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**YES, BUT CAN THEY EARN A LIVING?
Methods for Creating an Effective System of Measuring
Labor Market Outcomes in Higher Education¹**

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ABSTRACT

A new federal initiative calls for a "College Scorecard" which will include a yet to be determined measure of graduate earnings. In this paper we examine the political context that drives this initiative and examine the nascent efforts of four states to develop statewide systems to measure the labor market outcomes of higher education. We propose five principles to support a system that would generate valid labor market measures that could cut across all segments of higher education in California, and disaggregate down to campuses, departments and programs. We present results from a large-scale pilot project using these principles that generated labor market outcomes for 44,000 college students from California State University Northridge. Finally, we recommend an agenda for creating a statewide system to measure labor market outcomes in California. A first step is to create a venue in which policymakers representing the three public segments (University of California, California State University and the California Community Colleges) and the private sector can come together to design a system. In the past, the California Postsecondary Education Commission (CPEC) would have been a natural body to do this, as it had representatives from all higher education segments. But it was essentially closed in the last round of budget cuts, so an alternative is needed. We believe that a system that emerges through voluntary cooperation will be stronger in the long run than one that is imposed legislatively. We recommend that each sector designate a high level administrator to join an ad hoc group to develop a system that will ultimately be endorsed by the boards of each system. Private institutions should be represented as well and should encourage their colleagues to join in.

On January 27, 2012 at the University of Michigan, President Obama laid out his vision for a federal initiative that would reward colleges and universities with increases in federal student aid if colleges restrained cost increases and increased their accountability to the public.¹ At the heart of this initiative is a new "College Scorecard" that, according to the White House, will "assist prospective student and their families in comparing colleges before they choose using key measures of college affordability and value."² There are five measures in the score card, beginning with the cost of attendance, a series of four graduation rates, student loan repayment rates, student loan debt, and of most interest to us an "Earnings Potential" measure.

The "Earnings Potential" measure, unlike the other measures in the scorecard, is not specified. The model scorecard simply says the following about the measure: "We don't have this information yet. Before you enroll, ask [your university] to tell you about how many of their graduates get jobs, what kinds of jobs they get and how much they typically earn."³ While few colleges and universities could produce such data now, a valid, reliable and reasonably cost efficient method for measuring earnings is closer than most people in higher education know. This paper reports on a pilot project which followed up 44,000 students who entered California State University, Northridge during the 1995-2000 period to measure their earnings one year and five years after leaving higher education using administrative data sets available in every state.

In this paper we briefly outline the renewed interest in the labor market experience of college students and then describe in detail the method we developed for measuring the earnings and labor market experience of college students, both graduates and

¹ The authors would like to thank Provost Harry Hellenbrand, of California State University, Northridge for taking a risk and supporting the project on which this paper is based. We also thank our colleagues at Labor Market Information Division of the California Employment Development Department, Steve Saxon, Spencer Wong, Andrew Wong and Jennifer Taylor who contributed to all aspects of our project.

dropouts. The system we developed can produce earnings data over time down to the department and program level. Finally, we lay out an agenda for developing a state wide system in California that can produce labor market outcomes on an on-going basis, objectively and cost efficiently, for all segments of higher education, and fill in the blank in the President's scorecard.

A. THE IMPORTANCE OF MEASURING LABOR MARKET OUTCOMES

The President's proposed scorecard did not drop out of the blue. Going back to 1983 when the *A Nation at Risk* report was first published, all of education has been under increased scrutiny, from analysts, policy makers and the public. Initially attention focused on K through 12 education, but as evidence mounted that the US higher education system was falling behind other developed countries, the attention of critics and reformers turned towards higher education. In a 2011 article Charles Kolb, President of the Committee for Economic Development, makes an increasingly common critique of the higher education system in *Change: The Magazine of Higher Learning*.

*American postsecondary education has avoided the accountability spotlight. Our postsecondary policy debates have focused mostly on input problems such as access, the cost of the federal student loan program, the value of the Pell Grant, and diversity. Issues such as graduation rates, the quality of learning, and cost effectiveness were rarely addressed: Everyone simply assumed that America had the best postsecondary education system in the world... We have gone from first to ninth among developed nations in the 33-member Organization for Economic Cooperation and Development.*⁴ (Pg. 14)

In truth, higher education has not completely avoided the "accountability spotlight"; in 2005 the State Higher Education Officers issued a special report entitled *Accountability for Better Results: A national Imperative for Higher Education* calling for an increased focus on the performance of higher education.⁵ A recent study found that in face increased demand for higher education and reduced funding many policy makers turned to performance based funding to prod higher education toward specific policy goals. But while research shows that half the states had tried some form of performance based funding, half of those who tried it abandoned it and the rules and methods used were unstable⁶.

In two states with the longest running performance funding programs labor market outcomes were included in performance. In Florida quarterly earnings for graduates six months after graduation was one performance measure. In Tennessee placement in employment was a performance measure for community colleges.⁷

The issues raised by these critiques are particularly acute in California, where a continuing budget crisis, shifting demographics and a rapidly changing economy have combined to undermine affordability, access, and the capacity of the system to support the state's economy. As a result of this critique far reaching proposals are emerging to significantly reform the system⁸. Almost all of these proposals include changes to better align higher education with the needs of the economy. These proposals in turn raise the question of how will campuses and policy makers know if they are better serving the economy, if they don't know where their students end up in the labor market?

As the nation continues to wrestle with slow economic growth and high unemployment, the questions of whether or not "college pays off" is on the mind of policymakers, parents and students. For example, a widely reported study out of the Georgetown University Center for Education and the Workforce, titled *Hard times: College Majors, Unemployment and Earnings, Not all College Degrees are Created Equal* used national data from 2009-10 to ask the question "Is college worth it?"⁹. The answer was yes, but, as the authors went on to point out, unemployment among recent college graduates was at record highs, and those with graduate degrees do not always out earn those with bachelor's degrees. These authors worked with standard national data sets and hence could not bring their analysis down to the campus level.

There is a long history of research showing that college graduates do indeed earn substantially more than workers without a college degree¹⁰. But critics, parents and current students have other questions, such as: Does college pay off for someone like me? Will I earn more or less depending on which campus or major I choose? Which college experiences affect how much I will earn? Will the increasing number of students in need of remediation achieve the same earning increases as other students?

In our view, it seems inevitable that in the current climate higher education institutions will have to produce some earnings and labor market data for their programs, whether the President's scorecard is implemented or not. The question that concerns us is how will this be done? Will the federal government or accrediting bodies impose an arbitrary and possibly poorly conceived measure? Or will each campus initiate some sort of survey of graduates, so results and populations will vary from campus to campus and state to state? We recommend another path. We believe that higher education institutions and systems can come together and develop a meaningful, comparable measure of earnings, and other labor market outcomes that can both provide public accountability and provide campuses with the data they need to make critical decisions.

B. PRINCIPLES FOR AN EFFECTIVE LABOR MARKET OUTCOMES SYSTEM

Based on our experience, which we elaborate below, we believe an effective system that can cut across states and types of institutions should adhere to five principles.

1. Follow all matriculated students over time.

This is a critical feature of an effective system. The sad fact is that nationally about 40% of student enrolling in four year institutions don't graduate. The proportion is higher in the community college sector. These students consume public resources and invest their own time and money as well. We need to know what happened to them after they left. Similarly some students transfer to other institutions and complete there, campuses should know how they did in the labor market even if they did not complete at their original institution. Without tracking graduates, transfers, and leavers, the system will not be able to show the benefit of graduating over not graduating.

We know the benefits of higher education are long term. Only measuring earnings and employment in the first or second year after graduation, leads to systematically underestimating the impact of higher education. Recent graduates often flounder in the labor market for sometime after graduation. Their advantages over non-graduates emerge as they find opportunities that are a fit for their skills. Similarly, gaps between graduates in technical fields and liberal arts fields are largest right after graduation and often diminish over time. To get the whole picture we have to see how earnings and employment evolve over time.

2. Use standard data sources available in every state.

Comparable measures cannot be calculated unless the same data are used in each state. We have identified standard data sources tied to the federal unemployment insurance system and other sources that can be used across the nation. We will elaborate them later in the paper.

3. Create standard, easily understood labor market measures.

The President's proposal essentially calls for consumer information to inform students, parents and other interested parties about the economic outcomes of higher education. This means the measure must be quickly and easily understood by non-specialists. Hence measures should be few and expressed in terms that people can understand without elaborate explanations. This means measures that may be different from those used in the scholarly research on this subject.

4. Disaggregate data to the campus and program level.

We largely know what the typical benefits of higher education are. What we don't know are the outcomes for specific campuses or programs. To meet the demand for detailed information that can inform individual decisions and be used to improve campuses and programs, data must be disaggregated down to these levels. This means that we need a system that can essentially follow all students on a regular basis, and report results quickly and efficiently to academic units and other stakeholders. At the same time, institutional stakeholders in particular must be sensitive to the difficulty of creating accurate estimates for small departments and degree programs.

5. Make results publically available.

A key point of the President's score card is that the data would be readily available for all interested parties. This means that results allowing comparisons between systems, campuses and programs must be readily accessible to typical users. In the following section we take a look at initial efforts by four states to generate measures of employment and earnings and evaluate them against these five principles.

C. WHAT ARE LEADING STATES DOING?

Using personal contacts, we identified four states that have launched at least pilot efforts to collect analyze and report earning and employment data for higher education. They include: Florida, Minnesota, Washington, and Virginia. We acknowledge that there may be other states that we have overlooked. Our purpose was not to be exhaustive but illustrative of the state of the field. Table 1 summarizes how each stat stacks up against our five principles.

Table 1 State Initiatives Compared to the Five Principals

	Florida	Minnesota	Washington	Virginia
<i>Follow all matriculated students.</i>	Florida public universities only. Graduate cohorts of bachelor, masters, PhD recipients.	Public community colleges, technical colleges, colleges and university. Exit cohorts of graduated students only.	Undergraduate Cohorts of The Evergreen State College.	Virginia public and private institutions 4 year and 2 year. But not all campuses participate. System tracks graduates only.
<i>Use standard data sources available in every state.</i>	Using "record linkage", student records and unemployment insurance wage files are matched anonymously	Using student records and Unemployment Insurance wage file	Using student records and Unemployment Insurance wage file	Using student records and Unemployment Insurance wage file
<i>Create standard easily understood labor market experience measures.</i>	Annual record matching based on fourth quarter of the calendar year (October-December). Earnings data is not adjusted for inflation.	Reports hourly earnings for each of their educational programs reported. Three different points in time are: initial, six months, and two years. The "initial" point contains earnings data from the second quarter (October-December), six month contains data from the fourth quarter, and two year contains the tenth quarter of earnings following graduation. Earnings are adjusted using the quarterly employment cost index.	Earnings change over time, 1/3/5 years. Earnings collected for the entire year, taking the highest reported employer only. For example, if a match has two part time employers within a year, only the employer with the greatest reported wages is taken into account.	Earning calculated for the quarters 3 to 6 after graduation. Students earning less than minimum wage full time are excluded. Earning adjusted for inflation. Five year trends reported by field.
<i>Disaggregate data to the program level.</i>	Two types of disaggregation. 1) By degree type within each Institution, separated into percentage found by population 2) Disaggregated by program and degree type by institution.	Program level information is available my institution only (i.e. Minnesota State University Moorhead - Accounting)	Disaggregated by employment sector rather than degree program. BA vs. BS degrees (no MA, MS, PhD)	Data can be displayed at the campus or program level. No system level data.
<i>Make data publicly available.</i>	Data available at the Florida Department of Education website (www.fldoe.org/fetpip/). Other data available involving federal employment, public assistance and corrections. Data available is starting with the 2007-2008 cohort	Minnesota's earnings data are available on the web via www.iseek.org , under "Plan Your Education". Then search for a specific institution, under the programs offered sections then select "view program performance".	Specific earnings data by program or major is not available but there are plans to make the data available in the future. Information about Washington's methodology is available at (http://www.ercd.wa.gov/), under presentations.	Data available through an interactive website. http://esm.collegemeasures.org/esm/virginia/

Florida

Students Followed

Among the fifty states, Florida has one of the most extensive college graduate follow-up programs. Although the data are available for 2007 and forward, Florida has been a pioneer and has been working in the graduate earnings field for several decades. Florida's primary goal is to find everyone who graduated from an educational system, K-20, matching not only earnings records, but also federal employment data, public assistance data and corrections data. At the higher education level Florida follows annual cohorts of graduates from its public universities who attained a bachelor's, masters and/or PhD degree.

Data Source

Florida has coined their matching technique as "record linkage" which is similar to that of other states. Using student records and unemployment insurance wage files, they anonymously link graduated students to earnings records. However, because of additional data provided by the state, they also gather information from the Department of Corrections, Department of Children and Families, Department of Economic Opportunity, U.S. Department of Defense and U.S. Office of Personal Management.

Labor Market Experience Measures

For its workforce development programs, Florida conducts “record linkage” on a quarterly basis, and for higher education it matches annually. The annual record matching is based on the fourth quarter of the calendar year (October-December). Earnings are not adjusted for inflation over time and therefore make year over year comparison difficult. Earnings information available on the web is for all graduates starting with the 2007-2008 degree recipients.

Data Disaggregation

Once the earnings data are collected, Florida has disaggregated them in two different formats. The first format is broken down by degree type within each University. (i.e. all bachelor degrees from the University of Florida). Those results are then separated into percentage found from various population groups (federal employment, continuing education, public assistance, etc). The second form of disaggregation is by various programs and degree types from different Universities. For example, bachelor's degree recipients within the accounting program from the University of Florida.

Availability

Florida has made its findings available at the Florida Department of Education website (www.fldoe.org/fetpip/). Currently there are annual cohorts starting with the 2007-2008 degree recipients.

Minnesota

Students Followed

Minnesota's graduate earnings system is geared towards potential students in their educational system. Their system follows a vast majority of their graduated students and presents the data to college seekers. Minnesota follows graduates from public community colleges, technical colleges, colleges and universities as far back as 2006.

Data Source

Minnesota uses a method similar to both Florida and Washington, linking student records to unemployment insurance wage files to match students and earnings records anonymously.

Labor Market Experience Measures

Along with earnings data, Minnesota employers also report hours worked. Thanks to these additional data, Minnesota reports hourly earnings for each of the educational programs covered. Hourly earnings are based off one quarter of reported data, either second, fourth or tenth depending on the reported point in time. These three different points in time are initial six months, and two years from exit. The “initial” point contains earnings data from the second quarter (October-December) following the end of the academic year. Six month retention contains data from the fourth quarter, and two year contains the tenth quarter of earnings following graduation. The quarterly earnings reported are adjusted using the quarterly employment cost index.

Data Disaggregation

Minnesota's available information is directed primarily towards potential students. Program level information is available by institution only i.e. Minnesota State University Moorhead – Accounting.

Availability

Minnesota's earnings data are available on the web via www.iseek.org, under “Plan Your Education”. Then search for a specific institution; under the programs offered section; then select “view program performance”.

Washington

Students Followed

Washington is in the preliminary stage of their follow-up earnings program. They are conducting earnings matching on a small scale in order to evaluate and decide the future scope of their program. Currently they are using the bachelor's degree cohorts of The Evergreen State College.

Data Source

Similar to Florida and Minnesota, Washington uses student records and unemployment insurance wage files to match students and earnings records anonymously.

Labor Market Experience Measures

Instead of quarterly data, Washington uses reported yearly data by the employer reporting the highest yearly wage. For instance, if an earnings record contains two part time employers, the employer with the highest overall reported wages would be used, and

the other wages are not added into the students' wage. Similar to Minnesota, Washington reports hours worked data as well as industry codes, which are reduced from six digits to two or three digits. Washington is not only interested in yearly earnings data, but also in evaluating earnings change through time at one, three and five year intervals.

Data Disaggregation

Currently Washington does not disaggregate data by program level but does disaggregate by degree type (BA vs. BS).

Availability

Specific earnings data by program or major are not available but there are plans to make the data available in the future. Information about Washington's methodology is available at the State of Washington Education Research and Data Center website (<http://www.ercd.wa.gov/>), under presentations.

Virginia

Students Followed

Virginia's college earnings data are produced primarily by College Measures partnering with the American Institutes for Research. Together, they are following students graduating from Virginia's community colleges and universities. The system includes many public and private colleges but not all campuses in the state. Notably missing is the main campus of the University of Virginia. Non completers are not followed up or taken into account.

Data Source

Similar to Florida and Minnesota, Virginia uses student records and unemployment insurance wage files to match students and earnings records anonymously.

Labor Market Experience Measures

Virginia's earnings data are captured for quarters 3-6 post graduation and are adjusted for inflation. However students not earning more than the minimum wage of a full time employee are not included in the earnings data. That may pose a problem because some students working within the state may not show up. For example, graduates who only manage a part time job or graduates who are out of work may not be included within the earnings calculation, causing earnings to be greater than they may otherwise be. Five year trends in earnings are reported by field using CIP codes.

Data Disaggregation

Virginia's primary reason for measuring student earnings is to compare individual colleges and programs. Their data are disaggregated by university and by program on the College Measures website.

Availability

The College Measures website houses the earnings data for Virginia at <http://esm.collegemeasures.org/esm/virginia/>. Disaggregated earnings data can be viewed by selecting either a college or an area of study at the bottom of the page.

D. THE NITTY-GRITTY OF TRANSPARENCY IN LABOR MARKET OUTCOMES

In this section we delve into the details of creating the measures that meet the five principles outlined earlier. We recognize that once a standard measure of post-college earnings and employment exists, many different sorts of people will use it. Parents, students and the counselors that advise them will want to use these numbers to help make decisions about degrees, programs and colleges. University administrators, accrediting bodies, and state legislators will likely try to evaluate the effectiveness of education, in part, with these numbers. Many measures that are desirable for research purposes become undesirable when the general public misinterprets their meaning due to the subtleties involved in their calculation. In our proposed system, we place substantial value on providing a statistic that means what most users think it means.

Problem: Unemployment and missing earnings numbers

When a student uses a post-graduation earnings number to evaluate a program or university, he or she will be interested in the whole labor market experience that follows education. Suppose, for example, that a business school claims that its baccalaureate graduates earn \$60,000 five years after graduation. Most people would reasonably think this includes both the very successful graduates earning much higher sums and the much smaller earnings of people who found lower paying jobs or were unemployed. Many projects done with the base wage file only include students who had earnings reported in every quarter after graduation. Unfortunately, this amounts to assuming that a graduate is never unemployed. The average earnings number, then, is the average earnings among those graduates who have jobs for a full year.

Many reasons exist for having no reported earnings in the base wage file. The file derives its information from unemployment insurance tax payments. Each quarter employers in covered industries must report what they paid employees to a state government agency (the Employment Development Department in California). One route to having no reported earnings is to have a job that doesn't require employers to pay into the unemployment insurance system. This includes people working in the military, some Federal Government jobs, people in the underground economy¹¹, as well some self-employed people.¹² Another route to zero reported earnings involves getting a job in another state. Of course the employer in the new state is likely to report earnings to that state's unemployment insurance tax collector, but states don't routinely share this information with each other. Finally, zero reported earnings might mean the person is unemployed.

Several devices exist to minimize this problem. We distinguish between two groups of people absent from the data set: "Zero Earners" and "Missing Observations." and wish to include Zero Earners in our numbers, but not Missing Observations. A Zero Earner did not receive any money from employment. The government may classify the person as unemployed (and provide some unemployment insurance) or the person may receive no earnings (other than TANF or other government transfer payment). A "Missing Observation" is anyone the unemployment insurance system in the State of California knows nothing about.

One can potentially recover a large number of Zero Earners by examining the unemployment insurance claims file. For these individuals, one can be sure that they are unemployed, and even report the amount they are receiving in unemployment insurance and the number of weeks they have been unemployed. California's Employment Development Department is working to provide us with this information, but we have not yet received it. As a consequence, this information has not been incorporated into the numbers presented here.

In our approach, we infer the presence of Zero Earners by making educated guesses based on individuals' successive quarters of earnings. Suppose we denote a quarter with positive earnings by an \$ and a quarter with no reported earnings with a "M." Consider four patterns of quarterly earnings.

Figure 1: Earnings Records Inclusions and Exclusion Criteria

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Decision
Individual A	\$	\$	\$	\$	M	\$	\$	\$	\$	\$	\$	\$	Included
Individual B	\$	\$	\$	\$	M	M	M	M	M	M	M	M	Excluded
Individual C	\$	\$	M	M	\$	\$	\$	\$	\$	\$	\$	\$	Included
Individual D	\$	M	M	M	M	M	M	M	M	M	M	\$	Excluded

Individual A has only one quarter of missing earnings information. In the quarters both before and after the missing number he or she is employed in a UI-covered job in California. It is unlikely (though not impossible) that this person moved to a different state or took a job with an uncovered firm for a single quarter. A fairly good guess of their earnings (ignoring transfer payments) is zero dollars. Individual B is much more likely to be a Missing Observation. In this case a good guess is the person moved out of state, or took a job not covered by unemployment insurance. In the case of B, inferring that the person has 0 earning as opposed to simply being missing is unlikely to be correct. Individuals C and D look a bit like individual A except that they have longer periods of missing data. In our approach, individuals with short periods of missing data preceded and followed by reported earnings are put in the Zero Earner category, and included in calculations. We erred on the side of caution by defining "short" to be two consecutive quarters. If there were three or more consecutive quarters of missing earnings, the individual was eliminated from our data and treated as someone who could not be found using the Base Wage file. With this method we were able to find over 70% of the students we followed.

Problem: Diverse paths through the educational system

Following the labor market outcomes for all students means getting the Social Security number of every person attending the university. In addition to regularly enrolled students in baccalaureate and graduate programs, it includes people in professional and certificate programs (such as teaching credentials). For our purposes, "all students" really means "ALL STUDENTS." Tracking only a small number of students is a tried and true tactic for misleading others about the prospects of a college education. For example, colleges may tell a student that engineering graduates earn very high salaries after graduation. The number is true enough, but if our student has a weak background in mathematics, it may be very unlikely that he/she will earn an engineering degree, and may not earn a baccalaureate degree of any kind.

Students take many paths through a college education. We've identified six paths that account for 100% of matriculating students:

- Success Stories: students who started as first-time freshmen or transfers and graduated from the same campus.

- Other People's Children: students who started as first-time freshmen or transfers and graduated at a different institution,
- Problem Children: students who started as first-time freshmen or transfers and never graduate from anywhere.
- Stars: students who started as first-time freshmen or transfer students and completed a graduate degree at some other institution.
- Graduate Completers: students who enrolled as graduate students and completed a degree. One twist here, students who enrolled as first-time freshmen and transfers at our campus and went on to complete a graduate degree at our campus are included in this group, and not in the undergraduate completers, as this represents their final exit point from campus.
- Graduate Drops: students who enrolled as graduate students and left without completing a degree.

The appropriate timing of labor market measurement differs for each of these groups. A "success story" enrolls in college, then graduates and enters the labor market immediately afterward. Hence, the moment the student leaves the institution, we can begin to follow his/her career. The group "other people's children" contains students that began college at the institution generating the list of Social Security Numbers, but transferred to another school and received a bachelor's degree there. They enter the labor market when they receive their degree, not when they leave their original institution. "Problem children" begin college, but never graduate. They "exit" the college system by giving up rather than graduating.¹³

Keeping track of these groups separately has important advantages. Importantly, members of some of these groups exit from a particular educational institution (California State University (CSUN) in our case) but don't enter the labor market right away. Thus, earnings numbers shouldn't be reported at X number of years after exiting CSUN. Instead, the numbers must be reported X years after exiting the educational system. Stars receive advanced degrees from other institutions. An earnings number one year after their exit from CSUN is likely to be what they make as somebody's research assistant at another university. This student is still in the educational system and has not yet entered the labor market. Fortunately, the National Student Clearinghouse provides data on all degrees received by students from member universities and covers 96% of all students in public and private US institutions.¹⁴

One added advantage of following all students is the ability to compare the earnings of "Success Stories" to "Problem Children." When you want to measure the value of college education in principle, you'd like to compare what a person going to college earned with what an otherwise identical high school graduate without college would earn. Of course, the "otherwise identical" part is a big problem. Comparing graduates to non-graduates gives some similar information, and is simple to compute. Since everyone in both categories was admitted to the university in question, they are meeting similar minimum entrance requirements and comparisons of earnings give an intuitive notion of the degree's value.

Problem: Inflation

In 1929 Babe Ruth was demanding to be paid \$80,000. Even humble college professors make more than that today, but Mr. Ruth definitely had a better job. \$80,000 in 1929 could buy goods and services roughly equivalent to a salary of \$1,071,831 in 2012.¹⁵ Of course, most reported earnings will not be 83 years old, but correcting for inflation can still be critical. A person earning \$80,000 in 2002 could buy as many goods and services as someone earning \$101,880 in 2012. One could reasonably look at a report suggesting that graduates a decade ago earned \$80,000 and grossly undervalue the education they received. The need for inflation corrections suggests that earnings numbers must be re-calculated regularly to identify all measures on a current dollar basis.

Inflation corrections can solve other problems as well. Suppose you were interested in determining the average (or median) earnings of students who began studying at a university in 1995, five years after exiting the college system. Since they take different amounts of time to graduate, they enter the labor market at different times. With an inflation correction, we can get a sensible understanding of what happened to the entire group.

Problem: Means, Medians and Cleaning the Data

Statistical researchers have long realized that medians have some advantages over means as a transparent measure of earnings. A mean can be very high for a department because it produced a single very wealthy alumnus. Medians insulate users from this problem. We advocate the use of medians, but worry that using medians encourages the agencies preparing the data to avoid cleaning the data of fraudulent social security numbers and other problems. While we present means in this paper, both means and medians are planned for our subsequent work.

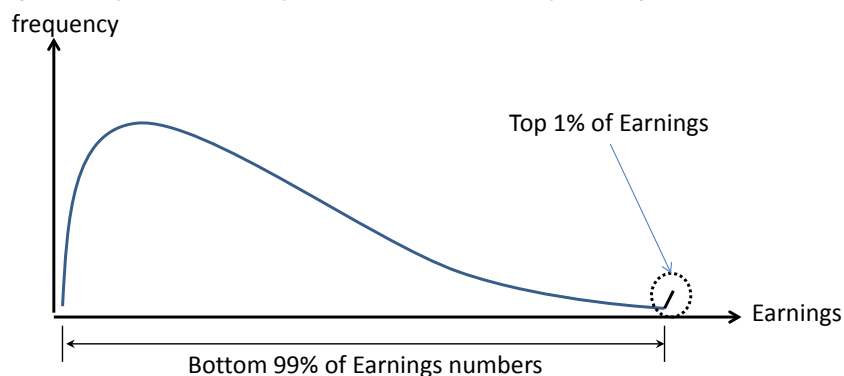
While means and medians give a broad sense of typical earnings for graduates, they provide little information concerning the spread of the distribution. To better capture this we suggest providing the range of earnings between the 25th and 75th percentile rankings. While this approach was not taken in the pilot project discussed in this paper, we do plan to calculate this in the follow up study currently in progress.

Fraud can be a serious problem with earnings data. In our pilot effort, one Social Security Number (SSN) showed up for as many as 50 employers in a quarter (never less than 17). Of 26 possible industries (as defined by 2 digit NAICS codes¹⁶) this SSN showed up 13 or more times in each quarter. Quarterly earnings averaged \$70,444¹⁷. It seems likely that considerably more than one person was using this SSN. We identified 20 SSNs with 14 or more distinct employers in a single quarter. Any statistical work done with these extreme values left in the data will generate seriously misleading conclusions. Medians, of course, minimize the impact of these problems. However, if we intend to make any other use of these data, the data need to be cleaned up.

After investigating several methods of cleaning out bad SSNs, we decided to examine the shape of the frequency distribution. Figure one illustrates a stylized version of what we found. Note that only earnings in the top 1% of the data appear to contain significant amounts of anomalous earnings numbers. Hence our method of cleaning the data was brutally simple: we deleted the top 1% of earnings numbers. This allows for more accurate fitting of maximum likelihood models of earnings distributions based on common skewed distributions used with earnings (e.g., log-normal and similar distributions). Leaving the fraudulent data in would cause even greater problems.

Of course, our approach may have eliminated a small number of very significant alumni of great interest to the development office as potential wealthy donors, but our data cannot be used to identify individuals so this is no great loss. If this procedure is adopted for use with the data provided to the California State University Chancellor's office, then we will recommend keeping them in a separate file for careful study of individuals.¹⁸

Figure 2: Stylized Frequency Distribution for Quarterly Earnings Numbers



Problem: Some desirable jobs pay less

People enroll in college in pursuit of various goals. While most of us are interested in future earnings as one goal, other goals can be very important. A program in social work is very successful if most of its graduates find work in that field. The fact that social workers earn less than MBA's is not a particularly damning criticism of the program. Ideally, we would like to have Standard Occupation Codes (SOC) to track the type of employment obtained.

Unfortunately, the California unemployment insurance tax form does not collect this information. The form does collect North American Industry Classification System codes (NAICS). These can be useful in tracking employment in some industry-focused programs, but are not terribly valuable elsewhere. It is less useful for most programs on campus to know that an alumnus works for a firm that makes chocolate (the NAICS code information) than to know that his/her position is in senior management (the SOC code information).

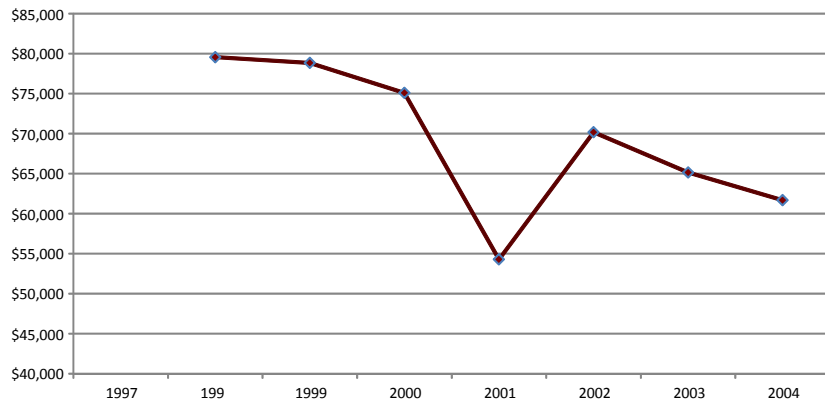
Since we can't track occupation codes, it seems most valuable to track the earnings potential of single programs over time. Such an approach allows cross-institution comparisons of alumni pursuing similar occupations. Earnings comparisons across disciplines with substantially different occupational goals are more problematic.

Problem: Labor Market Cycles

Alumni earnings numbers reflect more than the quality of the training received and the talents of the individual. They also represent labor market conditions. To be valuable, we track earnings over time so that the difference between the effect of training and the effect of job market conditions can be seen. Figure 2 presents a blatant example of this. Inflation adjusted earnings of CSUN bachelor's degree recipients in computer science five years after graduation drop precipitously in 2001. This

reflects neatly the tech-bust occurring in that period. Almost certainly it has little to do with the quality of instruction students received. Following these data over time reveals that even the end of the tech-bust did not eliminate the reductions in earnings.

Figure 3 CSUN Bachelors in Computer Science Graduates Earnings Year 5 Overtime (2010 Dollars)



Problem: Rewards to Education increase with time

Preliminary estimates using our data suggest that earnings increase with experience at a slightly decreasing rate. We estimated a fixed effects regression for the undergraduates using quarterly earnings as the dependent variable. More precisely:

$$Earnings = 208.46 * Exp - .2564 + 25836 * ExpSquared + \sum_{i=1}^{33153} \alpha_i x_i$$

(-.2564)
(.00898)

Where Exp is the number of quarters since labor market entry, ExpSquared is the square of Exp and x_i is a dummy variable for student i and α_i is its coefficient.¹⁹ The numbers in parenthesis are standard errors for the coefficients. Economists have been running regressions of this sort since seminal work by Jacob Mincer²⁰, and our results are highly consistent. It is worth noting in these Mincerian earnings regressions that the effect of education is typically smallest when initially entering the labor market. In fact, it is often true that those going to college have lower earnings initially than those going to work right out of high school, since the high school graduate has a significant advantage in on-the-job training. The earnings profile for the educated worker is much steeper, however, and the more time that passes, the greater the earnings gap between the two. This suggests that focusing on relative earnings very close to entry into the labor market is likely to understate the reward to education. For this reason, we advocate ongoing matching of earnings to students over very long periods.

OUTCOMES FOR CSU NORTHRIDGE

We applied the five principles we introduced earlier to a project to follow-up students at our own campus, California State University Northridge (CSUN). Our campus is a large comprehensive public university in Los Angeles. CSUN's current enrollment is over 36,000 by head count and over 29,000 fulltime equivalent students. The student population is diverse ethnically and economically, and 11% of enrollment is at the graduate level.

Figures 4 through 6 present a brief summary of earnings outcomes for CSU Northridge students derived from our initial analysis of student earnings. The study tracked all students who entered CSUN between 1995 and 2000, a population of 44,437. The group includes first-time freshmen, transfer students, and post-baccalaureate students, but omits some students in certificate programs. Since the majority of exits from CSUN for this cohort occurred between 1997 and 2004 we have focused on this period.

Figure 4 illustrates one of the most critical advantages of using unemployment insurance tax records to track earnings: you can find most people. We found earnings for between 60 to 80 percent of all students who exited during the 1997 to 2004 period.

Surveys of alumni earnings often generate response rates in the 10-15% range so this improvement is substantial. We do note that the percent found declines slightly over time, typically 4% to 5% for each group.

Figure 4 The Percent of Student Found with Earnings In California for Students Exiting Between 1997 and 2004 by Path Through Higher Education

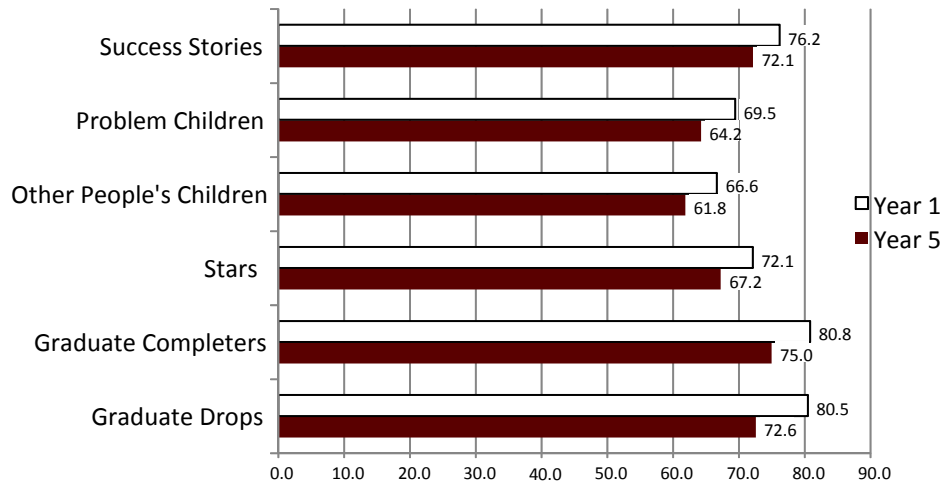
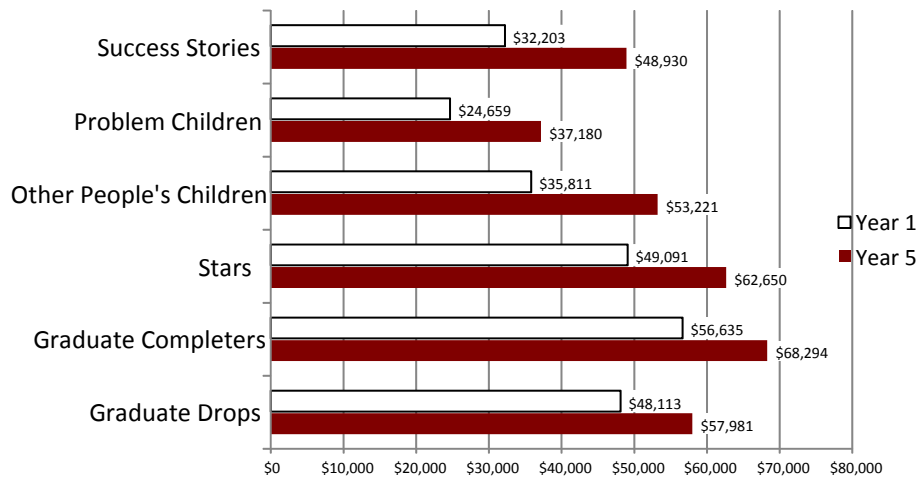


Figure 5 presents earnings one and five years out for each of our 6 paths through the higher education system. Success stories earn about 30% more than problem children one year after entering the labor market, and about 32% more after five years. Hence, the reward for completing a degree is quite substantial. Other people's children earn 11% more than success stories after 1 year and 9% more after 5 years. For those of us with graduate degrees, figure 3 also provides some reassuring evidence of the value of advanced degrees. Stars earn 52% more than success stories one year into the labor market and 28% more after five years.

Figure 5: Average Earnings for Students Exiting CSU Northridge Between 1997 and 2004 One and Five Years After Entering the Labor Market. (All numbers are in 2010 dollars)



In Figure 6 we make an attempt to compare the CSUN numbers to national benchmarks, but the comparisons are crude at best. The Survey of Recent College Graduates is fairly comparable in that its reports all earnings – even when the number is zero due to unemployment, but it reports earnings only for the science and engineering fields it focuses on most. They also include many Ph.D. granting institutions whose training programs are quite different from those on a CSU campus. Nevertheless, Figure 6 shows a comparison of the Surveys results relative to ours for Success Stories and Graduate Completers. Since the comparison is quite crude, we note only that our results for CSUN are fairly close to the national averages.

Figure 6: CSUN Earnings Compared to the Survey of Recent College Graduates during the same period.²¹ (All numbers are in 2010 Dollars)

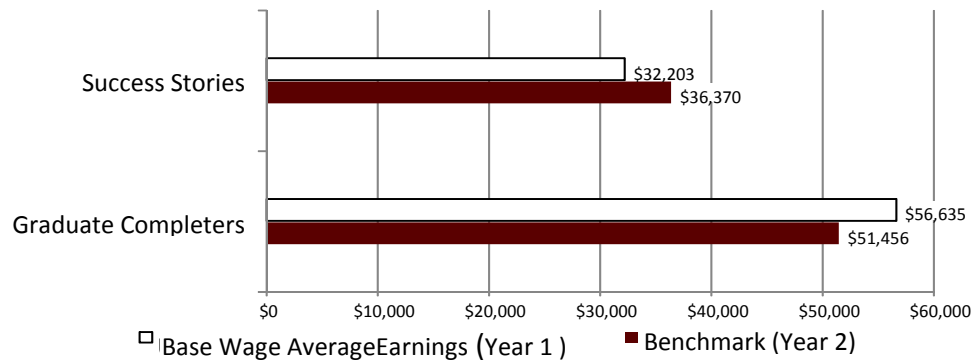


Table 2 illustrates our results for success stories across CSUN colleges differing by discipline. Comparisons across such colleges can be misleading, since they feed many different types of occupations, with different levels of pay. Doing these calculations every year would provide a significantly more useful comparison. For example, the Engineering College could compare graduates' earnings five years into the labor market now against a similar number five or ten years before, to assess the success of its programs. For most program level numbers, this is the most meaningful approach.

Table 2 Success Stories Who Entered CSUN Northridge between 1995 and 2000 and Exited Between 1997 and 2005. (All numbers are in 2010 dollars)

Year After Graduation	Avg Earnings		# Found		Total #		% Found	
	Year 1	Year 5	Year 1	Year 5	Year 1	Year 5	Year 1	Year 5
All Groups	\$32,203	\$48,930	12,114	10,945	15,900	15,171	76.2	72.1
Arts, Media and Communications	\$27,763	\$43,085	1,957	1,742	2,618	2,519	74.8	69.2
Business and Economics	\$38,802	\$55,930	3,088	2,733	4,031	3,852	76.6	71.0
Engineering and Computer Science	\$47,746	\$68,121	505	473	696	638	72.6	74.1
Education	\$27,561	\$40,801	144	129	178	175	80.9	73.7
Health and Human Development	\$29,140	\$47,328	1,840	1,677	2,342	2,245	78.6	74.7
Humanities	\$28,771	\$44,248	1,733	1,626	2,235	2,119	77.5	76.7
Social and Behavioral Sciences	\$30,002	\$46,004	2,330	2,111	3,055	2,935	76.3	71.9
Science and Mathematics	\$28,022	\$47,833	517	454	745	688	69.4	66.0

F. AN AGENDA FOR MOVING FORWARD

The fact is California lags many states in creating a state-level data system for tracking students through the education system and linking those data to labor market information. It is particularly far behind in measuring the labor market outcomes of higher education. But with a new state law that allows the higher education segments access to the Unemployment Insurance Base Wage File, the state can create a strong system for measuring labor market outcomes. In this section we lay out an agenda for moving all segments of the higher education community forward together.

Bring California's Higher Education Segments Together at a Policy Level

A first step is to create a venue in which policymakers representing the three public segments (University of California, California State University and the California Community Colleges) and the private sector can come together to design a system. In the past, the California Postsecondary Education Commission (CPEC) would have been a natural body to do this, as it had representatives from all higher education segments. But it was essentially closed in the last round of budget cuts, so an alternative is needed.

We believe that a system that emerges through voluntary cooperation will be stronger in the long run than one that is imposed legislatively. We recommend that each sector designate a high level administrator to join an ad hoc group to develop a system that will ultimately be endorsed by the boards of each system. Private institutions should be represented as well and should encourage their colleagues to join in. Legislation may be required to compel for-profit colleges and universities to join the system. In the absence of CPEC, some other third party that is not part of any one segment, such as, an accrediting body (e.g. the Western Association of Schools and Colleges (WASC), or an independent research organization could convene the group.

It seems to us that if the leaders of the public systems sought foundation funding for such an effort it would be forthcoming. These resources could be used to support a small professional staff to develop the technical aspects of the system.

A Third Party to Calculate Basic Measures

The power of third party evaluations is well recognized. If the proposed system is to have validity in the eyes of all stakeholders a third party, independent of any segment or campus, needs to operate it. Again, in the past CPEC would have been the natural group to build and maintain such as system. In its absence we recommend that the Labor Market Information Division (LMID) of EDD, which has been our partner in the pilot project, is a logical group to merge all the various data sets and produce the basic public measures of earning and employment. LMID currently generates the unemployment rate for the state, along with labor market demand forecasts and other key economic indicators so they have the needed expertise to manage the system.

Develop Measures That Are Valid Across Segments

Developing measures that can cut across the system is both a technical and political challenge. To have standard earnings measures that will work for Ph.D. graduates, undergraduate dropouts, and vocational certificate completers is not easy but can be achieved, as we have demonstrated with our pilot study. Key decisions such as who is considered to be in the labor market, how earnings are adjusted for inflation and the appropriate follow-up period are key technical questions that must be addressed if data are to be comparable across segments, institutions and programs. Without agreement on these key measurement issues, we anticipate an arms race to come up with the measure that makes each segment or campus look the best. Achieving standard measures means bringing together researchers with the technical expertise and policymakers who able to commit their segments to common measures that are valid across the higher education spectrum.

Access the National Clearinghouse and the Wage Records Interchange to Find People in Other States.

As we note in our technical discussion, the power of our model is the ability of the system to find a large proportion of the students in question. This means not only finding out if students are continuing their education, but finding them even if they are employed out of state. To do this, the follow up system should use the National Clearinghouse to find students who have moved on to other higher education institutions in California and in other states. In addition, California's EDD Department should join the Wage Record Interchange System (WRIS). WRIS is a clearing house where states share their Base Wage File so that they can follow people into other states. If California participated, it could at least identify students who had left the state and are active in other states' labor markets. Currently 23 states are participating and the number is expected to grow.²² Finally, other states, notably Florida, have gotten cooperation from the federal government in identifying students who are employed there. We believe California can get similar cooperation that will allow us to find even more students. In short, the proposed system should aim to identify as many students as possible to paint the most complete picture it can of students' labor market experience.

Advanced Research Agenda Ideas.

The measures proposed here, while valuable, only scratch the surface of what could be done with such a powerful data set. We recommend that after the basic measures are calculated and publicized, data sets be returned to system offices and campuses for research purposes. More in-depth analysis will yield many valuable insights into specific campuses and programs. Further, we suggest that sanitized data sets, which protect individual identities, be made available to researchers for more traditional research into the relationship between education and labor markets.

Funding the System

An initiative of the scope recommended here, while cost efficient in our view, is not cheap. Ideally, the state would fund the initiative, since it is a service not just to the institutions, but also to the entire state. California has missed out on two rounds of federal funding for large-scale education data systems, but it may be possible to build a labor market outcomes system into any future proposal, as previous federal proposals called for the inclusion such data.

If producing these labor market outcomes becomes a requirement for the federal government, it would be cost effective for systems and individual colleges to pool their resources to have one centralized system rather than a host of campus and system initiatives. In this case, each campus could pay a per capita fee to support a larger system.

G. CONCLUSIONS

Looking at the national policy landscape, it seems inevitable that eventually California higher education will have to become accountable for the labor market success of its students. We believe if higher education takes the initiative to develop a valid, reliable, cost efficient system that produces meaningful and understandable results, both the state's institutions and the public will be better off. We recognize that many of our colleagues may object to measures that so explicitly tie higher education to the labor market. So we will close by quoting Clark Kerr concerning the relationship between academia and the economy.

The cherished view of some academics that higher education started out on the Acropolis of scholarship and was desecrated by descent into the Agora of materialistic pursuits led by ungodly commercial interests and scheming public officials and venal academic leaders is just not true for the university systems that have developed at least since 1200 A.D. If anything, higher education started in the Agora, the market place, at the bottom of the hill and ascended to the Acropolis on top of the hill...Mostly it has lived in tension, at one and the same time at the bottom of the hill, at the top of the hill, and on many paths in between.²³

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⁵ State Higher Education Executive Officers (SHEEO) *Accountability for Better Results: A national Imperative for Higher Education*, 2005.

⁶ Dougherty, Kevin J., Natow, Rebecca S., Hare, Rachel J., Jones, Sosanya M., Vegas, Blanca E. *The Politics of Performance Funding in Eight States: Origins, Demise and Change, Final Report to the Lumina Foundation*. Community College Research Center, Teachers College, Columbia University, February 2011.

⁷ Bogue, E. Grady and Johnson, Betty Dandridge "Performance Incentives and Public College Accountability in the United States: A quarter Century Policy Audit. *Higher Education Management and Policy*, v. 22, n.2, 2010.

⁸ Douglas, John Aubrey "Re-Imagining California Higher Education" CSHE Research and Occasional Paper Series, CSHE 14.10 (October 2010) <http://cshe.berkeley.edu/publications/publications/.php?id=358>. This paper provides clear summary of California's public higher education system's current inability to meet future labor market demands and proposed restructuring ideas to increase access and efficiency in the system.

⁹ Carnevale, Anthony P., Cheah, Ban, and Strohl, Jeff *Hardtimes: College Majors, Unemployment and Earnings, Not all College Degrees are Created Equal*, Georgetown University, Center for education and the Workforce, January 12, 2012. <http://www9.georgetown.edu/grad/gppi/hpi/cew/pdfs/Unemployment.Final.update1.pdf>.

¹⁰ For recent example of research on the benefits of higher education in California see: Stiles, Jon, Hout, Michael and Brady, Henry "California's Fiscal Return on Investments in Higher Education" CSHE Research and Occasional Paper Series: CSHE 15.12 (October 2012).

¹¹ The underground economy includes people like housewives who perform jobs that have no formal pay outside the family. It also includes people who systematically don't want to report their earnings to the government perhaps to avoid taxes, or perhaps to hide criminal activity.

¹² Some self-employed people will be in the data because they have incorporated and pay themselves as an employee. When they do this they will have to file unemployment insurance tax for themselves. A complete list of tax exempt wages is listed below courtesy of Wikipedia with much longer, if far more official, documentation found at <http://www.irs.gov/pub/irs-pdf/p15.pdf> and <http://www.irs.gov/pub/irs-pdf/p15a.pdf>. "...[W]ages exempt from Federal Unemployment Tax Act payments [include]

1. Wages for services performed outside the United States.
2. Wages paid to a deceased employee or a deceased employee's estate in any year after the year of the employee's death.
3. Wages paid by a parent to a child under age 21, paid by a child to a parent, or paid by one spouse to the other spouse.

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4. Wages paid by a foreign government or international organization.
 5. Wages paid by a state or local government or by the United States federal government.
 6. Wages paid by a hospital to interns.
 7. Wages paid to newspaper carriers under age 18.
 8. Wages paid by a school to a student of the school.
 9. Wages paid by an organized camp to a student.
 10. Wages paid by non-profit organizations."

Some self-employed people will be in the data because they have incorporated and pay themselves as an employee. When they do this they will have to file unemployment insurance tax for themselves.

¹³ In our data we followed students who had matriculated between 1995 and 2000. A student had exited without graduating if there were no records of enrollment at CSUN from the quarter they were last enrolled until the last period for which we had data (fourth quarter 2010). The student was in the "problem children" category if the exited CSUN without graduating and the National Clearinghouse Database revealed no further education elsewhere. Problem children really do pose measurement difficulties as they may enroll in college somewhere else, and give up there. If so, they don't enter the labor market until after they give up the last time. We ignored this problem (being unable to correct it) and treated them as entering the labor market after they exited CSUN.

¹⁴ http://www.studentclearinghouse.org/about/clearinghouse_facts.php .

¹⁵ This number was calculated using the Consumer Price Index. We used a convenient inflation calculator provided by the Bureau of Labor statistics at http://www.bls.gov/data/inflation_calculator.htm .

¹⁶ NAICS is an abbreviation for the North American Industry Classification System.

¹⁷ In 2010 dollars.

¹⁸ This, of course, is subject to legal and ethical restrictions.

¹⁹ We have mercifully suppressed the list of values for the 33153 dummy variable coefficients. Use of these fixed effects seems justified since the F statistic testing the joint significance of the fixed effects suggests the probability.

²⁰ Jacob Mincer wrote the classic monograph on the subject *Schooling Experience and Earnings* (New York: Columbia University Press for the National Bureau of Economic Research, 1974) with relevant discussion on p. 57. Related material is available in "Why do Wage Profiles Slope Upward? Tests of the General Human Capital Model," *Journal of Labor Economics* 13 (October 1995): 736-761.

²¹ <http://www.nsf.gov/statistics/sestat/> .

²² See www.doleta.gov/performance/wris2.cfm for details on the system.

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