Competitiveness of Florida Business Activity:
A REMI Model Perspective

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Introduction

Maintaining an economic climate for business development and growth that compares favorably with that of other states is central to the economic development strategies of all states. *Measuring* competitiveness, however, is not a simple matter because it comprises many factors, many of which are intangible. In this study an attempt was made to assess Florida's competitive position relative to 24 other states on the basis of ***input costs, productivity and profitability***. The REMI model[1] was used to provide an internally consistent regional database that would permit comparisons between states at a meaningful level of detail. Costs, productivity and profitability are admittedly not the only aspects of business climate that can affect a state's competitiveness. State and local regulatory behavior, the tax system, climate, geography, transportation systems and numerous other factors also play a significant role. None of these are adequately captured in the information available from the REMI model. The results of this analysis concentrate on economic fundamentals and while it is acknowledged that this presents an incomplete picture, it is hoped that the information provided will shed some light on the nature of Florida's current competitive position.

This study compares Florida to 24 other states. The other states include all of Florida's southeast regional neighbors as well as the other large states. The staff of Enterprise Florida and Governor's Office of Tourism, Trade and Economic Development (OTTED) suggested additional states. Table 1 lists the states included in this study.

Table 1
Florida's Primary Competitor States

Alabama	Kentucky	New Mexico	South Dakota
Arizona	Louisiana	New York	Tennessee
California	Massachusetts	North Carolina	Texas
Colorado	Mississippi	Ohio	Utah
Connecticut	Nevada	Pennsylvania	Virginia
Georgia	New Jersey	South Carolina	Washington

[1] Regional Economic Models, Inc., Amherst, Massachusetts. The REMI model used in this study is an established analytical tool that was developed over a 20-year period. The entire regional economy is modeled as interactions between five linked groups of economic variables. These five groups are the output, labor and capital demand, population and labor supply, wages, price, and profits, and markets shares of national and local firms operating in the region. The following characteristics of the model are worth noting:

- Interregional trade is a function of the profitability of each regional industrial sector relative to the national average.
- Workers migrate to regions with lower unemployment and higher after tax inflation adjusted wages.
- Profit maximizing behavior drive the employment and investment decisions of firms who locate new plants or expand existing production facilities in regions with greater returns to capital.

The model is completely described in Treyz, G.I., D. Rickman and G. Shao, " The REMI Economic-Demographic Forecasting and Simulation Model", International Regional Science Review, Vol 14, No. 3, pp 221-253, 1992.

The REMI model permits comparison of Florida to the other states on the basis of: (1) factor costs; (2) factor productivity (including labor productivity); and (3) profitability. These comparisons are made for each of 168 business sectors that are coincident with Standard Industrial Classification codes at the three-digit level developed by the U.S. Department of Commerce. A list of the sectors included is found in Appendix A. The result is a very large amount of comparative data that is included in Appendix D. The key results of these comparisons are presented below.

Key Results

Factor Costs

Florida's factor costs (which include labor, capital and fuel costs) were found to be highly competitive, due largely to relatively low labor costs. Highlights of the factor costs findings include:

- Factor costs in over 80% of Florida's business sectors are lower than the national average.

- In 70% of the business sectors, Florida's factor costs are below those of competitor states and the national average. In other words, although many competitor states have factor costs that are below the national average, Florida's factor costs are *further below* the national average than most other competitor states.

- The principal reason for Florida's lower factor costs is relatively low labor cost. Florida's labor cost is below the national average in 85% of the business sectors. One of the reasons for this comparative advantage is the fact that, overall, Florida is considered to be the most desirable state to live and work in, based on an analysis published in 1991 by the authors of the REMI model[2]. This implies that it costs relatively less to induce people to work in Florida than it does in other states.

Productivity

Productivity is a measure relating the amount of real output from a production process to the amount of inputs used to obtain that output (output per unit of input). The REMI model provides two measures of productivity: labor productivity; and a broader measure, factor productivity, which includes labor and other factors of production in a single measure. ***Both measures of productivity included in the study (labor and factor productivity) were found to be low in most Florida sectors.***

Other key findings concerning Florida.s productivity include:

[2] Greenwood, Michael J., G.L. Hunt, D.S. Rickman and G. I. Treyz. "Migration, Regional Equilibrium, and Estimation of Compensating Differentials", American Economic Review, Vol. 81(5), Dec. 1991, pp. 1382-1390.

- Florida.s *labor productivity* exceeds the average of the 24 competitor states in only 22% of the 168 business sectors. The top performing Florida sectors include: food and kindred products, communications, wholesale trade, air transportation, motion pictures and hotels and other lodging places.

- Florida.s *overall factor productivity* rankings fared little better. Factor productivity outperformed the average of the 24 competitor states in less than 27% of the sectors and was10% lower than the national averages in 45% of the sectors.

Profitability

The competitiveness of Florida business activity is best summarized by profitability, which reflects both factor costs and productivity; that is, the model calculates profitability as the interaction between capital costs, labor costs, other factor costs and the productivity of those factors. The lower the costs and higher the productivity of a particular industry in a particular state, the greater the profitability. Profitability in a given industry is measured relative to the national average within that industry. Because of the limitations of the REMI model, profitability information is only available for 84 of the 168 private business sectors, principally those that represent Florida's export activities.

The highlights of the study.s findings with respect to profitability include:

- In 33 of the 84 sectors (39%) profitability in Florida exceeds the national average. In 15 of the 84 sectors (18%) profitability in Florida exceeds the national average by 5% or more. These sectors are presented in Table 2. In just three industries—bakery products, preserved fruits and vegetables, and miscellaneous food and kindred products—profitability in Florida exceeds the national average by more than 10%. Florida's most profitable and competitive export industries may be characterized as agricultural product related and electronics manufacturing.

- Four industries for which Florida is well known have relative profitability well below the national average in the industry. These industries are the following: (1) hotels and other lodging places (1.5% below the national average); (2) medical equipment, instruments and supplies (6.1% below the national average); (3) aerospace (10.1% below the national average); and (4) agricultural chemicals (17.3% below the national average).

- In industries where profitability in Florida is below the national average, it is frequently the result of low factor productivity—especially labor productivity—only partially offset by low factor costs.

Table 2
Florida business sectors in which profitability is at least 5%
above the US average

Bakery products	Electronic components and accessories
Preserved fruits and vegetables	Miscellaneous electrical equipment
Miscellaneous food and kindred products	Pulp, paper, and paperboard mills
Sugar and confectionery products	Electric lighting and wiring equipment
Beverages	Electric distribution equipment
Dairy products	Communications equipment
Household audio and video equipment	Electrical industrial apparatus
Household appliances	

General Implications

Florida's competitive position with respect to the 24 other states included in this analysis is reasonably strong. In addition to its traditional strengths in processed agricultural products (industries that typically locate near the source of supply to avoid the shipment costs of waste materials), Florida boasts an impressive number of reasonably competitive manufacturing industries, especially in the area of electronics. Moreover, a large number of Florida industries show factor costs, including labor costs, well below the national average.

The REMI model results show that Florida's major comparative advantage is relatively cheap labor (and other factor costs) resulting from its desirability as a place to live. This advantage tends to favor the location of businesses in Florida that use relatively large amounts of labor in their production processes. These types of businesses also tend to have a higher labor to capital ratio which results in the relatively low labor productivity that is evident in the comparative data.

A characteristic of jobs in industries with low labor productivity is relatively low levels of compensation. A state that is home to a disproportionate amount of industry characterized by low labor productivity will have lower average personal income. The income effect of Florida's heavy reliance on industry with low labor productivity is evident in Table 3. As can be seen, family income for a family of four is well below the national average and is lower than six of the nine states in the southeastern United States.

There is, however, a significant practical advantage to Florida's reliance on low labor productivity industries: these industries generate a lot of low-skill employment that makes employment in Florida more accessible in Florida than in other places. Thus, Florida's labor markets are relatively more open to younger workers or marginal workers such as those attempting to make the transition from public assistance to work or those leaving prison. A large amount of low-labor-productivity industry results in lower average income, but extends the advantages of employment to a wider group of people.

Table 3

1996 Median Income for a Family of 4

	By state & region	Percent of US median family income	Percent of Southeast regional median income
United States	$51,518		
Southeast Region	$44,776	86.9%	
Alabama	$44,879	87.1%	100.2%
Florida	**$44,829**	**87.0%**	**100.1%**
Georgia	$48,920	95.0%	109.3%
Kentucky	$44,932	87.2%	100.3%
Louisiana	$41,851	81.2%	93.5%
Mississippi	$38,748	75.2%	86.5%
North Carolina	$49,272	95.6%	110.0%
South Carolina	$46,973	91.2%	104.9%
Tennessee	$45,245	91.2%	101.0%

Source: U.S. Bureau of Census

Plainly, a mix of industries with different labor productivity characteristics is the most desirable situation and Florida is fortunate in that its natural endowments—climate and the obligatory presence of certain industries here, principally agriculture—produce a large amount of employment activity at the lower end of the labor productivity (and salary) spectrum without the need for much policy intervention. However, higher productivity—and consequently higher wage—jobs do not seem to flow effortlessly from Florida's natural economic advantages and may need some additional support from deliberate policy.

Economic Development Strategy Implications

Enterprise Florida, Inc. has devised an integrated business sector strategy as one of the main components of its economic development efforts.[3] The aim of the sector strategy is to undertake a proactive role in making Florida more attractive for specific sectors and their support industries. The industries chosen under this strategy are those that are expected to create high wage jobs and have a significant positive economic impact on the economy of the state. The potential impact of such a strategy can be gauged by examining Florida's competitiveness with respect to these sectors. The REMI model provides the required basis of comparison with other states and allows a look at Florida competitive status in these sectors in relation to such competitor states.

The high growth sectors currently identified by Enterprise Florida are the following:

Silicon Technology: This industry is primarily made up of semiconductor and related solid-state device manufacturing concerns. The primary products of this sector include integrated

[3] Enterprise Florida, Sector Strategy Updates, September 1998.

microcircuits, transistors, solar cells, as well as light sensing and emitting solid state devices. Jobs in this industry are high wage and usually require specific technical skills.

This sector is part of sector 43 in the REMI model described as electronic components and accessories. In terms of real output, Florida ranks eighth amongst all 24 states with approximately 4.2% of the total output of the top ten producers. This industry appears to be quite profitable in Florida with an average profit rate that is 6.7% above the average for all states. This is due to below average factor input costs. Florida has the lowest labor cost among the larger states such as California, Texas, and New York. Fuel, capital, and intermediate input costs are lower than average. These advantages are offset by low labor productivity. The average output per worker is lower than that of the other three large states by an average of 11.5%.

Aviation/Aerospace: This sector consists of guided missile, space vehicle, and aircraft manufacturing or assembly establishments, aircraft research and development units, aircraft repair and refurbishing establishments, aircraft engine manufacturing plants, and plants manufacturing auxiliary aircraft and space vehicle parts.

This sector is split into three separate REMI sectors, aerospace, search and navigation equipment, and communications (46, 50, & 113). Florida does not fare very well in the aerospace sector where it ranks ninth in terms of output and produces 3.7% of the total output of the top ten states. Florida's profitability ranking is twenty-first out of the 24 states with profitability which is more than 10% below average. The main reason for this low profitability suggested by the REMI data is low labor productivity. Florida ranks sixteenth in this category with a productivity level which is approximately half that of the most productive state, Washington. Labor costs are almost 6% above average while intermediate input costs are almost average.

Similar patterns with respect to labor productivity are evident in the search and navigation sector where Florida ranks next to last in that category. However, labor costs are significantly lower than average in this sector (28% below average) which gives Florida a profitability ranking of eighth. The picture is significantly different in the communications sector where Florida enjoys a relatively high ranking (fifth) in terms of labor productivity accompanied by lower than average labor costs. The high productivity translates into almost 12% of the total output of the top ten states in this sector.

The weak picture in the aerospace sector is surprising in light of the industry's large presence in Florida. The other parts of this sector also do not appear to be all that competitive, especially the aircraft related manufacturing concerns. The presence of Cape Canaveral and the industry's historic presence in Florida no doubt explain a level of representation that would appear out of proportion to its profitability here. In addition, Florida's large and relatively senior congressional delegation is probably also a factor given the fact that the majority of the business conducted by these firms is done under contract with the federal government. However, none of these factors can be depended upon, in the long run, to sustain economic activity that would be more profitably conducted elsewhere. Therefore, Enterprise Florida's targeting of this sector for special attention seems well justified.

Health Technology: This sector encompasses firms manufacturing drugs, laboratory equipment, analytical instruments and instrumentation systems used in laboratories, optical instruments, lenses, surgical, medical, and dental instruments and supplies, and ophthalmic goods.

This sector is contained in three REMI sectors: drugs (87), medical equipment instruments and supplies (52), and ophthalmic goods (53). Florida is currently a very minor player in pharmaceutical industry and ranks tenth amongst the 24 states. Total pharmaceutical output in Florida is less than 2% of total production by the top ten states. Profitability and factor productivity rankings are twenty-third and twenty-fourth respectively out of the 24 states considered in this study. The main reason for both of these low rankings is low labor productivity. Florida's labor productivity is about half that of Louisiana (the state ranked first in labor productivity) even though labor costs are 6% percent above average.

Medical instruments and ophthalmic goods sectors have almost the same rankings for Florida. In terms of output, Florida is tenth in medical instruments and third in ophthalmic goods. The profitability rankings are twelfth and fourteenth while labor costs are fifth for both sectors. As with pharmaceuticals, labor productivity is next to last with productivity levels that are about a third of that for the top state (New York).

Modeling Simulation and Training[4]: This sector encompasses computer, information, graphics, behavioral and related knowledge sciences and technologies having broad applications. The industry is defined as the body of organizations involved in applying those technologies to train and educate people, to entertain them and to improve productivity, safety and efficiency.

This industry is a small segment of the broader information services sector and cannot be identified as a distinct REMI sector. An evaluation of this sector in terms of the REMI model data is unlikely to yield any useful information. The information technology sectors discussed below include this sector.

Information Technology: This sector broadly includes the manufacture of electronic computers, accessories, communications devices, computerized equipment, as well as data processing services for such sectors as the finance, insurance, and real estate.

[4]The National Center for Simulation (http://www.simcentral.org) provides a more technical description of this sector as follows: This industry provides a variety of products and services that include advanced learning and training technologies, decision support systems, large-scale logistics models, and synthetic environments. Advanced learning technologies includes the production of customized job and skill training using interactive computer courseware and advanced multimedia. Decision and performance support systems are designed to provide information, training, and resources to users on-demand. Examples of this type of technology include just-in-time training, on-line training and job aids. Logistics models were originally developed to assist the military and space agencies in the large-scale management and/or movement of materials, machines, and other types of equipment. Synthetic environments are virtual or simulated environments that can be used for any training need where practicing, predicting and pre-testing results is important. Simulations are typically used in situations where job safety is an issue or in environments where workers need to practice to effectively perform their job functions. Flight, driving, and laparascopic surgery simulations are increasingly common and well-known, but occupations where workers need to handle any type of hazardous or nuclear materials are also ideal candidates for simulated training.

The following REMI sectors include the majority of the information technology sector:

Computer and Office Equipment (34)
Communication Equipment (42)
Electronic Components and Accessories (43)
Miscellaneous electrical equipment (44)
Communication (113)
Depository Institutions (117)
Insurance carriers (118)
Insurance agents, brokers, and services (119)
Non-depository Institutions (120)
Security and Commodity Brokers (121)
Real Estate (122)
Computer and Data processing (143)
Miscellaneous Business Services (144)

The best representatives of information technology on the product and services sides respectively are computer and office equipment and computer and data processing services. An examination of these two REMI sectors should provide a reasonable snapshot of the current status of this sector in Florida.

Florida ranks seventh in output terms in the computer and office equipment sector and produces 3.6% of the total output of the top ten producers. California is the runaway leading producer in this category. Florida ranks eleventh and twelfth respectively in profitability and labor productivity and has below average labor costs. Overall, Florida ranks roughly in the middle in all measures in this sector. The picture gets worse in the services sector. Florida ranks seventh in terms of output but finds itself third last in terms of labor productivity. Labor costs are about 12% below average

Automotive Services: Manufacture of motor vehicles, passenger car bodies, car parts and accessories, and miscellaneous automotive equipment comprise this sector.

The motor vehicles and equipment sector (45) in the REMI model most closely corresponds to this sector. Florida currently ranks seventeenth in output terms in this sector and has a profitability ranking of twentieth. Labor productivity is less than one-fourth that of the top ranked state (Kentucky) while labor costs are below average.

Although this report does not pretend to be an analysis of Enterprise Florida's business development strategy, the findings reported here clearly support the general direction being taken by Enterprise Florida as well as the choice of targeted sectors. Enterprise Florida's strategy devotes most of its attention to the higher productivity end of the economy, which seems sensible in light of Florida's apparent ability to spontaneously generate low productivity growth on the strength of the state's natural endowments. To the extent that it is successful, the Enterprise Florida strategy should eventually lead to higher incomes for Floridians relative to residents of other states, although this is a goal that may take a generation or more to realize.

In the interim, there is the practical problem of making incremental gains in high productivity economic development. There is an understandable temptation to directly address the issue of low labor productivity in targeted industries assuming that if a trained labor force exists, industry will move to Florida to take advantage of the resource. In the short term, however, it is difficult to entice people to prepare for jobs that do not yet exist, and those who do undertake training are likely to move out of state to obtain employment. On the other hand, it is difficult to attract high skill industries to a location that does not have an appropriately trained labor force. There is no simple solution to this dilemma other than to attempt to address both sides of the issue-labor force development and industry recruitment-simultaneously and hope for the best. Effectively, this is Florida's current policy.

The results of the comparisons to other states also suggest some long term vulnerability in the aerospace and medical technology manufacturing sectors targeted by Enterprise Florida. Given the relatively low profitability in these sectors, Florida can expect to lose business to other states, over the long term, absent effective intervention.