Assessing the impact of mandatory internships on employability of recent college graduates in Mexico

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Abstract

Internships have often been required for graduation by institutions of higher education because internships are perceived to help students increase their employability as well as provide educational value. This paper focuses on whether students’ performance as interns and the number of internships they completed are significant in determining their employability in various labor-market conditions. The study analyzed the records of 1,184 graduates at a private Mexican university who had completed undergraduate degrees in business, design, and engineering as well as mandatory internships between 2006 and 2009. A logistic regression model for job placement four months following graduation included: individual factors, personal circumstances, external conditions, and interactions with external conditions. Variables found to have a positive impact and a strong significance on the probability of employment (in order of decreasing influence) were: an excellent performance as an intern, a high degree of social connections, and high admission score. Moderately significant variables were: students’ having graduated from the engineering school, labor-market conditions during the job search, a good performance as an intern, and being male. Variables with a negative impact on employability and a strong significance on employment were the interaction between students having graduated from the engineering and technology majors and their performance as an intern. Moderately significant variables were the interaction between labor-market conditions and how early graduates began their first internship. This study revealed that the performance as an intern played an important role on employment and that employability depended on the interaction of a graduate’s personal assets, his/her family connections, and whether or not the labor market was contracting.

Introduction

Over the last century, the concept of employability has been changing from a static binary dimension defined as being qualified for a job or not to a more dynamic and complex notion of employability as an interactive and adaptive dimension to obtain meaningful jobs throughout an individual’s lifetime. The contemporary definition of employability is associated with a group of personal assets (knowledge, technical competences, parental circumstances, among others) that help one to face the changing labor market conditions and obtain employment. In this sense, employability is a relative capacity of individuals to obtain and retain employment and adapt their assets for new employment opportunities.
In response to this change, higher education institutions (HEI) have been adapting their curricula to foster characteristics of employability in their graduates. One such adaptation is an increased emphasis on experience-based learning through learning service, co-op programs, off-campus internships, practicums, and job experience activities.

Previous studies have reported that students received added value from experience-based learning activities such as internships, field experience, and practicum among others. Internships have been said to improve or develop characteristics looked-for by employers: essential skills and attributes, personal competencies, transferable skills, job qualifications, work knowledge, professional development, and adaptability and mobility to a new position.

Most of the studies noted above compared a group of students who had an internship experience with a group who had none. However, Scholz used pre and post internship questionnaires, to assess the influence of mandatory internships on scientific knowledge, general abilities, key qualifications, problem-solving ability, and aptitudes.

As mentioned, internships foster in students the desired employment characteristics and help them obtain their first job after graduation. The current study attempts to determine, for mandatory internships, whether the student’s performance as an intern and the amount of internship experience are important factors in determining employment after graduation. In general, the logistic model for the probability of employment within four months after graduation included recent graduates’ characteristics, recent graduates’ personal circumstances, conditions of the labor market, and the interactions between these factors.

**Changing notions of employability**

Gazier identified three stages of the evolution of employability: first, a binary notion of employability defined as simply the ability to be employed; second, a moderately interactive concept in which employability was defined as the ability to obtain and retain employment; and finally, an adaptive and interactive notion. Gazier suggests that individuals should show the ability to adapt skills, attributes and knowledge for future employment opportunities.

Based on the dynamic notion of employability of Hillage and Pollard, McQuaid and Lindsay synthetized a definition that includes three components: (a) individual factors which are assets such as knowledge, skills, and specific experiences; (b) personal circumstances such as socio-economic status, networking, and individual’s household conditions; and (c) external context factors related to labor market conditions, employment regulations, and the effectiveness of the job matching process.

Yorke defined employability as a probabilistic process, citing the following “a set of achievement–skills, understandings and personal attributes– that makes graduates more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community and the economy.” The uncertainty generated by contextual forces interacting with their individual factors and personal circumstances could affect a person’s
chance of obtaining employment, even if the individual precisely meets the desired attributes of employers.

Employability and the academic curriculum

One of the most important functions of HEIs is providing highly qualified human capital to the labor market. HEIs are using different academic models to better integrate curricular and extracurricular activities as formal actions to develop the student’s employability. The “spiral model for competency formation” presented in 2007 by Walther and Radcliffe includes five curricular components: (1) learning activities, (2) other curricular elements, (3) student attitude, (4) extra-curricular activities, and (5) meta-influences.16 It is worth mentioning that the “spiral model for competency formation” captures the entire curricular model with regard to the study context. The major goal of each curricular component is to enhance students’ employability characteristics to help them better face changing labor market conditions. The fourth component includes Internships that provide students with real-world experience in organizations and the opportunity to apply and develop their knowledge, skills and attributes while functioning as a professional.1, 2, 3, 4, 5 An internship typically involves three parties: the HEI, the student-intern, and the organization.

Internships are generally considered a curricular complement that engages students in learning about their professional field and provides them with real-world challenges. Internships also enable students to observe professional techniques and problems not contemplated in the classroom, giving them a better understanding of the business world.4

There are several ways to foster students’ employability via a HEI’s curriculum. One way is through experience-based learning, which requires students to use their experiences, capacities, previous knowledge, personal skills, and personality attributes to solve a problem.17 In 2010, Lichtenstein used data from the National Survey of Student Engagement (NSSE), based on responses from seniors in U.S.A. universities, to show the growing use of experience-based learning activities including internships, or similar learning activities. Nearly 86% of engineering seniors and social science seniors reported participating in such activities. The percent was 81.9% for business seniors and 74.6% for humanities seniors. These percentages show the high interest of American universities in offering experience-based learning and students’ interest in obtaining such real-world experience to enrich their employability.18

Legal framework of internships in Mexico

In Mexico, according to the Mexican Law of Professions and Law of Education, internships are not mandatory in the Mexican higher education system. The Mexican Law of Professions states that the Department of Education must authorize each internship program. An internship program is permitted for a regular student who has completed at least seventy percent of the academic program and has a QPA above of 70 of 100; a professional accredited under the Mexican Law of Professions must advise the intern. Most universities see internships as best implemented through social service, which is a requirement to obtaining a higher education degree. Social Service is mandated by The Mexican Constitution,20 and under related laws and regulations. The social service objectives allow two different approaches: (a) socially-oriented

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experience, and (b) professionally-oriented experience. The second approach opens the possibility for internships; the vast majority of Mexican universities allow this option.

Several Mexican HEIs are now integrating an internship as a mandatory part of the curricula, in addition to the federal requirement of social service. In 1993, the National Public System of Technological Institutes (NPSTI) established the first mandatory national internship policy, in addition to social service, as an obligatory curricular activity. The NPSTI's policy states that students must do at least one internship. Since 1990 internships have been mandatory in the university where this study was carried out. The University's policy allows its various academic programs to set their own requirements for the total number of internship credits (within a range of 12-24 credits). An internship has a specific objective; for example, a mechanical engineer could do internships in product development, product engineering, or manufacturing processes. Students can perform internships in the last one-and-a-half years of each academic program. In both the university under study and NPSTI systems, students are advised by a corporate coach and an academic-advisor, have a well-defined project, have their performance assessed, and create a technical report. Students receive help finding an internship mainly from the academic program director, the department chairman, an internship advisor, or the university’s Career Center; however, some of the students used their personal networks to find one.

Previous studies on the benefits of student internships

In previous studies, internship benefits to students were classified as: academic performance, desired employment characteristics, first job after graduation, and job performance.

Students improve their academic performance, and students come back to the university after an internship with more motivation. Narayanan states students consider internships as one of the most important curricular experiences to learn about occupational environments, it also provides real-life professional experience.

Previous studies have shown that internships foster employability characteristics: essential attributes such as self-discipline, positive attitude and performance at work, and ability to reconcile conflicts of interest. Studies have also showed an association with personal competences such as motivation and autonomy. Many previous studies have focused on the assessment of transferable skills. Bridges defined transferable skills as easily adaptable skills to re-use in different social or professional situations. Some examples of transferable skills have to do with: communication; oral presentations and computer skills; research skills and critical thinking; creative thinking; time management; report writing, problem-solving, abilities, and organization of work; and attitude to improve the status quo. Besides increasing students' knowledge, skills, and attributes, internships provide them with better job qualifications, professional training for specific jobs, and better ability to deal with ambiguous situations.

Internships nurture in students the desired characteristics expected by employers. This increases the likelihood of obtaining the first job after graduation. Students are also better equipped to evaluate and accept job opportunities, as a result of socialization and acculturation.
gained during the internship. In regards to *job performance*, Blair, Gault, Leach Duey, and Taylor have found that internships promote a better starting salary, better job satisfaction, and higher promotion rates. However Knouse, Tanner, and Harris mentioned that there is only a limited window of time (6 months) following graduation during which students who are looking for a job and who did an internship have an advantage over students who did not.

**Research question and hypotheses**

Employability and employment are not the same but depend on each other. Employability is a group of characteristics that a recent graduate possesses that is necessary but not sufficient to gain employment; external conditions in the labor market also play an important role.

The study addresses the research question whether students’ performance as interns and the number of internships they completed are significant in determining their employment in various labor-market conditions. A model to predict student employment within four months of graduation was built combining dimensions of various definitions of employability: as a probabilistic process; as having three components: individual factors, personal circumstances, and external conditions; as a dynamic concept and an interactive and adaptive notion. A logistic model was used to estimate the probability of employment of recent graduates, where one equal employed and zero otherwise. With this model the study tested several hypotheses:

H1) Better performance as an intern increases the recent graduate’s likelihood of employment in the first four months following graduation.

H2) A greater number of internships during college increases the recent graduate’s probability of employment in the first four months following graduation.

H3) Better personal circumstances provided by higher socio-economic status and wider social connections improve an individual’s probability of employment in the first four months following graduation.

H4) Labor-market conditions strongly affect the probability of employment for recent graduates.

In addition, the study considered control variables such as graduates’ gender, age at graduation, admission score (SAT), academic performance (QPA), earliness of students’ internship experience, and graduates’ major. The dynamic and interactive notion of employability was modeled using the graduation years (GY) to capture the changing external conditions in the labor market during job search.

**Data**

The study population was a cohort of 1,184 recent graduates at a private Mexican university who had completed their undergraduate degrees in engineering, business, or architecture and design between 2006 and 2009. The observational unit was a recent graduate from these schools.

The dependent and independent variables were collected from five databases of the university. The Alumni Relations Center routinely conducts two periodic surveys: (a) an exit
survey for graduating students (96% response rate), administered one month before graduation, which includes questions about students’ perception of curricular components and employability elements; and (b) the employment survey (92% response rate), which is a stratified random sample (by majors) for recent graduates administered within four months of graduation. Together, these two surveys provide information about whether recent graduates are employed or not, their starting salary, and how long they were unemployed prior to placement. In addition the data included the graduate’s gender, number of credits earned, grades obtained in each internship, quality point average, the number of months between the first day of a student's internship and his/her graduation, the students’ admission scores, high school affiliation, and parents’ hometown. The high school affiliation was used as a proxy variable of socio-economic status (SES). If recent graduates attended a private high school then the level of SES was assigned as high, and public high school as low socio-economic status. The location of the parents’ hometown was used as a proxy of family social connections (SC). If the student’s parents live in the same area of the university (local parents’ hometown) then the degree of SC was assigned as high, and if the parents’ hometown was not local, then the degree of SC was as low. After graduation, most of the students seek employment in the town where the university is located. Students whose parents resided in the same town as their university were considered to be better socially networked than students whose parents lived elsewhere.

Explanatory data analysis and coding variables

This section shows how each independent variable was classified, and coded. Table 1 shows the variable names and codes for the dependent variables and each independent variable as well as numbers of students represented in the dataset. Overall, the database included 1184 recent graduates from 2006 to 2009: 279 graduates in engineering and technology, 589 in business, and 316 in architecture and design. The overall percentage of employed students within four months of graduation for the four classes of recent graduates was 77%.

The three variables associated with internships are student’s performance as an intern (SPI), number of completed internships (NCI), and the earliness of student’s internship experience (Earliness). Table 1 shows the descriptive statistics of these variables. The students’ performance as an intern was evaluated by assigning one of four levels of performance, excellent, good, satisfactory or poor, based on his/her average performance as an intern. The amount of internship experience was measured with the number of internships completed during the academic program. The earliness of student’s internship experience was measured based on the remaining number of months from the student’s first day as an intern to his/her graduation. The time to start internships, according with the university policy is in the last one-and-a-half years of the academic program. The mean for the student’s performance as an intern was 93 points, the standard deviation was 6.0 points, a minimum of 72 points, and a maximum of 100 points. Four hundred thirty six new alumni had obtained an internship performance rating of excellent, and 83% of them were employed four months post graduation. Three hundred seventy six recent graduates had obtained an internship performance rating of good, and 75% of these graduates were employed. Finally,
372 recent graduates obtained performance ratings of satisfactory or poor, and 72% of them were employed. Five hundred forty five recent graduates had done 3 internships, and 76% of them were employed; 639 recent graduates had done 2 internships and 79% of them were employed.

The earliness of internship experience was measured in months from the first day as an intern to graduation day. The total mean was 17 months, approximately one-and-a-half years that is similar to the university’s policy recommendation. The standard deviation was 6 months, a minimum of 4 months, and a maximum of 58 months. The mean of recent graduates who were employed was 15 months and the mean of unemployed was 17 months.

Table 1. Dependent and independent variables: names, descriptive statistics, and coding

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Dependent Variable</th>
<th>Total</th>
<th>Coding, states of the variables (0=Baseline)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student’s Performance as an intern (mean=93 points, std dev=6 points)</td>
<td>Excellent (points &gt; 95)</td>
<td>361 (82.8%)</td>
<td>436 (36.8%)</td>
</tr>
<tr>
<td></td>
<td>Good (90 &lt; points &lt;= 95)</td>
<td>282 (75.5%)</td>
<td>376 (31.8%)</td>
</tr>
<tr>
<td></td>
<td>Satisfactory (85 &lt; points &lt;= 90)</td>
<td>147 (71.4%)</td>
<td>206 (17.4%)</td>
</tr>
<tr>
<td></td>
<td>Poor (points &lt;= 85)</td>
<td>122 (73.5%)</td>
<td>166 (14.0%)</td>
</tr>
<tr>
<td>Number of completed internships</td>
<td>Two Internships</td>
<td>500 (78.7%)</td>
<td>639 (54%)</td>
</tr>
<tr>
<td></td>
<td>Three Internships</td>
<td>412 (75.6%)</td>
<td>545 (46%)</td>
</tr>
<tr>
<td>Earliness of student’s internship experience (months)</td>
<td>Continuous variable</td>
<td>Mean=15.5</td>
<td>Mean=16.0</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>350 (79.4%)</td>
<td>441 (37.2%)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>562 (75.6%)</td>
<td>743 (62.8%)</td>
</tr>
<tr>
<td>Age at graduation</td>
<td>Continuous variable (years)</td>
<td>Mean=23.4</td>
<td>Mean=23.5</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>355 (76.4%)</td>
<td>443 (35.2%)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>565 (75.6%)</td>
<td>745 (62.8%)</td>
</tr>
<tr>
<td>Admission score</td>
<td>Continuous variable (Points)</td>
<td>Mean=1238</td>
<td>Mean=1209</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>355 (76.4%)</td>
<td>443 (35.2%)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>565 (75.6%)</td>
<td>745 (62.8%)</td>
</tr>
<tr>
<td>Academic performance</td>
<td>Continuous variable (Points)</td>
<td>Mean=87.0</td>
<td>Mean=85.8</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>355 (76.4%)</td>
<td>443 (35.2%)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>565 (75.6%)</td>
<td>745 (62.8%)</td>
</tr>
<tr>
<td>Major</td>
<td>Eng. and Tech.</td>
<td>214 (76.7%)</td>
<td>272 (33.5%)</td>
</tr>
<tr>
<td></td>
<td>Arch. and design Business</td>
<td>255 (80.7%)</td>
<td>316 (26.7%)</td>
</tr>
<tr>
<td></td>
<td>Business</td>
<td>443 (75.2%)</td>
<td>589 (49.8%)</td>
</tr>
<tr>
<td>SES</td>
<td>Private high school</td>
<td>535 (77.7%)</td>
<td>1075 (90.5%)</td>
</tr>
<tr>
<td></td>
<td>Public high school</td>
<td>777 (70.6%)</td>
<td>109 (9.3%)</td>
</tr>
<tr>
<td>Parents’ hometown as a proxy of SES</td>
<td>Parents’ hometown same as university town</td>
<td>645 (79.6%)</td>
<td>910 (64.8%)</td>
</tr>
<tr>
<td></td>
<td>Parents’ hometown different than university town</td>
<td>267 (71.4%)</td>
<td>374 (31.6%)</td>
</tr>
<tr>
<td>External conditions</td>
<td>Graduation years</td>
<td>2009 (falling employment)</td>
<td>202 (79.2%)</td>
</tr>
<tr>
<td></td>
<td>2008</td>
<td>218 (74.9%)</td>
<td>291 (24.6%)</td>
</tr>
<tr>
<td></td>
<td>2007</td>
<td>246 (79.6%)</td>
<td>309 (26.1%)</td>
</tr>
<tr>
<td></td>
<td>2006 (rising employment)</td>
<td>246 (74.7%)</td>
<td>329 (27.8%)</td>
</tr>
</tbody>
</table>

As mentioned above the study used other individual factors as controlling variables. Table 1 shows the descriptive statistics of these controlling variables. The employment figures for recent
graduates from the various schools were as follows: engineering and technology: 77%, architecture and design: 81%, and business: 75%. The total mean of the innate intellectual ability, measured with the admission score (SAT), was 1,232 points, the standard deviation was 117 points, a minimum of 978 points, and a maximum of 1,534 points. The mean of recent graduates who were employed was 1,238 points and the mean of unemployed was 1,209 points. The total mean of academic performance measured with the student’s quality points average was 87 points, the standard deviation was 7 points, a minimum of 70 points, and a maximum of 99 points. The mean of recent graduates who were employed was 87 points and the mean of unemployed was 86 points.

In regard to the variables of personal circumstances, in Mexico, there are two commonly accepted measurements for the students’ socio-economic status: the Mexican National Survey of Income and Consumption and the scale created by the Mexican Association of Market Research Agencies and Public Opinion. Using these two pieces of information and the parents’ address, one can easily approximate the socio-economic status for each new alumnus/a. However, because the parents’ address was considered confidential information, a proxy variable for socio-economic status was created by using the student’s high school affiliation, public being presumed to correlate with low socio-economic status and private being presumed to correlate with high socio-economic status. One thousand and seventy five recent graduates had high socio-economic status, and 78% of them were employed vs. low socio-economic status 71% employed. The students’ degree of social connection was modeled using another proxy, the parents’ hometown, which was described as either local (within the metropolitan area of the university) or not local. Local was presumed to correlate with a high degree of social connections and not local was presumed to correlate with a low degree of social connections. Eight hundred ten recent graduates had a high degree of social connections and 80% of them were employed vs. three hundred seventy four recent graduates who were not local, only 71% of them were employed.

Collinearity testing

The collinearity testing included the linear combination test, bivariate test, the tolerance test, the variation inflation factor test, and condition number test. Each independent variable was carefully chosen to avoid a linear combination between any two of them. The bivariate correlation test was used to look for high correlations between each pair of coded variables; results demonstrated no perfect correlation (correlation bigger than 80%). As expected the graduates’ SAT and QPA have just a 39% correlation, and a 39% correlation between their QPA and excellent student performance as an intern.

To test whether these levels of correlation could produce some collinearity problems in the logistic model; the tolerance (T) test, variation inflation factor (VIF) test, and condition number (CN) test were executed. A value of $T<0.1$, a value of $VIF>10$, and a value of $CN>15$ mean that there is a collinearity problem. The collinearity test showed that all values of $T$ were $>0.5$ and $VIF$ were $<2$, meeting the rules of thumb for $T$ and $VIF$. In order to meet the rule of thumb of $CN<15$ the continuous variables were centered at zero. This gave a $CN$ that was equal to 3.3, which is less than 15, avoiding any collinearity problems among the variables in the model.
**Best model**

The binary dependent variable of employment:

\[
y = \text{Employment} = \begin{cases} 0 & \text{if the recent graduate was unemployed} \\ 1 & \text{if the recent graduate was employed} \end{cases}
\]

It is assumed that employment is a probabilistic process. A binary outcome model gives the probability of employment (PE) for recent graduates within four months after graduation; consequently, the analysis was done using a logistic model.

\[
PE(\text{Employment} = 1 \mid \text{independent variables}) = \frac{\exp(\text{independent variables})}{1 + \exp(\text{independent variables})} \quad [1]
\]

In terms of the latent dependent variable \( y^* \), equation 2 shows the general logistic regression model for the probability of employment for this study.

\[
Employment^* = \beta_0 + \beta_1 * \text{Gender} + \beta_2 * \text{Age} + \beta_3 * \text{SES} + \beta_4 * \text{SC} + \beta_5 * \text{SAT} \\
+ \beta_6 * \text{QPA} + \beta_7 * \text{Major} + \beta_8 * \text{SPI} + \beta_9 * \text{NCI} + \beta_{10} * \text{Earliness} \\
+ \beta_{11} * \text{GY} + \beta_{12} * \text{interactions between variables} \quad [2]
\]

Table 2 shows the additive models (1 and 2) and the interactive models (3 and 4) for the study. Each previous model is nested in the new model. Model 1 had at least one independent variable for each component of employability. The best additive model was Model 2. When QPA was added to the model, the LR test was not significant (LR=1.07, df=1, pr > LR = 0.302) and the AIC increased, so QPA was not included because it did not improve the model. Only two interactions were significant. Model 3 incorporated the interaction between major and students’ performance as an intern, and Model 4 included the interaction between graduation years and the earliness of student’s internship experience. Model 4 was the best interactive model because the LR test was significant (LR=9.92, df=3, pr > LR = 0.019), the AIC decreased (from 1260 to 1248), and the goodness of fit test was significant (pr > \( \chi^2 \)=0.35). Since interactions improved the model, average marginal effects (AME) at the means were needed to take into account both the main factors and the interaction factors on the probability of employment within four months following graduation.

A potential problem is that the residual variation could differ within the group. If the homoscedasticity assumption does not hold, then the parameters are biased and the standard errors are invalid. As a result the inferences would be wrong. Williams cited Hoetker, who had shown that “. . . in the presence of even fairly small differences in residual variation, naïve comparisons of coefficients can indicate differences where none exist, hide differences that do exist, and even show differences in the opposite direction of what actually exists.” Thus, we tested each independent variable using two Stata commands: `oglm` for `logit` and `hetprob` for `probit`. Fortunately, the Model 4 did not exhibit any residual variation associated with an independent variable. QPA was tested for unobserved or neglected heteroscedasticity, as an omitted variable, both `oglm` for `logit` and `hetprob` for `probit` showed no significant unobserved heteroscedasticity.
Results

This section presents and interprets the results for Model 4. As reported in Table 2, Model 4 found with positive effect on the probability of employment the following individual factors: The probability of employment to be 2.3 times higher for students whose internship performance was rated excellent than for students whose performance was rated satisfactory or poor (p<0.01). The probability of employment is 2.1 times higher for recent graduates of engineering and technology majors than for recent graduates of business majors (p<0.05). For students with a good internship performance, the odds ratio for employment was 1.6 higher than for students with satisfactory or poor performance (p<0.05). But the potential influence on the probability of employment of good and excellent internship performance was diminished by the significant interaction with majors of engineering and technology by a factor of 0.24 for good performance as an intern (p<0.01) and 0.35 for excellent performance as an intern (p<0.05). The last column of Table 2 shows the Average Marginal Effects at the Means of the main variables in Model 4.

The innate intellectual ability as represented by SAT score was significant (p < 0.01). For one standard deviation change (std dev=117 points) in the score centered at zero (SAT of a graduate minus the mean of sample), the odds ratio for the probability of employment was expected to change by a factor of 1.2. Finally, the probability of employment was 1.4 times higher for recent male graduates than for females (p < 0.05).

In regard to personal circumstances, the probability of employment was 1.6 times higher for students who had high degree of social connections (SC) and socio-economic status (SES) than students who had low degree of SC (p < 0.01). Students who had high degree of SES also had a positive effect on the probability of employment by 1.4 times higher than students who had low degree of socio-economic status, but it was not significant.

One unexpected finding was that the probability of employment within four months following graduation increased for graduation years with falling job opportunities. As mentioned in Table 1, 2006 was the year with highest new job opportunities (> 38, 500 individuals were hired in a new position), followed next by 2007 (> 22,100 individuals were hired in a new position), and then 2008 (> 6,400 job positions were lost) and 2009 (> 23,000 employees lost their jobs), which had the fewest opportunities (Mexican Institute for Social Security, Sept 30th, 2011). Graduation year 2009 was particularly significant with odds of employment of 1.8 times higher than graduation year 2006 (p < 0.05).

The last column of Table 2 shows the results of the Average Marginal Effects at the Means. For individual factors, students with an excellent performance as an intern, the influence on the probability of employment was about 10 percent higher than for students whose performance was rated satisfactory or poor (P <0.001); and for a standard deviation change in the SAT score centered at zero, the probability of employment increased by 4 percent (p < 0.001). Males had a 6 percent higher probability of employment than females (p <0.05). In regards to personal circumstances, for recent graduates having a high degree of social connections, the probability of employment was found to be 8 percent higher than for those having low degree of social connections (p < 0.05). Finally, for the external conditions, students who graduated in 2009 were
Table 2. Additive and interactive models for the probability of employment for recent graduates

<table>
<thead>
<tr>
<th>P(Y=Employment)</th>
<th>Model 1 Additive Model</th>
<th>Model 2 Additive Model</th>
<th>Model 3 Interactive Model</th>
<th>Model 4 Interactive Model</th>
<th>Average Marginal Effects at Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Odds ratio z-statistic pr&gt;</td>
<td>z</td>
<td>Odds ratio z-statistic pr&gt;</td>
<td>z</td>
<td>Odds ratio z-statistic pr&gt;</td>
</tr>
<tr>
<td><strong>Main effects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (Male)</td>
<td>1.346 1.860 +</td>
<td>1.401 2.080 *</td>
<td>1.412 2.120 *</td>
<td>1.414 2.120 *</td>
<td>0.056 2.180 *</td>
</tr>
<tr>
<td>Age (Age)</td>
<td>0.922 -1.260</td>
<td>0.960 -0.600</td>
<td>0.967 -0.490</td>
<td>0.978 -0.330</td>
<td>-0.004 -0.330</td>
</tr>
<tr>
<td>Private high school (High SES)</td>
<td>1.289 1.100</td>
<td>1.275 1.040</td>
<td>1.338 1.240</td>
<td>1.368 1.330</td>
<td>0.055 1.260</td>
</tr>
<tr>
<td>Local parents’ hometown (High SC)</td>
<td>(H-SC) 1.630 3.210 **</td>
<td>1.610 3.100 **</td>
<td>1.572 2.920 **</td>
<td>1.554 2.830 **</td>
<td>0.076 2.740 **</td>
</tr>
<tr>
<td>SAT (admission score)</td>
<td>(SAT) 1.308 3.640 ***</td>
<td>1.258 3.070 **</td>
<td>1.243 2.890 **</td>
<td>1.239 2.830 **</td>
<td>0.036 2.860 ***</td>
</tr>
<tr>
<td>Graduation year 2007 (GY-07)</td>
<td>1.346 1.530</td>
<td>1.379 1.640 +</td>
<td>1.374 1.610 +</td>
<td>1.361 1.560</td>
<td>0.053 1.560</td>
</tr>
<tr>
<td>Graduation year 2008 (GY-08)</td>
<td>0.972 -0.150</td>
<td>1.092 0.430</td>
<td>1.065 0.300</td>
<td>1.071 0.330</td>
<td>0.012 0.320</td>
</tr>
<tr>
<td>Graduation year 2009 (GY-09)</td>
<td>1.263 1.140</td>
<td>1.537 1.860 +</td>
<td>1.555 1.890 *</td>
<td>1.777 2.350 *</td>
<td>0.082 2.230 *</td>
</tr>
<tr>
<td>Architecture and Design (A&amp;D)</td>
<td>1.453 2.120 *</td>
<td>1.320 1.360</td>
<td>1.467 1.280</td>
<td>1.450 1.230</td>
<td>0.047 1.490</td>
</tr>
<tr>
<td>Engineering and Technology (E&amp;T)</td>
<td>0.852 -0.890</td>
<td>0.837 -0.900</td>
<td>2.071 1.830 +</td>
<td>2.133 1.890 *</td>
<td>-0.015 -0.420</td>
</tr>
<tr>
<td>Good perform as an intern (G-SPI)</td>
<td>1.126 0.670</td>
<td>1.582 1.930 *</td>
<td>1.571 1.890 *</td>
<td>0.011 0.340</td>
<td></td>
</tr>
<tr>
<td>Excellent perform as an intern (E-SPI)</td>
<td>1.837 3.190 **</td>
<td>2.189 3.040 **</td>
<td>2.254 3.140 **</td>
<td>0.097 3.140 ***</td>
<td></td>
</tr>
<tr>
<td>Three internships (3-Internships)</td>
<td>0.869 -0.710</td>
<td>0.883 -0.620</td>
<td>0.850 -0.800</td>
<td>-0.027 -0.800</td>
<td></td>
</tr>
<tr>
<td>Earlyness of internship experience (Earliness)</td>
<td>0.955 -0.580</td>
<td>0.943 -0.730</td>
<td>1.018 0.110</td>
<td>-0.004 -0.310</td>
<td></td>
</tr>
</tbody>
</table>

| **Interaction effects** |                        |                        |                          |                          |                                  |
| A&D*G-SPI | 0.711 -0.840 | 0.754 -0.690 |
| A&D*E-SPI | 1.047 0.100 | 1.080 0.170 |
| E&T*G-SPI | 0.246 -2.860 ** | 0.244 -2.860 ** |
| E&T*E-SPI | 0.363 -2.100 * | 0.352 -2.150 * |
| GY-07*Earliness | 1.060 0.280 |
| GY-08*Earliness | 1.126 0.560 |
| GY-09*Earliness | 0.631 -2.240 * |

| Constant | 0.401 1.520 | 1.194 0.610 | 0.982 -0.060 | 0.971 -0.090 |

N 1184
Hosmer and Lemeshow Test (pr>|χ|2) 0.871
Likelihood Ratio Test (pr>|LR|) 0.005
AIC 1260

* pr<0.1,  † pr<0.05, ** pr<0.01, *** pr<0.001
Age is centered at zero.
SAT is standardized and centered at zero.
Earliness is standardized and centered at zero.

Hypotheses testing

The study had four hypotheses concerning the probability of employment for recent graduates.

First hypothesis was that the probability of employment would be higher for a graduate who performed better as an intern than for one who did not. A Wald test showed significance in favor of the hypothesis 1 (χ² =10.14, df=2, pr > χ² = 0.006). In this sense a better performance as an intern was shown to increase the probability of employment for recent graduates within four months after graduation; the hypothesis one was found significantly to be true.
Second hypothesis held that a greater amount of internship experience during college would increase the likelihood of employment of recent graduates. In this case the Wald test was not significant for hypothesis 2. ($\chi^2 = 0.64$, df=1, $p > \chi^2 = 0.422$). This means that this hypothesis was not proved to be true.

Third hypothesis was that students with a higher socio-economic status and more extensive social connections would have a higher probability of employment after graduation. A Wald test showed significance to hypothesis 3. ($\chi^2 = 11.44$, df=2, $p > \chi^2 = 0.003$). This means that a higher degree of these personal circumstances increase the probability of employment for recent graduates. The third hypothesis was found to be true.

Fourth hypothesis, that changing external conditions influenced the probability of employment of the recent graduates was marginally significant ($\chi^2 = 7.71$, df=3, $p > \chi^2 = 0.053$). This supports the fourth hypothesis that the graduation year influenced the probability of employment of the recent graduates.

The study also tested whether the impact of a student’s high performance as an intern had the same impact as a high degree of social connections on the probability of employment. A Wald test showed no difference between the impacts of these two factors on the probability of employment ($\chi^2 = 1.43$, df=1, $p > \chi^2 = 0.231$). This test showed that a student who had a better performance as an intern but did not have extensive social connections (e.g. students who are not local) could have a similar probability of employment as a student with low performance scores as an intern but extensive social connections.

Conclusions and discussion

The study demonstrated that contextual factors are affecting employability. It could be said that each recent graduate faced a different employability situation based on the different individual factors and personal circumstances with which they faced labor market conditions following graduation. The study demonstrated that employability is not an absolute attribute of a recent graduate; rather, it is a combination of individual, personal circumstances, and external factors.

The significant individual factors that had a positive effect on the probability of employment were excellent and good internship performance (consistent with Hypothesis 1), recent graduates of engineering and technology majors, high admission score and male. Social connections were significant, as an element of personal circumstances, and had a positive effect on the probability of employment, but socio-economic status per se was not significant. Yet, when both of them were tested simultaneously, the two elements of personal circumstances were significant (consistent with Hypothesis 3). Only the graduation year 2009 had a significant positive effect on the probability of employment within four months after graduation; but when all the graduation years were tested simultaneously they were significant determinants of the probability of employment (consistent with Hypothesis 4).
The significant variables of individual factors, personal circumstances, and the external conditions affirm the dynamic concept of employability stated by Hillage and Pollard,\textsuperscript{13} the adaptive and interactive dimension identified by Gazier,\textsuperscript{11, 12} and probabilistic process of employability articulated by Yorke.\textsuperscript{15}

The statistically insignificant and negative effect of the number of internship experiences (three internships vs. two) on the probability of employment challenged hypothesis 2. There are at least two reasons for this result: the stock of human capital theory,\textsuperscript{34} reservation wage and job matching. Each single component of a curricular model tries to contribute to the stock of human capital enabling a graduate to participate in the labor market. Dustman and Meghir state, “…wages are match specific [...] workers move jobs as a result of identifying a better match.”\textsuperscript{35} Thus, it is appears that graduates with more completed internships (human capital accumulation) could be looking for better opportunities. According to Van Ophem, Hartog and Berkhout, “the optimal strategy of an individual [i.e., a recent graduate] is to accept a job offer only if it exceeds the reservation wage.”\textsuperscript{36} One of the benefits of the internships is giving recent graduates an understanding of the wage structure and the labor market, enabling them to make better decisions about job opportunities. At the time of the survey 17% of the respondents had one job offer and 44% of them had three or more job offerings.

In regards to public or private policy, the study showed with statistical significance that good and excellent internship performance increases the probability of employment compared to satisfactory or poor internship performance for recent graduates within four months after graduation. Taking these results into account, it appears that the mandatory internship benefitted the recent graduates enhancing their employability only when their internship performance was ranked highly. The internship management process included a formal proposal, weekly advice, three progress presentations and a final presentation with participation of both the academic and the firm advisors, to evaluate the students’ performance. More than three internships had a negative effect on the probability of employment within four months after graduation compared with two internships. The earliness of internship experience did not have a significant effect on the probability of employment within four months after graduation. These two variables were not significant; in this sense better data is needed to define the optimal number of internships and the best time to start the internship experience.

Limitations

The limitations of this study are related to the measurement of some of independent variables. For socioeconomic-status, the best measure would have been parents’ annual income, but this information was not available. In addition, some of the participants in this study may have had a scholarship to a private high school, making this variable noisy. Finally, using parents’ hometown to assess the family social connections presumes that an alumnus has better networking options for employment if his/her parents live in the same city as the university. However, the study did not account for the fact that non-local students could also create their own network rather than depend solely, or in part, on their parents’ connections or that they could be employed elsewhere.
Acknowledgements

We gratefully acknowledge financial support from University of Monterey and TERNIUM during this period. We thank Indira Nair, Leonardo Reyes-González, Howard Seltman, Francisco Veloso, Jon Kowalski, Richard Williams, and Seth Richards for their valuable comments and suggestions on the study.

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