# RELATIONSHIP OF NON-BASIC SECTOR INCOME GROWTH

# AND THE GAMING SECTOR

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ABSTRACT

Nevada disaggregated export-base multipliers were derived to determine if and to what extent non-basic sector income growth was impacted by income growth of selected basic sectors. Results indicate that growth in the Hotel and Gaming Sector is statistically significant and substantially higher than growth in the Other Basic Industries Sector.

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## Introduction

Gaming related tourism has grown in popularity over the last several years. Many states, small rural communities and Native American Reservations have legalized gaming as a means to increase jobs and tax base. The goal is to increase the number of visitors to their community with gaming as the attraction.

Increased national interest in legalized gaming may be related to the growth in the gaming industry and the growing number of visitors in Nevada over the past ten years. The visual perception that Nevada gaming operations have portrayed during this growth period, is the ability to generate large pools of employment, income and tax revenue.

Table 1 summarizes the legalized gaming activity in the U.S. and territories for 1996 (International Gaming and Wagering Business). With the exception of Hawaii and Utah, every U.S. state and territory has some form of legalized gaming operating today. Bingo, lotteries, pari-mutuels and off-track gaming are the most popular types of gaming. Casino gaming, including Native American, riverboat and dockside casinos are currently operating or have been authorized to operate in 22 U.S. states and territories. Twenty years ago, only the state of Nevada had legalized casinos.

The availability of multiple forms of legalized gaming has grown in popularity among state and communities. Most legalized gaming expansion has occurred in rural America during the past decade. This may be due to the increased pressures to raise revenues and sustain the local economy. However, over the last couple of years, there

has been a surge of opposition that has led to the creation of a National Gambling Impact Commission. This commission is responsible for studying the economic and social impacts of legalized gaming.

Because of gaming, the economy of Nevada is often depicted as recession proof but other researchers have cautioned against this recession proof assumption from the 1970's (Cargill). However with the national recession of 1980-1982 and 1990-1992, along with the opening of legalized gambling in Atlantic City and other areas within the nation, the state of Nevada has now realized that it is not immune to national business cycles.

In order to address the changing national gaming industry, the state of Nevada has championed economic diversification. In 1983, the Nevada legislature created the Nevada Commission on Economic Development whose primary charge is to steer Nevada economic development away from singular industry development, such as gaming, to economic development strategies to diversity the state's economy.

However, diversifying a state economy may affect both the stability and the economic growth potential. Prior to the creation of the Nevada Commission on Economic Development, no study was conducted to determine the degree to which the gaming sector versus other sectors contributed to growth in the state's economy. It is alleged that significant economic diversification can be achieved by attracting non-gaming export-base industries to the state and resources are expended for this purpose. Since diversification can be achieved both by growth in non-gaming export base industry

or by growth in the non-basic industries, there is no clear economic evidence whether such strategy is efficient in achieving the diversification goal.

## OVERVIEW OF EXPORT BASE MODELS

In export base theory, it is argued that an economy is divided into two sectors; export or basic sector and the non-export sector or non-basic economic sector. The export or basic sector is that portion of the local economy that trades with firms outside the local region. This export trade brings income to the area which according to export-base theory generates future growth in the local economy. The non-export or non-basic industries sell their products within the local economy and exists to support export or basic sector activity. Therefore, expansion in export or basic economic sector activity will likewise increase economic activity in the non-export or non-basic economic sectors.

Given a time series of data, the export-base multiplier can be expressed as:

$$(1) \qquad E_{NB} = \alpha + \beta E_{B}$$

where $E_{NB}$ is total non-basic sector income and $E_{B}$ is total basic sector income. The intercept is symbolized by $\alpha$. The estimated coefficient $\beta$ indicates the change in non-basic sector income from a change in basic sector income. By adding one to the estimated coefficient or $(1 + \beta)$ yields the export-base multiplier; that states the total change in income from a change in basic sector income.

Differential export multipliers can be derived by disaggregating total export or basic sector employment into its industrial components (Braschler). Also non-export or

non-basic economic sectors can be derived to derive the differential response of different non-basic sector to basic sector employment differential changes.  Therefore, the differential multiplier can be rewritten as:

$$(2) \qquad E_{NB_i} = \alpha + \sum_{i=1}^{n} \beta_i E_{\beta i} + e$$

Equation 2 is used to estimate differential income multiplier where $E_{NB_i}$ represents non-basic sector income for sector i; $\beta_i$ represents the impacts of income for non-basic sector i by basic sector i; and $E_{\beta_i}$ represents basic sector income for sector i.  In order to obtain total income multiplier for each basic sector i, one must be added to the coefficient $\beta_i$ in equation 2.

Using equations 1 and 2, export-base multipliers are based on levels of income and therefore average export-base multipliers are derived.  To estimate changes in non-basic sector income from changes in basic sector income, marginal export-base multipliers are derived.  Therefore the marginal differential income multiplier can be rewritten as:

$$(3) \qquad \Delta E_{NB_i} = \alpha + \sum_{i=1}^{n} \beta_i \Delta E_{\beta_i} + e$$

where $\Delta E_{NB_i}$ represents the change in non-basic sector income for sector i; $\beta_i$ represents the change in income for non-basic sector i and $\Delta E_{B_i}$ represents change in income in basic sector i.  In order to obtain the total marginal employment multiplier for each basic sector i, one must be added to the coefficient $\beta_i$ in equation 3.

For this analysis, the contributions of the gaming sector to non-basic sector growth will require further development of the export-base models as shown in equations 1, 2 and 3. Basic and non-basic sector income growth was derived as:

$$(4) \quad GE_{B_{i,t}} = (E_{B_{i,t}} - E_{B_{i,t-1}}) / E_{B_{i,t-1}}$$

$$(5) \quad GE_{NB_{i,t}} = (E_{NB_{i,t}} - E_{NB_{i,t-1}}) / E_{NB_{i,t-1}}$$

where $GE_{B_{i,t}}$ represents income growth for basic sector i in time period t; $E_{B_{i,t}}$ represents income for basic sector in time period t; $E_{B_{i,t-1}}$ represents income for basic sector i in time period t-1; $GE_{NB_{i,t}}$ represents income growth for non-basic sector i in time period t; $E_{NB_{i,t}}$ represents income for non-basic sector i in time period t; and $E_{NB_{i,t-1}}$ represents income for non-basic sector i in time period t-1.

For this analysis, the differential growth impacts of income growth in the Hotel and Gaming Sector, the Other Basic Sector and Unearned Income Sector on income growth in non-basic sector are derived below:

$$(6) \quad GNB_i = \alpha + \beta_1 GHG + \beta_2 GOB + \beta_3 GUI$$

where $GNB_i$ represents income growth for non-basic sector i, $GHG$ represents income growth for the hotel and gaming sector, $GOB$ represents income growth for all other basic sectors, $GUI$ represents income growth for unearned income, $\beta_1$ represents the response in income growth of the non-basic sector i from income growth in the hotel and gaming sector, $\beta_2$ represents the response in income growth of non-basic sector i from income growth in other basic sectors and $\beta_3$ represents the response in income growth of

non-basic sector i from income growth in unearned income. After calculation of these response coefficients, statistical test will be performed to determine if responses differ between $\beta_1$ and $\beta_2$. Results will indicate which of the basic sectors influence non-basic sector growth the most.

DATA AND CALCULATION OF BASIC SECTOR INCOME

For this analysis, annual income data for the state of Nevada was used. Usually employment data is used for export-base analysis, but when available, income data is superior. Employment alone fails to adjust for differences in wages between industries and appropriately place an equal weight upon part-time and full-time employment. Also employment cannot provide any measure of the importance that unearned income, such as dividends, rents, interest and transfer payments, have upon a county's economy (Blumenfeld).

Unearned income, unlike income from wages and salaries, does not require physical movement between home and work. Transfer payments and dividends, interest and rents which are sometimes called "unearned income" can be generated in one place and received at another (Beyers).

Annual sectoral income was calculated from the Regional Economic Information System from 1969 to 1995 (U.S. Department of Commerce). One digit SIC data was used except for the Service Sector. The Service Sector was disaggregated between the Hotel and Gaming Sector and the Other Services Sector.

For this analysis, sectoral employment had to be bifurcated between basic and

non-basic sectors. All income for the Hotel and Gaming Sector and the Unearned Income Sector was assumed to be basic income while other sectors were bifurcated using the dynamic location quotient procedures. Also because of the uniqueness of transfer payments, dividends, interests and rents, a separate basic sector was developed for Unearned Income Sector.

Location quotient procedures do not assume that the entire income of a given sector is either basic or non-basic. Rather, location quotient procedures employ secondary information sources such as national income to bifurcate total sector income. Location quotient procedures employed in this paper follow a time-series version developed by LeSage and Reed or stated as:

$$(7) \qquad LQ_{irt} = \frac{E_{irt} / E_{rt}}{E_{int} / E_{nt}}$$

where $E_{irt}$ is income in sector i in region r at time period t; $E_{rt}$ is total income in region r at time period t; $E_{int}$ is national income in sector i in time period t; $E_{nt}$ is total income at time period t; and $LQ_{irt}$ is location quotient for sector i in region r and time period t.

After calculating location quotient values, if $LQ_{irt}$ is greater than one, the region is said to be producing more than the expected amount of output in that sector. Hence the excess is classified for region r in sector i or $E_{B_{irt}}$. Therefore, the basic income for region r in sector i or $E_{B_{irt}}$ can be given by:

$$(8) \qquad E_{B_{irt}} = \frac{LQ_{irt} - 1}{LQ_{irt}} E_{irt} \quad \text{if } LQ_{irt} > 1.$$

The sum of these $E_{B_{irt}}$ 's across all sectors except the Hotel and Gaming Sector and the Unearned Income Sector derives Other Basic Sector income. Non-basic income for equation 6 will be derived for the Transportation and Public Utilities Sector; the Wholesale Trade Sector; the Retail Trade; the Finance, Insurance and Real Estate Sector; and the Other Services Sector.

## RESULTS

Table 2 shows results of the analysis. For the state of Nevada and for the industrial sectors, income growth in the Hotel and Gaming Sector has a statistically significant impact on income growth on the Non-Basic Sectors and the estimated impacts are substantially higher than growth of the Other Basic Sector. The Unearned Income Sector is contributing to Non-Basic Sector growth and should be considered for economic development. However, when comparing industrial sectors non-basic Retail Sector income growth is impacted ten times greater by income growth in the Hotel and Gaming Sector than income growth of the Other Basic Sector. For income growth for the Other Services Sector, the impact of the Hotel and Gaming Sector is not as large. However, even for this sector, the estimate of the Hotel and Gaming Sector response coefficient is significantly larger than the Other Basic Sector.

From Table 2, an important result is shown. The emphasis of the state of Nevada to diversify away from the gaming sector should be questioned. Table 2 shows that the Hotel and Gaming Sector is by far the largest contributor to growth in employment in the non-basic sectors of the state. The other basic sectors do contribute, but at a somewhat lower rate in terms or percentage and absolute numbers. The state policy makers may

want to reconsider emphasis away from gaming and focus on additional efforts for the state to retain its lead in the industry. This does not mean the state should entirely move away from economic diversification nor does it mean that the state should continue economic development activities while ignoring economic linkages and expansion opportunities in the gaming sector. This analysis shows that the effectiveness of public expenditures for promoting growth in gaming as opposed to other basic sectors should be evaluated in light of the economic linkage indicated by this model's results to develop an appropriate and cost-effective strategy for diversification.

Table 1.  Types of Legalized Gaming in the United States, 1996.

| State | Bingo | Casinos * | Video Lottery | Lottery ** | Pari-Mutuels *** | Off-Track **** |
|---|---|---|---|---|---|---|
| | | | | | | |
| Alabama | X | | | | X | X |
| Alaska | X | | | | | |
| Arizona | X | X | | X | X | X |
| Arkansas | | | | | X | X |
| California | X | | | X | X | X |
| Colorado | X | X | | X | X | X |
| Connecticut | X | X | | X | X | X |
| Delaware | X | | I | X | | |
| D.C. | X | | | X | | |
| Florida | X | | | X | X | X |
| Georgia | X | | | X | | |
| Hawaii | | | | | | |
| Idaho | X | | | X | X | X |
| Illinois | X | X | | X | X | X |
| Indiana | X | I | | X | X | X |
| Iowa | X | X | | X | X | X |
| Kansas | X | | | X | X | X |
| Kentucky | X | | | X | X | X |
| Louisiana | X | X | | X | X | X |
| Maine | X | | | X | X | X |
| Maryland | X | | | X | X | X |
| Massachusetts | | | | X | X | X |
| Michigan | X | X | | X | X | X |
| Minnesota | X | X | | X | | A |
| Mississippi | X | X | | | | |
| Missouri | X | X | | X | P | A |
| Montana | X | X | | X | X | X |
| Nebraska | X | | | X | X | X |
| Nevada | X | X | | X | X | X |
| New Hampshire | X | | | X | X | X |
| New Jersey | X | X | | X | X | X |
| New Mexico | X | X | | I | X | X |
| New York | X | X | | X | X | X |
| North Carolina | X | | | | | |
| North Dakota | X | X | | | X | X |

Table 1.  Types of Legalized Gaming in the United States, 1996.  (continued)

| State | Bingo | Casinos * | Video Lottery | Lottery ** | Pari-Mutuels *** | Off-Track **** |
|---|---|---|---|---|---|---|
| Ohio | X | | | X | X | X |
| Oklahoma | X | | | | X | X |
| Oregon | X | X | X | X | X | X |
| Pennsylvania | X | | | X | X | X |
| Rhode Island | X | | X | X | X | X |
| South Carolina | X | | | | | |
| South Dakota | X | X | X | X | X | X |
| Tennessee | | | | | A | A |
| Texas | X | | | X | X | X |
| Utah | | | | | N | |
| Vermont | X | | | X | X | A |
| Virginia | X | | | X | A | A |
| Washington | X | X | | X | X | X |
| West Virginia | X | | X | X | X | X |
| Wisconsin | X | X | | X | X | X |
| Wyoming | X | | | | X | X |
| Puerto Rico | | X | X | X | X | X |
| Virgin Islands | | | | X | X | X |

Source:  International Gaming and Wagering Business, September 1996.

X = Legal and Operative
P = Permitted by law and previously operative
I = Implemented since June 1995
A = Authorized, but not yet implemented
N = Operative, but no pari-mutuel wagering

\*          Casinos includes Native American Reservations
\*\*         Includes Keno, instant pull-tabs, lotto, numbers and passives
\*\*\*        Includes greyhounds, jai-alai, harness racing, quarterhorse and thoroughbred racing
\*\*\*\*       Includes interstate intertrack, intrastate intertrack, off track betting, race/sportsbook and telephone betting.

Table 2. Differential Sector Impacts of Non-Basic Income Growth from the Hotel and Gaming Sector, Other Basic Sector and the Unearned Income Sector.

| Sector | Intercept | Hotel and Gaming Sector | Other Basic Sector | Unearned Income Sector | $R^2$ |
|---|---|---|---|---|---|
| Transportation and Public Utilities | 0.00075 (0.01532) | 0.51227 (0.1309) | 0.03571 (0.03623) | 0.25698 (0.1750) | 58.05 |
| Wholesale Trade | 0.00531 (0.01930) | 0.49460 (0.1469) | 0.09917 (0.04564) | 0.40429 (0.2205) | 59.65 |
| Retail Trade | 0.10241 (0.9073) | 0.56610 (0.9644) | 0.05435 (0.2669) | -0.95736 (1.290) | 31.20 |
| Finance, Insurance and Real Estate | 0.09054 (0.04597) | 0.92357 (0.3927) | 0.12075 (0.1087) | -0.96757 (0.5252) | 36.26 |
| Other Services | 0.04844 (0.01231) | 0.26001 (0.1052) | 0.06533 (0.02912) | 0.10449 (0.1407) | 50.81 |

Standard error in parenthesis.

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