

The Pennsylvania State University

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**EXAMINING BRAIN DRAIN: DEMOGRAPHIC, EDUCATIONAL AND  
EMPLOYMENT FACTORS INFLUENCING LEHIGH UNIVERSITY  
GRADUATES TO STAY OR LEAVE THE REGION**

A Thesis in

Workforce Education and Development

by

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## ABSTRACT

Attracting and retaining young, 25-34 year-old individuals with at least a bachelor's degree has become a major workforce and economic development strategy and concern for cities, towns, regions and states. Numerous previous research studies have shown that the educational attainment of its population has had an impact on the economic vitality or lack thereof in regions across the United States. Colleges and universities, economic development practitioners and business leaders have the potential to play a vital role in building economic success for its respective region by building and enhancing strategies to attract and retain college graduates. The overall purpose of this study was to examine the post-graduation employment experiences of Lehigh University (Pennsylvania) 2000 and 2004 academic year bachelor's degree graduates. Specifically the focus was to determine factors related to their securing employment within or outside of the Lehigh Valley and whether those relationships were similar for graduates in scientific or nonscientific majors.

The study was conducted using an electronically-administered questionnaire to gather information on the post bachelor's degree initial and current employment experiences of Lehigh University graduates from the Classes of 2000 and 2004. In addition, the study explored the relationships that selected demographic, educational and employment factors had on whether the graduates in the study were employed within or outside of the Lehigh Valley when controlling for whether they were bachelor's degree graduates majoring in a scientific or nonscientific area.

Binary block logistic regression, along with descriptive statistics, was the primary research technique employed to answer the study's research questions. The regression results showed that a person who majored in a science area as well as a person's scores on the Job Intrinsic Factor (flexible job, job offering a chance to do good, help others, and opportunities for continuing education at area universities or colleges) and the Family Factor (being close to friends and family) had a statistically significant influence on whether the person was initially employed in the Lehigh Valley region. For current employment, the person's hometown, whether the person completed additional education beyond the bachelor's degree, and the score on the Regional Factor had a statistically significant influence on whether the person was currently employed in the Lehigh Valley region.

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## Chapter 1

### INTRODUCTION

#### Historical Perspectives

According to a study commissioned by CEOs for Cities (a national network organization comprised of mayors, corporate CEOs, university presidents, foundation officials and business and civic leaders; see [www.ceosforcities.org/about](http://www.ceosforcities.org/about)), one primary factor driving economic growth today is educational attainment. Results of the study indicated that for each two percent growth in the proportion of college graduates in a region, income growth increased by about one percent (Weissbourd & Berry, 2004A, p. 7). Furthermore, a Knowledge Industry Partnership Report from June 2004 indicated that if Philadelphia were to retain four of ten non-native graduates instead of the three of ten it currently retains, 2,400 more knowledge workers would enter the local economy each year (p. 8). It is thus understandable why communities, regions and states are interested in factors influencing the decisions of college graduates to stay or leave the area in which they attended college.

Regions appear to be most interested in attracting and retaining graduates with specific degrees and majors in science, information technology, and engineering. This relates to the growing empirical evidence that innovation and entrepreneurship spur economic growth and the corresponding linkages between innovation, entrepreneurship and technology. According to a Southern Technology Council (STC) report, economic growth is tied to technology and companies will pay a large premium for highly trained

and knowledgeable people and base location decisions on where they have access to pools of these workers (Pennsylvania Economic League Report, part 2, 2000, p. 1). Economist Gerald Carlino added, “Firms are willing to pay higher wages to educated workers because as people acquire more knowledge, they become better workers, which leads to an increase in output” (1995, p. 17).

Many recent studies were conducted in regions to forge further understanding of the “brain drain” issue and patterns of out-migration, especially as they relate to knowledge workers. A study conducted by Gottlieb and Fogarty (2003) found a significant relationship between educational attainment in 1980 and the rate of income and employment growth during the next 17 years (p. 325). Some studies, such as one by James Rauch (1993), tested the knowledge spillover hypothesis among U.S. metropolitan areas. The knowledge spillover hypothesis refers to the notion that “the interaction of educated workers can multiply the benefit of education several times over. Smart, experienced people talking to each other will create more economic value than will smart people working alone” (Gottlieb & Fogarty, 2003, p. 326). Rauch (1993) estimated that one additional year of average metropolitan statistical area education increased total factor productivity by 2.8 percent (Gottlieb & Fogarty, 2003, p. 328).

Yolanda Kodrzycki (2001) studied the National Longitudinal Survey of Youth from 1979 to 1996 to examine cross-state migration in the five-year time frame after completion of schooling, either high school or college. Her research found that college-educated individuals are more likely to migrate than those people without a college education. The study also showed that an individual’s past history of migration was very



important. In addition, most of the migrations were to states possessing stronger economies or more attractive characteristics such as higher employment growth, lower unemployment, higher pay, lower housing costs, or better amenities (pp. 13-14).

The notion of amenities as a regional economic development driver has gained prominence through the work of Richard Florida (2000), among others. Florida identified several key findings in the attraction of talent and development of high technology regional economies. These include the following:

- Amenities and the environment – particularly natural, recreational, and lifestyle amenities – are essential in attracting knowledge workers and in supporting leading-edge high technology firms and industries.
- Knowledge workers prefer places with a diverse range of outdoor recreational activities (e.g. rowing, sailing, cycling, rock climbing) and associated lifestyle amenities.
- The availability of job and career opportunities is a necessary but insufficient condition to attract the young knowledge workers. Knowledge workers prefer cities and regions with a “thick labor market” which offers the wide variety of employment opportunities required to sustain a career in high technology fields. (p. 5)

Florida’s research and conclusions regarding amenities and the importance of creativity to the economy has received the support of many government officials and other leaders across the United States. In Michigan, for example, Governor Jennifer Granholm initiated a program to create “Cool Cities.” She stated, “Michigan’s economic future lies in creating vibrant communities that are magnets for people, jobs and opportunity... Today, we’re focusing the state’s resources on projects that will become the magnet communities of tomorrow” (Hansen, April 1, 2004). Michigan officials

conducted surveys designed to gather input from college students and young people on the factors most critical to them in choosing a city in which to live or work.

As Granholm stated, “The future economic security of our state is in the hands of young, college-educated workers who will choose to stay in or move to Michigan...I am eager to talk to young people...to find out what we can do to stop the brain drain and create the Michigan they want as a home and as a workplace” (Hansen, March 23, 2004). Studies were conducted to assess the effect of brain drain in Pennsylvania. Hansen and Huggins (2001) interviewed 2,131 graduates from the 1994 and 1999 classes of Carnegie-Mellon University, Duquesne University and the University of Pittsburgh (p. iii) to determine factors influencing college graduates to stay or leave the Pittsburgh region. Similarly, a Knowledge Industry Partnership Report released in June 2004 examined the retention of graduates in the Philadelphia area. The report stated, “Success in the new economy will be increasingly concentrated in those regions with the right combination of smart people and good ideas. It is crucial that Greater Philadelphia be well positioned to capitalize and build upon its existing base of knowledge assets” (p. 2). Thus, Pittsburgh, Philadelphia and other areas are finding it increasingly important to retain and attract knowledge workers. The overall purpose of this study was to examine the post-graduation employment experiences of Lehigh University 2000 and 2004 academic year bachelor’s degree graduates. Specifically the focus was to determine factors that were related to their securing employment within or outside of the Lehigh Valley and whether those relationships were similar for graduates in scientific or nonscientific majors.

### The Problem

The Lehigh Valley is home to more than 600,000 residents, 310,000 employees, 14,000 companies, 11 colleges and universities enrolling nearly 45,000 students, as well as growing clusters of technology and service businesses (*Municipal Profiles: Lehigh and Northampton Counties*. (June 2004)). The biotechnology and pharmaceuticals cluster, according to information from the Lehigh Valley Economic Development Corporation, is especially strong. Based on data from the Pennsylvania Department of Labor and Industry, the Lehigh Valley is one of nine regions that account for 75 percent of biotech companies in the U.S. as well as 75 percent of the biotech companies launched within the last ten years (see [www.lehighvalley.org](http://www.lehighvalley.org)).

Realizing that the Lehigh Valley focuses part of its economic development strategy on science and technology, and realizing that economist David Birch regarded universities as being the “feedstock of gazelles,” his term for the fast-growing companies that drive product innovation, create new job opportunities for workers and fuel regional economic growth (Pennsylvania Economic League Report, Part 1, 2000, p. 13), it was compelling to focus this study on factors influencing recent Lehigh University graduates, particularly those who majored in science and engineering, to stay or leave this region.

More applicable and pertinent was where the Lehigh Valley ranked on both “youth-specific” net migration and near-retirement worker proportion. Gottlieb (2004) examined the location and migration patterns of younger and older workers, especially those with college degrees, for the 100 most populous metropolitan areas in Census 2000. He found that the Allentown-Bethlehem-Easton, PA Metropolitan Statistical Area ranked

86<sup>th</sup> of the 100 largest metro areas, 1990-2000, on “youth-specific” net migration. This means that, when the residual of 25-34 year-old net migration index was regressed on the 35-64 year-old net migration index, the index difference was -4.4% (p. 9). This poor showing, coupled with its rank of 14<sup>th</sup> of 100 on the proportion of labor force aged 55-64 (p. 10) is alarming. As Gottlieb stated, trends in regions such as the Lehigh Valley region reflect “not only a ‘brain drain’ of younger workers...but also the relative tendency of older workers to age in place there” (p. 11).

Even with these alarming statistics, the Lehigh Valley has an interesting opportunity to expand its knowledge worker base, especially among its recent graduates, as it is home to many colleges and universities. This study will determine factors influencing the graduating classes of 2000 and 2004 from Lehigh University to stay or leave the region. (Please note that the original intention of this study was to also include samples from DeSales University, Lafayette College, Moravian College, and Muhlenberg College. However, due to the other institutions either declining to participate or insisting on sending out the survey for the researcher, it was decided it would be most effective to delimit this study to include only Lehigh University graduates.) Of particular interest will be to compare and contrast the factors influencing native Lehigh Valley graduates and non-natives on staying or leaving the region.

#### Significance of the Study

According to the Southern Technology Council Report, “if a given state has a relatively high rate of out-migration of its graduates without a corresponding in-migration

of talent, then over time the human resource assets available for participating in the knowledge economy are likely to become degraded” (Tornatzky, Gray, Tarant & Zimmer, 2001, p. 19). Brain drain is thus not always easy to reverse once it has begun.

This study is important because it adds to the body of knowledge and research on brain drain, brain gain and factors influencing college graduates to stay or leave the region they attended college. Regional economic competitiveness and prosperity are priorities of local, regional and state governments. Determining ways to enhance the educated population of a region, particularly science, technology and engineering graduates, is one step toward ensuring a viable, prosperous and innovative economy.

### Research Questions

#### Research Question One

What are the post-bachelor’s degree initial and current employment experiences regarding:

1. The initial employment: (a) type of employment, (b) length of this initial employment, (c) initial occupation, and (d) full-time and part-time positions since graduation?
2. The current employment: (a) type of employment, (b) employment status, (c) current occupation, (d) current work status, and (e) current salary?

#### Research Question Two

What relationships do selected demographic, educational and employment factors have on whether the graduates are employed within or outside of the Lehigh Valley

(dependent variable) when controlling for whether they are bachelor's degree graduates majoring in a scientific or nonscientific area?

### Limitations

This study was a quantitative study and adapted the research design applied by Susan Hansen, Carolyn Ban and Leonard Huggins (2003) in their research study on recent Pittsburgh area college graduates. The study was provided to a sample of recent graduates at Lehigh University and thus the results cannot be generalized for other areas of the state or country. That being said, due to this study being an adaptation of the Pittsburgh study, it was still interesting to compare the results of this study with those of the former Pittsburgh study.

### Definition of Terms

Brain Drain: For purposes of this study, brain drain was used to describe the out-migration of workers from one region of the United States to another (Florida, 2000, p. 9). The primary focus on brain drain for this study was on the 25-34 year-old cohort with a bachelor's degree or greater (Gottlieb, 2004, pp. 3-11; De Jong & Steinmetz, 2003, p. 1).

Brain Gain: A term used to describe the in-migration of knowledge workers entering a region in the United States. The primary focus was on the "youth-specific" net migration of the 25-34 year-old cohort with a bachelor's degree or greater (Gottlieb, 2004, pp. 3-11) .

Lehigh Valley Region: For the purposes of this study, the Lehigh Valley Region was defined as the area of Pennsylvania including Allentown, Bethlehem and Easton. See [www.lehighvalley.org](http://www.lehighvalley.org) for specifics.

### Assumptions

It was assumed that many graduates of Lehigh University were likely to leave the region due to a lot of non-natives attending this institution and due to its national ranking and reputation. It was also assumed that a higher percentage of natives remain in the Lehigh Valley region than those who are not native to the area.

### Conceptual Framework

As mentioned earlier, determining ways to enhance the educated population of a region, particularly that of science, technology and engineering graduates, is one step toward ensuring a viable, prosperous and innovative economy. The underpinnings of this concept are based on the importance of human capital. Vijay Mathur (1999) explained his thoughts on regional economic development by stating:

...for a region to grow in employment and per capita income, it must save and invest in human resources to accumulate human capital. Human capital is an accumulated stock of skills and talents, and it manifests itself in the educated and skilled workforce in the region. The stock of human capital can be increased through formal and informal education and/or on-the-job training of labor. Human capital, although itself produced by human capital and labor, is a significant input in the production of labor and ideas. (p. 205)

Masur's work built on the studies of Lucas (1988) and Romer (1990). In the Lucas and Romer models, in addition to capital and unskilled labor, human capital was also

considered a distinct input in the production function of the economy (Masur, 1999, p. 206). According to Lucas, a knowledge spillover effect occurs due to a person's human capital as a person's human capital not only enhances his or her productivity level but also the productivity level of fellow workers with any given skill level. Romer took the concept one step further by intimating that the growth of knowledge is dependent on the stock of knowledge as well as human capital. As Masur stated,

Because all knowledge cannot be kept completely secret, productivity of human capital in knowledge production will be greater the larger the stock of knowledge. For example, the current breakthroughs in genetic research are not only the result of dedicated scientists engaged in such research but are also due to the wealth of accumulated information and knowledge since the discovery of the DNA structure in 1953 by James Watson and Francis Crick. Romer (1990c) shows that, in a balanced growth equilibrium (steady state) in which the rate of growth of knowledge is the same as the rate of growth of output, a rise in human capital stock at a given interest rate will increase human capital stock devoted to knowledge production, thus providing the stimulus to growth in output. Therefore, even in the extreme case in which all regions have access to the same stock of knowledge (no secrets at all), regions with a larger stock of human capital will produce a higher growth of knowledge – and consequently, higher growth rate of output. (1999, p. 206)

The conceptual framework for this study was taken from Masur and others and was largely based on the contention that accumulated human capital leads to increased knowledge production which is a primary driver of regional economic prosperity. It can thus be seen why policymakers, economic development professionals and researchers are so interested in the educational attainment of a region's workers. Gottlieb and Fogarty (2003), for instance, used as their preferred measure of educational attainment the proportion of the population 25 years and older who possess at least a bachelor's degree. Their rationale is that the bachelor's degree is a credential that separates knowledge



workers from manual workers and according to their research is held by only 26 percent of adults in the U.S. (p. 326).

Richard Florida's work on the importance of human creativity to regional economic growth garnered a lot of attention from policy makers over the last several years (Gottlieb, 2004, p. 22). Florida contended that amenities (i. e., coffee houses, bars, cultural opportunities, outdoor recreation) within a region are key economic drivers for a region, as a region without amenities will have difficulty attracting the creative worker, who essentially is a knowledge worker, one that possesses at least a bachelor's degree and likely is employed in science, technology, the arts or some creative field. While amenities may very well be important to a region's economic growth, and Florida's work was covered somewhat further in Chapter 2 of this study, this study contended that amenities should serve more as a complement to an overall regional economic growth strategy that focuses on knowledge infrastructure. This contention was affirmed by Weissbourd and Berry (2004A) from their CEOs for Cities report – amenities are a nice complement to economic growth strategies, but a focus on knowledge infrastructure and commercialization of new ideas are key factors that lead to genuine innovation and economic growth (p. 14).

## Chapter 2

### REVIEW OF RELATED LITERATURE

The overall purpose of this study was to examine the post-graduation employment experiences of Lehigh University 2000 and 2004 academic year bachelor's degree graduates. Specifically the focus was to determine factors that were related to graduates' securing employment within or outside of the Lehigh Valley and whether those relationships were similar for graduates in scientific or nonscientific majors. This chapter explores in greater detail why it is necessary for workforce and economic development professionals to have a greater understanding of what factors contribute to decisions of this demographic sector to stay or leave the region where they attended college. Covered in this chapter is the importance of human capital and educational attainment to an area's economic growth and prosperity, as well as a look at previous research on stay or leave decisions, educational attainment and out-migration.

#### Human Capital

Vijay Mathur (1999) defined human capital as “an accumulated stock of skills and talents, and it manifests itself in the educated and skilled workforce in the region” (p. 205). He contended that the accumulation of human capital is a successful long-term strategy for regional economic development and that it has both direct and indirect effects. He stated that human capital:

...directly contributes to knowledge growth and therefore to the knowledge stock of the region. Hence, the productivity of human capital

in knowledge growth rises with the accumulation of knowledge stock. Output growth and economic development would be even more pronounced as entrepreneurs apply and diffuse the knowledge in a region. Human capital stock also provides the pool for the emergence of entrepreneurs. Indirectly, to the extent that human capital raises the productivity of other workers and capital, promotes agglomeration economies, and stimulates household investment in children due to lower fertility rates, it further contributes to growth and development. (p. 213)

Mathur based his conceptual framework on the human capital-based theories of other economists such as Lucas (1988), Romer (1990), and Simon (1998). In the Lucas model, human capital possesses both an “internal productivity effect” as well as an “external productivity effect.” That is, an individual’s human capital will not only increase his or her productivity level but also those of co-workers at any given skill level. Thus, Lucas’s model contended that with the presence of this externality effect (increased knowledge spillover), the growth rate will be higher in those regions with more accumulated human capital. Mathur (1999) cautioned, however, that spillover effects can “create disincentives to economic agents to accumulate an optimum of stock. Therefore, a region will face slower growth in the absence of policy intervention to restore the incentives” (p. 206).

Romer’s model addressed Mathur’s concern in that the source of the externality is the stock of knowledge. The growth of knowledge within the region depends on both human capital and the stock of knowledge. Because “all knowledge cannot be kept completely secret, productivity of human capital in knowledge production will be greater the larger the stock of knowledge” (Mathur, 1999, p. 206).

Curtis Simon (1998) conducted a metropolitan-level study on the impact of human capital on employment growth. Simon’s analysis found that educational

attainment, measured at both the high school and college levels, was significant in determining employment growth in U.S. metropolitan areas between 1940 and 1986. One of Simon's primary findings was that the impact of human capital on employment growth can be long term and persistent. Simon's study did not address the impact of human capital on income growth which is where Gottlieb and Fogarty picked up the research (Gottlieb and Fogarty, 2003, p. 328).

### Educational Attainment

Gottlieb and Fogarty's (2003) work employed the conceptual framework of Mathur and explored the relationship between educational attainment at the bachelor's degree level and the subsequent economic growth of U.S. metropolitan areas. In their study, the authors found a significant relationship between educational attainment in 1980 and the rate of per capita income and employment growth during the next 17 years (p. 325).

Gottlieb and Fogarty (2003) utilized data from the decennial census for the years 1980 and 2000. The key independent variable in their study was the proportion of adults age 25 or older in each metropolitan area who held at least a four-year bachelor's degree. The bachelor's degree is utilized by the authors because "it remains a credential that separates knowledge workers from manual workers. This degree is held by only 26% of adults nationwide" (pp. 325, 328-329). The dependent variables in the study were the growth rate in real per capita income and employment between 1980 and 1997 (pp. 328-329).

Initial focus of Gottlieb's and Fogarty's (2003) study was on the top 75 metropolitan areas in terms of population. One finding was a significant difference both in statistical and magnitude terms for the proportion of bachelor's degrees between the ten most educated metropolitan areas and the ten least educated metropolitan areas. The average proportion of bachelor's degrees for the top ten areas in 1997 was 34.8 percent compared to 17.4 percent of the bottom ten areas. The Allentown-Bethlehem-Easton area, the focus of this study, fell in the bottom ten categories in Gottlieb's and Fogarty's analysis of the Census data (p. 329).

Gottlieb and Fogarty (2003) proceeded to display a diverging trend in per capita income after 1980. In 1980 the ten most educated metropolitan areas possessed an average real per capita income level of about 12 percent above the national average, whereas the average real per capita income level for the ten least educated metropolitan areas was about three percent below the national average. The alarming story is that, by 1997, the most educated metro areas were 20 percent above the national average and the least educated areas were 12 percent below the national average. Furthermore, among the 75 largest metropolitan areas, the ten most educated areas in 1980 enjoyed real per capita income growth of 1.8 percent per year through 1997, compared to only a 0.8 percent increase during this period for the ten least educated areas (Gottlieb & Fogarty, p. 330).

Gottlieb and Fogarty (2003) did not find a significant difference in annual employment growth in the period 1980-1997 between the top ten (2.7%) and bottom ten (2.5%) educated metros. They surmised that this could be due to large metro areas experiencing congestion effects that curtail employment and population growth long

before they curb income or productivity growth, and that because the 75 metro areas initially studied were at the top end population-wise of America's 276 metropolitan regions, it could be that none of the metro areas in the sample added jobs quickly enough to register successfully in the area of annual employment growth. Thus, the authors applied a regression framework to address the city size issue (p. 330).

When the regression was applied, educational attainment was found to be significantly related to subsequent employment growth across all 267 metros. Thus, "fears that an education strategy will boost productivity without helping employment are unfounded in the long run; these results parallel those of Simon (1998)" (Gottlieb & Fogarty, p. 331). The most integral result of the regression analysis was that the relationship between educational attainment and subsequent per capita income growth was robust to the addition of several reasonable covariates even if the magnitude of the education effect was small, *ceteris paribus* (Gottlieb & Fogarty, p. 332).

Weissbourd's and Berry's (2004B) study for CEOs for Cities mirrors the findings by Gottlieb and Fogarty. The CEOs report employed econometric models utilizing four dependent variables as indicators of economic success over the period 1990 to 2000: change in city per capita income, change in city population, change in metropolitan statistical area (MSA) per capita wage, and change in MSA average wage. An emphasis in the results was placed on income and wage growth as the authors contended it "more directly measures aspects of economic prosperity than population growth" (Weissbourd & Berry, 2004B, p. 15).

The CEOs report found that between 1990 and 2000, median income growth was 10.2 percent and median population growth was 7.7 percent. However, there was significant variation in the results of the cities – income grew by 27 percent in San Francisco but fell by 14.4 percent in Anaheim. Log change in population had an even broader range with 62 percent growth in Las Vegas but 13 percent decline in St. Louis. Also, it should be noted that population growth does not necessarily mean income growth; some of the fastest growing cities population-wise are among the worst performers income-wise (Weissbourd & Berry, 2004B, p. 17).

The educational levels in cities were enhanced substantially over the 1990s: the average percentage of adults with a bachelor's degree or higher increased from 22.8 percent in 1990 to 26.3 percent in 2000. Yet, variations were significant among cities: Arlington, Virginia possessed 60 percent of adults with at least a college degree whereas Newark, New Jersey only had eight percent of its adults with at least a bachelor's degree. Thus, the smart got smarter (Weissbourd & Berry, 2004B, p. 30). This is important because, based on Weissbourd's and Berry's regression analysis, of all the variables examined over the 1990s, educational levels had the single largest impact on economic growth. As they stated,

In particular the percentage of adults with college degrees proved to be highly positive and significant for population, income and wage growth, both at the city and at the MSA level. The regression coefficient indicates, that, roughly, for each 2% growth in the proportion of college graduates, income growth increased by about 1%. On the other hand, a higher proportion of the population having a high school degree without completing college has a much smaller impact: a 2% increase in high school graduates yields only a 0.2% increase in income growth. (p. 32)

The CEOs for Cities report analyzed much more than just educational attainment as it was looking at the changing dynamics of urban America. Of all the demographic factors (i.e. gender, race, etc.), the age variables had the strongest relationship to economic growth. The 35-44 year-old age group had the greatest impact – one percent growth in the proportion of this age group’s population increased income growth by 1.5 percent. Additionally, this group was the only one that had a significant impact on income growth at the MSA level as well (Weissbourd & Berry, 2004B, p. 55). Why then, if the 35-44 year-old age group has the greatest impact on the economy, did this study, as well as most other studies in the literature related to out-migration, educational attainment and brain drain, deal primarily with the 25-34 year old age group? The reason is that the younger group tends to be more mobile. People in the 35-44 year-old group tend to be settled down with families whereas the younger age groups are still exploring their paths in life. The next section of this chapter addresses out-migration research, especially as it pertains to the 25-34 year-old sector.

### Educational Attainment and Out-Migration

In “Labor Supply Pressures and the ‘Brain Drain’: Signs from Census 2000,” Paul Gottlieb (2004) analyzed the dynamics of the labor supply of the 100 largest metropolitan areas (those with at least 519,000 residents) in the United States based on their population in Census 2000. The report concentrated primarily on the 25-34 year-old age group (p.

3). Gottlieb’s major findings included:

- The proportion of young and educated workers is highest in the Northeast region followed by the Midwest, South and West. Lower



educational attainment among the South's and West's 25-34 year-old segment likely relates to the fact that the metropolitan areas in these regions specialize in lower-skill, lower-wage industries like agriculture, mining and tourism.

- Young and educated workers represent a larger part of the workforce in metropolitan areas with high populations, strong arts scenes, significant international immigration and large numbers of high technology job offerings. Additional analysis of the relationship between proportions of the young, college-educated cohort and technology employment illustrated that the positive correlation between the two measures depends primarily on overall metropolitan educational attainment with the size of the 25-34 year-old cohort playing a smaller role. Thus, it appears that the nation's technology centers attract the better-educated, including those in the younger cohort.
- Metropolitan areas that attracted the largest group of new 25-34 year-old residents between 1990 and 2000 are located almost entirely in the South and West. Most studies, including Gottlieb's, illustrate the propensity to migrate increases with educational attainment. The Northeast does lead in terms of sheer concentration of the young cohort, yet in terms of youth migration (all levels), the West leads, followed in order by the South, the Midwest, and the Northeast. Allentown-Bethlehem-Easton, the metro area researched in this study, ranked 86<sup>th</sup> out of the 100 largest metro areas with a "youth-specific" net migration of -4.4 percent (i.e. -2.6 percent for 25-34 age group and 1.8 percent for the 35-64 year-old cohort). By contrast, San Francisco had a net migration index rate of 56.7 percent (46.5 percent for youth and -10.2 percent for 35-64 year-olds.)
- Compared to older workers (aged 35-64), young workers migrated more frequently to high-amenity, high human-capital metro areas during the 1990s.
- Allentown-Bethlehem-Easton ranked 14<sup>th</sup> out of 100 in proportion of labor force aged 55-64 at 10.9 percent (319,629 total labor force aged 16 and older and 34,816 55-to-64 year-old workers). The vast majority of higher percentages of older workers are in the Northeast whereas Austin, ranking lowest in this proportion at 7.1 percent, is in the South. Moreover, eleven of the bottom 15 metro areas in terms of "youth-specific" migration also appear at the bottom in terms of lowest net migration. Their appearance on both factors reflects not only a brain drain of young workers from these areas but also the relative

tendency of older workers to age in place there. (Gottlieb, 2004, pp. 3-11)

In another study of the 25-39 year-old cohort between 1995-2000, Rachel Franklin (2003) analyzed Census 2000 long form question data and found that one-third of all movers between 1995 and 2000 were in the 25-to-39 year-old category. While this youthful cohort trended similarly to the overall population in terms of the majority of moves being intracounty, followed by moves from different counties in the same state, and then to different states, the percentage of the population moving from a different state was higher for the 25-to-39 age group than for all others (Franklin, 2003, p. 2). College-educated 25-39 year olds were almost twice as likely to leave the state than non-college-educated individuals in the same age group: 22.6 percent compared with 12.4 percent (Franklin, 2003, p. 2). Gordon De Jong and Michele Steinmetz (2003), who studied brain drain in Pennsylvania, found similar trends within the state of Pennsylvania. The first and foremost indicator of brain drain migration was educational attainment (De Jong & Steinmetz, p. 8). Some statistical information analyzed in the Pennsylvania study point to some startling statistics:

- Between 1995-2001, the net yearly net migration loss (the balance of in and out interstate migrants) of Pennsylvania 20-29 year olds ranged from -23,578 to -39,425.
- Pennsylvania experienced a migration loss of -20,038 people with college/professional/graduate degrees between 1999-2001, with -13,056 of this net migration loss being in the 20-29 year old age group. In addition, during this same time period, the state lost 21,376 individuals with an associate's degree or some college training.
- During the 1999-2001 period, 22.5 percent of the state's official labor force had completed a Bachelor's Degree. This ranked below the national average and was next to last compared to adjacent states (NY,

NJ, MD, DE, OH, WV). In addition, Pennsylvania ranked next to last in adjacent states with 16.5 percent of the official labor force holding an Associate's Degree or some college training.

- At the start of the 21<sup>st</sup> Century, 52.3 percent of Pennsylvania's official labor force ages 18-64 had no more than high school training or a high school diploma. (De Jong & Steinmetz, 2003, p. 1)

The fact that such a high percentage of Pennsylvania's workers only possess a high school diploma or training appears to have a significant bearing on the economy and what De Jong and Steinmetz termed "important implications for economic development" (p. 8). Workers with higher education levels experience lower rates of unemployment. Between 1999 and 2001, the total unemployment rate for high school drop-outs was 11.2 percent and 5.5 percent for those with a diploma. This contrasts to the relatively low unemployment rates for those with college (2.6%) and graduate (2.7%) degrees. In addition, from 1999 to 2001, the median annual income for Pennsylvanians with a graduate or professional degree was \$64,600 compared to only \$22,000 for those with a high school diploma (De Jong & Steinmetz, p. 22). Furthermore, during the same time period between 1999 and 2001, 11 percent of Pennsylvania workers with only a high school diploma had earnings under the poverty line – over twice the percentage of those with an associate's degree and over 3.5 times the rate for those with a bachelor's degree (Brookings Institution, p. 61-62).

Another related study was completed by Yolanda Kodrzycki (2001) who studied the National Longitudinal Survey of Youth from 1979 to 1996 to examine cross-state migration in the five-year time frame after completion of schooling, either high school or college. Her research found that college-educated individuals are more likely to migrate

than those people without a college education. The study also showed that an individual's past history of migration was very important. In addition, most of the migrations were to states possessing stronger economies or more attractive characteristics such as higher employment growth, lower unemployment, higher pay, lower housing costs, or better amenities (pp. 13-14).

Yet another set of studies are the recent "Young and Restless" reports published by Carol Coletta of Coletta & Company and Joseph Cortright of Impresa, Inc. Studies were separately released for the cities of Philadelphia, Portland, Tampa, Richmond, Virginia and Providence, Rhode Island under the heading "The Young and the Restless: How [City Name] Competes for Talent." Much of the statistical information mirrors the other studies covered in this chapter. However, qualitative methods through focus groups captured additional information about what the young and the restless are looking for in cities. Ten themes were developed and are summarized below with some select quotes from one of the reports:

1. Open the Circle and Welcome Newcomers – cities that want to attract and keep smart young people must be open to newcomers as full participants in the community's civic, social and business life: "I was looking to get involved but found it hard to break into the social circle. The city is kind of traditional. Who you know is important. It's different coming in from the outside. It's frustrating to be involved."
2. Welcome New Ideas – Newcomers often feel their ideas are discounted or dismissed: "Let it go. Let go of the reins. Let change happen. Let new blood in."
3. Encourage Diversity: "This city lacks diversity tremendously. This was a huge disappointment. The city doesn't do much to attract diversity. People are a little-bit close-minded. That's the thing I hate the most...."

4. Create a place where people can be themselves: “Here, you have the ability to thrive in your own little world.”
5. Let young people live their values and create a new history: “Our generation is picking up the flag. Manifest destiny. The city is not finished. We can change it. The rewards are on merit, not the past. We are creating the history of the city as we go.”
6. Build vibrant places: “Downtown sucks. You can’t live there, there are no restaurants, no train, no coffee shops. I can’t live there.”
7. Take care of the basics: “It wouldn’t kill them to clean the streets.”
8. Be the best at something: “The city needs to do one thing really well. It should be unique.”
9. Sell your regional assets: “The location. It’s so close to everything. There is the ease of getting places.”
10. Know what you want to be and be willing to take risks to achieve it: “When asked, ‘If your city were a car, what kind of car would it be?’ one woman gave it a moment of thought and answered, ‘An El Camino. This city just doesn’t know what it wants to be.’ ” (Coletta & Cortright, 2004, pp. 8-15)

These focus groups and themes serve as a supplement to the statistical evidence regarding the importance of attracting and retaining the 25-34 year-old cohort. Also, it can be seen from the themes developed and responses given that amenities play some role in the decision making of the young knowledge worker. The role of amenities in regional economic development was championed by economist Richard Florida (2000). While the study described in Chapter 3 stated that amenities should only supplement the overall regional development strategy, it was logical to describe some of Florida’s thoughts here.

In his 2000 report, *Competing In The Age of Talent: Environment, Amenities, And The New Economy*, Richard Florida (2000) pointed out the brain drain situation in Pittsburgh:

There is growing concern that the greater Pittsburgh region is experiencing an out-migration of its top entrepreneurial, technical, and managerial talent, particularly its young talent. There is also a related concern over the outmigration of Pittsburgh-based high technology companies – for example, the relocation of Lycos, the successful spin-off from Carnegie Mellon University, to the greater Boston area. The Pittsburgh region, according to numerous studies, is growing old and is suffering from a classic “brain drain.” This last point is particularly important, as it is these young, knowledge workers who participate in entrepreneurial high technology enterprises that create wealth, employment, and regional growth opportunities. (p. 9)

He continued:

Sprawl poses a particularly vexing problem for rapidly growing high technology regions. Part of their appeal in the first place came from the manageable size and high quality-of-life. Growth generates pressures that threaten these qualities. A rapidly growing high technology economy brings with it social and environmental costs as a consequence of greater industrial activity and population growth. Deteriorating air quality, traffic congestion, and damage to natural amenities are some of the negative outcomes that challenge prospering high technology regions. In extreme cases, unmanaged growth may eventually destroy the appeal of a region and create an impediment to growth and make other regions relatively more attractive location choices. (Florida, 2000, p. 26)

Richard Florida identified several key findings in the attraction of talent and development of high technology regional economies. These include the following:

- Amenities and the environment – particularly natural, recreational, and lifestyle amenities – are essential in attracting knowledge workers and in supporting leading-edge high technology firms and industries.
- Knowledge workers prefer places with a diverse range of outdoor recreational activities (e.g. rowing, sailing, cycling, rock climbing) and associated lifestyle amenities.
- The availability of job and career opportunities is a necessary but insufficient condition to attract the young knowledge workers. Knowledge workers prefer cities and regions with a “thick labor market” which offers the wide variety of employment opportunities required to sustain a career in high technology fields. (Florida, 2000, p. 5)

Florida's research and conclusions regarding amenities and the importance of creativity to the economy received the support of many government officials and other leaders across the United States. In Michigan, for example, Governor Jennifer Granholm initiated a program to create "Cool Cities." She stated, "Michigan's economic future lies in creating vibrant communities that are magnets for people, jobs and opportunity... Today, we're focusing the state's resources on projects that will become the magnet communities of tomorrow" (Hansen, April 1, 2004).

Michigan officials conducted surveys designed to gather input from college students and young people on the factors most critical to them in choosing a city in which to live or work. In-person forums with the governor intended to follow the survey effort at select colleges and universities.

As Granholm stated, "The future economic security of our state is in the hands of young, college-educated workers who will choose to stay in or move to Michigan...I am eager to talk to young people...to find out what we can do to stop the brain drain and create the Michigan they want as a home and as a workplace (Hansen, March 23, 2004).

It was interesting that several of the cities often mentioned as attractive to the high technology knowledge worker were also the same cities that made smart growth and amenities an important part of their economic development strategies. Austin, Texas, for instance, instituted a two-pronged strategy for its economic future: high technology and smart growth along with lifestyle amenities. According to a Greater Austin Chamber of Commerce report:

A clean and well-managed environment and an economy that provides job opportunities for all its residents are important community objectives. But

given Austin's economic direction, environmental and social issues are important for a second reason: they are also critical inputs to its long-term economic competitiveness. If Austin's robust technology-driven economy has one weakness, it is a chronic labor shortage in technical fields... Similarly, if Austin is to keep its skilled workforce and continue to attract people from other regions, it will have to offer more than high wages – many regions can offer high wages. The region will need to leverage its quality-of-life: its clean environment, recreational opportunities, and stimulating cultural scene... If the region is to continue to grow and develop, it must take full advantage of all its assets. It also means that the assets that have made the economy what it is, such as its workforce capabilities and its quality-of-life, receive the reinvestment necessary to keep them strong. (Florida, 2000, p. 28)

Burlington, Vermont also utilized lifestyle as a thrust for economic development.

While Austin and Seattle emphasized their music scenes and nightlife, Burlington boasted of its excellent natural amenities and outdoor recreation such as hiking, biking and skiing (Florida, 2000, p. 29).

As mentioned above and in Chapter 1, the study described in Chapter 3 utilized some of Florida's work with amenities but more closely aligned with other studies including Weissbourd's and Berry's CEOs for Cities report where they found amenities were a nice complement to economic growth strategies, but a focus on knowledge infrastructure and commercialization of new ideas were key factors that lead to genuine innovation and economic growth (Weissbourd & Berry, 2004A, p. 14). In any event, each study described above lends credence to the argument that college-educated, 25-34 year-old workers should be a major focus of local, state and regional economic development efforts. Whether this cohort stays or leaves the state or region can play a significant role in determining the economic success of a region. The analyses below described in additional detail some focused studies related to brain drain, migration, and



the 25-34 year-old cohort, particularly those in the coveted fields of science and engineering.

### Southern Technology Council Report

In 2001, the Southern Technology Council (STC) published a report entitled “Who will stay and who will leave?: Individual, Institutional and State-level Predictors of State Retention of Recent Science and Engineering Graduates – Policy and Research Recommendations.” One primary objective of this study was to identify predictors of graduates’ migration behavior at both the B.S. and M.S. levels in science and engineering (Tornatzky et al., 2001, p. 10). This study, which was preceded by an earlier 1998 analysis, “Where Have All the Students Gone?,” utilized the National Science Foundation’s National Survey of Recent College Graduates (NSRCG) in arriving at its findings. This instrument is a national probability survey of bachelor’s and master’s science and engineering degree recipients (Tornatzky et al., 2001, p. 11). The 2001 report sought to uncover additional information missing from the 1998 study; missing from the earlier report was an analysis of individual factors that might influence the decision to stay after graduation and work in-state (e.g. gender, grades, major), in addition to an exploration of institutional factors that might impact the migration decisions of graduating students (e.g. institution type, tuition, private vs. public school) (Tornatzky et al., p. 8).

Utilization of the NSRCG database allowed the researchers to uncover where a student went to high school and college as well as where he or she was currently

employed. This was important in that it allowed the researchers to build retention measures for each student. Surveys were conducted by phone or mail to both institutions and individual graduates of institutions (Tornatzky et al., p. 12). The statistical analysis included 44 predictor variables comprised of individual (13 variables), institutional (5 variables), and state levels (26 variables) of analyses. The initial analysis examined simple one-to-one relationships between the predictors and the outcomes. Predictors found to be statistically important at this level were then coupled with other predictors of the same domain (e.g. demographics) and level (e.g. individual, institutional, or state characteristics) and re-analyzed. As a result of this procedure, 23 variables were retained for the final full model statistical analyses. Logistic regression analysis was employed as the primary statistical tool (Tornatzky et al., 2001, p. 18). Some of the major findings of this report were:

- There is tremendous variance in graduate migration across states. 43.2 percent of science and engineering college graduates who obtain their high school degree in one state will take a job in another state after graduation from college. However, certain states retain an estimated 81 percent of these graduates while the lowest state retained only 18 percent. (p. 18)
- Not only are these migration patterns large but there is some evidence that they are stable over time and cumulative in their impact. That is, if a given state has a relatively high rate of graduate out-migration without a corresponding in-migration of talent, then over time the human resource assets available for participating in the knowledge economy are likely to become degraded. For example, based on retention estimates of recent college graduates from 25 of the larger states represented in the 1993 and 1997 NSRCG, the general performance pattern holds over this period for most states. In fact, a computed correlation coefficient between 1993 and 1997 scores, which probably provides a conservative estimate, was very high ( $r=.77$ ) and statistically significant. It thus appears that brain drain is a

fairly stable phenomenon that may be difficult to turn around.  
(Tornatzky et al., 2001, p. 19)

- The odds that a person would be working in the same state they attended high school in were increased over ten times (1,022 percent) if that person remained in-state to attend college. (Tornatzky et al., 2001, p. 19)
- Engineering and physical science majors are more likely to leave the state they attended college. Those attending research institutions are also less likely to stay in-state. In addition, salary played a role. Every \$10,000 of salary increase decreases the odds by approximately eight percent that a person will be working in the state where they received their high school diplomas. (Tornatzky et al., 2001, p. 21)
- The larger the state population where the high school degree was received, the more likely the college graduate who attended high school in the state is to be retained. Every increase in the state population of one million increases the odds of retention roughly three percent. For example, in a state with a population of five million, the odds that a graduate would remain in the state to work would be six percent higher than in a state with a population of three million. (Tornatzky et al., 2001, p. 21)

According to the STC findings, the average state could expect to retain 76 percent of its “stayers” (attended high school in the same state), 43 percent of its “arrivers” (attended high school elsewhere but received most recent degree in focal state), and 23 percent of its “leavers” (attended high school in focal state then left to attend college elsewhere.) Arrivers were approximately 2.5 times more likely to be retained than leavers (Tornatzky et al., 2001, p. 26). Thus, according to these data, policymakers need to consider tailored strategies for each of these groups and be cognizant that “stayers” are the easiest group to retain. These findings also appear on the surface to lend credibility to states’ and universities’ active recruitment of out-of-state students.

While being a “stayer” was by far the best predictor of where a graduate worked after college, many of the variables did not explain retention in the multivariate model. These included gender, degree, race, number of degrees, financial aid, most state general economic conditions (economic dynamism was the exception), and most quality of life measures (except healthcare) (Tornatzky et al., 2001, p. 27).

Policy research suggestions that came out of the Southern Technology Council report included:

- Research on older state scholarship programs to analyze impact;
- Better data on the best mix of institutions in a state, from the perspective of attraction and retention of out-of-staters; and
- Need for a more qualitative study of undergraduates or graduate students near the end of their programs as they weigh their employment options. (Tornatzky et al., 2001, p. 34)

### Scholarship Programs

State scholarship programs were addressed in the literature and will now be briefly discussed. Georgia’s HOPE scholarship program, established in 1993 and funded by a state lottery, was probably the most-written about initiative. The scholarship covers tuition, fees and book expenses for students attending public colleges and universities in Georgia, and provides a subsidy of equivalent value to students attending Georgia’s private institutions. There are no income restrictions related to the scholarship (Cornwell et al., 2004, n.p.) A study conducted by University of Georgia researchers contrasted college enrollment in Georgia with enrollments of other Southern Regional Educational

Board states by utilizing Integrated Postsecondary Education Data System (IPEDS) data for the period 1988-1997. The researchers found:

- HOPE raised the total first-time freshmen enrollment in Georgia colleges by 5.9 percent, which translated into an additional 2,889 students per year.
- The total enrollment impact is clustered primarily in four-year institutions, with the greatest percentage gain in private colleges.
- Using the available years of IPEDS student residency and migration data, which are limited to first-time freshmen in four-year institutions who recently graduated from high school, it was estimated that HOPE reduced the number of students leaving Georgia to attend college by an average of 560 per year. (Cornwell et al., 2004, p. 19)

Another study which touched on the impact of scholarship programs was conducted by Mak and Moncur (2003). The researchers utilized a general economic model to explain differences among all fifty states in terms of out-migration rates for college-bound freshmen in 1996 and 1998, the most recent years for which available out-migration data existed (Mak & Moncur, 2003, p. 604). The results found tremendous variance in out-migration rates among college-bound freshmen with Alaska having 66.8 percent out-migration and Mississippi only 8.1 percent. The median out-migration rate among the fifty states was 18 percent in 1998 (Mak & Moncur, 2003, p. 604). States like Georgia possessing broad-based merit scholarship programs tended to retain a significantly higher percentage of their college graduates. The equations indicated that the retention effect of these scholarships is significantly greater the longer the scholarship programs were in effect. On average, each additional year the scholarship was in effect resulted in about a one percentage point lower out-migration rate of college-bound freshmen. Another finding was that states with low in-state tuition and fees tend to retain

a higher percentage of their own students (Mak & Moncur, 2003, p. 610). Both the Cornwell and the Mak and Monsur studies addressed the impact of scholarships and/or lower tuition on retention of in-state students for college. However, further research should be conducted as to whether these variables impact the retention of workers within the state.

#### Gottlieb's "Brain Drain" Study of Ohio

Paul Gottlieb (2001), in his study on brain drain in Ohio and Northeastern Ohio, contended that brain drain, "defined as a relative failure to attract or retain knowledge workers in the short run, is a *symptom* of an economic development problem. It is not the problem itself" (p. 6). He pointed this out as a shortcoming of the STC report, which treated brain drain as the problem itself. He also stated that the STC report did not examine brain drain at the level of metropolitan areas which Gottlieb argued are more coherent economic units than U.S. states (p. 7). Gottlieb's main point in this study was that simple measures of student out-migration are meaningless in the absence of information on university degree production (supply) and high-tech job demand (demand) (p. 4).

Gottlieb employed a typology of U.S. states on the net migration of scientists and engineers, cross-classified by supply and demand factors, and then utilized statistical analysis to emphasize that net out-migration is largely explained by an excess of supply over demand. It further provided a measure (the regression residual) for determining whether a state had a brain drain problem once its stock of high-tech jobs and its flow of

university graduates are controlled (p. 7). Gottlieb's analysis led him to state the following recommendations which were confirmed through multivariate analysis (p. 15):

- If your state is above average on both high-tech demand and supply, then you should ignore out-migration because you already enjoy both a high-tech economy and a strong university innovation system. Even if you appear to be bleeding graduates, you do not have a problem. *Examples: Massachusetts, North Carolina.*
- If your state is a poor performer on degree supply, but you are above average on high-tech industry demand and you currently import talent, it is difficult to argue that you have a serious problem. This is especially true if your state is small and is well-supplied by universities in neighboring states – to whom you may effectively shift some of the financial burden of higher education. *Example: New Jersey.*
- If your state ranks low on both supply and demand, then you should improve the technology base in your universities in order to create new high technology agglomerations. If this is the case, measured brain drain will be a poor indicator of your problem because it will reflect the relative scale of supply and demand in your state without making the observation that *both* are too low. *Examples: Florida, Louisiana.*
- If your state is average or above average on degree supply, but below average on high-tech demand, then your first priority should be to work on the demand side. Human capital programs may be part of this strategy, but entrepreneurship and university technology transfer programs seem more direct. Many Midwestern states with strong land grant universities fit into this category. *Examples: Ohio, Indiana, Pennsylvania.* (Gottlieb, 2001, pp. 12-13)

Based on these recommendations, Gottlieb asserted that:

We now have three important determinants of migration performance that are part of what you might call the “accounting” or “body count” view of brain drain. They are overall degree supply, overall high-tech job demand and the match between university disciplinary strengths and industry demand (which is really just supply and demand defined at a greater level of detail). Excess out-migration remains a problem, but only when viewed as a residual that appears after supply and demand issues have been addressed. (2001, p. 19)

### Additional Related Research on “Brain Drain”

A 2001 study of recent college graduates in Michigan studied the patterns of approximately 30,000 life science, information technology and engineering graduates from 1997 to 2000. An 800-person random survey of students of those fields was also implemented (Michigan Economic Development Corporation, p. 3). Results of the study illustrated that Michigan retained 79 percent of these graduates who took employment in the high-tech sector. Michigan also retained as workers 55 percent of students in these fields who come to a Michigan public university from out-of-state. Michigan, along with California, Texas, Illinois, Minnesota, New Jersey, North Carolina and South Carolina, was one of only a small number of states that can claim such an impressive retention rate. These states also maintained high attraction rates (Michigan Economic Development Corporation, p. 5). Additional research would obviously be warranted to try to uncover what factors played a role in the success of these states’ attraction and retention rates.

As part of the Indiana Human Capital Retention Project, a survey of postsecondary retention was conducted. The report gathered the results of a national survey of education officials and legislative staff on state graduate retention policies (Indiana’s Human Capital Retention Report, 2000, pp. i-ii). One of the recommendations that came out of the results mirrored the suggestions of Gottlieb (2001) – it is important to connect the production of graduates to available (or soon-to-be available) jobs. The report stated and illustrated several examples:

The demand for college graduates in various sectors of the economy must be measured. Since the recruitment and education of graduates is a multi-year process,



workforce demands must also be anticipated. Utah and Georgia developed programs to jointly forecast the skill sets or degrees needed by the states' employers and respond to the need with curricular adaptations (p. 11).

Utah's Partnership for Education and Economic Development, a non-profit with an associated foundation, made judgments about workforce needs, including calling for short-term programs to answer specific needs as well as recommendations on long-term research and development needs. Georgia's higher education strategy was influenced by needs assessments performed as part of the Intellectual Capital Partnership Program (ICAPP). Studies performed assist in determining the supply and demand of Georgia's colleges and universities with the needs of Georgia's current and prospective employers (Indiana's Human Capital Retention Project, 2000, p. 9). The Indiana study also promoted the viability of state-supported internships. Internships expose students to in-state career opportunities and encourage employers to look for an in-state solution to their human resource needs. Successful internship programs are ones that require colleges and employers to collaborate and build stronger relationships – "a sector specific program promotes careers in those industries most important to the state's economy" (Indiana's Human Capital Retention Project, 2000, p. 12).

#### Philadelphia's Knowledge Industry Partnership Report

In January 2004, the Knowledge Industry Partnership (KIP), "a broad-based coalition of civic, business, government and higher education leaders working together to maximize the impact of the region's 'knowledge industry' of colleges and universities on

Philadelphia's competitive position" (KIP report, p. 21), conducted a web-based survey of 2,550 graduates who attended college in the Greater Philadelphia region and graduated in the spring or summer of 2003. Twenty-nine different colleges from the region participated by contacting their graduates (KIP report, p. 4). The study found that 64 percent of all Philadelphia graduates remain in the region after college. However, while 86 percent of graduates who attended high school in the region stay in Philadelphia, only 29 percent of those graduates who attended high school out of the region remain in the area. Boston, on the other hand, retains 42 percent of their out-of-state graduates. If Philadelphia were to have a similar retention rate to Boston's it would add 2,400 knowledge workers to its local economy each year (KIP report, pp. 4, 8). The report also pointed out the importance of internships – those out-of-state students who intern locally during their college career were twice as likely to stay in Philadelphia after graduation (KIP report, 2004, p. 10). The survey also stated that 25 percent of all Philadelphia graduates are "explorers," those non-natives leaving Philadelphia to go somewhere new or are Philadelphians leaving the area for the first time. These graduates, according to the report, represent Philadelphia's best shot at reversing brain drain (KIP report, 2004, p. 6). Some recommendations that came out of the study were:

Attract:

- Continue One Big Campus positioning and promotion efforts (this is a marketing effort aimed at making students from all Philadelphia-area schools connected)
- Target prospects interested in high retention fields of study – aligning regional strengths with those students whose major makes them more likely to stay will replenish Philadelphia's key industries
- Showcase Philadelphia's Internship Opportunities

- Welcome back the Graduates (i.e. home-bound and explorer graduates) (KIP report, 2004, p. 18)

Engage:

- Immerse students in the region through cultural and social opportunities
- Remove barriers that impede students from venturing off-campus
- Make community involvement a top priority (KIP report, 2004, p. 19)

Retain:

- Offer internship opportunities to all Philadelphia college students
- Redefine the Philadelphia internship
- Match internships with key areas of study
- Launch summer internship program (KIP report, 2004, p. 20).

### Career and Location Decisions Project

The remainder of this chapter is devoted to a project aimed at identifying factors of stay or leave decisions of Pittsburgh-area undergraduates in the classes of 1994 and 1999. Much of the study conducted in later chapters of this report based in the Lehigh Valley region of Pennsylvania built on the methodology and processes of the Pittsburgh study.

The purpose of the Pittsburgh project was to discover why so many area graduates were leaving Pittsburgh, how might more be persuaded to remain, and how Pittsburgh might attract more young knowledge workers to the area (Hansen & Huggins, 2001, p. i). A group of 2,131 recent (1994 and 1999) graduates of the University of Pittsburgh, Carnegie Mellon University (CMU) and Duquesne were interviewed through either telephone or internet. The survey instrument was developed on the basis of focus groups and pre-testing. Invitations to participate in the study were sent out to a sample of 10,667

individuals (Hansen & Huggins, p. 3). Based on the returned invitations, the research firm Taylor-Nelson Sofres Intersearch conducted the surveys during the first four months of 2001 (Hansen & Huggins, p. iii). While the phone response rate only yielded 19.8 percent response, the internet response rate posted an impressive 58.5 percent response rate. The 2,131 respondents equated to a 20 percent response rate based on the original sample, and 22 percent based on those for whom the researchers were able to locate contact information (Hansen & Huggins, 2001, p. 3).

The researchers of the Pittsburgh study asked their respondents why they came to Pittsburgh for their education, what types of jobs and lifestyles they wanted, and how they made their decisions about where to live and work. A primary purpose of the study was to compare recent college graduates who left the region with those who stayed to discover factors that might persuade more to remain in Pittsburgh. Multivariate analysis was utilized to illustrate how much various components contribute to the choice to stay or leave Pittsburgh (Hansen & Huggins, p. i). Some of the findings are summarized below.

*What are the key positive factors that promote retention versus the risk factors that encourage leaving?* Low salary was one reason why many Pittsburgh-area graduates leave the region. However, for area graduates working in the high-tech sector, a desire for more challenging jobs and recreational opportunities, rather than salaries, attracted them to positions outside the region (Hansen & Huggins, pp. i-ii).

*What attracts students to Pittsburgh?* Pittsburgh universities attracted large numbers of students from outside the area largely because of the quality of the academic programs. But graduates also claimed that cultural events, the urban scene, and

availability of economic opportunities were factors that led them to Pittsburgh-area institutions (Hansen & Huggins, 2001, p. ii).

*What makes Pittsburgh attractive to those who stay here?* Proximity to family was the most frequent response, primarily for those growing up in the Pittsburgh region. Affordable housing, convenient and low-cost transportation, access to the region's universities and colleges for continuing education, and economic opportunities in the region were all cited as other factors for retention (Hansen & Huggins, 2001, p. ii).

*Do amenities matter?* On the margin, yes, but most recent graduates based their career and location choices on job opportunities or family considerations (Hansen & Huggins, 2001, p. ii).

*What can Pittsburgh do to encourage more graduates to stay in the region and to persuade those who have left to return?* Stressing affordable housing and living costs was deemed important. Salaries and benefits should also be competitive with national norms and there should be an improvement in career counseling, particularly at the University of Pittsburgh and Duquesne (Hansen & Huggins, 2001, p. ii).

The researchers asked several questions which garnered useful and interesting data. Questions or information gathered through questions included:

- "What was the major reason you decided to come to Pittsburgh for your degree from [university]?"
- Please rate several specific reasons for choosing a particular university for higher education, using a four-point index ranging from "not at all important" to "very important"
- "What advantages do you see in the Pittsburgh region?"
- What are Pittsburgh-area graduates doing now?
- What are the types of employers of recent graduates?
- What are the current occupations of recent Pittsburgh-area graduates?
- What job search methods were used by recent graduates?

- Importance of values related to job choice. (pp. 8-17)

The above information assisted in answering the question, “who are the stayers and leavers?” (Hansen & Huggins, 2001, p. 26). Hansen and Huggins described the answer:

We contrast 821 Stayers currently working in Pittsburgh with 969 Leavers now working elsewhere. Stayers tend to be female, married, with children, Duquesne graduates, white, American citizens, and holders of MS or MBA degrees. Leavers tend to be male, CMU graduates, single, minority, foreign nationals, and holders of BS degrees. Those who graduated in 1999 were more likely to remain in this area than 1994 graduates. Although Stayers tend to earn less, they were considerably more likely than Leavers to own homes. Job location was far more important to stayers, and the predominant reason was having family in the area or an employed spouse/partner here. Stayers were also more concerned than Leavers were with the cost of living, commuting, and quality of public schools. Leavers who had previously held jobs here sought better job opportunities elsewhere, for themselves or for a spouse/partner, and wanted a different quality of life. (p. 26)

There was a tremendous variance among stayers and leavers dependent on the institution attended. Carnegie Mellon had 20 percent stayers and 80 percent leavers; Duquesne was 68.1 percent stayers and 31.9 percent leavers; and University of Pittsburgh was 45.7 percent stayers and 54.3 percent leavers. The year of graduation also played a role – 1994 graduates were comprised of 39.9 percent stayers and 60.1 percent leavers versus 1999 graduates who were 51.7 percent stayers and 48.3 percent leavers. The researchers surmised that the more advantageous economic conditions of 1999 may have played some role in the higher retention rate (Hansen & Huggins, 2001, p. 27).

In terms of explaining the choice of whether to stay or leave, Hansen and Huggins utilized a multivariate analysis. Results found that graduation from a high school in the Pittsburgh area was the strongest single factor predicting staying in Pittsburgh. This mirrored the findings of other studies described earlier in this chapter. Possessing a

graduate degree, access to continuing education, proximity to family and low housing costs also enhanced the chances of individuals remaining in the area. Concern with starting salaries led people to leave, and was a primary factor in that choice. Local high school graduates with a strong interest in amenities were more likely to leave Pittsburgh, but amenities did not influence non-natives to remain in Pittsburgh after graduation. The university one attended also significantly impacted the decision to stay (Duquesne) or leave (CMU) (p. 52).

Since attending a Pittsburgh-area high school proved to be such a strong predictor of staying in the region, the researchers surmised that people growing up in Pittsburgh might weigh factors differently in their stay-or-leave decisions than those who came to Pittsburgh from outside the region. To test this hypothesis, Hansen and Huggins repeated the multivariate analysis separately for these two groups, and some major differences did emerge (p. 56-58). Among the findings were that non-Pittsburghers concerned with housing and living expenses were considerably more likely to stay in the region, another indicator of the importance of housing for attracting people to the region. Secondly, salary appeared to be twice as important for non-natives as for Pittsburghers, while a chance to do good was more important to people who attended high school in the area. Third, men who grew up in Pittsburgh were more likely to leave and women to stay, while the opposite was true for non-Pittsburghers (Hansen & Huggins, 2001, p. 59).

Based on their research findings, Hansen and Huggins provided several policy recommendations including:

1. Bring more people to Pittsburgh for their education. Many people who come from outside the region for their schooling stay on to work, and

gain a positive view of the economy and culture of Pittsburgh. Reducing tuition, or curtailing the rate of increase, could assist Pennsylvania in attracting and retaining students.

2. Utilize affordable housing and living costs as a major strategy to recruit and retain young professionals.
3. Promote the availability of continuing education, a primary reason people choose to stay in Pittsburgh.
4. Make sure salaries and benefits in Pittsburgh are competitive with national norms.
5. Enhance the quality and visibility of amenities appealing to young professionals, especially those originally from this region.
6. Improve career counseling and internship availability – graduates who had held internships were considerably more likely to take jobs in Pittsburgh.
7. Pay more attention to minority concerns and cultural diversity issues. (Hansen & Huggins, pp. 63-65)

The aim of sharing results and policy recommendations of the Career and Location Decisions Project was two-fold: first, to show how many of the findings in this report mirrored many of the results found in other studies described in this chapter and, second, to share brief glimpses of the methodology further detailed in Chapter 3.

It should be apparent at this point how vital it is for policymakers to have an understanding of what factors influence the 25-34 year-old college-educated cohort to stay or leave a region. They are, quite simply, vital to an area's regional economic prosperity. The study of the Lehigh Valley, the focus in the subsequent chapters, adapted the methodology of the Pittsburgh study and adds to the body of knowledge and research on this very important topic. The Lehigh Valley region, as described above, scored low on youth-specific migration and also scored high on the aging 55-64 year-old cohort. As



described above, its knowledge economy is degrading. Yet, with its abundance of universities and colleges, it has an opportunity to turn the tide. The remainder of this study is devoted to providing research that will assist in informing Lehigh Valley policymakers on how to proceed in making their area a more attractive one for its area graduates.

## Chapter 3

### METHODOLOGY

The overall purpose of this study was to examine the post-graduation employment experiences of Lehigh University 2000 and 2004 academic year bachelor's degree graduates. Specifically the focus was to determine factors that were related to their securing employment within or outside of the Lehigh Valley and whether those relationships were similar for graduates in scientific or nonscientific majors. This chapter provides details about the population, data gathering techniques, instrument development and procedures that were used to analyze the data and to obtain results. The action plan utilized to collect the data is found in Table 1.

Table 1. Methodology Action Plan.

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Action steps used in data collection:

- Problem Defined
  - Purpose of Study and Research Questions Outlined
  - Population and Sample Identified
  - Survey Instrument Identified, Adapted, Approved for Content Validity and Factor Analyzed
  - IRB Approval received from Penn State University and Lehigh University
  - Pilot Study Conducted
  - Full Study Conducted
  - Descriptive Statistics and Binary Block Logistic Regression Utilized to Analyze Results
-

### The Problem

The Lehigh Valley is home to more than 600,000 residents, 310,000 employees, 14,000 companies, 11 colleges and universities enrolling nearly 45,000 students, as well as growing clusters of technology and service businesses (*Municipal Profiles: Lehigh and Northampton Counties*. (June 2004)). The biotechnology and pharmaceuticals cluster, according to information from the Lehigh Valley Economic Development Corporation, is especially strong. Based on data from the Pennsylvania Department of Labor and Industry, the Lehigh Valley is one of nine regions that account for 75 percent of biotech companies in the U.S. as well as 75 percent of the biotech companies launched within the last ten years (see [www.lehighvalley.org](http://www.lehighvalley.org)).

Realizing that the Lehigh Valley was focusing part of its economic development strategy on science and technology, and realizing that economist David Birch regarded universities as being the “feedstock of gazelles,” his term for the fast-growing companies that drive product innovation, create new job opportunities for workers and fuel regional economic growth (Pennsylvania Economic League Report, Part 1, 2000, p. 13), it made sense to conduct a study of recent graduates from Lehigh University.

More applicable and pertinent was where the Lehigh Valley ranked on both “youth-specific” net migration and near-retirement worker proportion. Gottlieb (2004) examined the location and migration patterns of younger and older workers, especially those with college degrees, for the 100 most populous metropolitan areas in Census 2000. He found that the Allentown-Bethlehem-Easton, PA Metropolitan Statistical Area ranked 86<sup>th</sup> of the 100 largest metro areas on “youth-specific” net migration between 1990 and

2000. When the residual of 25-to-34 year-old net migration index was regressed on the 35-64 year-old net migration index, the index difference was  $-4.4\%$  (p. 9). This poor showing, coupled with its rank of 14<sup>th</sup> of 100 on the proportion of labor force aged 55-64 (p. 10), was alarming. As Gottlieb stated, trends in regions such as the Lehigh Valley region reflect “not only a ‘brain drain’ of younger workers...but also the relative tendency of older workers to age in place there” (p. 11).

Even with these alarming statistics, the Lehigh Valley has an interesting opportunity to expand its knowledge worker base, especially among its recent graduates, as it is home to many colleges and universities. This study set out to determine factors influencing the graduating classes of 2000 and 2004 from Lehigh University to stay or leave the region.

### Research Questions

The following research questions guided the research study.

#### Research Question One

What are the post bachelor’s degree initial and current employment experiences regarding:

1. The initial employment: (a) type of employment, (b) length of this initial employment, (c) initial occupation, and (d) full-time and part-time positions since graduation?
2. The current employment: (a) type of employment; (b) employment status, (c) current occupation, (d) current work status, and (e) current salary?

## Research Question Two

What relationships do selected demographic, educational and employment factors have on whether the graduates are employed within or outside of the Lehigh Valley (dependent variable) when controlling for whether they are bachelor's degree graduates majoring in a scientific or nonscientific area?

Analysis of data relative to the two overarching research questions provided the basis for accomplishing the overall study purpose.

## Measurement

### Population

The population for this study consisted of graduates from the 2000 and 2004 classes at Lehigh University. While the study included a sample representing all undergraduate majors, an emphasis of the study was to examine factors influencing science and engineering graduates to stay or leave the region. For that reason engineering and science graduates were oversampled. Table 2 shows the breakdown of graduates for the specified years and Table 3 shows a breakdown of the class years by total graduates in engineering, science and total graduates in non-engineering and non-science majors.

Table 2. Lehigh University Graduates by Academic Year.

Class Year	n
2000	1029
2004	1122

(Source: Lehigh University Office of Institutional Research)

Table 3. Lehigh University Graduates by Discipline.

Majors	Class of 2000 n	Class of 2004 n
Engineering	302	332
Science	127	120
Non-engineering and non-science	600	670

(Source: Lehigh University Office of Institutional Research)

### Sampling

Graduates to be studied were selected through a stratified proportional random sampling technique. According to William Trochim of Cornell University, stratified proportional random sampling “involves dividing your population into homogeneous subgroups and then taking a simple random sample in each subgroup” (2004, n.p.).

Furthermore Trochim (2004) stated:

There are several major reasons why you might prefer stratified sampling over simple random sampling. First, it assures that you will be able to represent not only the overall population, but also key subgroups of the population, especially small minority groups. If you want to be able to talk about subgroups, this may be the only way to effectively assure you'll be able to. If the subgroup is extremely small, you can use different sampling fractions ( $f$ ) within the different strata to randomly over-sample the small group (although you'll then have to weight the within-group estimates using the sampling fraction whenever you want overall population estimates). When we use the same sampling fraction within strata we are conducting *proportionate* stratified random sampling. When we use different sampling fractions in the strata, we call this *disproportionate* stratified random sampling. Second, stratified random sampling will generally have more statistical precision than simple random sampling. This will only be true if the strata or groups are homogeneous. If they are, we expect that the variability within-groups is lower than the variability for the population as a whole. Stratified sampling capitalizes on that fact. (n.p.)

Based on the subgroup and total group populations illustrated in Table 2, as well as tables compiled by Krejcie and Morgan (1970) as well as Isaac and Michael (1997), it was determined how large a sample for each class year would need to be based on a five percent margin of error. The distribution of engineering, science and non-science and non-engineering graduates is summarized in Table 4. Because many of the records obtained from Lehigh University did not include email addresses, the number of participants sampled had to be adjusted to include those graduates with records which included email addresses. The breakdown of the 1,034 individuals surveyed for this study is illustrated in Table 5.

Table 4. Distribution of Intended Samples for Lehigh Class Years 2000 and 2004.

Majors	Class of 2000		Class of 2004	
	Sample	Population	Sample	Population
Engineering	200	302	210	332
Science	110	127	110	120
Non-engineering and non-science	275	600	275	670

Table 5. Modified Sample Distribution Based on Participants with Email Addresses (n=1034).

Majors	Class of 2000		Class of 2004	
	Modified Sample	Intended Sample	Modified Sample	Intended Sample
Engineering	148	200	176	210
Science	72	110	88	110
Non-engineering and non-science	275	275	275	275
Total	495	585	539	595

## Variables

### Dependent Variable

The dependent variable was the location decision and was measured at two levels: the decision to stay or the decision to leave the Lehigh Valley region. This study was based on the assumption from previous research studies that graduates might be more likely to stay in a geographic area due to family living in the area or because they attended high school in the region, and that graduates might be more likely to leave due to higher salaries in other regions or more amenities in other metropolitan areas (KIP report, 2004; Hansen & Huggins, 2001).

### Independent Variables

This study utilized an adapted survey instrument of the one employed by Hansen and Huggins in their 2001 Career and Locations Decision Project of Pittsburgh-area graduates. The independent variables for this study were:

- Gender
- Race/Ethnicity
- Current Age
- Current Marital Status
- Number of Children
- Original Hometown
- Location of High School Attended
- College Graduation Year
- College Major
- College Internship Completed
- Other Majors, Certificates or Minors
- Highest Degree Level Attained



### Instrumentation

Quantitative research methodology was utilized for this study. An electronically administered questionnaire was the specific method chosen to investigate the research questions. This questionnaire was an amended version of a telephone survey instrument employed by Hansen and Huggins (2001, p. 3) in their Pittsburgh study. Attempts to secure the web-based survey were unsuccessful as neither researcher had a copy to share.

### Reliability and Validity

Since Hansen's and Huggins' survey instrument utilized focus group research to inform the questionnaire design phase, this researcher in consultation with his committee determined focus groups would not need to be conducted. Also, since Hansen and Huggins did not conduct any statistical reliability and validity analysis of their instrument, and since efforts to obtain the web-based survey from the Pittsburgh researchers was unsuccessful, this researcher had the survey instrument assessed for content validity by his committee and conducted a factor analysis during the data collection phase to test reliability and validity for employability items in the survey instrument (see Question 25 in Appendix A).

### Factor Analysis Results for Employability Items

Principal components factor analysis techniques were used in an attempt to identify whether the 21 employability items/variables grouped or clustered together into factors. A factor represents a group of items/variables which measure an underlying

(latent) dimension. For this study the goal of the factor analysis was to reduce, if possible, the 21 items/variables to a smaller number of factors which would be used in subsequent data analysis procedures. O'Rourke, Hatcher and Stepanski (2005, p. 440) suggested that at a minimum the number of cases for conducting a factor analysis should be ten times the number of items being factor analyzed. In this study there were 21 employability items which would require a minimum of 210 cases. The calculated KMO value of sampling adequacy was .76 which indicates a minimally acceptable number of cases for factor analysis. In addition, the Bartlett's Test of Sphericity (Chi square = 1421.01;  $df = 210$ ;  $p = <.001$ ) indicated the data were suitable for conducting a factor analysis.

Field (2005) and Tabachnick and Fidell (2007) indicated the choice of which specific rotation approach to use and the criterion for the size of the factor loading is a highly individual choice. For this study the researcher assumed the factors would be independent of each other (low correlations between factors), used a Varimax rotation (Field, 2005) and established a factor loading of +/- .4 or higher in order for the item to be considered as part of a factor (Stevens, 1992). Stevens suggested that for sample sizes of approximately 200 a factor loading of +/- .364 or higher. A factor loading is the correlation between the observed item/variable value and the factor. O'Rourke, Hatcher and Stepanski (2005, p. 456) indicated a factor loading of +/- .4 or higher is considered a large loading.

Final rotated factor loadings appear in Table 6 and reveal that six employment factors (latent underlying dimensions) were identified. All 21 items have a factor loading

on each dimension; however, the strategy is to identify the one factor an item loads on at a value of +/- .4 or higher. Table 7 summarizes the factor loadings using the criterion of +/- .4 or higher. Examination of Table 7 reveals that the six factors have different numbers of items that load on each factor at +/- .4 or higher criterion.

The final step was to determine how many factors to retain and to name the retained factors. O'Rourke, Hatcher and Stepanski (2005, pp. 449-454) indicate in detail the criteria one may consider in deciding the number of factors to retain. The researcher used the following guidelines in determining the number of factors to retain.

1. The factor retained had to have an eigenvalue of 1.00 or higher and each retained factor should account for about 10% or more variance.
2. Each factor must have acceptable internal consistency.
3. The items loading on a factor must make conceptual sense.
4. There should be a minimum of three items per factor.

Table 8 provides summary information regarding application of the aforementioned criteria to determine the number of factors to retain for further analysis. In Table 8 the six factors are labeled/named based on the content of the items that loaded onto each factor. The application of the first guideline reveals each of the six factors met the eigenvalue greater than one criterion. The application of the second criterion reveals that Factor 1(Regional) and Factor 3 (Family/Friends) meet the commonly accepted internal consistency (reliability) criterion of .7 or higher (Salkind, 2006, p. 58). Pallant (2005, p. 90) indicated that the number of items greatly influences the internal consistency coefficient, and when there are ten items or less per factor internal

Table 6. Final Rotated Factor Loadings for Employment Items across Six Extracted Factors.

Employment Item	Employment Factor					
	1	2	3	4	5	6
Starting Salary I am offered	-.055	-.101	.127	.264	.036	.714
Opportunities for advancement	.024	-.054	-.098	-.262	.005	.733
Interesting or challenging job	.330	.101	-.199	-.459	.303	.331
Benefits offered by the employer	.076	.325	.067	.263	-.082	.563
Flexible job	-.054	.576	.002	.277	.207	.056
Job offering a chance to do good, help others	.155	.786	.126	.113	-.009	-.184
Opportunities for continuing education at area universities or colleges	.057	.757	.114	-.113	.034	.105
Near my spouse/partner	-.165	.207	.277	.180	.641	-.027
Close to family	-.001	.187	.835	.072	.195	-.028
Close to friends	.244	.047	.818	-.013	.068	.070
Region with lots of young people	.801	.045	.232	-.093	-.114	.072
Region with many cultural attractions	.832	.063	-.009	.015	-.028	-.030
Region with nationally ranked sports teams	.452	.001	.341	.058	.285	.031
Region with outdoor recreation	.527	.211	-.011	.066	.426	.108
Region with lots of nightlife	.769	-.098	.219	-.036	-.200	.106
Region with ethnic and cultural diversity	.766	.190	-.024	.150	.035	-.142
Physical setting	.421	.358	-.149	.291	.336	.131
Cost of living/housing costs	.146	.132	-.102	.685	.230	.113
Easy commuting - roads	.164	.116	.135	.681	.186	.062
Easy commuting - public transportation	.627	-.048	-.051	.340	.114	.012
Availability of child care	.007	-.024	.122	.154	.789	-.034

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization; rotation converged in 8 iterations.

Table 7. Rotated Factor Loadings for Employment Items Using .4 Cutoff Criterion.

Employment Item	Employment Factor					
	1	2	3	4	5	6
Starting Salary I am offered						.714
Opportunities for advancement						.733
Interesting or challenging job				-.459		
Benefits offered by the employer						.563
Flexible job		.576				
Job offering a chance to do good, help others		.786				
Opportunities for continuing education at area universities or colleges		.757				
Near my spouse/partner					.641	
Close to family			.835			
Close to friends			.818			
Region with lots of young people	.801					
Region with many cultural attractions	.832					
Region with nationally ranked sports teams	.452					
Region with outdoor recreation	.527				.426	
Region with lots of nightlife	.769					
Region with ethnic and cultural diversity	.766					
Physical setting	.421					
Cost of living/housing costs				.685		
Easy commuting - roads				.681		
Easy commuting - public transportation	.627					
Availability of child care					.789	

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization; rotation converged in 8 iterations.

Factor loadings of +/- .4 cutoff or higher displayed.

Table 8. Reliability Results and Summary Factor Analysis Information for Employment Factors.

Factor	# of Items (inter-item r)	Cases	Cronbach Alpha Value	Factor Item Mean (Variance)	Eigenvalue	Percent Variance
Factor 1- Regional	8 (.39)	228	.838	2.41 (.102)	3.85	18.32
Factor 2- Job Intrinsic	3 (.35)	235	.615	2.67 (.012)	1.99	9.48
Factor 3- Family/Friends	2 (.62)	234	.761	2.59 (.005)	1.83	8.71
Factor 4- Cost of Living	3 (.17)	232	.445	3.11 (.387)	1.76	8.36
Factor 5- Spouse/Partner	2 (.41)	235	.534	1.96 (.603)	1.76	8.34
Factor 6- Job Extrinsic	3 (.24)	235	.490	3.54 (.035)	1.61	7.68

Note: Each summated factor mean represents responses to a Likert type response scale as follows: 1= not at all important; 2 = not too important; 3 =somewhat important; and 4= very important.

reliability coefficient values of .5 are common. In such cases it may be more appropriate to report the inter-item mean correlation ( $r$ ) values, and the optimal range would be .2 to .4. Factor 2 (Job Intrinsic) has marginal internal consistency (Cronbach alpha = .615) but does meet the inter-item correlation optimum range identified by Pallant (2005). Factor 4, Factor 5 and Factor 6 clearly yield factor scores that are not internally consistent.

The application of the third criterion is highly subjective on the part of the researcher. In this case the items that load on each of the factors appear to make general conceptual sense.

The final guideline relates to the number of items on each factor. In reality Factor 3 (Family/Friends) only has two items, and although the Cronbach alpha value is acceptable the inter-item correlation value of  $r=.62$  is too high. Therefore these two items should not be combined into a factor score and should be treated as separate variables.

Thus the factor analysis results reveal only Factor 1 (Regional) and Factor 2 (Job Intrinsic) emerged as dimensions (latent factors) meeting the acceptable guidelines. It must be emphasized that neither of these two factors explains a very large amount of variance (Factor 1 = 18.32% and Factor 2 = 9.48%).

### Survey Methods and Response

The first step in administering the survey was to receive Institutional Review Board approval from both Penn State University and Lehigh University. IRB approval was initially received for the pilot survey and then subsequently for the full study (see Appendix B).

A pilot survey was initially conducted with a random sample of 40 graduates from the class of 2002 to test the questionnaire format, the utility of the Web-based-only survey method, and the response the study was likely to receive with the invitation postcard. Sixteen responses, or a 40 percent response rate, were received from the pilot study.

For the full study to the 1,034 graduates of the classes of 2000 and 2004, efforts to boost response rate using an internet-based survey tool were utilized based on research by Dillman (2000). One thousand and thirty-four postcards introducing the study (see Appendix B) were mailed to participants on March 9, 2007; 43 postcards were returned with wrong addresses. The postcard briefly described the importance of the survey and offered the opportunity to be entered into a drawing for a \$50 Lehigh University bookstore gift certificate. Even with incorrect addresses, 1,034 emails were sent electronically with a link to the web-based survey instrument on March 15, 2007. There were no email bouncebacks. Each participant had to agree to the electronic informed consent form before being allowed to complete the survey. Completed questionnaires were submitted online and collected in a database on a secure server. Each questionnaire was assigned with a unique identification number embedded within the URL and included the return date so that those completing the survey would not receive reminder emails.

In an effort to boost response rates, subsequent email reminders were sent to those participants who had not filled out a survey on March 20, 2007 and March 27, 2007. Finally, a mixed-strategy approach was used to follow-up with non-respondents. On April 5, 2007, 150 non-respondents or 20% of the non-respondents received an email



inviting them to participate in a phone interview with the researcher. Lehigh University refused to provide the researcher with phone numbers; thus this approach was the only way to try and conduct phone interviews. In addition, on April 5, 2007, another email went to another 20% of the non-respondent list or 150 additional participants, asking them to respond to the original survey instrument. The final mixed-strategy approach involved sending 226 letters on April 10, 2007 to another group of non-respondents requesting them to fill out the internet survey. A sample of all correspondence is found in Appendix B.

A total of 315 responses were received or a 30.5% response rate. When adjusting for incorrect addresses, the adjusted response rate was 31.8%. In an effort to understand whether there were key differences based upon time of response to the survey, this researcher analyzed the distribution of final responses by time period (see Table 9) and then examined whether the responses differed significantly on key occupational, educational and demographic variables (see Appendix C, Comparison of Key Respondent Variables by Survey Return Time Period.) The key variables used to determine whether the responses differed significantly on key occupational, educational and demographic variables were

- major field as defined by science fields vs non science fields
- current employment status
- location of first job after graduation
- gender of respondent
- year of graduating class
- current salary
- employment attribute factor scores, and
- number of full-time positions held

Table 9. Distribution of Final Responses by Time Period.

Response Time Period	Frequency	Percent
March 15 - March 20	190	60.3
March 21 - March 27	56	17.8
March 28 - April 4	31	9.8
April 5 – April 29	<u>38</u>	<u>12.1</u>
Total	315	100.0

Statistically significant relationships were found between the response time period and two key variables—namely, current employment status and location of first job after graduation. No significant associations or differences were found for the other seven key variables. See Appendix C, Comparison of Key Respondent Variables by Survey Return Time Period, for detailed tables.

#### Mode of Analysis

A combination of descriptive statistical techniques and binary block logistic regression was utilized to analyze the data. The descriptive analysis in Chapter 4 provides useful statistical information but it is the multivariate analysis which allows this study to determine which factors are the strongest determinants of a recent college graduate staying or leaving the region.

### Descriptive Statistics

In an effort to provide a statistical picture of factors influencing stay or leave decisions of recent college graduates in the Lehigh Valley region, the following tables and figures were utilized throughout the analysis in Chapter 4.

- Demographic Profile of Lehigh University Study Participants
- Educational Background of Lehigh University Participants
- Distribution of Graduates by Reported Major for Bachelor's Degree
- Frequency of Major for Bachelor's Degree Reported by Participants Indicating Other for Major Field of Study
- Frequency of Other Majors, Certifications or Minors of Lehigh University Participants
- Importance of Factors in Selecting Lehigh University for Bachelor's Degree
- Summary Information Regarding the First Employment after Graduation from Lehigh University
- Part-time Positions since Graduation from Lehigh University
- Full-time Positions since Graduation from Lehigh University
- Summary of Binary Block Logistic Regression Results for Initial Job after Graduation
- Current Employment Information for Lehigh University Participants
- Summary of Binary Block Logistic Regression Results for Current Job after Graduation

### Logistic Regression

While the descriptive statistics above played a useful role in profiling respondents in terms of demographics, family status, career field, and values respondents place on their ideal jobs, it did not explain which of these factors are most likely to influence an individual's decision to stay or leave the region. In order to assess this question as well as what role amenities play in these decisions, this study employed multivariate analysis (Hansen & Huggins, 2001, p. 53). Because the dependent variable represented nominal

data and because it possessed two levels, it was appropriate to utilize binary logistic regression to analyze the data. Logistic regression requires that:

- The independent variables be interval, ratio, or dichotomous;
- All relevant predictors be included, no irrelevant predictors be included, and the form of the relationship is linear;
- The expected value of the error term is zero;
- There is no autocorrelation;
- There is no correlation between the error and the independent variables;
- There is an absence of perfect multicollinearity between the independent variables. (SPSS, 2000, p. 5)

After examining the data using descriptive statistics, it was determined that binary block logistic regression could be utilized to determine the impact the participants' initial job after graduation and their current job after graduation had on their decision to stay or leave the region. The results of this logistic regression are discussed in Chapter 4.

### Qualitative Findings

In addition to the descriptive statistics and the logistic regression, the survey instrument allowed this researcher to gather qualitative data. Written responses to short-answer questions were read and grouped to identify meaningful patterns that could be compared with the findings of the quantitative results of the study. This information allowed for a deeper understanding of decisions by survey participants to stay or leave the Lehigh Valley area.

### Summary

This analysis serves as a resource for policymakers, economic development professionals and higher education officials in the Commonwealth of Pennsylvania. It

also may be useful to policymakers or researchers outside the state who want to conduct similar studies on different populations. By retaining and attracting more college-educated graduates, the Lehigh Valley region and the Commonwealth of Pennsylvania will increase their chances for a prosperous tomorrow.

## Chapter 4

### RESEARCH RESULTS

#### Purpose of Study and Research Questions

The overall purpose of the study was to examine the post-graduation employment experiences of Lehigh University 2000 and 2004 academic year bachelor's degree graduates. Specifically the focus was to determine factors related to graduates' securing employment within or outside of the Lehigh Valley and whether those relationships were similar for graduates in scientific or nonscientific majors. To accomplish that overall purpose the following research questions guided the research study.

#### Research Question One

What are the post bachelor's degree initial and current employment experiences regarding:

1. The initial employment: (a) type of employment, (b) length of this initial employment, (c) initial occupation, and (d) full-time and part-time positions since graduation?
2. The current employment: (a) type of employment; (b) employment status, (c) current occupation, (d) current work status, and (e) current salary?

#### Research Question Two

What relationships do selected demographic, educational and employment factors have on whether the graduates are employed within or outside of the Lehigh Valley

(dependent variable) when controlling for whether they are bachelor's degree graduates majoring in a scientific or nonscientific area?

Analysis of data relative to the two overarching research questions provided the basis for accomplishing the overall study purpose.

### Profile of Participants

As outlined in Table 10, the survey respondents were slightly more likely to be male (54.2%) than female (45.8%) and were predominantly white or Caucasian (90.7%). The great majority of respondents (84.9%) were aged 25 to 29. Nearly half were single and never married (48.3%). Few (7.2%) had children.

Less than one-tenth of the survey respondents considered their hometown to be in the Lehigh Valley (9.3%) and an additional 22.0% grew up in Pennsylvania. The majority of the survey respondents (68.6%) were from outside Pennsylvania.

As shown in Table 11, approximately half of the survey respondents received degrees in the areas of science or engineering (52.7%) while approximately half received degrees in non-science areas. Nearly one-fifth (19.0%) participated in an internship while an undergraduate student and more than half (51.0%) completed a minor, certificate program or multiple major.

After graduation from Lehigh, more than one third of the survey respondents received subsequent degrees. Nearly all of those subsequent degrees received were master's degrees. Table 12 illustrates that the survey respondents reflect a variety of

Table 10. Demographic Profile of Lehigh University Study Participants.

		Count	Valid Percent
Gender	Male	128	54.2%
	Female	<u>108</u>	<u>45.8%</u>
		236	100.0%
Ethnicity	White or Caucasian	215	90.7%
	African American or Black	5	2.1%
	Asian or Pacific Islander	12	5.1%
	Other	<u>5</u>	<u>2.1%</u>
		237	100.0%
Current age	24 years	3	1.3%
	25 years	94	40.5%
	26 years	37	15.9%
	27 years	2	.9%
	28 years	3	1.3%
	29 years	61	26.3%
	30 years	28	12.1%
	31 years	3	1.3%
	32 years	<u>1</u>	<u>.4%</u>
		232	100.0%
Current marital status	Single, never married	114	48.3%
	Married	62	26.3%
	In committed relationships	53	22.5%
	Divorced	2	.8%
	Other	<u>5</u>	<u>2.1%</u>
		236	100.0%
Number of children less than 6 years old	0	2	11.8%
	1	8	47.1%
	2	4	23.5%
	3	<u>3</u>	<u>17.6%</u>
		17	100.0%
Number of children 6 through 12 years old	0	16	94.1%
	1	<u>1</u>	<u>5.9%</u>
		17	100.0%



Table 10. Continued

		Count	Valid Percent
Number of children 13 through 17 years old	0	15	88.2%
	1	1	5.9%
		<u>1</u>	<u>5.9%</u>
		17	100.0%
Total number of children under 18 years old	1	9	52.9%
	2	4	23.5%
	3	<u>4</u>	<u>23.5%</u>
		17	100.0%
Original hometown	In Lehigh Valley	22	9.3%
	Elsewhere in PA	52	22.0%
	Elsewhere in US or abroad	<u>162</u>	<u>68.6%</u>
		236	100.0%
HS is in Lehigh Region	No	214	93.4%
	Yes	<u>15</u>	<u>6.6%</u>
		229	100.0%

Table 11. Educational Background of Lehigh University Participants.

		Count	Valid Percent
Graduation year	2000	123	39.0%
	2004	<u>192</u>	<u>61.0%</u>
		315	100.0%
Area of primary major	Nonscience major	166	52.7%
	Science major	<u>149</u>	<u>47.3%</u>
		315	100.0%
Internship	No	255	81.0%
	Yes	<u>60</u>	<u>19.0%</u>
		315	100.0%
Completed other majors, certificates, or minors	Yes	145	49.0%
	No	<u>151</u>	<u>51.0%</u>
		296	100.0%
Highest education level currently achieved	Bachelor's Degree	149	63.7%
	Master's Degree	73	31.2%
	Juris Doctor	6	2.6%
	Medical Doctor	1	.4%
	Ph.D.	<u>5</u>	<u>2.1%</u>
		234	100.0%
Additional education completed post bachelor's degree from Lehigh University	Associate Degree	2	.9%
	Bachelor's Degree	4	1.7%
	Master's Degree	73	31.2%
	Juris Doctor	6	2.6%
	Medical Doctor	1	.4%
	Doctoral	5	2.1%
	No additional degree	<u>143</u>	<u>61.1%</u>
		234	100.0%

Table 11. Continued

		Count	Valid Percent
Primary reason for additional degree	Get promotion; better job fellowship	16	18.2%
	Career change	10	11.4%
	Encouraged/required for my job	6	6.8%
	Encouraged/required for advancement/certification	14	15.9%
	Personal growth/interest	22	25.0%
	Availability of funding, or post doc	14	15.9%
	Other	<u>6</u>	<u>6.8%</u>
		88	100.0%

Table 12. Distribution of Graduates by Reported Major for Bachelor's Degree.

Major	Count	Valid Percent
Humanities	21	7.1%
Social sciences	29	9.9%
Economics	9	3.1%
Psychology	11	3.7%
Natural & Environmental Science	28	9.5%
Business Administration	33	11.2%
Computer Science	19	6.5%
Engineering	99	33.7%
Other	<u>45</u>	<u>15.3%</u>
	294	100.0%

undergraduate degree program majors. One-third of the respondents majored in engineering. Tables 13 and 14 illustrate other majors and minors or certificates received.

As reflected in Table 15, the most important factor in selecting Lehigh University was the overall reputation of the institution. Nearly all the respondents (99.3%) indicated the overall reputation was somewhat important or very important to them. In general, the advantages of the Lehigh Valley region were not seen as an important factor in selecting Lehigh University with 80.4% reporting that these factors were not too important or not important at all in their selection decision. More than one-fourth of the respondents cited having family in the area was somewhat or very important to them in their selection of Lehigh University.

#### Influence of Selected Factors on Graduates' Employment in Lehigh Valley Region

The primary foci of the study research questions were to examine the influence of selected demographic, educational and employment factors on the graduates' employment in or outside of the Lehigh Valley area/region after graduation. To answer the research questions, a hierarchical binary logistic regression analysis was used (Hair, Anderson, Tatham & Black, 1998; Meyers, Gamst & Guarino, 2006; Tabachnick & Fidell, 2007). Analysis of the data for the three research questions was most efficiently accomplished using two hierarchical analyses. The first analysis is for the first job after graduation from Lehigh University and the second analysis is for the current job, if different from the first job after graduation from Lehigh University.

Table 13. Frequency of Major for Bachelor's Degree Reported by Participants Indicating Other for Major Field of Study.

Major	Frequency	Valid Percent
Accounting	9	19.1%
Advertising	1	.2%
Architecture	4	8.5%
Behavioral Neuroscience	4	8.5%
Business & Economics	1	.2%
Business Information Systems	1	.2%
Finance	7	14.9%
Finance (IBE)	1	.2%
Information Systems	1	.2%
Integrated Business and Engineering	2	.4%
International Business	1	.2%
International Careers	1	.2%
International Relations	1	.2%
Journalism	2	.4%
Journalism, Public Relations	1	.2%
Marketing	8	17.0%
Marketing and Information Systems	1	.2%
Mathematics	1	.2%
	47	100.0%

Table 14. Frequency of Other Majors, Certifications or Minors of Lehigh University Participants. (n=315)

Area	Frequency
Humanities	47
Social Science	42
Psychology	16
Natural & Environmental Science	10
Business Administration	6
Computer Science/engineering	2
Engineering	2
Education	6
Women's Studies	1
Other	29
None indicated	151

Table 15. Importance of Factors in Selecting Lehigh University for Bachelor's Degree.  
(n = 315)

	Not at All Important		Not too Important		Somewhat Important		Very Important	
	Count	%	Count	%	Count	%	Count	%
Overall reputation of the school			2	.7%	53	18.8%	227	80.5%
Programs or courses in my chosen field	8	2.9%	18	6.5%	88	31.5%	165	59.1%
Cost, financial considerations	37	13.2%	80	28.6%	92	32.9%	71	25.4%
Advantages of the Lehigh Valley Region	108	38.4%	118	42.0%	46	16.4%	9	3.2%
Personal contact with faculty	32	11.3%	65	23.0%	120	42.6%	65	23.0%
Personal contact with students	20	7.1%	55	19.6%	115	41.1%	90	32.1%
Spouse or partner in the area	254	90.1%	16	5.7%	9	3.2%	3	1.1%
Family in the area	153	54.3%	53	18.8%	54	19.1%	22	7.8%

### Initial Employment Profile after Graduation

Table 16 summarizes information regarding the initial employment after graduation from Lehigh University. This information includes initial employment regardless if individuals held a single job or multiple jobs since graduation. Predominantly the initial employment was in the private sector (73.6%) with approximately 8 percent working in an educational setting and approximately 5 percent working in a governmental setting. It is important to note that approximately 8 percent reported working in some type of other setting. The most frequently reported other settings were a public company (7 persons) and continued to graduate school (3 persons).

Examples of other types of initial employment (frequency of 1 person each) included radio station, editor, political party, public traded company, government contractor, a resort company, and fashion house. Regarding the initial employment occupation, 32 percent worked in engineering and computer science fields, followed by approximately 12 percent who reported work in sales, marketing or advertising and another 5.5 percent who worked in technical/scientific research. Approximately 26 percent reported other types of initial employment occupations. The most frequently reported other occupations included accounting/auditing (17 persons), broker/financial services (13 persons), legal services (3 persons), human resources (2 persons) and entertainment (2 persons). Figures 1 and 2 summarize the reported number of part-time and full-time positions (37 or more hours per week) since graduation from Lehigh University.

Table 16. Summary Information Regarding the First Employment after Graduation from Lehigh University.

Variable	Response Category	Count	Valid Percent
First type employment	Self-employed	1	<.1%
	Working for private company	159	73.6%
	Working for government	11	5.1%
	In the military	2	<.1%
	Working for education institution	17	7.9%
	Working for nonprofit employer	7	3.2%
	Working for hospital medical facility	2	<.1%
	Other	<u>17</u>	<u>7.9%</u>
		216	100.0%
Length first employment held	0-6 months	23	10.6%
	7-11 months	28	12.8%
	1-2 years	79	36.2%
	More than 2 years	<u>88</u>	<u>40.4%</u>
		218	100.0%
First occupation	Administrative Assistant/Clerical	7	3.5%
	Architect	3	1.5%
	Clergy	0	.0%
	Consultant	15	7.5%
	Creative	2	1.0%
	Dentist or Medical Doctor	0	.0%
	Engineering, Computer Science	65	32.3%
	Executive/General Management	0	.0%
	Middle Management	2	1.0%
	Lawyer	1	.5%
	Librarian	1	.5%
	Manual Worker	3	1.5%
	Pharmacist	0	.0%
	Policy Analyst	0	.0%
	Professor	1	.5%
	Sales, Marketing, Advertising	24	11.9%
	Social Worker	2	1.0%
	Teacher	8	4.0%
	Technical/Scientific Research	11	5.5%
	Other	<u>52</u>	<u>25.9%</u>
		201	100.0%



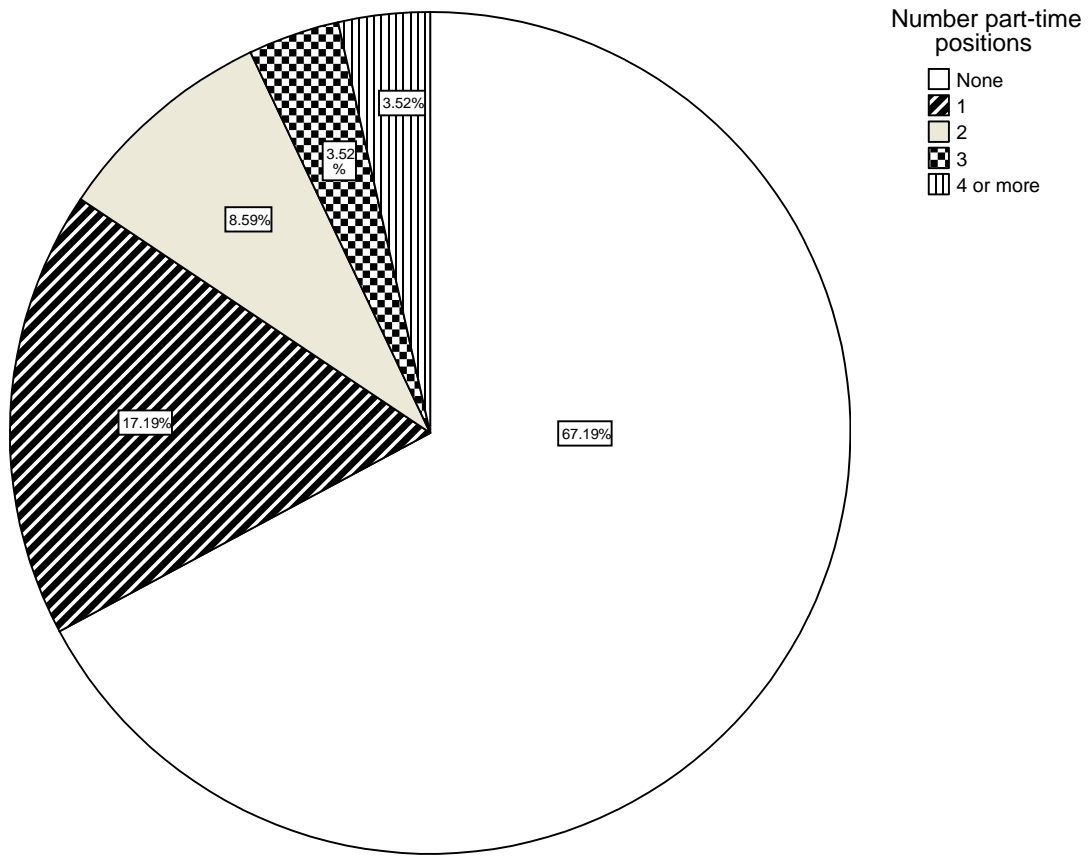


Figure 1. Part-time Positions since Graduation from Lehigh University.

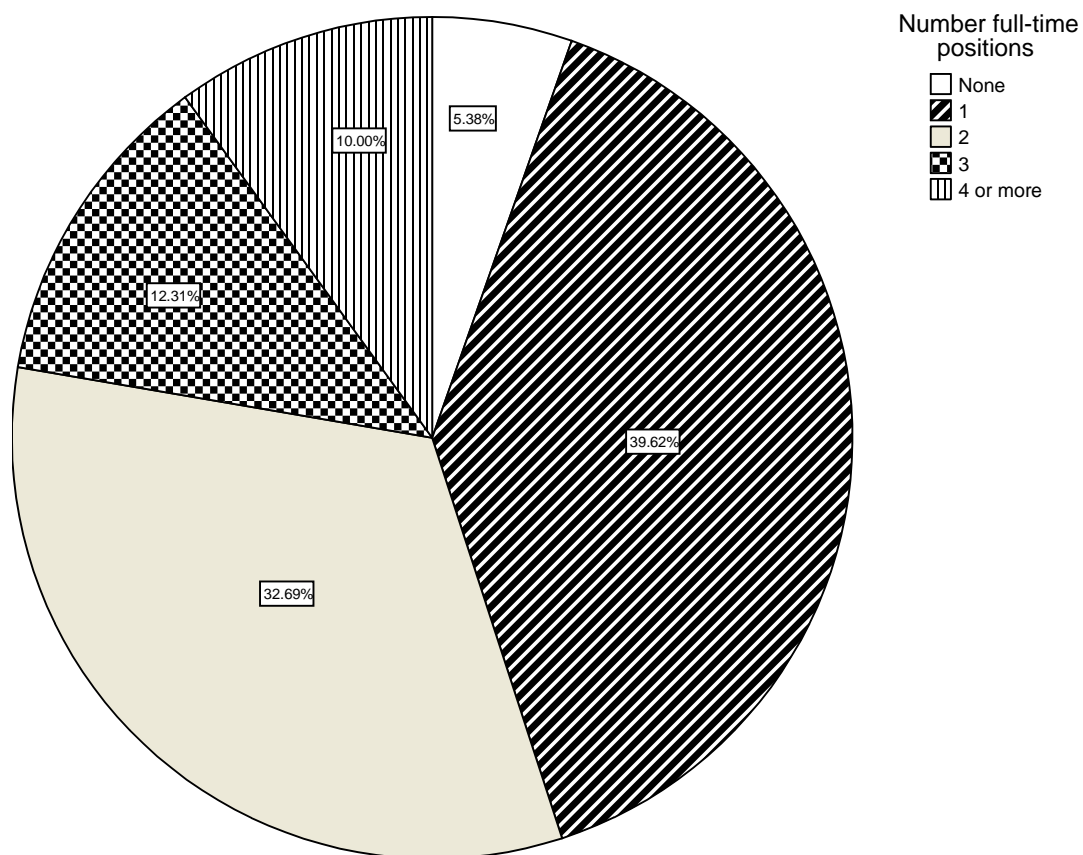


Figure 2. Full-time Positions since Graduation from Lehigh University.

### Influence of Demographic, Educational and Employment Factors on Initial Employment in Lehigh Valley Region

Table 17 summarizes the results of the binary logistic regression analysis for initial employment in the Lehigh Valley after graduation. The Hosmer and Lemeshow goodness of fit test was used because the logistic regression included independent variables (covariates) that were treated as approximating continuous (interval) data. For all three models summarized in Table 17 the Hosmer and Lemeshow test indicated an acceptable fit for the number of cases used in the analysis (Munro, 2005, p. 309).

#### Demographic Variable Influence (Model One)

Four demographic variables (gender, ethnicity, hometown and graduation from a Lehigh Valley area high school) were collectively examined to determine whether they influenced a person's decision to accept initial employment in the Lehigh Valley after graduation from Lehigh University. Collectively these four demographic variables by themselves had no significant influence on whether the graduate was initially employed in the Lehigh Valley region (Chi square 5.72, df = 5, p = .33).

#### Addition of Educational Variables (Model Two)

The second step was to include educational variables with the demographic variables. Four educational variables were included (year of graduation from Lehigh, graduated in a science major, internship participation and multiple degrees, minors or certificates). The results indicate that neither the four educational variables nor the four demographic variables are statistically significant in explaining whether a person took

Table 17. Summary of Binary Block Logistic Regression Results for Initial Job after Graduation (n=315).

Variable	<u>Model # 1</u>			<u>Model #2</u>			<u>Model #3</u>		
	b (SE b)	p	Exp (B)	b (SE b)	p	Exp (B)	b (SE b)	p	Exp (B)
<i><u>Demographic Variables</u></i>									
Gender									
M vs F	.12 (.53)	.82	1.13	-.06 (.57)	.92	.94	-.07 (.60)	.91	.93
Ethnicity									
White vs Other	.12 (.53)	.82	1.13	-.65 (.88)	.46	.52	-.18 (1.01)	.86	.84
Hometown									
Lehigh Valley									
Other PA	-1.33 (1.11)	.23	.26	-1.17 (1.12)	.30	.31	-1.54 (1.22)	.21	.22
US/Abroad	-.88 (.89)	.32	.41	-.71 (.93)	.44	.49	-.98 (1.01)	.33	.38
Regional HS									
Yes vs No	.82 (1.01)	.42	2.28	.81 (1.02)	.43	2.24	.38 (1.10)	.73	1.46

Table 17. Continued.

Variable	<u>Model # 1</u>			<u>Model #2</u>			<u>Model #3</u>		
	b (SE b)	p	Exp (B)	b (SE b)	p	Exp (B)	b (SE b)	p	Exp (B)
<i>Education Variables</i>									
Year Grad. 2004 vs 2000				.01 (.54)	.98	1.01	.23 (.57)	.69	1.26
Science Major Yes vs No				-.86 (.59)	.14	.42	-1.42 (.66)	<b>.03</b>	<b>.24</b>
Internship Yes vs No				-.11 (.63)	.87	.90	.04 (.67)	.96	1.04
Other Educ. Yes vs No				.67 (.58)	.24	1.96	1.03 (.64)	.11	2.80

Table 17. Continued.

Variable	<u>Model # 1</u>			<u>Model #2</u>			<u>Model #3</u>		
	b (SE b)	p	Exp (B)	b (SE b)	p	Exp (B)	b (SE b)	p	Exp (B)
<i>Occupational Variables</i>									
Regional Factor							-.21 (.47)	.67	.82
Job Intrinsic Factor							1.43 (.55)	<b>&lt;.01</b>	<b>4.19</b>
Family Factor							-.83 (.38)	<b>.03</b>	<b>.44</b>
Constant	-.10 (1.27)	.43	.36	-.1.15 (1.46)	.43	.32	24.71 (%.55)	<.001	5.4
-----									
Model Summary									
Chi square value			5.72			8.69			11.04
Model p value			.33			.45			.06
df			5			9			12
Nagelkerke R2 value			.06			.10			.21

Note: For nominal variables the reference category follows vs in the table (e.g. Gender M vs F indicates female is the reference category). Dependent variable, location for initial employment, is coded 0 = not in Lehigh Valley region and 1 = in Lehigh Valley region.

initial employment in the Lehigh Valley region after graduation from Lehigh University (Chi square = 8.69, df = 9, p = .45).

#### Addition of Occupational Variables (Model Three)

The third step was to include three occupational factors identified from the factor analysis for the attribute when selecting a job (21 items). The three occupational factors which emerged and were included in this analysis were Regional Factor, Job Intrinsic Factor, and Family Factor. The results reveal the third model approached statistical significance (Huck, 2005, pp. 169-172). The addition of the three occupational factors resulted in a model Chi square = 11.04 (df = 12, p = .06). Specifically a person's value on the summated Job Intrinsic Factor (Exp B = 4.19, p = <.01) and the Family Factor (Exp B = .44, p = .03) significantly influenced whether the initial employment was or was not in the Lehigh Valley region. Persons with higher values on the Job Intrinsic Factor were more likely to take initial employment in the Lehigh Valley region. Persons with lower scores on the Family Factor were more likely to take employment outside of the Lehigh Valley region. Interestingly the inclusion of the occupational variables had an influence on the contribution of one educational variable (science or nonscience major). When including the occupational variables whether a person was or was not a graduate from a science major (Exp B = .24, p = .03) now had an influence on whether the graduate took initial employment in the Lehigh Valley region. A person with a science major was less likely to take initial employment in the Lehigh Valley region.

### Summary of the Models for Initial Employment

For initial employment, whether a person majored in a science area and the person's score on the Job Intrinsic Factor and score on the Family Factor had a statistically significant influence on whether the person was initially employed in the Lehigh Valley region. The four demographic variables (gender, ethnicity, hometown or graduated from a Lehigh Valley high school) had no statistically significant influence on where graduates took initial employment. Likewise the educational variables (year of graduation, internship participation and having multiple majors, certifications or minors) had no influence on location of initial employment.

### Influence of Demographic, Educational and Employment Factors on Current Employment in Lehigh Valley Region

Current employment in the analysis is limited to graduates reporting their current employment information if they had more than one position. Those with only one employment position since graduation from Lehigh University are not included in this analysis.

### Current Employment Profile after Graduation

Information in Table 18 summarizes information regarding the current employment after graduation from Lehigh University. Predominantly the current employment was in the private sector (69.9%) with approximately 10 percent working in an educational setting and approximately 4 percent working for a nonprofit employer. It is important to note that approximately 8 percent reported working in some type of other



Table 18. Current Employment Information for Lehigh University Participants.

Variable	Response Category	Count	Valid Percent
Current type employment	Self-employed	7	3.2%
	Working for private company	153	69.9%
	Working for government	7	3.2%
	In the military	2	.9%
	Working for education institution	21	9.6%
	Working for nonprofit employer	9	4.1%
	Working for hospital medical facility	3	1.4%
	Other	<u>17</u>	<u>7.8%</u>
	219	100.0%	
Current employment status	Working full time	220	84.3%
	Working part time (20-36 hrs/wk)	3	1.1%
	Working part time (<20 hrs/wk)	1	.4%
	Unemployed; looking for work	1	.4%
	Full-time student	27	10.3%
	Full-time home maker	3	1.1%
	Other	<u>6</u>	<u>2.3%</u>
	216	100.0%	
Current occupation	Administrative Assistant/Clerical	3	1.4%
	Architect	1	.5%
	Clergy	1	.5%
	Consultant	17	7.9%
	Creative	3	1.4%
	Doctor	2	.9%
	Engineering, Computer Science	70	32.7%
	Executive/General Management	3	1.4%
	Middle Management	8	3.7%
	Lawyer	2	.9%
	Librarian	1	.5%
	Professor	1	.5%
	Sales, Marketing, Advertising	22	10.3%
	Social Worker	1	.5%
	Teacher	12	5.6%
	Technical/Scientific Research	8	3.7%
Other	59	27.6%	
	214	100.0%	

Table 18. Continued.

Variable	Response Category	Count	Valid Percent
Work status	Work full time ( $\geq 37$ hr/wk)	220	84.3%
	Work part time (20-36 hrs/wk)	3	1.1%
	Work part time ( $< 20$ hrs/wk)	1	.4%
	Unemployed; looking for work	1	.4%
	Full-time student	10	10.2%
	Retired	0	.0%
	Disabled; unable to work	0	.0%
	Unemployed; not looking for work	0	.0%
	Full-time homemaker	3	1.1%
	Other	<u>6</u>	<u>2.3%</u>
	216	100.0%	
Location of current position	In Lehigh Valley region	18	18.1%
	Elsewhere in PA	32	14.5%
	Elsewhere in U.S.	167	75.6%
	Abroad	<u>4</u>	<u>1.8%</u>
	221	100.0%	
Current salary	Less than \$25,000	27	11.5%
	\$25,000 to less than \$35,000	15	6.4%
	\$35,000 to less than \$50,000	31	13.2%
	\$50,000 to less than \$75,000	92	39.1%
	\$75,000 to less than \$100,000	37	15.7%
	Over \$100,000	17	7.2%
	Chose not to answer	<u>16</u>	<u>6.8%</u>
	235	100.0%	

setting. The most frequently reported other settings were a public company or publicly traded company (8 persons). Regarding the current employment occupation, 33 percent worked in engineering and computer science fields, followed by approximately 10 percent who reported work in sales, marketing or advertising and another 7.9 percent who worked as consultants and approximately 6 percent who were teachers. Approximately 28 percent reported other types of current employment occupations. The most frequently reported “other” occupations included broker/financial services (10 persons) and accounting/auditing (7 persons). Examples of other current occupations (frequency of one) included: college administration, director of alumni relations, military, IT consultant, land developer, and animal shelter director.

#### Demographic Variable Influence (Model One)

As illustrated in the binary logistic table (Table 19), six demographic variables (gender, ethnicity, hometown, age, marital status and graduation from a Lehigh Valley area high school) were collectively examined whether they influenced a person’s decision to accept current employment in the Lehigh Valley. Collectively these six demographic variables by themselves had a significant influence on whether the graduate was currently employed in the Lehigh Valley region (Chi square 20.27,  $df = 7$ ,  $p < .01$ ). Of the demographic variables, whether a person was originally from outside of Pennsylvania as compared to originally being from the Lehigh Valley was statistically significant (Exp B =8.21,  $p < .01$ ). No other demographic variables were statistically significant.

Table 19. Summary of Binary Block Logistic Regression Results for Current Job after Graduation (n=135).

Variable	Model # 1			Model #2			Model #3		
	b (SE b)	p	Exp (B)	b (SE b)	p	Exp (B)	b (SE b)	p	Exp (B)
<i>Demographic Variables</i>									
Gender									
M vs F	-.10 (.52)	.85	.91	.44 (.60)	.46	.64	.45 (.60)	.46	.64
Ethnicity									
White vs Other	.35 (1.22)	.77	1.42	.61 (1.29)	.64	1.84	.61 (1.29)	.64	1.84
Hometown									
Lehigh Valley									
Other PA	1.56 (.93)	.11	4.51	1.67 (1.04)	.11	5.30	1.67 (1.04)	.11	5.30
US/Abroad	2.11 (.58)	<b>&lt;.01</b>	<b>8.21</b>	2.38 (.68)	<b>&lt;.001</b>	<b>10.85</b>	2.38 (.68)	<b>&lt;.001</b>	<b>10.85</b>
Regional HS									
Yes vs No	-1.12(1.11)	.31	.33	-1.12 (1.19)	.35	.33	-1.15 (1.20)	.35	.33
Married									
Yes vs No	.51(.60)	.40	1.67	.79 (.67)	.24	2.20	.79 (.70)	.24	2.20
Age (Yrs)									
	-.05 (.13)	.70	.95	.21 (.49)	.67	1.24	.21 (.49)	.67	1.24

Table 19. Continued.

Variable	<u>Model # 1</u>			<u>Model #2</u>			<u>Model #3</u>		
	b (SE b)	p	Exp (B)	b (SE b)	p	Exp (B)	b (SE b)	p	Exp (B)
<i><u>Education Variables</u></i>									
Year Grad. 2004 vs 2000				1.13 (2.10)	.59	3.10	1.13 (2.10)	.59	3.10
Science Major Yes vs No				.42 (.64)	.51	1.53	.42 (.64)	.51	1.53
Internship Yes vs No				.98 (.66)	.14	2.68	.98 (.67)	.14	2.68
Other Educ. Yes vs No				.20 (.57)	.73	1.23	.20 (.57)	.73	1.22
More Education Yes vs No				- 1.81 (.74)	<b>.02</b>	<b>.17</b>	-1.81 (.74)	<b>.02</b>	<b>.17</b>

Table 19. Continued.

Variable	<u>Model # 1</u>			<u>Model #2</u>			<u>Model #3</u>		
	b (SE b)	p	Exp (B)	b (SE b)	p	Exp (B)	b (SE b)	p	Exp (B)
<i>Occupational Variables</i>									
Regional Factor							- 1.51 (.60)	<b>.01</b>	<b>.22</b>
Job Intrinsic Factor							.84 (.57)	<.14	2.32
Family Factor							-.22 (40)	.59	.81
Work Type Private vs Public							.26 (.75)	.72	1.31
Number Full-time Positions							-.60 (.45)	.18	.55
Constant	.11 (3.65)	.98	1.12	-.7.88 (14.52)	.59	00	-5.19 (16.71)	.76	.01
-----									
Model Summary									
Chi square value			20.27			9.46			10.07
Model p value			<.01			<.03			<.01
df			7			12			17
Nagelkerke R2 value			.26			.36			.46

Note: For nominal variables the reference category follows vs in the table (e.g. Gender M vs F indicates female is the reference category). Dependent variable, location for initial employment, is coded 0 = not in Lehigh Valley region and 1 = in Lehigh Valley region.

### Addition of Educational Variables (Model Two)

The second step was to include educational variables with the demographic variables. Five educational variables were included (year of graduation from Lehigh, graduated in a science major, internship participation and multiple degrees, minors or certificates, and completing additional education beyond the bachelor's degree). The results indicate that one of the five educational variables, additional education beyond the bachelor's degree, and the demographic factor, whether a person was originally from outside of Pennsylvania as compared to originally being from the Lehigh Valley, were the only variables statistically significant in explaining whether a person was currently employed in the Lehigh Valley region (Chi square = 9.46, df = 12,  $p < .03$ ).

### Addition of Occupational Variables (Model Three)

The third step was to include three occupational factors identified from the factor analysis for the attribute when selecting a job (21 items). The three occupational factors which emerged and were included in this analysis were Regional Factor, Job Intrinsic Factor, and Family Factor. The results revealed the third model was statistically significant (Chi square 10.07, df = 17,  $p < .01$ ). Specifically a person's value on the summated Regional Factor (Exp B = .22,  $p = .01$ ) significantly influenced whether the current employment was or was not in the Lehigh Valley region. If local and statewide businesses offer flexible jobs and benefits and if Lehigh University and other Lehigh Valley higher education institutions seek to promote continuing education opportunities to college seniors, it might increase the chances of retaining highly skilled graduates to the Lehigh Valley region.

### Summary of the Models for Current Employment

For current employment the person's hometown, whether the person completed additional education beyond the bachelor's degree, and the score on the Regional Factor had a statistically significant influence on whether the person was currently employed in the Lehigh Valley region.

### Introduction to the Qualitative Findings

Qualitative data were gathered from survey participants to gain a deeper understanding of decisions to stay or leave the Lehigh Valley area. Written responses to short-answer questions were read and grouped to identify meaningful patterns that could be compared with the findings of the quantitative results of the study. Since the focus of this study was on stay and leave decisions of Lehigh University graduates, selected responses to Question 27 of the survey instrument were analyzed.

The 28 respondents who stayed in Pennsylvania for their current position reported nearly 70 reasons they took their present positions. Those reasons can be categorized in the following themes:

- Location or place
- Opportunity/responsibility
- Salary
- Advancement
- Good fit for education/experience/goals
- Work schedule
- Start own business
- Benefits
- Educational opportunities
- Work environment/colleagues/employers
- Company stability/reputation



- Type of industry
- Size of firm
- Alma mater
- Travel/expenses
- Career exploration

Just over half (15 out of 28) of the respondents reported location or place as a reason for taking the position.

*Respondent 219: Moving to Philadelphia and living downtown*

*Respondent 315: Relocation of my husband's job/starting over in a new place*

*Respondent 132: Distance from home*

*Respondent 335: ...kept me in the same area*

*Respondent 322: ...I chose one that was close to my family and that provided me with the most educational opportunities*

*Respondent 170: Close to big family, girlfriend*

*Respondent 251: Close to friends and family*

*Respondent 72: ...Location as within my acceptable driving range (45 min or less)*

*Respondent 351: ...Close to home*

Specifically two respondents noted Lehigh University in their primary reason for selecting their present positions:

*Respondent 170: Great job with alma mater*

*Respondent 88: Closer to my alma mater*

Location or place were the most often cited reasons for accepting their current positions (n=17). Other themes with multiple responses included salary (n=10), advancement (n=8), opportunity/responsibility (n=7), work environment/ colleagues/ employers (n=7), good fit for education/experience/goals (n=7), benefits (n=4), educational opportunities (n=3), start own business (n=2), and company stability/ reputation (n=2).

## Chapter 5

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

#### Introduction

Attracting and retaining young, 25-34 year-old individuals with at least a bachelor's degree has become a major workforce and economic development strategy and concern for cities, towns, regions and states. Numerous research studies have shown that the educational attainment of its population has had an impact on the economic vitality or lack thereof in regions across the United States. Colleges and universities, economic development practitioners and business leaders have the potential to play a vital role in building economic success for their respective regions by building and enhancing strategies to attract and retain college graduates. The overall purpose of this study was to examine the post-graduation employment experiences of Lehigh University 2000 and 2004 academic year bachelor's degree graduates. Specifically the focus was to determine factors related to their securing employment within or outside of the Lehigh Valley and whether those relationships were similar for graduates in scientific or nonscientific majors.

The study was conducted using an electronically administered questionnaire to gather information on the post-bachelor's degree initial and current employment experiences of Lehigh University graduates from the classes of 2000 and 2004. In addition, the study explored the relationships that selected demographic, educational and employment factors had on whether the graduates in the study were employed within or

outside of the Lehigh Valley when controlling for whether they were bachelor's degree graduates majoring in a scientific or nonscientific area.

Binary block logistic regression, along with descriptive statistics, was the primary research technique employed to answer the study's research questions. The regression results showed that a person who majored in a science area as well as a person's scores on the Job Intrinsic Factor and the Family Factor had a statistically significant influence on whether the person was initially employed in the Lehigh Valley region. For current employment, the person's hometown, whether the person completed additional education beyond the bachelor's degree, and the score on the Regional Factor had a statistically significant influence on whether the person was currently employed in the Lehigh Valley region.

The first four chapters of the study presented an overview of the problem and research questions, reviewed the related literature, described the methodology employed to conduct the study, and presented the data analysis results. This chapter summarizes the major findings, places these findings in the context of the related research literature, and illustrates conclusions based on the findings. The chapter concludes with recommendations for future related research.

### Analysis of the Descriptive Statistical Results

According to the Southern Technology Council study cited in Chapter 2 of this study, the average state can expect to retain 76 percent of its "stayers" (attended high school in the same state) while only 43 percent of its "arrivers" (attended high school

elsewhere but received most recent degree in focal state) (Tornatzky et al., 2001, p. 26). One of the more interesting findings regarding the demographic complexion of this study's respondents was that less than one-tenth of the survey respondents considered their hometown to be in the Lehigh Valley (9.3%) and an additional 22.0 percent grew up in Pennsylvania. The majority of the survey respondents (68.6%) were from outside Pennsylvania.

It is interesting to note that the demographic make up of the Lehigh University graduate is similar to that of the Carnegie Mellon graduate studied by Hansen and Huggins in their 2001 Career and Location Decisions Project. That is, the majority of students attending Lehigh and Carnegie Mellon did not attend high school in the city or state that they attended college. In that study, it was shown that Carnegie Mellon graduates only had 20.0 percent of its graduates remain in the Pittsburgh geographical area after graduation compared to Duquesne (68.1%) and University of Pittsburgh (45.7%) (Hansen & Huggins, 2001, p. 27). The Pittsburgh study illustrated that the university one attends significantly impacts the decision to stay (Duquesne) or leave (Carnegie Mellon) (p. 52). Furthermore, the Southern Technology Council report indicated that the odds that a person would be working in the same state they attended high school in were increased over ten times (1,022 percent) if that person remained in state to attend college (Tornatzky et al., 2001, p. 19). The fact that 75.6 percent of Lehigh University graduates examined in this study are employed outside of the region and state appears to be fairly consistent with the findings of these previous research studies.

This research study analyzed only one university but, if further research were conducted in the Lehigh Valley region, it would be interesting to compare the differences in stay or leave decisions among Lehigh University graduates and those of other graduates in the region. It was, in fact, the original intention of this researcher to study five colleges and universities in the Lehigh Valley region but Lehigh University was the only institution interested in releasing the necessary student data records to this researcher. Thus, this researcher delimited the study to the one university.

Another interesting statistic was that not even one-fifth (19.0%) of Lehigh University graduates participated in an internship while an undergraduate student. According to Philadelphia's 2004 Knowledge Industry Partnership survey of 2,550 graduates who attended college in the Greater Philadelphia region, graduates who completed an internship during their undergraduate years were twice as likely to stay in the Philadelphia region after graduation (p. 10). Indiana's Human Capital Retention Project also promoted the viability of state-supported internships and suggested that successful internship programs were ones that require colleges and employers to collaborate and build stronger relationships (2000, p. 12). In the opinion of this researcher, simply based on the above findings regarding internship frequency, Lehigh University, in conjunction with local and state-wide employers, should place an increased emphasis on placing its undergraduate students in internships.

The most important factor in why a survey respondent selected Lehigh University as his or her undergraduate university was the overall reputation of the institution. Nearly all the respondents (99.3%) indicated the overall reputation was somewhat important or

very important to them. In general, the advantages of the Lehigh Valley region were not seen as an important factor in selecting Lehigh University with 80.4 percent reporting that these factors were not too important or not important at all in their selection decision. More than one-fourth of the respondents cited having family in the area was somewhat or very important to them in their selection of Lehigh University.

The factors for selecting an institution are interesting compared to those findings from previous research studies. The Hansen and Huggins study showed that Pittsburgh universities attracted large numbers of students from outside of the area largely because of the quality of the academic programs. This is consistent with the findings of this research study. However, the Pittsburgh area graduates also claimed that the urban scene, cultural events and the availability of economic opportunities were factors that led them to Pittsburgh area institutions (Hansen & Huggins, 2001. p. ii). As indicated above, amenities in the Lehigh Valley region played only a small role in the decision of survey participants to attend Lehigh University.

Approximately half of this study's survey respondents received degrees in the areas of science or engineering (52.7%) while approximately half received degrees in non-science areas. According to the Southern Technology Council's report, engineering and physical science majors are more likely to leave the state they attended college (Tornatzky et al., 2001, p. 21). The results of this study, illustrated further below in the logistic regression analysis, support the findings of the STC's previous research study.

### Analysis of the Logistic Regression Results

The primary foci of the study research questions were to examine the influence of selected demographic, educational and employment factors on the graduates' employment in or outside of the Lehigh Valley area/region after graduation. To answer the research questions, a hierarchical binary logistic regression analysis was used (Hair, Anderson, Tatham & Black, 1998; Meyers, Gamst & Guarino, 2006; Tabachnick & Fidell, 2007). Analysis of the data for the three research questions was most efficiently accomplished using two hierarchical analyses. The first analysis was for the first job after graduation from Lehigh University and the second analysis was for the current job, if different from the first job after graduation from Lehigh University. The first research question was broken into two parts: post-bachelor's degree initial employment experiences and post-bachelor's degree current employment experiences.

For initial employment experiences, the study sought answers to what the employment experiences were regarding (a) type of employment, (b) length of this initial employment, (c) initial occupation, and (d) full-time and part-time positions since graduation. For initial employment, whether a person majored in a science area and the person's score on the Job Intrinsic Factor (flexible job, job offering a chance to do good, help others, and opportunities for continuing education at area universities or colleges) and score on the Family Factor (being close to friends and family) had a statistically significant influence on whether the person was initially employed in the Lehigh Valley region. Specifically a person's value on the summated Job Intrinsic Factor (Exp B = 4.19,  $p < .01$ ) and the Family Factor (Exp B = .44,  $p = .03$ ) significantly influenced

whether the initial employment was or was not in the Lehigh Valley region. Persons with higher values on the Job Intrinsic Factor were more likely to take initial employment in the Lehigh Valley region. Persons with lower scores on the Family Factor were more likely to take employment outside of the Lehigh Valley region. Interestingly the inclusion of the occupational variables had an influence on the contribution of one educational variable (science or nonscience major). When including the occupational variables whether a person was or was not a graduate from a science major (Exp B = .24,  $p = .03$ ) now had an influence on whether the graduate took initial employment in the Lehigh Valley region. A person with a science major was less likely to take initial employment in the Lehigh Valley region. The four demographic variables (gender, ethnicity, hometown, or graduated from a Lehigh Valley high school) had no statistically significant influence on where graduates took initial employment. Likewise the educational variables (year of graduation, internship participation and having multiple majors, and certifications or minors) had no influence on location of initial employment.

It is particularly interesting to note that graduating from a Lehigh Valley high school was not statistically significant in terms of staying or leaving the Lehigh Valley region. As indicated previously, the Southern Technology Council report found that those attending high school and college in the same state dramatically increased the odds that an individual would remain to work in that region (Tornatzky et al., 2001, p. 19). The findings of this Lehigh University study, at least as it relates to a study participant's initial employment experience, are not consistent with the findings of the STC report. The Hansen and Huggins multivariate analysis of Pittsburgh area graduates found that



graduation from a high school in the Pittsburgh area was the strongest single factor predicting staying in Pittsburgh after graduation (2001, p. 52). Again, this current study's findings show that the Lehigh University cohorts do not meet that same statistically significant test as it relates to attending high school in the region they attended college.

For the current employment experience logistic regression, it is important to realize that the analysis is limited to graduates reporting their current employment information if they had more than one position since graduating from Lehigh University. Those with only one employment position since graduation from Lehigh are not included in this analysis. The number of survey respondents who fit the profile for this regression was only 135 individuals.

Six demographic variables (gender, ethnicity, hometown, age, marital status and graduation from a Lehigh Valley area high school) were collectively examined whether they influenced a person's decision to accept current employment in the Lehigh Valley. Collectively these six demographic variables by themselves had a significant influence on whether the graduate was currently employed in the Lehigh Valley region (Chi square 20.27,  $df = 7$ ,  $p < .01$ ). Of the demographic variables, whether a person was originally from outside of Pennsylvania as compared to originally being from the Lehigh Valley was statistically significant (Exp B =8.21,  $p < .01$ ). No other demographic variables were statistically significant.

When the five educational variables (year of graduation from Lehigh, graduated in a science major, internship participation and multiple degrees, minors or certificates, and completing additional education beyond the bachelor's degree) were included with

the demographic variables, the results indicated that one of the five educational variables, additional education beyond the bachelor's degree, and the demographic factor, whether a person was originally from outside of Pennsylvania as compared to originally being from the Lehigh Valley, were the only variables statistically significant in explaining whether a person was currently employed in the Lehigh Valley region (Chi square = 9.46,  $df = 12$ ,  $p < .03$ ).

Once the three occupational factors (Regional Factor, Job Intrinsic Factor, and Family Factor) were included with the demographic and educational variables, the results revealed the third model was statistically significant (Chi square 10.07,  $df = 17$ ,  $p < .01$ ). Specifically a person's value on the summated Regional Factor (Exp  $b = .22$ ,  $p = .01$ ) significantly influenced whether the current employment was or was not in the Lehigh Valley region. Persons with lower values on the Regional Factor were more likely to take initial employment outside the Lehigh Valley region. Thus, for current employment, the person's hometown, whether the person completed additional education beyond the bachelor degree, and the score on the Regional Factor had a statistically significant influence on whether the person was currently employed in the Lehigh Valley region.

In the opinion of this researcher, it is interesting to note that being from the Lehigh Valley region appeared to be significant for the current job but not for the initial job. While the current job analysis was again based on a lower number of respondents, it is worth considering that graduates from Lehigh University may perhaps leave the region immediately after graduation but do consider the possibility of returning. This observation relates to information in Philadelphia's Knowledge Industry Partnership

(KIP) report which suggested that 25 percent of all Philadelphia graduates are “explorers,” those non-Philadelphia natives leaving Philadelphia to go somewhere new or native Philadelphians leaving the area for the first time. These “explorer” graduates, according to the KIP report, represent Philadelphia’s best attempt at reversing brain drain (KIP Report, 2004, p.6). Lehigh University, and the Lehigh Valley, would be wise to explore strategies to recruit back to the area its former graduates.

#### Implications for Policymakers and University Officials

While this study focused on two cohorts of Lehigh University graduates, and thus cannot be generalized to a larger population, the research findings should provide useful information to Lehigh Valley economic development professionals, workforce development practitioners, industry leaders, and university administrators, especially those at Lehigh University. In addition, this study adds to the growing body of academic research on brain drain and likely will be of interest to academic researchers and other professionals from regions outside the Lehigh Valley that are seeking ways to enhance their economic vitality strategies as it relates to retaining or attracting highly educated professionals.

#### Implications for Policymakers

Lehigh Valley economic development professionals should be interested in knowing that among the survey participants in this study, science majors are more likely to leave the region after graduation. These practitioners should focus on whether there are enough employers in the science fields locally and statewide to increase the chances

of graduates staying in the region or at least the state. While it was outside the scope of this study, in the opinion of this researcher, Gottlieb's research on supply and demand in states like Pennsylvania is valuable information to contemplate; that is, if Pennsylvania is high on degree supply but lower on high-tech demand (Gottlieb, 2001, pp. 12-13), economic developers need to work on attracting more science and engineering businesses to the state that provide job opportunities for the students who are qualified to take initial positions in this field. Otherwise, the region likely will continue to lose high-tech and science graduates to other regions or states.

Economic and workforce development practitioners need to vigorously seek steps to retain more of its talented workforce if the Lehigh Valley region is to thrive. Based on Gottlieb's Census 2000 research on the top 100 metropolitan statistical areas, it was shown that the Allentown-Bethlehem-Easton area ranked 14<sup>th</sup> of 100 in proportion of labor force aged 55-64 at 10.9 percent (319,629 total labor force aged 16 and older and 34,816 55-64 year-old workers) while it ranked 88<sup>th</sup> of 100 at -4.4 percent in "youth-specific" 25-34 year-old net migration (Gottlieb, 2004, pp. 3-11). By seeking out ways to partner with Lehigh University and perhaps other regional institutions of higher education, these economic and workforce development practitioners can hopefully show positive trends when new Census figures are released.

One area economic and workforce development professionals can most effectively help is serving as a facilitator and linchpin between area businesses and colleges and universities, particularly as it relates to helping undergraduates find internship opportunities and ultimately local employment opportunities. As previously

mentioned, only 19 percent of this study's respondents participated in undergraduate internships. While internships did not prove to be statistically significant in terms of stay or leave decisions for this study's sample, the fact that they have proven to be significant in other studies leads this researcher to suggest that economic and workforce development practitioners need to serve as leaders in promoting the importance of internships as a possible retention strategy for Lehigh University graduates, and perhaps for other local colleges and universities' graduates.

#### Implications for University Officials

Similar to economic development practitioners, this researcher believes that Lehigh University should pursue getting more of its students involved in undergraduate internship experiences. Lehigh University career development officials should also find it interesting that this study's findings show that for initial employment, whether a person majored in a science area and the person's score on the Job Intrinsic Factor (flexible job, job offering a chance to do good, help others, and opportunities for continuing education at area universities or colleges) and score on the Family Factor (being close to friends and family) had a statistically significant influence on whether the person was initially employed in the Lehigh Valley region. The career development administrators need to share this information with local and statewide businesses who recruit on campuses. If local and statewide businesses offer flexible jobs and benefits and if Lehigh University and other Lehigh Valley higher education institutions seek to promote continuing education opportunities to college seniors, it might increase the chances of retaining highly skilled graduates to the Lehigh Valley region.

The Lehigh University alumni association also can benefit from this research as it relates to the Regional Factor having a significant influence on the current job experience. The alumni association, in collaboration with the career services office and local businesses, should stay in close contact with those Lehigh University graduates who initially left the region but who might consider returning (a possibility drawn from this researcher's findings and assumptions). Seeking out ways to continually engage its alumni might prove useful as an attraction and recruitment strategy in addition to the ongoing fundraising campaigns that take place.

The university officials and others should also study partnering with area high schools and middle schools to offer academic camps or internships with local companies. While there was no statistical significance on initial job experience as it related to attending high school in the region, it is also important to note that only a very small percentage of the survey respondents attended high school in the region. In fact, the majority of this study's sample came from out of state. If Lehigh University can partner with its local and regional secondary school districts, particularly in science and engineering areas, it might enhance the local high school talent pool. If this strategy grew and more local students attended Lehigh University, it would be interesting to run a similar study in several years to see if attending a local high school had a significant impact on staying or leaving the Lehigh Valley region. Ultimately, Lehigh University needs to decide whether this is a strategy it wants to employ, but in the estimation of this researcher, seeking out ways to further engage high school students may hold a key to

increasing retention among the “youth-specific” 25-34 year-old cohort in the region, even though the statistical significance was not proven from this study.

### Contributions and Limitations

One key contribution that this study adds to the field is that this researcher conducted factor analysis on his survey instrument. Future researchers can utilize this instrument with confidence that it has been tested for content validity and was thoroughly factor analyzed. The instrument is applicable to research both in the Lehigh Valley as well as any other geographical region. In addition, while this study focused on the Lehigh Valley region, researchers, economic developers and others can replicate or adapt this study in their regions or for their universities to garner important information on the stay or leave trends of their recent college graduates.

A potential limitation to the study was this researcher's definition of the Lehigh Valley which states that the Lehigh Valley is made up of Allentown, Bethlehem and Easton. It is possible for future researchers to expand the definition of the Lehigh Valley to include certain counties in New Jersey and other regions. This could potentially change some of the results of the study. In addition, this researcher's survey instrument yielded minimal qualitative results. Future researchers might want to consider moving the short-answer questions closer to the beginning of the survey or consider shortening the survey as in the opinion of this researcher, the length of the survey may have had an adverse effect on the breadth of qualitative responses.

### Recommendations for Future Research

This study has added to the body of knowledge regarding stay and leave decisions of recent post-bachelor's degree graduates. It is interesting to note, as explained in detail above, that there were some similarities yet some differences between this study and Hansen's and Huggins' Pittsburgh Career Location Decisions Project. This researcher believes the following future research would further benefit the Lehigh Valley region in specific and economic development, workforce development and university administrators in general:

- Additional studies similar to this one should be conducted at other Lehigh Valley institutions to compare and contrast the findings of other schools' graduates with those found in this study for Lehigh University participants. Researchers interested in pursuing this line of research should remember that this researcher faced resistance from other Lehigh Valley institutions of higher education when he sought the release of student records. The information gathered from these future studies, coupled with this study's findings, may assist in developing a more robust overall retention and attraction strategy for recently graduated individuals.
- Lehigh University could utilize this researcher's survey instrument to study other graduating class cohorts and compare the results of those classes with the classes of 2000 and 2004. As indicated in the research of Weissbourd and Berry (2004B, p. 55), the 35-44 year old cohort actually has the highest impact on the economy. If Lehigh and its local economic development



partners and local higher education institutions can develop strategies to attract and retain the 35-44 year-old cohort, in addition to the 25-34 year old cohort, the Lehigh Valley economy is likely to be more robust. Research on this group would be valuable. Researchers should consider utilizing methods other than or in addition to web surveys to gather data from this age group.

- Research to study the factors influencing Lehigh Valley high school seniors to stay or leave the Lehigh Valley region for high school would also be useful information for local universities, businesses and economic and workforce development professionals. If the Lehigh Valley adopts this researcher's strategy as it relates to increasing internship opportunities for high school students, a study that focused on the potential significance of the internship experience with local employers on stay or leave college decisions would be fascinating and a valuable complement to this study.
- Finally, a study that focused on degree supply and high-tech job demand in the Lehigh Valley region would be valuable. This study illustrated that the majority of the respondents were science or engineering majors, but it did not seek answers regarding the availability of positions available in these fields in the Lehigh Valley region. That additional information would serve as an important supplement to the findings determined from this research and would likely serve as an important economic and workforce development strategic guide for the Lehigh Valley.

- Future studies should consider utilizing qualitative methods including focus groups, case studies and interviews. Comparing qualitative studies with quantitative studies such as this one would be a valuable addition to the field.

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Appendix A

SURVEY INSTRUMENT



SPSS variables SPSS values PAGE PRESENTATION CRITERIA
---

**ID** ) Please enter the ID number from the post card/email

PB
----

**INFORM**

[Insert Informed Consent]

- 1 Yes
- 2 No

PB If No → terminate ( <a href="http://">http://</a>
---

**EVERYONE**

**Q1) What was your major field of study for the bachelor's degree you received from Lehigh University? (PRIMARY MAJOR)**

- 1 Humanities - languages, arts, philosophy, religion, communications, cultural studies
- 2 Social sciences - history, sociology, political science, anthropology, area studies
- 3 Economics
- 4 Psychology
- 5 Natural & environmental sciences - biology, physics, chemistry, geology, astronomy
- 6 Business administration
- 7 Public administration
- 8 Computer science/computer engineering
- 9 Engineering: mechanical, industrial, civil, electrical, chemical, environmental
- 10 Law & legal studies
- 11 Nursing
- 12 Pharmacy
- 13 Public health, epidemiology
- 14 Physical therapy
- 15 Social work
- 16 Education
- 17 Library and information science
- 18 Other (please specify)

**Q1x** If you selected other, please specify: \_\_\_\_\_

**Q2) Did you have any other majors, certificates, or minors as part of your bachelor's degree from Lehigh University?**

- 1 Yes
- 2 No

PB: If Q2="No" → Q4

**ONLY THOSE WITH MINOR, CERTIFICATE, OR SECOND MAJOR**

**3) What were your other majors, certifications, or minors? (Select all that apply)**

*SPSS values: 1 = checked*

**Q3\_1** Humanities - languages, arts, philosophy, religion, communications, cultural studies

**Q3\_2** Social sciences - history, sociology, political science, anthropology, economics, area studies

**Q3\_3** Psychology

**Q3\_4** Natural & environmental sciences - biology, physics, chemistry, geology, astronomy

**Q3\_5** Business administration

**Q3\_6** Public administration

**Q3\_7** Computer science/engineering

**Q3\_8** Engineering: mechanical, industrial, civil, electrical, chemical, environmental

**Q3\_9** Law & legal studies

**Q3\_10** Nursing

**Q3\_11** Pharmacy

**Q3\_12** Public health, epidemiology

**Q3\_13** Physical therapy

**Q3\_14** Social work

**Q3\_15** Education

**Q3\_16** Library and information science

**Q3\_17** Women's studies

**Q3\_18** African/Black studies

**Q3\_19** Other (please specify)

**Q3\_19x** If you selected other, please specify: \_\_\_\_\_

PB

**EVERYONE**

**Q4) What was the main reason you decided to come to Lehigh University for your bachelor's degree?**

[text box]

*May want to code most popular options for inclusion in SPSS data*

PB

**EVERYONE**

**5) How important was each of the following attributes in your decision to choose Lehigh University?**

	Not At All Important 1	Not Too Important 2	Somewhat Important 3	Very Important 4
<b>Q5_1</b> Overall reputation of the school				
<b>Q5_2</b> Programs or courses in my chosen field				
<b>Q5_3</b> Cost, financial considerations				
<b>Q5_4</b> Advantages of the Lehigh Valley Region				
<b>Q5_5</b> Personal contact with faculty				
<b>Q5_6</b> Personal contact with students				
<b>Q5_7</b> Spouse or partner in the area				
<b>Q5_8</b> Family in the area				

PB

**EVERYONE**

**Q6) Thinking back to when you were an undergraduate student, what advantages did you see in the Lehigh Valley region/Allentown/Bethlehem?**

[text box]

*May want to code most popular options for inclusion in SPSS data*

**Q7) Did you consider any other colleges or universities before deciding to attend Lehigh?**

1 Yes

2 No

PB: If Q7="No" → Employment After College [html snippet]
--

**ONLY THOSE WHO CONSIDERED OTHER COLLEGES/UNIVERSITIES**

**8) Which other colleges and universities did you consider? (Please list)**

Q8\_1 \_\_\_\_\_

Q8\_2 \_\_\_\_\_

Q8\_3 \_\_\_\_\_

Q8\_4 \_\_\_\_\_

Q8\_5 \_\_\_\_\_

<i>PB</i>
-----------

**EVERYONE**

*Employment After College*

**Q9) How many different full-time positions (at least 37 hours per week) have you held since you graduated with your bachelor's degree from Lehigh?**

[Dropdown]    1 None  
                   2 1  
                   3 2  
                   4 3  
                   5 4 or more

**Q10) How many different part-time positions have you held since you graduated with your bachelor's degree from Lehigh?**

[Dropdown]    1 None  
                   2 1  
                   3 2  
                   4 3  
                   5 4 or more

**Q11) What is your current employment status?**

- 1 Working full time (at least 37 hours per week)
- 2 Working part time (20 to 36 hours per week)
- 3 Working part time (less than 20 hours per week)
- 4 Unemployed and looking for work
- 5 Full-time student
- 6 Retired
- 7 Disabled and unable to work
- 8 Unemployed and not looking for work
- 9 Full-time homemaker
- 10 Other (please specify)

**Q11x** If you selected other, please specify: \_\_\_\_\_

If Q11="unemployed and looking for work, full-time student, full-time homemaker, retired, disabled and unable to work, or unemployed and not looking for work" AND Q9="None" AND Q10="None" → Future Plans

PB: Q9≠"None" AND Q10≠"None" → First job after LU [html snippet]

**ALL CURRENTLY EMPLOYED****Q12) Which of the following best represents your current employment situation?**

- 1 Self-employed
- 2 Working for a private company
- 3 Working for the government
- 4 In the military
- 5 Working for an educational institution
- 6 Working for a nonprofit employer
- 7 Working for a hospital or other medical facility
- 8 Other (please specify)

**Q12x** If you selected other, please specify: \_\_\_\_\_

**Q13) Is this the first job you have held since graduating with your bachelor's degree from Lehigh University?**

- 1 Yes
- 2 No

**14) What is your current occupation?**

- |  |                                    |
|--|------------------------------------|
| 1 Administrative Assistant/Clerical          | 12 Librarian                       |
| 2 Architect                                  | 13 Manual Worker                   |
| 3 Clergy                                     | 14 Pharmacist                      |
| 4 Consultant                                 | 15 Policy Analyst                  |
| 5 Creative (actor, artist, musician, writer) | 16 Professor                       |
| 6 Dentist                                    | 17 Sales, Marketing or Advertising |
| 7 Doctor (medical doctor)                    | 18 Social Worker                   |
| 8 Engineering, Computer Science              | 19 Teacher                         |
| 9 Executive/General Management               | 20 Technical/Scientific Research   |
| 10 Middle management                         | 21 Other (please specify)          |
| 11 Lawyer                                    |                                    |

**Q14x** If you selected other, please specify: \_\_\_\_\_

**Q15) What is the location of your current position?**

- 1 In the Lehigh Valley region (Allentown/Bethlehem/Easton)
- 2 Elsewhere in Pennsylvania
- 3 Elsewhere in the US
- 4 Abroad

PB: If Q15="Abroad" → Q17
---------------------------

**CURRENTLY EMPLOYED/US RESIDENTS****Q16) What is the 5-digit zip code for the location where you currently work?**

\_\_\_\_\_

PB
----

**ALL CURRENTLY EMPLOYED****Q17) How long have you held your current position?**

- 1 0 - 6 months
- 2 7 - 11 months
- 3 1 - 2 years
- 4 More than 2 years

<b>PB: IF Q13="Yes" → Q23</b>
-------------------------------

*CURRENTLY EMPLOYED, MORE THAN ONE JOB SINCE GRADUATION  
CURRENTLY UNEMPLOYED/HELD JOB SINCE GRADUATION*

*The following questions relate to the first job you held upon graduating from Lehigh with your bachelor's degree.*

**Q18) What was the employment situation in the first job you had after graduating with your bachelor's degree?**

- 1 Self-employed
- 2 Working for a private company
- 3 Working for the government
- 4 In the military
- 5 Working for an educational institution
- 6 Working for a nonprofit employer
- 7 Working for a hospital or other medical facility
- 8 Other (please specify)

**Q18x** If you selected other, please specify: \_\_\_\_\_

**Q19) What was your occupation at that time?**

- 1 Administrative Assistant/Clerical
- 2 Architect
- 3 Clergy
- 4 Consultant
- 5 Creative (actor, artist, musician, writer)
- 6 Dentist
- 7 Doctor (medical doctor)
- 8 Engineering, Computer Science
- 9 Executive/General Management
- 10 Middle management
- 11 Lawyer
- 12 Librarian
- 13 Manual Worker
- 14 Pharmacist
- 15 Policy Analyst
- 16 Professor
- 17 Sales, Marketing or Advertising
- 18 Social Worker
- 19 Teacher
- 20 Technical/Scientific Research
- 21 Other (please specify)

**Q19x** If you selected other, please specify: \_\_\_\_\_

**Q20) What was the location of your first job after college?**

- 1 In the Lehigh Valley region (Allentown/Bethlehem/Easton)
- 2 Elsewhere in Pennsylvania
- 3 Elsewhere in the US
- 4 Abroad

PB: IF Q20="Abroad" → Q22
---------------------------



*CURRENTLY EMPLOYED/US RESIDENTS*  
*CURRENTLY UNEMPLOYED/HELD JOB SINCE GRADUATION/US RESIDENTS*

**Q21) What is the 5-digit zip code for the location where you worked in your first job after college?**

\_\_\_\_\_

PB

*ALL CURRENTLY EMPLOYED*  
*CURRENTLY UNEMPLOYED/HELD JOB SINCE GRADUATION*

**Q22) How long did you hold the first job you had upon graduation from college?**

- 1 0 - 6 months
- 2 7 - 11 months
- 3 1 - 2 years
- 4 More than 2 years

PB

*ALL CURRENTLY EMPLOYED*  
*CURRENTLY UNEMPLOYED/HELD JOB SINCE GRADUATION*

**Q23) Has any job come about as a result of an internship you participated in while in college?**

- 1 Current job
- 2 First job after graduation
- 3 Another job
- 4 No jobs as results of internship
- 5 Did not participate in internship

PB: If Q23="No jobs" OR "Did not participate" → Q25

*ALL CURRENTLY EMPLOYED/Q23= 4 or 5*  
*CURRENTLY UNEMPLOYED/HELD JOB SINCE GRADUATION/Q23= 4 or 5*

24) **In which of the following ways did you benefit from the internship?** (Select all that apply)

*SPSS values for Q24\_x: 1 = checked*

**Q24\_1** It lead directly to a job offer from the internship employer.

**Q24\_2** It helped me get a job in the same field, but with a different employer.

**Q24\_3** It gave me useful contacts and experiences that led to a different type of job.

**Q24\_4** Other (please specify)

**Q24\_4x** If you selected other, please specify: \_\_\_\_\_

PB
----

*ALL CURRENTLY EMPLOYED*  
*CURRENTLY UNEMPLOYED/HELD JOB SINCE GRADUATION*

25) **How important is each of the attributes listed below when you choose a job?**

	Not At All Important 1	Not Too Important 2	Somewhat Important 3	Very Important 4
<b>Q25_1</b> Starting salary I am offered				
<b>Q25_2</b> Opportunities for advancement				
<b>Q25_3</b> Interesting or challenging job				
<b>Q25_4</b> Benefits offered by the employer				
<b>Q25_5</b> Flexible job (hours, work at home)				
<b>Q25_6</b> Job offering a chance to do good, help others				
<b>Q25_7</b> Opportunities for continuing education at area universities or colleges				
<b>Q25_8</b> Near my spouse/partner				
<b>Q25_9</b> Close to family				
<b>Q25_10</b> Close to friends				
<b>Q25_11</b> Region with lots of young people				

	Not At All Important 1	Not Too Important 2	Somewhat Important 3	Very Important 4
<b>Q25_12</b> Region with many cultural attractions				
<b>Q25_13</b> Region with nationally ranked sports teams				
<b>Q25_14</b> Region with outdoor recreation				
<b>Q25_15</b> Region with lots of nightlife				
<b>Q25_16</b> Region with ethnic and cultural diversity				
<b>Q25_17</b> Physical setting: climate, geography				
<b>Q25_18</b> Cost of living/housing costs				
<b>Q25_19</b> Easy commuting - good roads				
<b>Q25_20</b> Easy commuting - availability of public transportation				
<b>Q25_21</b> Availability of child care				

PB

If Q11="unemployed and looking for work, full-time student, full-time homemaker, retired, disabled and unable to work, or unemployed and not looking for work" → Q33

*ALL CURRENTLY EMPLOYED  
CURRENTLY UNEMPLOYED/HELD JOB SINCE GRADUATION*

**Q26) What is the primary reason you took your present job?**

[text box]

**Q27) What other factors were important to you when you decided to take your present job?**

[text box]

**Q28) When you took your present job did you consider jobs in any other locations?**

1 Yes

2 No

PB: If Q28="No" → Q32

*ALL CURRENTLY EMPLOYED/CONSIDERED OTHER LOCATION  
CURRENTLY UNEMPLOYED/HELD JOB SINCE GRADUATION/CONSIDER OTHER  
LOCATION*

**Q29) What other locations did you consider?**

[text box]

**Q30) Did you have a job offer in any of those other locations?**

- 1 Yes
- 2 No

PB: If Q30="No" → Q32

*ALL CURRENTLY EMPLOYED/OFFER OTHER LOCATION  
CURRENTLY UNEMPLOYED/HELD JOB SINCE GRADUATION/OFFER OTHER LOCATION*

**Q31) At which location(s) did you have a job offer?**

[text box]

PB

*ALL CURRENTLY EMPLOYED  
CURRENTLY UNEMPLOYED/HELD JOB SINCE GRADUATION*

32) How important was each of the following factors in your decision to take your present position?

	Not At All Important 1	Not Too Important 2	Somewhat Important 3	Very Important 4
<b>Q32_1</b> Availability of a job in the region for your spouse/partner				
<b>Q32_2</b> Membership in clubs and organizations in the region				
<b>Q32_3</b> Graduated from high school in the region				

***PB***

*EVERYONE  
Future Plans*

**Q33)** Please think ahead to five years from now. Do you think you will be living in the same city as you are now?

- 1 Same city
- 2 Different city

**Q34)** Still thinking about five years from now, do you think you will be working for the same employer you work for now?

- 1 Yes, same employer
- 2 No, different employer
- 3 I won't be working
- 4 I will be starting/owning my own business

**Q35) What kind of job do you think you will be doing in five years?**

- |  |                                    |
|--|------------------------------------|
| 1 Administrative Assistant/Clerical          | 12 Librarian                       |
| 2 Architect                                  | 13 Manual Worker                   |
| 3 Clergy                                     | 14 Pharmacist                      |
| 4 Consultant                                 | 15 Policy Analyst                  |
| 5 Creative (actor, artist, musician, writer) | 16 Professor                       |
| 6 Dentist                                    | 17 Sales, Marketing or Advertising |
| 7 Doctor (medical doctor)                    | 18 Social Worker                   |
| 8 Engineering, Computer Science              | 19 Teacher                         |
| 9 Executive/General Management               | 20 Technical/Scientific Research   |
| 10 Middle management                         | 21 Will not be employed            |
| 11 Lawyer                                    | 22 Other (please specify)          |

**Q35x** If you selected other, please specify: \_\_\_\_\_

PB:

Q11≠"working full time/part time" → Q39

If Q15="Lehigh Valley Region" and Q33="Same City" → Q36

If Q15="Lehigh Valley Region" and Q33="Different City" → Q37

If Q15≠"Lehigh Valley Region" and Q33="Different City" → Q38

If Q15≠"Lehigh Valley Region" and Q33="Same City" → Q39

**CURRENTLY EMPLOYED/LIVING IN LVR/PLANNING TO STAY****Q36) What is the main reason you think you will stay in the Lehigh Valley region?**

[text box]

*May want to code most popular options for inclusion in SPSS data*

PB: Go to Q39

**CURRENTLY EMPLOYED/LIVING IN LVR/PLANNING TO LEAVE****Q37) What is the main reason you expect not to be in the Lehigh Valley region five years from now?**

[text box]

PB: Go to Q39

**CURRENTLY EMPLOYED/NOT LIVING IN LVR/PLANNING TO MOVE****Q38) What might persuade you to consider returning to the Lehigh Valley region?**

[text box]

PB:

**EVERYONE****Q39) Where is your hometown?**

- 1 In the Lehigh Valley region
- 2 Elsewhere in Pennsylvania
- 3 Elsewhere in the United States
- 4 Abroad
- 5 None, don't have a hometown

**40) Where did you graduate from high school?****Q40\_1** High School: \_\_\_\_\_**Q40\_2** City: \_\_\_\_\_**Q40\_3** State: \_\_\_\_\_**Q40\_4** Country (if other than US): \_\_\_\_\_

PB: IF Q15="Abroad" → Q42

**US RESIDENTS****Q41) What is the 5-digit zip code at your current residence? \_\_\_\_\_**

PB

**EVERYONE****Q42) What is your gender?**

- 1 Male
- 2 Female

**Q43) Do you consider yourself to be Hispanic or Latino origin or descent?**

- 1 Yes
- 2 No

**Q44) How would you classify yourself?**

*SPSS values: 1 = checked*

**Q44\_1** White or Caucasian

**Q44\_2** African American or Black

**Q44\_3** Asian or Pacific Islander

**Q44\_4** Alaskan Native/Native American

**Q44\_5** Other (please specify)

**Q44\_5x** If you selected other, please specify: \_\_\_\_\_

**Q45) In what year were you born?** \_\_\_\_\_

**Q46) Which of the following best represents your marital status?**

- 1 Single, never married
- 2 Married
- 3 In a committed relationship
- 4 Widowed
- 5 Divorced
- 6 Other (please specify)

**Q46x** If you selected other, please specify: \_\_\_\_\_

**Q47) Do you have children under 18 living with you at home?**

- 1 Yes
- 2 No

PB: If Q47="No" → Q49
-----------------------

**CHILDREN AT HOME ONLY**

**48) How many children do you have in the following age groups?**

0-5 years Q48\_1

6-12 years Q48\_2

13-17 years Q48\_3



PB:

**EVERYONE**

**Q49) Are you a U.S. citizen?**

- 1 Yes
- 2 No

**Q50) Which of the following best represents your current gross individual salary?**

- 1 Less than \$25,000
- 2 \$25,000 to less than \$35,000
- 3 \$35,000 to less than \$50,000
- 4 \$50,000 to less than \$75,000
- 5 \$75,000 to less than \$100,000
- 6 Over \$100,000
- 7 Choose not to answer

PB: IF Q49="Yes" skip to Q52

**NON=US CITIZENS ONLY**

**Q51) What is your citizenship?**

Country: \_\_\_\_\_

PB

**EVERYONE**

**52) What other degrees have you received since your graduation from Lehigh University?**

*SPSS values: 1 = checked*

- Q52\_1** Associate
- Q52\_2** Bachelor's
- Q52\_3** Master's
- Q52\_4** Juris Doctor
- Q52\_5** Medical Doctor
- Q52\_6** Doctoral
- Q52\_7** None

**Q53) Other than the degrees listed above, have you taken any college courses or postgraduate training since you received your bachelor's degree from Lehigh University?**

- 1 Yes  
2 No

PB: If Q52="none" AND Q53="No" → submit  
 If Q52="None" and Q53="Yes" → Q61  
 If Q52="Associate" → Q54  
 If Q52≠"Associate" AND Q52="Bachelor's" → Q55  
 If Q52≠"Associate" AND Q52≠"Bachelor's" AND Q52="Master's" → Q56  
 If Q52≠"Associate" AND Q52≠"Bachelor's" AND Q52≠"Master's" AND Q52="JD" → Q57  
 If Q52≠"Associate" AND Q52≠"Bachelor's" AND Q52≠"Master's" AND Q52≠"JD" AND Q52="MD" → Q58  
 If Q52≠"Associate" AND Q52≠"Bachelor's" AND Q52≠"Master's" AND Q52≠"JD" AND Q52≠"MD" AND Q52="Doctoral" → Q59

#### **ASSOCIATE'S DEGREE SINCE GRADUATION**

**54) You indicated you received an associate degree after receiving your bachelor's degree from Lehigh University. Please indicate your area of study, the school you graduated from and your graduation year.**

**Q54\_1** Area of study:

**Q54\_2** School Attended:

**Q54\_3** Year Graduated:

Format: 9999

PB: If Q52="Bachelor's" → Q55  
 If Q52≠"Bachelor's" AND Q52="Master's" → Q56  
 If Q52≠"Bachelor's" AND Q52≠"Master's" AND Q52="JD" → Q57  
 If Q52≠"Bachelor's" AND Q52≠"Master's" AND Q52≠"JD" AND Q52="MD" → Q58  
 If Q52≠"Bachelor's" AND Q52≠"Master's" AND Q52≠"JD" AND Q52≠"MD" AND Q52="Doctoral" → Q59  
 If Q52≠"Bachelor's" AND Q52≠"Master's" AND Q52≠"JD" AND Q52≠"MD" AND Q52≠"Doctoral" → Q60

**BACHELOR'S DEGREE SINCE GRADUATION**

55) You indicated you received another bachelor's degree after receiving your bachelor's degree from Lehigh University. Please indicate your area of study, the school you graduated from and your graduation year.

Q55\_1 Area of study:

Q55\_2 School Attended:

Q55\_3 Year Graduated:

Format: 9999

PB: If Q52="Master's" → Q56

If Q52≠"Master's" AND Q52="JD" → Q57

If Q52≠"Master's" AND Q52≠"JD" AND Q52="MD" → Q58

If Q52≠"Master's" AND Q52≠"JD" AND Q52≠"MD" AND Q52="Doctoral" → Q59

If Q52≠"Master's" AND Q52≠"JD" AND Q52≠"MD" AND Q52≠"Doctoral" → Q60

**MASTER'S DEGREE SINCE GRADUATION**

56) You indicated you received a master's degree after receiving your bachelor's degree from Lehigh University. Please indicate the specific degree you received, your area of study, the school you graduated from and your graduation year.

Q56\_1 Degree received:

Q56\_2 Area of study:

Q56\_3 School Attended:

Q56\_4 Year Graduated:

Format: 9999

PB: If Q52="JD" → Q57

If Q52≠"JD" AND Q52="MD" → Q58

If Q52≠"JD" AND Q52≠"MD" AND Q52="Doctoral" → Q59

If Q52≠"JD" AND Q52≠"MD" AND Q52≠"Doctoral" → Q60

**JD DEGREE SINCE GRADUATION**

57) You indicated you received a J.D. degree after receiving your bachelor's degree from Lehigh University. Please indicate the school you graduated from and your graduation year.

Q57\_1 School Attended:

Q57\_2 Year Graduated:

Format: 9999

PB: If Q52="MD" → Q58

If Q52≠"MD" AND Q52="Doctoral" → Q59

If Q52≠"MD" AND Q52≠"Doctoral" → Q60

**MD DEGREE SINCE GRADUATION**

58) You indicated you received an M.D. degree after receiving your bachelor's degree from Lehigh University. Please indicate the school you graduated from and your graduation year.

Q58\_1 School Attended:

Q58\_2 Year Graduated:

Format: 9999

PB: If Q52="Doctoral" → Q59

If Q52≠"Doctoral" → Q60

**DOCTORAL DEGREE SINCE GRADUATION**

59) You indicated you received a doctoral degree after receiving your bachelor's degree from Lehigh University. Please indicate the specific degree you received, your area of study, the school you graduated from and your graduation year.

Q59\_1 Degree received:

Q59\_2 Area of study:

Q59\_3 School Attended:

Q59\_4 Year Graduated:

Format: 9999

PB:

**ALL THOSE WITH ADDITIONAL DEGREE SINCE GRADUATION**

**Q60) What was the primary reason you decided to get an additional degree?** (Choose one)

- 1 To get a promotion, better job
- 2 To change careers
- 3 Encouraged/required for my job
- 4 Encouraged/required for professional advancement/certification
- 5 Personal growth/interest
- 6 Availability of funding, fellowship or post-doctoral
- 7 Other (please specify)

**Q60x** If you selected other, please specify: \_\_\_\_\_

PB: If Q53="No" → Q62
-----------------------

**COMPLETED NON-DEGREE TRAINING SINCE GRADUATION**

**61) Not including any courses taken for a degree, what kind of college courses or postgraduate training have you taken?** (Select all that apply)

*SPSS values: 1 = checked*

- Q61\_1** More courses in my field  
**Q61\_2** Courses required for professional certification  
**Q61\_3** Courses or classes for fun or enrichment  
**Q61\_4** Courses toward another degree in my field  
**Q61\_5** Courses toward a degree in a new field  
**Q61\_6** Other (please specify)

**Q61\_6x** If you selected other, please specify: \_\_\_\_\_

PB:
-----

**COMPLETED DEGREE OR OTHER TRAINING SINCE GRADUATION**

**Q62) Did an employer help pay for all or part of your education?**

- 1 Yes, in full
- 2 Yes, in part
- 3 No

## Appendix B

### CORRESPONDENCE TO PARTICIPANTS

- Pre-notification Postcard and Informed Consent Letter
- Informed Consent Form
- Penn State University IRB Approval of Research Study
- Lehigh University IRB Approval of Research Study
- Postcard Invitation to Participate in Research Study
- Email Follow-up to Postcard Invitation
- Email Reminder to Original Email Follow-up
- Second Email Reminder to Survey Participants
- Email to Non-Respondents asking them for Phone Interview Follow-Up
- Email to Non-Respondents asking them to complete the Electronic Questionnaire
- Letter to Non-Respondents asking them to complete the Electronic Questionnaire

**Informed Consent Form for Social Science Research**

The Pennsylvania State University

**Title of Project: Examining Brain Drain: Demographic, Educational and Employment Factors Influencing Lehigh University Graduates to Stay or Leave the Region**

**Principal Investigator:** *Mark Bernhard, 2274 Oak Leaf Drive, State College, PA 16803, 814-876-0238, mvb8@psu.edu*

**Advisor:** *Dr. William J. Rothwell, Professor, 305A Keller Building, University Park, PA 16802, 814-863-2581, wjr9@psu.edu*

- 1. Purpose of the Study:** The purpose of this research is to determine demographic, educational and employment factors influencing Lehigh University Graduates to stay or leave the Lehigh Valley region.
- 2. Procedures to be followed:** You will be asked to complete a survey which will include several multiple-choice questions and a small group of short answer questions. This information will be analyzed collectively with all other respondents in an effort to analyze the factors contributing to stay or leave decisions for Lehigh University graduates. You will be participating in a study which will survey a random sample from the Lehigh Classes of 2000 and 2004.
- 3. Duration/Time:** The survey should take you no more than fifteen minutes to complete.
- 4. Statement of Confidentiality:** Your participation in this research is confidential. Only Mark Bernhard, and his advisor, William J. Rothwell, will know your identity. The data will be stored and secured in a locked file in Mark Bernhard's office. In the event of a publication or presentation resulting from the research, no personally identifiable information will be shared.

The code number you will be asked to provide on your survey will be used only to ensure you do not receive follow-up reminders once you have filled out your survey. Once the survey administration has been completed with all potential respondents, the code number information will be destroyed so there is no way to trace your identity back to your responses. Again, only Mark Bernhard and William J. Rothwell will have access to this information and the identifiers will be destroyed at the completion of the study.

Your confidentiality will be kept to the degree permitted by the technology used. No guarantees can be made regarding the interception of data sent via the Internet by any third parties.

- 5. Right to Ask Questions:** Please contact Mark Bernhard at (814) 876-0238 with questions or concerns about this study.
- 6. Payment for participation:** While you will receive no payment to participate in this study, successful completion of the survey will allow you the opportunity to be entered into a drawing for a \$50 gift certificate to the Lehigh University bookstore.
- 7. Voluntary Participation:** Your decision to be in this research is voluntary. You can stop at any time. You do not have to answer any questions you do not want to answer.

You must be 18 years of age or older to consent to take part in this research study.

Completion and submission of the survey implies that you have read the information in this form and consent to take part in the research. Please print this form to keep for your records or for future reference.

If you agree to take part in this research study and the information outlined above, click "I agree" below.

\* I AGREE

\*I DISAGREE

---

Person Obtaining Consent

---

Date



Penn State IRB Approval of Research Study

IRB# 24251 - "Examining Brain Drain Demographic, Educational and Employment Factors Influencing Lehigh University Graduates to Stay or Leave the Region"

Hi Mark,

The Office for Research Protections (ORP) has reviewed the modification for the above referenced study. This request does not change the exemption status and this study continues to be exempt from IRB review. You may continue with your research.

**MODIFICATION REVIEW CATEGORY:**

**Category 2:** Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observations of public behavior unless: (i) information obtained is recorded in such a manner that human participants can be identified, directly or through identifiers linked to the participants; **and** (ii) any disclosure of the human participants' responses outside the research could reasonably place the participants at risk of criminal or civil liability or be damaging to the participants' financial standing, employability, or reputation. [45 CFR 46.101(b)(2)]

**COMMENT: Approval of the February 14, 2007 email has been granted.**

**PLEASE NOTE THE FOLLOWING:**

- Include your IRB number in any correspondence to the ORP.
- The principal investigator is responsible for determining and adhering to additional requirements established by any outside sponsors/funding sources.
- **Record Keeping**
  - The principal investigator is expected to maintain the original signed informed consent forms, if applicable, along with the research records for at least three (3) years after termination of the study.
  - This will be the only correspondence you will receive from our office regarding this modification determination.
    - **MAINTAIN A COPY OF THIS EMAIL FOR YOUR RECORDS.**
- **Consent Document(s)**
  - The exempt consent form(s) will no longer be stamped with the approval/expiration dates.
  - The most recent consent form(s) that you sent in for review is the one that you are expected to use.

- **Follow-Up**
  - The Office for Research Protections will contact you in three (3) years to inquire if this study will be on-going.
  - If the study is completed within the three year period, the principal investigator may complete and submit a **Project Close-Out Report**. (<http://www.research.psu.edu/orp/areas/humans/applications/closeout.rtf>)
  
- **Revisions/Modifications**
  - Any changes or modifications to the study must be submitted to the Office for Research Protections on the *Modification Request Form - Exemption* available on our website:  
<http://www.research.psu.edu/orp/areas/humans/applications/exemptmod.rtf>
  - **Modifications will not be accepted unless the Modification Request Form is included with the submission.**

Please do not hesitate to contact me if you have any questions or concerns.

Thank you,  
Jodi

Jodi L. Mathieu, BS, CIP  
IRB Administrator - Social Science  
Office for Research Protections  
The Pennsylvania State University  
201 Kern Graduate Building  
University Park, PA 16802

Telephone: 814-865-1775  
Fax: 814-863-8699  
<http://www.research.psu.edu/orp/>

Lehigh University IRB Approval of Research Study**MEMORANDUM****March 12, 2007**

**TO:** Mark Bernhard

**FROM:** Ruth L. Tallman, Executive Secretary IRB

**SUBJECT:** Approval of Research Protocol Involving Human Subjects (Revised)

Approval Date: 3/7/07  
(Original Approval Date: 12/8/06)

Title: "Examining Brain Drain: Demographic, Educational and Employment Factors Influencing Lehigh University Graduates to Stay or Leave the Region"

Protocol No.: ORSP 07/79

This is to advise you that your revised protocol has been approved by the Institutional Review Board for Human Subjects Research.

**Reapproval and Progress Report:** The current approval will expire 12/7/07. If you wish to continue beyond that time, you must again submit your proposal to the committee for review. The renewal request and progress report should be submitted on the Human Subjects Progress Report form, Appendix C of the Human Subjects Policy. The Progress Report Form is also available on the ORSP website (<http://www.lehigh.edu/~inors/inorsub.htm#humansubjects>) or in hard copy from the ORSP.

This protocol will be due for continuing IRB review in November 2007.

**Changes or Amendments:** If during the current year you have made changes in your approved protocol, please submit these changes immediately to the committee for further review. Use the Human Subjects Progress Report form to show changes. The proposed changes may not be initiated without IRB review and approval, except where necessary to eliminate apparent immediate hazards to subjects.

**Adverse Events:** Any injuries or other unanticipated problems involving risks to research subjects and others resulting from this study must be reported promptly to the Executive Secretary of the IRB. If the problem is serious, approval may be withdrawn pending further review by the committee.

**Completion of Study and Record Retention:** Please notify the Executive Secretary of the IRB as soon as the research has been completed. Study records, including full protocols and signed consent forms (originals) for each subject, must be kept in a secured location by the investigator for 3 years following the study's completion.

RLT;jll  
cc: W. Rothwell

P.S. A hard copy will be sent to you via U.S. mail.

--

***Confidentiality Notice: This email and any attachment to this message may contain confidential information. It is intended only for the use of the individual(s) or entity named above who have been specifically authorized to receive it. Any further distribution of this material should be strictly on a need-to-know basis. You should consider the confidential nature of the information before disseminating, distributing or copying this material. Thank you.***

Postcard Invitation to Participate in Research Study

Dear Lehigh Graduate,

I am writing to ask for your help with a research study at Penn State University. With the full endorsement of Lehigh University's Office of Institutional Research, I will be administering a survey of Lehigh graduates.

In the next few days, you will receive an email invitation to participate in a web survey. Your participation is very important. Completing the web survey will take approximately 15 minutes of your time; not responding will greatly reduce the accuracy of our final results. For your participation, you will have the opportunity to be entered in a drawing for a \$50 gift certificate to the Lehigh University bookstore.

If you have any questions, please contact me at (814) 876-0238 or [mvb8@psu.edu](mailto:mvb8@psu.edu)

Sincerely,

Mark Bernhard  
Doctoral Candidate in Workforce Education and Development  
Penn State University

Email Follow-up to Postcard Invitation

Dear Lehigh Graduate,

A few days ago you received a postcard inviting you to participate in a research study at Penn State. This research study involves graduates of your university and your participation is vital to the success of the study and the accuracy of the results.

Please visit the following web site to complete the web survey: <http://omr.outreach.psu.edu/bernhard>. You will be asked to enter this identification number: 2H6Y. This number ensures that you will not receive reminders or follow-up requests. Your responses will be kept confidential and will never be connected to your name or your contact information.

If you have questions, please feel free to call me at (814) 876-0238 or email me at [mvb8@psu.edu](mailto:mvb8@psu.edu).

Sincerely,

Mark Bernhard  
Doctoral Candidate in Workforce Education and Development  
Penn State University

Email Reminder to Original Email Follow-up

Dear Lehigh Graduate,

A few days ago you received an email inviting you to participate in a Penn State research study. This research study involved graduates of your university and your participation is vital to the success of the study and the accuracy of the results.

Please visit the following web site to complete the web survey:  
<http://omr.outreach.psu.edu/bernhard>. You will be asked to enter this identification number: **TRAD**. This number ensures that you will not receive reminders or follow-up requests. If you previously began the survey on the computer you are currently using, you may resume where you left off. Your responses will be kept confidential and will never be connected to your name or your contact information.

If you have questions, please feel free to call me at (814) 876-0238 or email me at [mvb8@psu.edu](mailto:mvb8@psu.edu).

Sincerely,

Mark Bernhard  
Doctoral Candidate in Workforce Education and Development  
Penn State University

## Second Email Reminder to Survey Participants

Dear Lehigh Graduate,

You have received two previous emails from me inviting you to participate in my doctoral dissertation research through Penn State. This research study involves graduates from the Lehigh classes of 2000 and 2004 and is studying demographic, educational and economic factors influencing Lehigh graduates to stay or leave the Lehigh Valley region. Your participation is vital to the success of the study and the accuracy of the results. The survey should take no more than fifteen minutes of your time, and by completing it, you will be entered into a random drawing for a \$50 Lehigh University bookstore gift certificate. To be eligible for the drawing, you must complete the survey no later than this Friday, March 30.

Please visit the following web site to complete the web survey:

<http://omr.outreach.psu.edu/bernhard> .

You will be asked to enter this identification number: I9VO. This number ensures that you will not receive reminders or follow-up requests. If you previously began the survey on the computer you are currently using, you may resume where you left off. Your responses will be kept confidential and will never be connected to your name or your contact information.

If you have questions, please feel free to call me at (814) 876-0238 or email me at [mvb8@psu.edu](mailto:mvb8@psu.edu). I appreciate your consideration and hope you will participate in my research study.

Sincerely,

Mark Bernhard



Email to Non-respondents Asking Them for Phone Interview Follow-up

Dear Lehigh Graduate,

As part of my doctoral research study through Penn State, I am required to follow-up with individuals who have not yet responded to my survey. As you know, this research study involves graduates from the Lehigh classes of 2000 and 2004 and is studying demographic, educational and economic factors influencing Lehigh graduates to stay or leave the Lehigh Valley region. Comparing the results of those individuals who have not responded with those who have is important for statistical reasons. Thus, your participation is important to the success of the study and the accuracy of the results.

I would like to invite you to participate in a fifteen-minute interview with me from April 16-19. Please let me know if you would be willing to participate and if so, please indicate the best days and times for you and the phone number I should call you at. You may reach me by email at [mvb8@psu.edu](mailto:mvb8@psu.edu) or by phone at (814) 876-0238. By participating in this phone interview, you will still have a chance to win a \$50 Lehigh University bookstore gift certificate through a random drawing. To be eligible for the drawing, you must complete a phone interview with me between April 16-19.

If you have questions or need more information, please feel free to call me at (814) 876-0238 or email me at [mvb8@psu.edu](mailto:mvb8@psu.edu). I appreciate your consideration and hope you will participate in my research study.

Sincerely,

Mark Bernhard

Email to Non-respondents Asking Them to Take the Electronic Survey

Dear Lehigh Graduate,

As part of my doctoral research study through Penn State, I am required to follow-up with individuals who have not yet responded to my survey. As you know, this research study involves graduates from the Lehigh classes of 2000 and 2004 and is studying demographic, educational and economic factors influencing Lehigh graduates to stay or leave the Lehigh Valley region. Comparing the results of those individuals who have not responded with those who have is important for statistical reasons. Thus, your participation is important to the success of the study and the accuracy of the results.

Please visit the following web site to complete the web survey:

<http://omr.outreach.psu.edu/bernhard>. You will be asked to enter this identification number: **PTEST**. Your responses will be kept confidential and will never be connected to your name or your contact information.

If you have questions, please feel free to call me at (814) 876-0238 or email me at [mvb8@psu.edu](mailto:mvb8@psu.edu).

Sincerely,

Mark Bernhard

Letter to Non-respondents Asking Them to Take the Electronic Survey

Dear Lehigh Graduate,

As part of my doctoral research study through Penn State, I am required to follow-up with individuals who have not yet responded to my survey. As you know, this research study involves graduates from the Lehigh classes of 2000 and 2004 and is studying demographic, educational and economic factors influencing Lehigh graduates to stay or leave the Lehigh Valley region. Comparing the results of those individuals who have not responded with those who have is important for statistical reasons. Thus, your participation is important to the success of the study and the accuracy of the results.

Please visit the following web site to complete the web survey:

<http://omr.outreach.psu.edu/bernhard>. You will be asked to enter this identification number: **PTEST**. Your responses will be kept confidential and will never be connected to your name or your contact information.

If you have questions, please feel free to call me at (814) 876-0238 or email me at [mvb8@psu.edu](mailto:mvb8@psu.edu).

Sincerely,

Mark Bernhard

Appendix C

COMPARISON OF KEY RESPONDENT VARIABLES BY  
SURVEY RETURN TIME PERIOD

Table 20. Crosstabulation of Response Group by Major Field for Lehigh University Bachelor's Degree Graduates Classes of 2000 and 2004.

Time Period	Major Field		Total
	Non Science Major	Science Major	
March 15-20			
Count	103	87	190
% within Response Group	54.2%	45.8%	100.0%
March 21-27			
Count	28	28	56
% within Response Group	50.0%	50.0%	100.0%
March 28-April 4			
Count	17	14	31
% within Response Group	54.8%	45.2%	100.0%
April 5-End			
Count	18	20	38
% within Response Group	47.4%	52.6%	100.0%
Total			
Count	166	149	315
% within Response Group	52.7%	47.3%	100.0%

Notes:

Science major field includes:

Natural & Environmental Sciences (biology, physics, chemistry, geology and astronomy)

Computer Science/Computer Engineering

Engineering (mechanical, industrial, civil, electrical, Chemical, environmental)

Nursing

Pharmacy

Public Health, Epidemiology

Non science major field includes all other major fields

Chi square = .828; Cramer's V = .051; p = .083.

Table 21. Crosstabulation of Response Group by Current Employment Status for Lehigh University Bachelor's Degree Graduates, Classes of 2000 and 2004.

Time Period	Current Employment		Total
	All Others	Work FT 20 hr/wk	
March 15-20			
Count	67	123	190
% within Response Group	35.3%	64.7%	100.0%
March 21-27			
Count	9	47	56
% within Response Group	16.1%	93.9%	100.0%
March 28-April 4			
Count	4	27	31
% within Response Group	12.9%	87.1%	100.0%
April 5-End			
Count	12	26	38
% within Response Group	31.6%	68.4%	100.0%
Total			
Count	92	223	315
% within Response Group	29.2%	70.8%	100.0%

Notes:

All others includes: working part time less than 20 hrs per week; unemployed and looking for work; full-time student; retired; disabled and unable to work; unemployed and not looking for work; full-time homemaker; and other.

Chi square = 12.132; Cramer's V = .196; p = .007.

Table 22. Crosstabulation of Response Group by Location of First Job after Graduation for Lehigh University Bachelor's Degree Graduates, Classes of 2000 and 2004.

Time Period	Location of First Job			Total
	Lehigh Valley	Elsewhere in PA	Elsewhere in US or abroad	
March 15-20				
Count	10	84	34	128
% within Response Group	7.8%	65.6%	26.6%	100.0%
March 21-27				
Count	6	9	38	53
% within Response Group	11.2%	17.0%	71.7%	100.0%
March 28-April 4				
Count	4	6	20	30
% within Response Group	13.3%	20.0%	66.7%	100.0%
April 5-End				
Count	2	8	25	35
% within Response Group	5.7%	22.9%	71.4%	100.0%
Total				
Count	22	107	115	246
% within Response Group	8.9%	43.5%	47.6%	100.0%

Notes:

Chi square = 56.639; Cramer's V = .339; p = <.001.

Table 23. Crosstabulation of Response Group by Gender for Lehigh University Bachelor's Degree Graduates, Classes of 2000 and 2004.

Time Period	Gender		Total
	Male	Female	
March 15-20			
Count	59	62	190
% within Response Group	48.8%	51.2%	100.0%
March 21-27			
Count	33	18	51
% within Response Group	64.7%	35.3%	100.0%
March 28-April 4			
Count	16	14	30
% within Response Group	53.3%	46.7%	100.0%
April 5-End			
Count	20	14	34
% within Response Group	58.8%	41.2%	100.0%
Total			
Count	128	108	236
% within Response Group	54.2%	45.8%	100.0%

Notes:

Chi square = 4.012; Cramer's V = .130; p = .260.



Table 24. Crosstabulation of Response Group by Year for Lehigh University Bachelor's Degree Graduates, Classes of 2000 and 2004.

Time Period	Class Year		Total
	2000	2004	
March 15-20			
Count	67	123	190
% within Response Group	35.3%	64.7%	100.0%
March 21-27			
Count	27	29	56
% within Response Group	48.2%	51.8%	100.0%
March 28-April 4			
Count	10	21	31
% within Response Group	32.4%	67.7%	100.0%
April 5-End			
Count	19	19	38
% within Response Group	50.0%	50.0%	100.0%
Total			
Count	123	192	315
% within Response Group	59.0%	61.0%	100.0%

Notes:

Chi square = 5.636; Cramer's V = .131; p = .134.

Table 25. Crosstabulation of Response Group by Current Salary for Lehigh University Bachelor's Degree Graduates, Classes of 2000 and 2004.

Time Period	Current Salary			Total
	Less than \$35,000	\$35,000-\$74,999	\$75,000 or higher	
March 15-20				
Count	16	68	29	113
% within Response Group	14.2%	60.2%	25.7%	100.0%
March 21-27				
Count	9	24	14	47
% within Response Group	19.1%	51.1%	29.8%	100.0%
March 28-April 4				
Count	6	16	7	29
% within Response Group	20.7%	55.2%	24.1%	100.0%
April 5-End				
Count	11	15	4	30
% within Response Group	36.7%	50.0%	13.3%	100.0%
Total				
Count	42	123	54	219
% within Response Group	19.2%	56.2%	24.7%	100.0%

Notes:

Chi square = 9.164; Cramer's V = .145; p = .165.

Table 26. Means and Standard Deviations for Employment Factor Scores by Response Group for Lehigh University Bachelor's Degree Graduates, Classes of 2000 and 2004.

Time Period	Statistic	Regional Factor	Intrinsic Job Factor	Family Friends Factor
March 15-20	Mean	2.4254	2.6499	2.5252
	n	114	119	119
	Std. Deviation	.53802	.64491	.86810
March 21-27	Mean	2.4639	2.5833	2.5784
	n	52	52	51
	Std. Deviation	.58596	.68560	.73738
March 28- April 4	Mean	2.2589	2.7011	2.4483
	n	28	29	29
	Std. Deviation	.81361	.60648	.91948
April 5- End	Mean	2.3787	2.8095	2.9429
	n	34	35	35
	Std. Deviation	.67384	.63290	.80231
Total	Mean	2.4068	2.6652	2.5897
	n	228	235	234
	Std. Deviation	.60804	.64752	.84690

Note:

Each summated factor mean represents responses to a Likert type response scale as follows: 1= not at all important; 2 = not too important; 3 =somewhat important; and 5= very important.

Table 27. Summary of Employment Factor Anova Results by Response Time Period for Lehigh University Bachelor's Degree Graduates, Classes of 2000 and 2004.

Factor	Sum of Squares	Df	Mean Square	F	Sig.
Regional Factor by Response Group					
Between groups	.849	3	.283	.763	.516
Within groups	83.077	224	.371		
Total	83.926	227			
Intrinsic Job Factor by Response Group					
Between groups	1.143	3	.381	.908	.438
Within groups	96.968	231	.420		
Total	98.111	234			
Family Friends Factor by Response Group					
Between groups	5.447	3	1.816	2.583	.054
Within groups	161.669	230	.703		
Total	167.115	233			

Table 28. Crosstabulation of Response Group by Number of Full-time Positions for Lehigh University Bachelor's Degree Graduates, Classes of 2000 and 2004.

Time Period	Number of Full-Time Positions				Total
	None	1	2	3 or more	
March 15-20					
Count	10	61	40	29	140
% within Response Groups	7.1%	43.6%	28.6%	20.7%	100.0%
March 21-27					
Count	0	17	20	16	53
% within Response Group	0.0%	32.1%	37.7%	30.2%	100.0%
March 28-April 4					
Count	2	10	12	7	31
% within Response Group	6.5%	32.3%	38.7%	22.6%	100.0%
April 5-End					
Count	2	15	13	6	36
% within Response Group	5.6%	41.7%	36.1%	16.7%	100.0%
Total					
Count	14	103	85	58	260
% within Response Group	5.4%	39.6%	32.7%	22.3%	100.0%

Notes:

Chi square = 9.262; Cramer's V = .109; p = .413.

Table 29. Crosstabulation of Response Group by Hometown Location for Lehigh University Bachelor's Degree Graduates, Classes of 2000 and 2004.

Time Period	Hometown			Total
	Lehigh Valley	Else-where in PA	Else-where in US or abroad	
March 15-20				
Count	10	27	83	120
% within Response Group	8.3%	22.5%	69.2%	100.0%
March 21-27				
Count	6	8	37	51
% within Response Group	11.8%	15.7	72.5%	100.0%
March 28-April 4				
Count	4	7	19	30
% within Response Group	13.3%	23.3%	63.3%	100.0%
April 5-End				
Count	2	10	23	35
% within Response Group	5.7%	28.6%	65.7%	100.0%
Total				
Count	22	52	162	236
% within Response Group	9.3%	22.0%	68.6%	100.0%

Notes:

Chi square = 3.390; Cramer's V = .085; p = .759.

## VITA

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Mark Bernhard is the Director of Continuing and Professional Education at the Virginia Polytechnic Institute and State University. In that capacity, Mark leads 45 faculty and staff in the development and delivery of non-credit and credit experiences including conferences, short courses, trainings and institutes. His primary focus and interest is to run a professional operation that serves as an economic and workforce development driver for the Commonwealth of Virginia, the nation, and beyond.

Prior to his current position, which he has held since November 2006, Mark spent over eight years as a senior conference planner with Penn State's Conferences and Institutes. At Penn State, Mark served as project director for two important workforce and economic development initiatives: a 21<sup>st</sup> Century Economic Development Summit--a grant-sponsored national program held in conjunction with the U.S. Department of Commerce's Economic Development Administration--and Creating Pennsylvania's Future: A Higher Education Economic and Community Development Summit. Mark received his Bachelor's Degree in Political Science from Bucknell University in 1989 and received his Master's Degree in Sport Management from The Ohio State University in 1991. Mark's primary research interest, in addition to the brain drain topic which was the focus of this research study, is succession planning, particularly for the public sector. He is a co-editor and chapter author of *Cases in Government Succession Planning: Action-Oriented Strategies for Public Sector Human Capital Management, Workforce Planning, Succession Planning and Talent Management*, to be published by HRD Press in 2008.