

Measuring Job Flows and the Life Cycle of Establishments
With BLS Longitudinal Establishment Microdata

December 29, 1999

For Presentation at the January 2000 Annual Meeting of Economists

Timothy R. Pivetz
Bureau of Labor Statistics
2 Massachusetts Ave NE
Suite 4840
Washington DC 20212

Pivetz_T@bls.gov
202-691-6493

Michael A. Searson
Bureau of Labor Statistics
2 Massachusetts Ave NE
Suite 4840
Washington DC 20212

Searson_M@bls.gov
202-691-6469

James R. Spletzer
Bureau of Labor Statistics
2 Massachusetts Ave NE
Suite 4945
Washington DC 20212

Spletzer_J@bls.gov
202-691-7393

Note: The data contained in this paper are preliminary and will be revised.

Abstract

The Bureau of Labor Statistics (BLS) is constructing a longitudinal database with monthly employment and quarterly wage data for virtually all business establishments in the United States. This longitudinal database, or LDB for short, will be used to generate high quality, high frequency, timely, and historically consistent information regarding job creation, job destruction, and the life cycle of establishments. This paper describes the new database, highlights its potential for researchers and policy-makers, and discusses how to obtain access to the microdata.

I. Introduction

The relatively recent development of longitudinal establishment datasets has generated quite a bit of excitement in both the academic and the statistical communities. The descriptive statistics coming out of these datasets illustrate the large amount of volatility at the individual establishment level that underlies the smooth time series of aggregate employment growth. This finding has not only stimulated the review and updating of existing labor market theories, but has also motivated the U.S. statistical agencies to produce longitudinal job flow statistics from their administrative datasets. The purpose of this paper is to describe a new longitudinal database from the Bureau of Labor Statistics (BLS). We highlight the potential of this new database for microdata research into topics such as job creation, job destruction, and the life cycle of establishments.

The labor demand literature and specifically the gross job flows literature has flourished during the past decade. Perhaps the most important finding from this literature is the tremendous heterogeneity in establishment level employment changes that is evident in the job creation and job destruction statistics underlying net employment growth. For example, using data spanning much of the 1970s and 1980s, Davis, Haltiwanger, and Schuh (1996) report that, on average, 5.5 percent of manufacturing jobs were destroyed and 5.2 percent of manufacturing jobs were created over a three month interval. The -0.3 percent difference between these two statistics is the average net employment growth per quarter.

Despite all that we have learned about the labor market from the existing job flows literature, the call for better data always resonates. Three aspects of existing data are often mentioned. First, much of the early work using U.S. data has been restricted to the manufacturing sector -- see, for example, Davis and Haltiwanger (1990, 1992) and Dunne, Roberts, and Samuelson (1989). Recent work using unemployment insurance data from various states has illustrated how job creation and job destruction in manufacturing may not be representative of other industries -- see Anderson and Meyer (1994), Lane, Stevens, and Burgess (1996), Foote (1998), and Spletzer (2000). Second, much of the existing empirical work on job flows, either by choice or by necessity, is based upon data that excludes the smallest establishments. Small plants with less than five employees are not in the sample frame of the Annual Survey of Manufactures used by Davis and Haltiwanger (1990, 1992), manufacturing plants with less than five employees from the Census of Manufactures are excluded by Dunne, Roberts and Samuelson (1989), and the sample used by Anderson and Meyer (1994) includes only firms with at least 50 employees. And finally, many of the existing studies use annual data, whereas the ideal data for studying gross job flows would be quarterly or perhaps even monthly. Data at high frequencies are necessary for analyzing seasonal patterns in employment growth, or analyzing the short run employment growth immediately following birth and immediately preceding death.

The longitudinal database introduced in this paper is not subject to any of the three limitations just mentioned. The microdata from which we construct the database are the unemployment insurance (UI) reports that employers in the U.S. are required to file with the states. These data are essentially a quarterly census of establishments in all industries, which implies that the job creation and job destruction statistics derived from the longitudinal database have the potential to be among the most important economic indicators published by the statistical agencies of the U.S. government.

In the following section of the paper, we define job creation and job destruction, and we describe how these statistics relate to those already published by the Bureau of Labor Statistics. A detailed description of the UI microdata and the construction of the longitudinal dataset is provided in sections three and four of this paper. Because the forthcoming BLS publications will distinguish between establishments that are expanding, contracting, opening, and closing, special attention is given in section four to the description of the longitudinal linkage algorithm used to minimize the incidence of spurious births and deaths. We discuss researcher access to the microdata in section five. Section six describes the methodology used in constructing tables of job creation and destruction statistics.

II. Concepts and Definitions

The cross-sectional or "snap-shot" employment statistics that are published by the Bureau of Labor Statistics are invaluable for policy-makers, researchers, and the business community. However, comparing aggregate employment levels at two points in time only states the net change in employment, and does not inform us with regard to how many establishments are either expanding or contracting, nor by how much these establishments are either expanding or contracting. This can easily be seen by an example.

Assume that payroll employment in September 1998 is 102.7 million jobs, and that payroll employment in December 1998 is 103.5 million jobs. Net employment growth is 700,000 jobs during the quarter. This net employment growth is consistent with many scenarios, including any of the following three: 1) 700,000 jobs created and 0 jobs destroyed, 2) 8.1 million jobs created and 7.4 million jobs destroyed, or 3) 103.5 million jobs created and 102.7 million jobs destroyed. Scenario #1 illustrates a labor market where no employer decreased the size of his establishment, and all employment growth is attributable to establishments either opening or expanding. Scenario #3 illustrates a labor market where all establishments in the previous quarter shut down and all establishments in the current quarter started up. The true underlying labor market is, of course, somewhere in between these two extreme cases. Scenario #2 illustrates one possible intermediate case.

Net employment growth is nothing more than a comparison of cross-sectional employment at two points in time: how many more jobs exist at the latter time period compared to the earlier time period. Thinking about how this net employment growth occurred, some establishments have expanded, some have contracted, and some establishments have either opened or closed. Job creation is defined as the employment growth contributed by establishments that expand or start up, and job destruction is defined as the employment decline resulting from establishments that contract or shut down. The sum of job creation and job destruction is the net change in employment. It is obvious that longitudinal microdata at the establishment level is required to decompose net employment change into its components of job creation and job destruction, and this decomposition is one of the motivations for the longitudinal establishment database being developed by BLS.

It is informative to present job creation and job destruction statistics as rates as well as a count of the number of jobs. Notationally, let E_t denote aggregate employment in quarter t , let e index establishments, define S^+ as the sector of expanding and opening establishments, and define S^- as

the sector of contracting and closing establishments. Net employment growth over the quarter is $(E_t - E_{t-1})$, and the quarterly net employment growth rate is written as

$$\left[\frac{E_t - E_{t-1}}{\{E_t + E_{t-1}\} / 2} \right].$$

Job creation is defined as the net employment growth for those establishments that expand or open during the quarter, and the average quarterly job creation rate is defined as

$$\left[\sum_{e \in S^+} \left(\frac{E_t^e - E_{t-1}^e}{\{E_t + E_{t-1}\} / 2} \right) \right].$$

Similarly, job destruction is defined as the net employment growth for those establishments that contract or close during the quarter, and the average quarterly job destruction rate is defined as

$$\left[\sum_{e \in S^-} \left(\frac{|E_t^e - E_{t-1}^e|}{\{E_t + E_{t-1}\} / 2} \right) \right].$$

As is evident in the above equations, we use the mean of employment in the current and the previous quarter as the measure of employment in the denominator when converting employment levels into rates. The reason for this is that we will be publishing job creation and job destruction rates by employment size class, and this introduces certain statistical issues. As noted by Davis, Haltiwanger, and Schuh (1993, 1996), defining "size according to base-year employment leads to a regression fallacy, which in turn paints an overly favorable picture of the relative job growth performance of small employers."

The difficulties when using the base year in the denominator of a growth rate can be illustrated by example. Assume that an establishment grows from 1 employee to 2 employees, and then declines back to 1 employee. Using employment in the previous quarter in the denominator, the growth rate in the first quarter is 100 percent (2 minus 1 divided by 1) and the growth rate in the second quarter is negative 50 percent (1 minus 2 divided by 2). If we use the average employment across two quarters in the denominator, the growth rate in the first quarter is 67 percent (2 minus 1 divided by 1.5) and the growth rate in the second quarter is negative 67 percent (1 minus 2 divided by 1.5). This simple example illustrates how using the average of the current and previous quarter employment in the denominator portrays expansion and contraction symmetrically.

III. The Data: Sources and Definitions

The source of the establishment microdata used for constructing the new BLS longitudinal database (often referred to as the LDB) is the quarterly Unemployment Insurance microdata. All employers subject to state Unemployment Insurance (UI) laws are required to submit quarterly contribution reports detailing their monthly employment and quarterly wages to the State

Note: The data contained in this paper are preliminary and will be revised.

Employment Security Agencies (SESAs). After the microdata are edited and, if necessary, corrected by the State Labor Market Information staff, the states submit these data and other business identification information to the Bureau of Labor Statistics as part of the Covered Employment and Wages program (ES-202), which is a cooperative endeavor of BLS and the States. The data gathered in the ES-202 program are a comprehensive and accurate source of employment and wages, and provide a virtual census (98%) of employees on nonfarm payrolls. According to *Employment and Wages*, an annual publication of the BLS, employers in private industry in 1998 provided State Employment Security Agencies with quarterly UI tax reports for an average of 105.1 million wage and salary workers in approximately 7.4 million business establishments. For more information on the ES-202 program, see U.S. Bureau of Labor Statistics (1997) and Farmer and Searson (1995).

Several definitions deserve mention. An establishment is an economic unit, such as a factory or store, which produces goods or provides services. An establishment is usually a physical location and engaged in one or predominantly one type of economic activity for which a Standard Industrial Classification (SIC) code is applicable. The industry code of an establishment is assigned based on its primary activity, which is determined by the primary product or groups of products produced or distributed (or services rendered) by the establishment.

Employment for a given month is the number of covered workers (whose wages are subject to UI taxes) who earned wages during the pay period which includes the 12th of the month. The employment count includes all corporation officials, executives, other supervisory personnel, clerical workers, wage earners, persons on paid vacations or paid sick leave, pieceworkers, part-time workers, and workers earning wages which are nontaxable under UI because the taxable wage limit has been exceeded. The employment count excludes workers who were on leave without pay or who earned no wages during the applicable pay period because of strikes, work stoppages, or temporary layoffs. Covered private industry employment excludes proprietors, the unincorporated self-employed, unpaid family workers, and certain farm and domestic workers.

Employers report employment and wages on an individual establishment basis. Multiple Worksite Reports are used to collect separate employment and wage data for each establishment owned by employers with multiple locations within a state. The Multiple Worksite Reports were instituted as part of the Business Establishment List Improvement Project (BEL breakouts), which was a major initiative conducted jointly by the states and the Bureau of Labor Statistics in 1990 and 1991. The purpose of the BEL breakouts was to have businesses report their employment and wages at the establishment level rather than the reporting unit level that was used prior to the first quarter of 1991. Since the first quarter of 1991 (with the exception of two states that implemented the BEL breakouts in 1992), every multi-establishment employer with ten or more employees in secondary physical locations covered under one UI account has been requested (and in 21 states are legally required) to provide establishment level data. A small number of consolidated records (1.4% in the first quarter of 1999) remain on the file because they fall below the reporting criteria or employers refuse to disaggregate their worksites.

The quarterly UI microdata contain information on monthly employment. The publications from the longitudinal database will use employment in the third month of the quarter as the measure of the establishment's quarterly employment. This decision was made because comparisons between specific points in time are easier to interpret than are comparisons of

quarterly averages. The averaging of monthly employment within a quarter distorts the timing of when changes in employment actually occurred, especially employment changes that occur when an establishment shuts down. Furthermore, monthly employment flows constructed from data reported quarterly might be affected by unknown problems such as quarterly seam effects and other forms of recall bias -- this is an area for further research.

Previous authors have raised questions about the quality of job flows data constructed from administrative data from the Unemployment Insurance system. The contention is that UI reporting units do not correspond precisely to either establishments or enterprises, and businesses can and do change the level of aggregation at which they report information. We have two responses. First, this criticism applies to the data collected before the introduction of the Multiple Worksite Reports, and is not an issue for the recent ES-202 data reported at the establishment level. Since the introduction of the Multiple Worksite Reports in 1991, virtually all data transmitted to the BLS are at the establishment level of reporting and are standardized with respect to content, structure, and BLS definitions. Second, we must be careful when distinguishing between the ES-202 microdata and the UI wage records microdata, both of which have been used to study job creation and job destruction. The wage records refer to the earnings of each individual each quarter, and these microdata are reported at the UI account level rather than at the establishment level. The states do not transmit the quarterly wage records to the BLS.

IV. Construction of Longitudinal Microdata

BLS uses two sets of information to match establishments across quarters. The first is the SESA-ID, which is the UI account number in combination with the establishment's reporting unit (RU) number. The SESA-ID is the establishment's unique identifier that the State Employment Security Agencies transmit to BLS. Although the RU number is not used for administration of the Unemployment Insurance system, the RU number is assigned by the state (through information collected in the Multiple Worksite Reports) for BLS purposes of identifying establishments within a multi-establishment employer in that state.

The second piece of information in the UI microdata used for longitudinal linking is the predecessor and successor numbers. The predecessor number is the SESA-ID of the establishment that previously owned the establishment in the event of either a change in ownership or a change in reporting configuration (i.e. a breakout of units). The successor number is the SESA-ID of the establishment that will take over the establishment in the event of either a change in ownership or a change in reporting configuration (i.e. a consolidation of units). The term "breakout" refers to a transition from a single establishment employer to a multi-establishment employer, and the term "consolidation" refers to a transition from a multi-establishment employer to a single establishment employer. These breakouts and consolidations may be actual economic events representing business expansions and contractions, or merely administrative reporting changes due to whether or not the business completes the Multiple Worksite Report.

In addition to matching on SESA ID and matching on predecessor and successor numbers both within and across quarters, another step undertaken to link the establishment level microdata across quarters is a probability-based statistical match that attempts to identify two establishments with different SESA IDs as continuous. This match is based upon comparing

births in the current quarter to deaths in the previous quarter and looking for occurrences such as the same name, the same address, same phone number, and so forth.

The longitudinal linkage system developed by the BLS specially handles establishments that are imputed by the state agency because of a failure to report data. A business may not report data because of negligence or because of an ownership change. When an employer fails to report, the state imputes data when the status of the establishment is unknown. This might result in linkage difficulties in cases of ownership change, since the establishment may not be given a chance to match to its successor because it is imputed and matches to itself. Thus, when there are fully imputed (all three months of employment and quarterly wages) current quarter single establishment units that have a SESA ID match to the prior quarter, the prior quarter records involved are returned to the matching process after their identification. These prior quarter records are then eligible to match in all other components of the matching process. At the end of the matching process, if the prior quarter records were not linked to another current quarter record, they will be rejoined with their fully imputed current quarter counterpart.

Almost all of the establishments identified as continuous from quarter to quarter are matched by SESA ID (between 95 and 97 percent each quarter). Although the predecessor-successor match and the probability-based match link only a relatively small number of establishments, these matches have a significant effect on the number of births and deaths. See Robertson, Huff, Mikkelson, Pivetz, and Winkler (1997) for a more detailed description of the matching algorithm used for the LDB. The linkage system also assigns a unique number, the LDB Number, to each establishment that is maintained across changes in SESA ID. This LDB Number allows establishments to be tracked longitudinally for purposes such as sampling and creating tabulations.

A natural question to ask is whether our longitudinal linking algorithm might mistakenly code any continuous establishments as deaths in the previous quarter and births in the current quarter, and vice-versa. We have spent a considerable amount of time investigating this question. Establishments in the state Unemployment Insurance system are required not only to submit establishment totals of monthly employment and quarterly wages, but are also required to submit the name, Social Security Number, and quarterly wages of every employee during the quarter. Only the establishment level totals are submitted to BLS; the individual "wage records" are not submitted to BLS by the states. However, for several states, BLS obtained the individual wage records for several consecutive quarters, and for one of these states we have examined the mobility of persons from the employers we classify as births and deaths. If a sizable group of individuals move as a group from a closed account (death) to a new account (birth), this action suggests a missed link. As reported by Pivetz and Chang (1998), analysis of the wage records supports the validity of the matches identified by the LDB Record Linkage System. Specifically, over 99 percent of the SESA ID matches analyzed and 92 percent of predecessor and successor matches were verified by the underlying wage records. The analysis of the wage records also indicates a few additional links between businesses not identified by the LDB System, which implies that additional research is required to explore the sources and consequences of any additional valid establishment links.

V. Researcher Access to the Longitudinal Database

Note: The data contained in this paper are preliminary and will be revised.

The BLS plans to publish quarterly and annual tabulations of job creation and job destruction. Current plans include producing these statistics for the entire U.S. economy, by industry, by state, by size, and by age of firm. These tables will be processed through a non-disclosure review to insure that we consistently protect the identity of the establishments. Although these tables should satisfy the majority of our customers, we do anticipate requests by researchers who want to go beyond these tabulations and examine these microdata in far more detail.

What is the optimal tradeoff between data confidentiality and data access? The suppliers of the data (the businesses), and BLS as custodians of the data, are concerned about the sensitivity of the employment and wage data being stored on the same microdata record as characteristics such as location, size, and industry that could easily identify the specific establishment. The consumers of these data (the researchers) desire access to the longitudinal database because it will provide a wealth of data never before available which potentially can be used to address important research questions relevant to economic theory, employment and wage policy, and a general understanding of the U.S. economy. As part of the process of constructing the longitudinal database, BLS has been considering how to maximize access to the microdata by qualified researchers while minimizing the risk of a violation of respondent confidentiality.

Historically, access has only been granted to confidential BLS microdata when authorized by the Commissioner of Labor Statistics for a statistical or research purpose that furthers the mission and function of BLS. Although some confidential data from the National Longitudinal Survey of Youth (NLSY) and the Census of Fatal Occupational Injuries (CFOI) are made available to outside researchers under special agreements, even these data do not contain all the data elements that could identify an individual or business. With the exception of the NLSY and the CFOI, most previous access to confidential BLS microdata by outside researchers has been through the ASA/NSF/BLS senior research fellows program. Researchers obtaining access to BLS confidential microdata must be affiliated with an organization, and a high official in the organization (a Dean of a university or a Vice President of the organization) signs the agreement with BLS committing the organization to abide by BLS confidentiality policy. The researchers sign BLS non-disclosure affidavits pledging to protect the data and not release the data to anyone.

With regard to access to the longitudinal establishment microdata, perhaps the two most important questions are who will be able to use the data, and under what conditions? Researchers wishing to use the confidential microdata must submit a formal written proposal for consideration. These proposals are reviewed on a case-by-case basis to determine their technical merit and whether they meet the aforementioned goal of furthering the mission and functions of BLS. Researchers must work for organizations eligible to participate in Intergovernmental Personnel Act assignments such as institutions of higher education, non-profit organizations that principally offer professional advisory, research, education, or development services, or organizations representing state or local governments. A format fee structure is being developed.

Approved outside researchers must perform their work on-site at the BLS national office in Washington, D.C. No confidential microdata can be removed from the building; however, researchers may take summary or statistical output with them following review by BLS staff. Just as obtaining access to the data requires a proposal review, prior to public dissemination the research resulting from the access has to undergo a several-week review by BLS staff for potential breaches of confidentiality.

Note: The data contained in this paper are preliminary and will be revised.

The Bureau of Labor Statistics has approved three sets of outside researchers to use the longitudinal establishment microdata. Professor Alan Krueger of Princeton University examined the issue of minimum wages using fast-food restaurants in the states of New Jersey and Pennsylvania; the resulting research paper is Card and Krueger (1998). Two new studies were approved recently with one analyzing the employment and wage effects of another state raising its minimum wage and the other examining the spatial clustering of businesses in the U.S.

VI. LDB Table Methodology

The LDB System is being programmed to produce various tabulations summarizing job creation, job destruction, and the opening and closing of establishments. Currently the system is producing two sets of tables – Quarterly Establishment Employment Levels and Flows and Quarterly Establishment Levels and Flows. These tables are disaggregated by the variables Industry Division, State, and Employment Size Class. In the future, the system will disaggregate these data by wage size class and establishment age as well.

Definitions

The standard layout of the LDB Tables reports total employment or establishments in each of the quarters under comparison; the change in employment or establishments between quarters; and the employment or establishments involved in expansions, openings, contractions, and closings. Establishments that maintain the same level of employment between the two quarters are not reported in any of these last four columns, and are only reported in the totals columns.

Following are the definitions used to identify the status of establishments in the LDB tables. A *business expansion* is defined as a previously operating establishment -- one which had positive employment (greater than zero) in the third month of the preceding quarter -- that has a higher level of positive employment in the current quarter. A *business opening* is defined as an establishment increasing its employment level from zero to greater than zero or an establishment appearing for the first time with positive employment. Openings are only counted in the unit totals for the quarter in which they first appear with positive employment. A *business contraction* is defined as a previously operating establishment that decreases third month employment between two periods of time, and the employment in the latter quarter is greater than zero. A *business closing* is defined as an establishment that decreases employment from greater than zero to zero or an establishment with positive employment that disappears from the file with no link to the subsequent quarter. Closings are not counted in the unit totals for the quarter in which they report zero employees, but are counted as closings for the quarterly comparison.

It is not possible for the LDB System to define business deaths on a contemporaneous basis. Businesses in the Unemployment Insurance system are allowed to, and often do, report zero employment for several quarters after they have effectively closed. This undoubtedly occurs when a business owner temporarily shuts down but anticipates starting up the business again when economic conditions improve. By reporting zero employment and wages on the quarterly contributions form, the business owner can keep his UI account active. This results in many observed business closings, but which of these closings will start up again and which will die is not observed for several more quarters.

Note: The data contained in this paper are preliminary and will be revised.

Although deaths cannot be defined contemporaneously, we can define births and deaths in the historical data. A *business birth* is defined as an establishment for which no predecessor in previous time periods is identified that achieves non-zero employment for the first time. Births are a subset of openings. Likewise, a *business death* is defined as an establishment that over some period of time ceases reporting with no successor identified or decreases employment from positive to zero and does not resume operations (report positive employment) during the subsequent four quarters. Deaths are a subset of closings.

Administrative Reporting Changes

The ES-202 is an establishment-based file. BLS and State staffs continuously work with employers in order to obtain employment and wages data at the establishment or worksite level. In some cases, however, employers with multiple units within a state only report the total employment and wages for the state or consolidate their worksites in some other manner. At some point, an employer reporting consolidated data to a state may begin to disaggregate their data to the worksite level. This administrative reporting-level change, or Breakout, would appear to be an opening of a series of new units if not handled specially. The LDB Record Linkage System attempts to identify these special cases and flag the units accordingly so that they are not counted as business births. Reporting changes can also occur in the reverse direction as well, as multiple location employers switch from reporting disaggregated data to consolidated data. These Consolidations are also identified by the LDB System.

In order to maintain consistency within the tables, for the quarter in which a breakout or consolidation occurs, the disaggregated units are collapsed and compared to their consolidated partner. Thus, for the transition quarter, there is a one-to-one comparison. The subsequent quarter's table then compares all of the individual worksites to themselves. This consolidated comparison allows a business's employment and other identifying information to be accurately compared between the two time periods. The system uses the administrative information of the previously consolidated unit to define the industry and area of the collapsed subunits in the implementation quarter.

As a result of this methodology, some inconsistency in unit counts and row totals between tables comparing different points in time will occur. For example, the total number of fourth quarter 1998 units reported in the September 1998 to December 1998 comparison may not equal the number of fourth quarter 1998 units reported in the December 1998 to March 1999 comparison. In another example, total December employment reported for the Services industry in the September to December comparison may change slightly in the December to March comparison if there are some pending fourth quarter breakouts previously coded in Services with disaggregated units in industries other than Services.

Most of these administrative reporting changes are implemented in the first quarter of the year. State staff are instructed to hold any such changes identified in the 2nd, 3rd, or 4th quarters until the first quarter. This coincides with the overall policy of implementing non-economic changes in the first quarter of each year. This includes changes to administrative fields such as industry, geographic, and ownership codes. Thus, in the first quarter of each year, there will be some movement reported between industries and geographic areas that is not attributable to any economic events. BLS will supplement the first quarter LDB tables with information on the effects of non-economic administrative code changes.

Note: The data contained in this paper are preliminary and will be revised.

Employment Size Class

How an establishment's employment size class is defined directly impacts the results of any analysis regarding job creation and destruction by size. Following the methodology mentioned above in Section two, the LDB System defines an establishment's employment size by the average of the third month employment values in the two periods being compared. For openings, the current employment is averaged with zero to yield an employment size of half of its opening level. The opposite is performed for closings with employment size being half of its positive level in the prior period. Note that in calculating employment size, values ending in .5 are rounded up to the next whole number.

The employment size class tables are also affected by pending breakouts and consolidations. The consolidated unit may qualify for a larger employment size class than do each of the individual establishments in the preceding or subsequent quarter.

Industry

In the LDB tables, an establishment's industry code is based on the current quarter classification with two exceptions. The first exception is the case of the administrative breakout. As described, for the quarterly comparison in the quarter when the breakout occurs, the individual worksites are collapsed to a single record to compare to the previously consolidated record. In this case, the industry code of the consolidated unit in the prior quarter is used. For an administrative consolidation, the industry code of the current quarter consolidated unit is used. The second exception is for establishment closings. Their industry will also be based on prior quarter classifications.

Because the LDB data are derived from quarterly data, an establishment's industry code may change between quarters. Industrial coding changes necessary for non-economic reasons, however, are only implemented with the first quarter data of each year. Non-economic code changes are those required to correct previously assigned codes or to change the code of an establishment which has gradually changed its economic activity. Economic code changes that can be implemented at any time during the year include cases of assigning a specific industry code to an establishment that was previously unclassified as well as cases of reassigning an establishment's classification following a complete conversion of its industrial activity. An example of such a conversion is a retail bakery that closes down for a month or less and reopens as a full service restaurant.

The movement of employment between industries could potentially confuse the results in the industrial tables, especially in the first quarter when the majority of industrial coding changes are implemented. Thus, with the first quarter tables each year, BLS will provide information on the movement of establishments and employment between industry divisions and between finer levels of industry classification if required.

Exclusions

A final point deserves mention. Certain establishments are excluded from the forthcoming BLS publications. These exclusions are establishments with SIC 8811 (private household workers), establishments that are not in the private sector (federal, state, local, or foreign government), and establishments in Puerto Rico and the Virgin Islands.

VII. Discussion and Future Directions

The Bureau of Labor Statistics (BLS) has constructed a longitudinal database that contains quarterly employment and wage data for virtually all business establishments in the United States. This longitudinal database enables us to track changes in employment and wages not only at the macro level, but also at the micro level of the establishment. This database, referred to as the Longitudinal Database or LDB for short, will be used to generate high quality, high frequency, timely and historically consistent information regarding not only job creation and job destruction, but also the life cycle of establishments. No timetable has been established for the first official release of these statistics nor for the frequency of their publication. The LDB currently is the Bureau's sampling frame for establishments, and contains the most current data available. Furthermore, by mid-2000 the LDB will have the entire history of quarterly microdata since 1990.

Job creation and job destruction statistics have the potential to increase our understanding of labor markets. For example, labor market outcomes reflect the interactions of supply and demand, and due to the availability of appropriate microdata, almost all we know about worker mobility reflects supply-side considerations such as individual preferences and human capital acquisition. The job flows data suggest that job opportunities at a specific employer appear and disappear, which suggests a major role for demand-side considerations. Another example is that underlying the gross job flows are gross worker flows, and an analysis of the relationship between these two types of flows would further our understanding of the matching process that occurs between employees and employers. Such worker-firm matching is undoubtedly related to important areas of research such as wage determination, capital-labor complementarities, and long-term employment relationships.

The job flows data will also increase our understanding of industrial organization. Topics such as firm growth and survival are interrelated with job flows, as firms seek the set of workers that maximizes profitability given their product market and their choices of technology. Haltiwanger, Lane, and Spletzer (1999) have found that long lived employers choose very different types of workforces, and these choices are quite persistent over time. This finding leads to speculation about the role of entry and exit, and the dynamics of how businesses initially choose and evolve towards a particular mix of workers. Job flows have also been found to be a key component in the study of aggregate productivity growth. Foster, Haltiwanger, and Krizan (1999) have shown that the reallocation of jobs from less efficient to more efficient plants plays a significant role in aggregate productivity growth. The LDB by itself is without question the best dataset for analyzing business growth and survival, and the research possibilities seem endless when one considers merging together the longitudinal establishment microdata with other microdata on firm technology, profitability, productivity, and other measures of inputs and outputs.

Job flows data also have interesting implications for the study of macroeconomics. One of the key findings by Davis, Haltiwanger, and Schuh (1996) is that job destruction rates in U.S. manufacturing exhibit greater cyclical variation than job creation rates. In particular, recessions are characterized by a sharp increase in manufacturing job destruction accompanied by a

relatively mild slowdown in job creation. This finding has led to several theories of business cycle dynamics which emphasize the “cleansing” effects of recessions, where costly reallocation activities can be concentrated during recessions when the value of foregone production is low. A natural question is whether this cyclical asymmetry extends to nonmanufacturing industries. The evidence presented by Foote (1998) suggests that the manufacturing and nonmanufacturing sectors exhibit systematically different job flows dynamics. The job flows data in the LDB, which are computed from essentially the full universe of establishments, should help economists, policy-makers, and the business community develop a more complete understanding of business cycles.

And finally, we return to our opening motivation of labor demand. This literature has flourished during the past decade, largely due to the creation and analysis of establishment level datasets. We at BLS believe that we have created a very useful database for both governmental statistics and microdata research. We close with a quote from Hamermesh (1993, page 157): “While they are extremely interesting in their own right, data on gross flows of jobs tell us nothing directly about the magnitude of the wage or output elasticities of employment changes through the births or deaths of establishments, or growth or contraction in existing establishments. All that we can infer is that changes occur and that, by assumption, they must be produced by shocks that change labor demand by existing and potential employers.” Much work remains to be done, and we hope that the LDB will be used by economists and other social scientists to further both the empirical and the theoretical understandings of the economy.

References

- Anderson, P.M., and Meyer, B.D. (1994), "The Extent and Consequences of Job Turnover," *Brookings Papers on Economic Activity*, 177-236.
- Card, D. and A.B. Krueger (1998), "A Reanalysis of the Effect of the New Jersey Minimum Wage Increase on the Fast-Food Industry with *Representative Payroll Data*," NBER Working Paper #6386.
- Davis, S.J., and Haltiwanger, J.C. (1990), "Gross Job Creation and Destruction: Microeconomic Evidence and Macroeconomic Implications," *NBER Macroeconomics Annual*, 123-168.
- Davis, S.J., and Haltiwanger, J.C. (1992), "Gross Job Creation, Gross Job Destruction, and Employment Reallocation," *Quarterly Journal of Economics*, 57, 819-863.
- Davis, S.J., and Haltiwanger, J.C. (1998), "Measuring Gross Worker and Job Flows," in *Labor Statistics Measurement Issues*, eds. J. Haltiwanger, M. Manser, and R. Topel, Chicago, University of Chicago Press, 77-119.
- Davis, S.J., and Haltiwanger, J.C. (1999), "Gross Job Flows," in *Handbook of Labor Economics*, volume 3b, eds. O. Ashenfelter and D. Card, Amsterdam, Elsevier Science, 2711-2805.
- Davis, S.J., Haltiwanger, J.C., and Schuh, S. (1993), "Small Business and Job Creation: Dissecting the Myth and Reassessing the Facts," NBER Working Paper #4492.
- Davis, S.J., Haltiwanger, J.C., and Schuh, S. (1996), *Job Creation and Destruction*, Cambridge, MA: MIT Press.
- Dunne, T., Roberts, M.J., and Samuelson, L. (1989), "Plant Turnover and Gross Employment Flows in the U.S. Manufacturing Sector," *Journal of Labor Economics*, 7, 48-71.
- Farmer, T.E. and Searson, M.A. (1995), "Use of Administrative Records in the Bureau of Labor Statistics' Covered Employment and Wages (ES-202) Program," in *Proceedings of the Bureau of the Census 1995 Annual Research Conference*, Washington DC, 198-235.
- Foote, C.L. (1998), "Trend Employment Growth and the Bunching of Job Creation and Destruction," *Quarterly Journal of Economics*, 63, 809-834.
- Foster, L., Haltiwanger, J., and Krizan, C.J. (1999), "Aggregate Productivity Growth: Lessons from Microeconomic Evidence," NBER Working Paper #6803.

Haltiwanger, J.C., Lane, J.I., and Spletzer, J.R. (1999), "Productivity Differences Across Employers: The Roles of Employer Size, Age, and Human Capital," *American Economic Review Papers and Proceedings*, 89, 94-98.

Hamermesh, D.S. (1993), *Labor Demand*, Princeton, NJ: Princeton University Press.

Lane, J., Stevens, D., and Burgess, S. (1996), "Worker and Job Flows," *Economics Letters*, 51, 109-114.

Pivetz, T., and Chang, H. (1998), "Linking Unemployment Insurance Wage Records to ES-202 Establishment Microdata to Improve the Accuracy of the BLS' Longitudinal Business Establishment Database," Paper presented at the 1998 International Symposium on Linked Employer-Employee Data, Washington DC.

Robertson, K., Huff, L., Mikkelsen, G., Pivetz, T., and Winkler, A. (1997), "Improvements in Record Linkage Processes for the Bureau of Labor Statistics' Business Establishment List," *Proceedings for the 1997 Record Linkage Workshop and Exposition*, Washington DC.

Spletzer, J.R. (2000), "The Contribution of Establishment Births and Deaths to Employment Growth," *Journal of Business and Economic Statistics*, 18, pp-pp.

U.S. Bureau of Labor Statistics (1997), *BLS Handbook of Methods, Bulletin #2490*, Washington D.C.