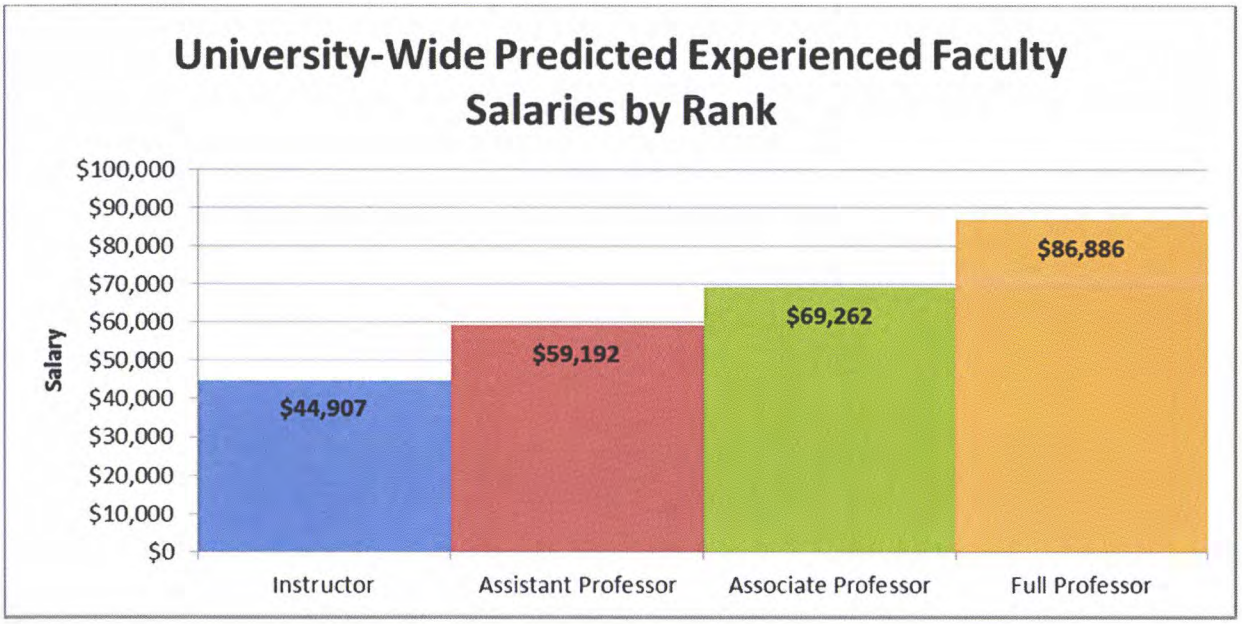



The years at rank variables measure the additional salary faculty members receive for each year of experience at their current rank. The variable YRSAR measures the additional salary that instructors

receive for each year experience. The model estimates instructors receive $66 less for each year, but this estimate is not statistically significantly different from zero, which suggests that there is no discernible pattern of salary increase for experience among instructors. YRAST measures the additional annual increase in salary that assistant professors earn above instructors. The additional salary that assistant professors earn for each year at that rank is calculated as YRSAR + YRAST = $-484, which is not statistically different from zero. The additional salary increases for year of experience at the ranks of associate professor and full professor are calculated in a similar way. The additional salary that each year of experience yields for associate professors is calculated as YRSAR + YRASOC = $603, and for full professors YRSAR + YRPROF = $1,266. The increases in salary for associate professors and full professors are both statistically significant at the 5% level.

These estimates imply that additional years of experience are rewarded at an increasing rate as rank increases. Taken together with the significant increases in salary for increasing rank of new faculty members, the increases in salary for additional years of experience also indicate that salary inversion is not occurring in university-wide disciplines with the possible exceptions of the health (CIP 51) and business (CIP 52) professions. Figure 5 shows average predicted salaries by rank with experience accounted for in the model.

**Figure 5. Predicted Salary by Rank with Faculty Experience**




***Model Results for Faculty in Health Professions Disciplines***

We included separate variables for rank in health professions (CIP 51) and business (CIP 52) because the rank ratio analysis suggests there is salary inversion occurring in CIP 52 and compression in CIP 52. Model results for these two disciplines are discussed next.

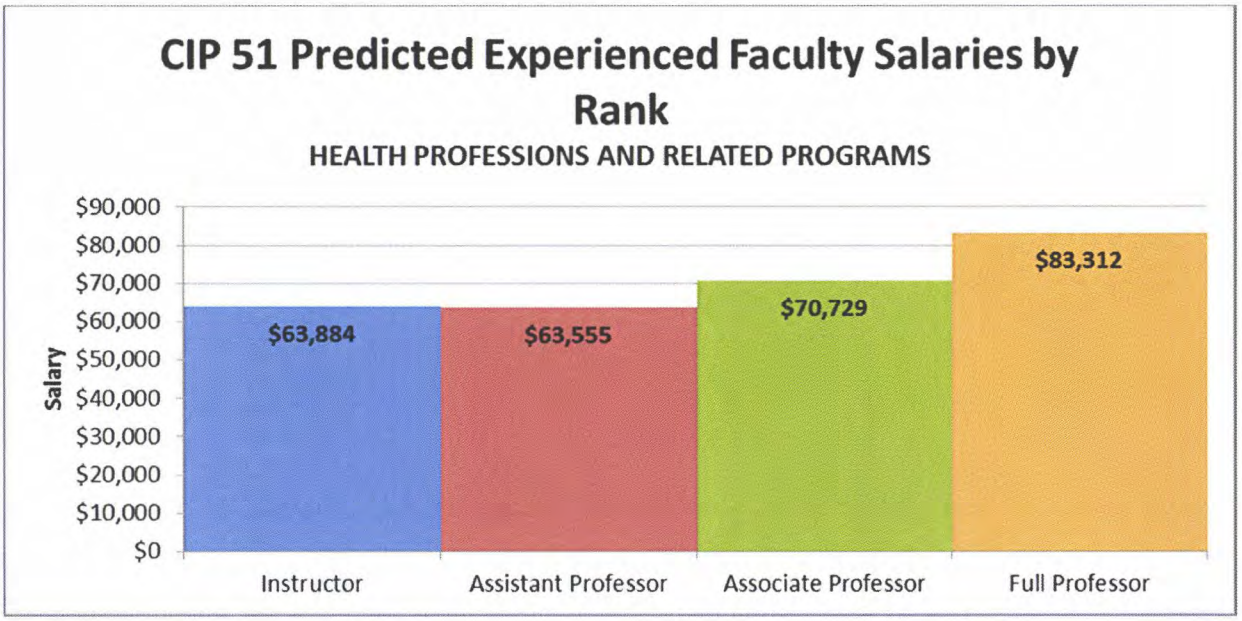
The three coefficients for faculty members in health professions, CIP 51, (HASST, HASOC, and HPROF) respectively measure the additional pay that new assistant professors, new associate professors, and

new full professors in CIP 51 earn above new assistant professors, new associate professors, and new full professors at FGCU. All of these three coefficients have negative signs, which tells us that increased salary for higher ranks in CIP 51 are less than those for the average FGCU faculty.

After controlling for other factors that determine salary, the average salary for instructors in health professions is estimated to be $64,027. The average salary increase for new assistant professors is HASST + DVASST + JRAST + HJASST = $-3,258, which would imply new assistant professors in health professions are earning less than new instructors. This is the result that the rank ratio analysis suggested. However, this difference is insignificant and we conclude there is not a statistical difference between salaries of new instructors and assistant professors. Therefore, salary inversion is not supported statistically, but the existence of salary compression cannot be rejected when experience is not considered. New associates in health professions earn on average HASOC + DVASOC = $3,463 above instructors, which is $6,720 above new assistant professors in health professions. These salary differences are also statistically insignificant, indicating that salary compression cannot be rejected when experience is not considered. Finally, new full professors in health professions earn HPROF + DVPROF = $7,236 above instructors, which is $3,772 above new associate professors in health professions and also insignificant, indicating once again that salary compression cannot be rejected when experience is not considered.

Taking experience into account when comparing salary differences between assistant professors and associate professors, and between assistant professors and full professors, changes indications of salary compression. Figure 6 illustrates salary differences for experienced health faculty. As above, salary compression between instructors and junior assistant professors cannot be rejected. However, assistant professors are now shown to earn statistically significant lower salaries than their experienced senior colleagues. Consequently, salary compression between assistant professors and associate professors is rejected at a 10% level. Similarly salary compression is rejected for associate and full professors at the 10% level. This result is expected given the significant increases in salary for years of service at the ranks of associate and full professor.

**Figure 6. Predicted Faculty Salaries with Experience by Rank for CIP 51**




***Model Results for Faculty in Business Disciplines***

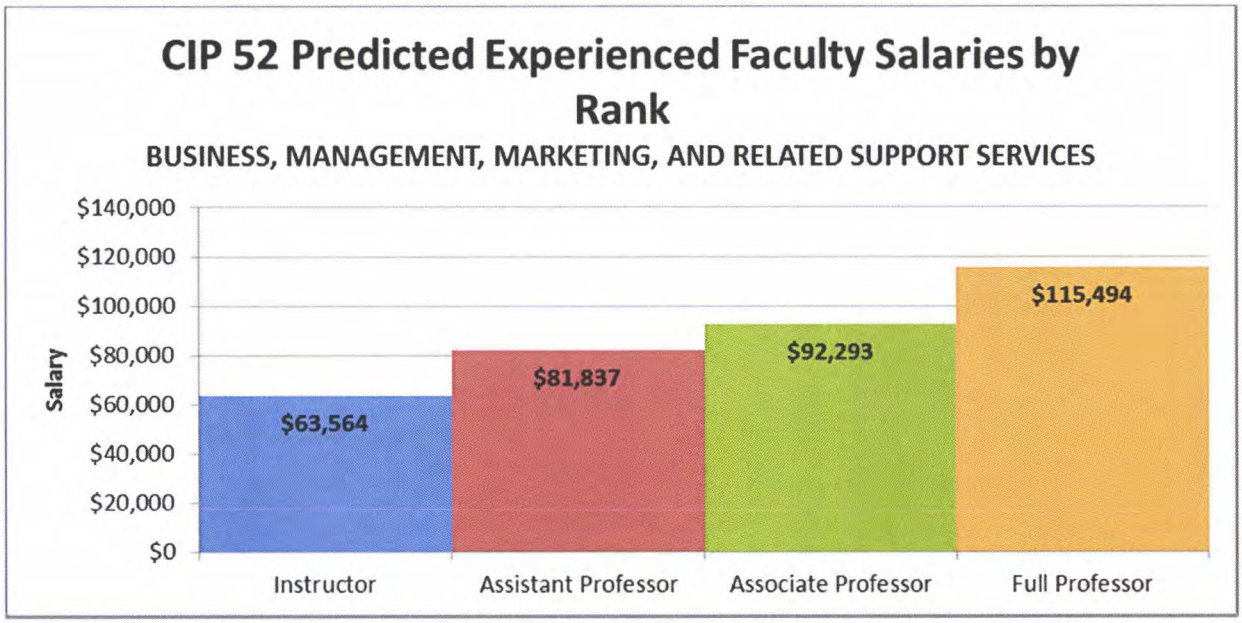
There are four coefficients that were used to describe faculty members in business, CIP 52, (BASST, BASOC, BPROF, and DBUSHI). The coefficients BASST, BASOC, and BPROF respectively measure the additional pay that new assistant professors, new associate professors, and new full professors in CIP 52 earn above new assistant professors, new associate professors, and new full professors. The coefficient DBUSHI is a control variable that indicates faculty in finance and accounting – high-paid business sub-disciplines. Each of these business variables is positive and statistically significant, which indicates that business professors at each rank earn statistically higher salaries than other FGCU professors at each rank.

Faculty members in finance and accounting earn DBUSHI = $20,375 more than business faculty at all ranks in other sub-disciplines in business. The average salary for instructors in business disciplines other than finance and accounting is $57,588. The average salary increase for new assistant professors in non-finance and non-accounting business disciplines is BASST + DVASST + JRAST + BJASST = $32,268. New associates earn on average BASOC + DVASOC = $27,505 above new instructors, which is $4,763 below new assistant professors. However, this difference in salary between new associate professors and new assistant professors is insignificant; indicating that salary inversion is not supported, but salary compression between new assistants and new associates cannot be rejected when experience is not considered. Finally, new full professors in non-finance and non-accounting business earn BPROF + DVPROF = $46,724 above instructors, which is $19,219 above new associate professors in the non-finance and non-accounting business disciplines. Salary compression is rejected for professors relative to lower level ranks at the 5% level.

When comparing associate salaries to assistant salaries that include experience effects, there is no significant difference, indicating that salary compression for these ranks cannot be rejected. For associate professors versus full professors salary inversion and compression are rejected at the 5% level.

The figure below illustrates these salary differences. Figure 7 compares the salaries of Business faculty when both rank and experience are included. It shows that when experience is accounted for, salaries increase by rank. However, for assistant versus associate professors, the increased differential is not statistically sufficient to reject salary compression. For associate professor versus full professor, the increased salary is sufficient to reject compression.

**Figure 7. Predicted Faculty Salaries with Experience by Rank for CIP 52**




***Librarian Salary Analysis***

The salary structure of librarians is analyzed using the regression model summarized in table 5. Results are compared to CUPA data for benchmark analysis. Regression results are expressed as predicted salaries for each CUPA job category. The regression model explains salary structure very well, with an R-squared of 97%. The benchmark comparisons with CUPA data show FGCU salary levels that are very similar to benchmark values. Across all librarians the ratio of predicted FGCU salaries to the appropriate CUPA benchmark shows that FGCU salaries exceed benchmark values by an average of 3%. Because the rank of FGCU librarians may be over-represented by professors relative to assistant professors, which would increase the overall average, the predicted salaries of associate professors are compared to benchmark values for the appropriate CUPA job category. This analysis shows that on average FGCU salaries exceed CUPA mean salaries by one percent.

Further analysis shows that all assistants are on average 25% below the CUPA mean for their job categories. Full professor are on average 26% above CUPA means for their job categories. The differences for assistant and full professor relative to CUPA means are likely due to CUPA reporting one mean value for each job category, which is aggregated across ranks. The implication is that the most appropriate comparison is between associate professor salaries and CUPA mean salary. Alternatively, if

FGCU has a similar rank structure as other universities (similar percentages of assistant, associate, and full professors) then the mean predicted salary across all ranks would also be appropriate to compare to CUPA benchmarks.

Our regression model for librarians is reported in table 5 at the end of this section. As expected from the rank ratio analysis, the results do not suggest salary compression or inversion for university librarians. Associate university librarians' salaries are on average $10,724 above those of assistant librarians. Full university librarians' salaries are on average $13,383 above associate librarians. The model also suggests that additional years of service do not increase librarians' salaries. The coefficient for years of service, YRSAR = -$1,335 and is not statistically different form zero.

***Academic Advisor Salary Analysis***

The regression model used to analyze the salary structure of Academic Advisors is reported in Table 6 at the end of this section. The model suggests that advisors' compensation is determined by their rank for 24 out of the 25 2-digit CIP codes. The model estimates that faculty with rank Advisor II earn, on average, an extra $4,500 per year. The model also suggests that advisors do not receive significant increases in salary for additional years of service, averaging $243/year, but the coefficient YRSAR is not statistically significant.

Tables 4 through 6 present regression results for all regressions estimated. Other functional forms (quadratic and logarithmic) were also tested, but did not substantially alter reported results. Any additional explanatory value from these models was not sufficient to warrant the added complexity of interpretation.

**Table 4. Linear Regression Results**

| Variable | Description | Coefficient | Standard Error | t-ratio | *p*-value |
|---|---|---|---|---|---|
| **Faculty Rank** | | | | | |
| **CIP 01** | Instructor in AGRICULTURE, AGRICULTURE OPERATIONS, AND RELATED SCIENCES | 39,606 | 6,418 | 6.1707 | |
| **CIP 03** | Instructor in NATURAL RESOURCES AND CONSERVATION | 43,603 | 3,092 | 14.1007 | |
| **CIP 05** | Instructor in AREA, ETHNIC, CULTURAL, GENDER AND GROUP STUDIES | 36,540 | 6,563 | 5.5675 | |
| **CIP 09** | Instructor in COMMUNICATION, JOURNALISM AND RELATED PROGRAMS | 37,480 | 2,466 | 15.1999 | |
| **CIP 11** | Instructor in COMPUTER AND INFORMATION SCIENCES AND SUPPORT SERVICES | 67,768 | 5,426 | 12.4900 | |
| **CIP 13** | Instructor in EDUCATION | 40,444 | 2,056 | 19.6737 | |
| **CIP 14** | Instructor in ENGINEERING | 63,567 | 2,804 | 22.6708 | |
| **CIP 16** | Instructor in FOREIGN LANGUAGES, LITERATURES, AND LINGUISTICS | 36,617 | 4,538 | 8.0691 | |
| **CIP 22** | Instructor in LEGAL PROFESSIONS AND STUDIES | 39,959 | 4,694 | 8.5129 | |
| **CIP 23** | Instructor in ENGLISH LANGUAGE AND LITERATURE/LETTERS | 35,015 | 2,035 | 17.2090 | |
| **CIP 24** | Instructor in LIBERAL ARTS AND SCIENCES, GENERAL STUDIES AND HUMANITIES | 36,493 | 6,426 | 5.6789 | |
| **CIP 26** | Instructor in BIOLOGICAL AND BIOMEDICAL SCIENCES | 39,105 | 2,024 | 19.3241 | |
| **CIP 27** | Instructor in MATHEMATICS AND STATISTICS | 38,919 | 2,196 | 17.7247 | |
| **CIP 30** | Instructor in MULTI/INTERDISCIPLINARY STUDIES | 39,871 | 6,531 | 6.1047 | |
| **CIP 31** | Instructor in PARKS, RECREATION, LEISURE AND FITNESS STUDIES | 48,838 | 5,407 | 9.0320 | |
| **CIP 38** | Instructor in PHILOSOPHY AND RELIGIOUS STUDIES | 39,230 | 4,338 | 9.0436 | |
| **CIP 40** | Instructor in PHYSICAL SCIENCES | 38,403 | 2,279 | 16.8472 | |
| **CIP 42** | Instructor in PSYCHOLOGY | 39,690 | 2,917 | 13.6065 | |
| **CIP 43** | Instructor in HOMELAND SECURITY, LAW ENFORCEMENT, FIREFIGHTING AND RELATED PROTECTIVE SERVICE | 41,747 | 3,201 | 13.0423 | |
| **CIP 44** | Instructor in PUBLIC ADMINISTRATION AND SOCIAL SERVICE PROFESSIONS | 41,747 | 2,668 | 15.6484 | |
| **CIP 45** | Instructor in SOCIAL SCIENCES | 36,732 | 2,865 | 12.8193 | |
| **CIP 50** | Instructor in VISUAL AND PERFORMING ARTS | 36,871 | 2,435 | 15.1441 | |
| **CIP 51** | Instructor in HEALTH PROFESSIONS AND RELATED PROGRAMS | 64,027 | 2,336 | 27.4129 | |
| **CIP 52** | Instructor in BUSINESS, MANAGEMENT, MARKETING, AND RELATED SUPPORT SERVICES | 57,588 | 3,101 | 18.5717 | |
| **CIP 54** | Instructor in HISTORY GENERAL | 37,607 | 3,177 | 11.8365 | |
| **DVASST** | Assistant Professor | 14,177 | 2,954 | 4.8000 | 0.0000 |
| **DVASOC** | Associate Professor | 18,934 | 2,028 | 9.3350 | 0.0000 |