ESTIMATING BUSINESS BIRTH EMPLOYMENT IN THE CURRENT EMPLOYMENT STATISTICS PROGRAM

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1. INTRODUCTION

This paper discusses the estimation of business birth employment in the Bureau of Labor Statistics' (BLS) Current Employment Statistics Program (CES). The estimation methodology presented has been derived to utilize the data collected in a joint BLS - New York Department of Labor study of new unemployment insurance (UI) accounts in the state. The survey and estimation procedures are designed to produce monthly estimates of birth employment that are more timely and based on more recent data than are currently used in the CES.

Over the past several years, BLS has devoted resources to correct CES program errors at their source. Continuing projects aim at improving frame quality with refinement surveys, lowering estimator bias and variance through new sample design and estimation methodologies, raising data quality through the use of a response analysis survey, and increasing response rates by implementing computer assisted telephone interviewing, touchtone self-response, and improved solicitation methods . The two aims of the business birth study are to create a business birth frame and to produce monthly birth estimates by conducting a sample survey based on the frame.

The impact of business births on economic growth in the United States is believed to be profound, but is not well understood. About three-quarters to one million new businesses form each year, generating between two and two and a half million new jobs. Although minor when compared to the U.S. payroll base of one hundred million employees, business births account for a large share of over the year employment change. For example, total U.S. nonagricultural payroll employment net increases for the past three years were 3.0, 2.1, and 2.5 million employees (annual average employment, 1984 through 1987).

Two problems affecting studies of business births and contributing to the debate over their significance are frame coverage error and the high death rate for new businesses. The administrative files upon which most surveys and economic studies of business births rely do not have birth identification as a primary function. They may suffer from three deficiencies: birth undercoverage, misclassification of nonbirths as births and vice versa, and a lagtime in obtaining birth data. The first two deficiencies cause an under or over estimation of births, and the third causes a mistiming of the birth activity. The high death rate for new businesses - in New York approximately 20% go out of business within one year of beginning - hampers studies that use snapshots from a file rather than a longitudinal file. Snapshots spaced far apart in time can miss a significant portion of the gross birth and death activity, leading to an underestimate of the activity.

The birth frame created by New York for this study is a longitudinal file where a portion of the births and nonbirths are misclassified and where there is a lagtime from when a firm is born to when it enters the frame. In the survey, data are collected that can be used to estimate the misclassification rate and the distribution of the lagtime. The estimation methodology presented here corrects for misclassification and places the birth activity in the proper time period.

Section 2 discusses the definition of business births in the context of the CES program, birth coverage on the survey sampling frame, and the current CES methodology used to account for their employment. Section 3 describes the New York Business Birth Survey procedures, the implementation of the birth definition, and the data collected. In section 4, an analysis of the data highlights some of the complexities of using the data for estimation. In section 5, an estimator for the monthly birth employment in New York is proposed, and formulae for the variance of its components are derived. As the survey progresses, more data become available to use in the estimation procedure. The impact on the estimator and its variance of using an increasing pool of sample data is analyzed. Section 6 summarizes the results and contrasts them with the time constraints imposed by the CES program.

2. BIRTHS IN THE CURRENT EMPLOYMENT STATISTICS PROGRAM

In order to discuss business birth coverage on the CES survey frame, it is necessary to define births in the context of the CES program. Basically, a birth in the CES program is a business establishment, with employees, which formerly had no chance of being selected in the survey. Births include brand new businesses as well as existing businesses. Ownership changes, sales, mergers, reorganizations, and branches can lead to the creation of a birth establishment. The date on which the business first hired employees defines its birth date. The birth date can be quite different from the date the establishment opens its doors for business.

Business births and their employment impact the CES program in five principal areas: frame coverage, sample selection, estimation, benchmarking, and bias adjustment. In each of the first three areas, errors occur due to nonoptimal survey procedures and birth establishment nonresponse such as failing to register with the state bureau that maintains the frame or refusing to participate in the survey. The annual benchmarking procedure adjusts the CES all-employee estimate level to an independent annual census of establishments which includes births establishments identified up to the time of the census. The bias adjustment procedure attempts to correct the monthly CES estimates for all sources of error, including errors due to births.

The sampling frame for the CES survey consists of the states' unemployment insurance (UI) files. Each state has its own laws about who must pay UI taxes and its own system for maintaining its file. In general, each employer meeting some minimum employment and wage criterion is required to pay UI taxes. As a rule, a state assigns a unique UI account number to each covered employer and requires it to report employment and wages and pay a tax into the account at the end of every calendar quarter. The tax paid is a function of firm employment, wages, industry, and unemployment history. These data items are the primary information maintained on the file.

The state has a number of sources that enable it to identify businesses that should be paying taxes. Principal among these is the UI tax liability form which the state tries to get every account holder to complete. This form collects identification information such as establishment name, address, ownership, primary product or service, and whether the account is assuming the UI tax liability of a previously existing UI account. This would occur, for example, if a partnership paying UI taxes decided to incorporate. The corporation would receive a new UI account number because it represents a new ownership, but would assume the UI tax liability of the partnership. Other sources include the Secretary of State's office which monitors incorporations, the State Tax Commission, and the IRS. Occasionally, the state

discovers an employer when a laid-off employee files a benefit claim. The state may also have field offices which monitor business births among their other duties.

The birth estimation methodology addresses two characteristics of the account assignment process. The first is the lagtime from when a business first hires employees to when it receives a UI account. Only a small percentage of employers file for and receive an account within one month of their birth date. On average, the lagtime is about 3 or 4 months. Some businesses take over a year. This lagtime is not, in general, due to lengthy processing delays at the state office, but rather the employer's lack of knowledge of the filing requirement, its delay in meeting the requirement, or its attempt to hide from the system in order not to pay taxes.

The second characteristic of note is the absence of a one-to-one correspondence between new UI accounts and business births. A sizable percentage, around 40 percent, of new UI accounts are assigned to existing businesses undergoing some type of ownership change or other reorganization. This relationship between predecessor and successor accounts must be captured on the frame since these new UI accounts represent non-births. The predecessor relationship is captured for only 20 percent of the new UI accounts when they are initially assigned. The remaining 20 percent of the new UI accounts that should have the relationship appear as births when in fact they are not.

Once a birth establishment receives a new UI account and enters the frame, the state may solicit it to participate in the CES survey. A state will solicit for additional survey respondents when they are needed to meet the state's contract with BLS or when they are needed for making state and local estimates. Thus a birth establishment, after taking 3 or 4 months to enter the frame, may have to wait an additional length of time before a sample is drawn from the frame. At present, the states do not purposefully sample new UI accounts for the CES survey.

If the birth establishment agrees to participate in the survey, the state sends it the CES mail survey form - the 790 form. There is room for 12 months of data, and the form is mailed between the establishment and state agency each month. The survey collects data on the number of all employees, women workers, production workers, hours, and earnings. The birth establishment, now 6 or 7 months old, will begin reporting its current employment, usually 3 or 4 employees. Hence, data collection does not always capture the change from zero employees.

The change from zero employees is not always reflected in the CES monthly estimation process. The CES computes all-employee estimates using a link relative technique. Data from a matched sample, respondents reporting their employment in the current and previous month, are used to form a ratio of current to previous employment. This ratio represents the employment change between the previous and current month in a basic estimating cell. The previous month's employment estimate in that cell is multiplied by this ratio, yielding the current month's employment estimate. To reflect birth employment accurately in the procedure, the birth establishment must respond for two consecutive months, and the change from zero employees must be collected on the 790 form. To the extent that this is not done, the CES survey underestimates birth employment.

Once a year, the CES revises all-employee estimates to agree with a virtual census of business establishments conducted by the UI system. States collect the first quarter UI tax returns, summarize them to the county, employment size class, and four digit SIC level, and send the resulting March employment census counts to BLS. The counts are reviewed, and replace the corresponding March CES estimates. BLS revises estimates in the pre and postbenchmark period to reflect these changes. The benchmarking process - collecting the UI tax returns, summarizing, reviewing, and revising the CES estimates - takes about 14 months. The new March census count reflects birth employment that has been captured by the UI system since the previous benchmark. Part of the difference between the March benchmark and CES estimates is attributable to business births.

The differences between March estimates and benchmarks can arise from a number of sources. Frame coverage errors, sampling and response errors, nonresponse, definitional differences between the CES survey and benchmark, and industrial misclassification are but a few. Monthly all employee estimates are multiplied by a bias adjustment factor in an attempt to correct the estimates for all sources of error. The factor for a basic estimating cell is derived each quarter by averaging the differences between March estimates and benchmarks for the last three years, and adjusting for CES sample coverage and recent employment change. This methodology is based on the principle that future survey error is proportional to previous survey error. This assumption, however, may not be valid at turning points in the economy, and the bias adjustment methodology is not able to correct errors at their source in the CES program.

A previous study of Florida UI account characteristics conducted by BLS pointed to some of the potential benefits that could be attained by making better use of the data maintained on the UI files. In particular, the timeliness of the data, 3 or 4 months after the birth date, is an improvement over the 14-month benchmark process. The UI files also provide a means for directly measuring birth employment activity, as opposed to relying on historical data as in the bias adjustment procedure. The UI files have some drawbacks, including the lagtime from birth to entering the file and the assignment of new UI accounts to non-births.

In September 1986, BLS, in cooperation with the New York Department of Labor, began to survey a sample of new UI accounts in order to distinguish births from non-births and to collect birth date and employment information. The goals of this project are to develop the necessary collection instrument and survey procedures for capturing business births and to develop and evaluate birth employment estimators for the state and national CES program.

3. NEW YORK BUSINESS BIRTH SURVEY METHODOLOGY

The survey was designed to estimate the total employment generated monthly by new businesses in New York State. Monthly estimates of the number of business births and their average employment were obtained from the survey and frame data. Each month a systematic sample, stratified by employment, is drawn from a list of unemployment insurance accounts assigned in the previous month. New York State contacts sample businesses using computer assisted telephone interviewing (CATI). The survey questions are designed primarily to determine whether or not the establishment is a new business, collect employment data, and obtain the date on which the firm first hired employees. From this information, the number of business births occurring in a given month and the average employment of new businesses can be estimated.

The monthly sample frame is a list of unemployment insurance accounts assigned in the previous month. Since businesses may receive new UI accounts for any of several reasons, the frame includes accounts that do not represent business births. Branches of existing firms, for example, often apply for UI accounts when they begin to hire employees. Sales, mergers, and changes in a firm's type of ownership may also be reasons for assigning a new UI account. The survey is needed to determine the percentage of new accounts that represent births and to examine the reasons for assigning new UI accounts to previously existing

establishments. A further problem in estimation arises from the fact that new businesses may not receive UI accounts until several months after they begin hiring employees. The survey collects sample firms' birth dates in order to estimate the number of births occurring in a given month.

All accounts on the frame are divided into two size classes according to the number of employees reported by the business at the time it applied for a new UI account. The UI file maintains this employment figure. Size class one includes all units having fewer than ten employees, or no employment figure, while size class two consists of all units having ten or more employees. Within each size class, the units are ordered by SIC code. Since only about half the units on the frame have been assigned SIC codes, units having no SIC codes are given a code of zero. Independent systematic samples of 175 units from size class one and 25 units from size class two are drawn.

Once the monthly sample is drawn, New York State mails introductory letters to all sample units, indicating to the employers that their firms have been selected and will soon be contacted by telephone. Since most of the sample firms are new businesses, their telephone numbers are not always readily available. The state conducts a two part search for telephone numbers. Data collectors first obtain numbers from directory assistance, using both the legal names and the DBA ("doing business as") names of the sample establishments. Each sample unit whose telephone number is not found in this initial search is sent a mail questionnaire and a letter explaining that its telephone number could not be found. About two weeks after telephone data collection has begun, the state conducts a second search for telephone numbers through directory assistance. Interviewers contact all firms with telephone numbers. If repeated attempts to contact a firm by telephone fail (for example, if there is no answer or a recorded message), the interviewer sends it a mail questionnaire.

The primary mode of data collection is CATI. The telephone interviewer reads the survey questions from a computer screen and enters the responses directly into a computer file. Although the questionnaire consists of only six or seven questions, interviewers must verify that the correct establishment has been contacted and identify a knowledgeable respondent before administering the questionnaire. The interviewer reschedules a contact if this person is not available. The CATI instrument contains routines which help the interviewer search for a knowledgeable respondent and answer common questions the respondent may ask about the survey. The instrument includes routines for scheduling and conducting recalls.

Once a willing and knowledgeable respondent has been identified, the interviewer administers the questionnaire. The first few questions concern the firm's current ownership and its opening and hiring dates. The hiring date is considered the firm's birth date in the CES program. The respondent is then asked to give the firm's current employment and its employment in the month after it first hired employees. For study purposes, a business birth occurs when a firm begins hiring employees. Since the initial hiring process may take several weeks, the firm's employment in the month after it first hired employees is its birth employment.

A respondent's answers to a sequence of questions determine whether or not the sample unit is a birth establishment. The interviewer first asks if the establishment is a branch, or if it formed as the result of an incorporation, ownership change, or a sale or merger. If the respondent replies that the firm is a new business with no relationship to any previously existing firm, the unit is a birth establishment. But if a predecessor is discovered, the interview proceeds in the pattern illustrated in Figure 1. Note that the survey distinguishes between sales and ownership changes: if any of the previous owners are part of the current ownership, the relationship is an ownership change; if not, it is a sale. In general, a sample establishment is a birth establishment if it had no predecessor or if the predecessor had no employees in New York State. Exceptions to this rule include sales in which only part of the other firm was acquired. In these cases, the new account is a birth establishment, since its predecessors would show a loss of employment in the CES program.

4. CHARACTERISTICS OF THE COLLECTED DATA

The collected data are analyzed with regard to the following characteristics of interest:

- birth date (the date employees were first hired)
- birth employment (employment one month after birth date)
- current employment
- existence of predecessor firms
- relationships to any predecessors discovered
- location and employment of predecessors
- lag between birth date and receiving an unemployment insurance account
- response rate
- factors affecting response rate, e.g. availability of telephone numbers

The data from the sample of June 1987 UI accounts typify the collected data. The state found telephone numbers for 176 (88%) of the 200 sample units. Of the 130 (65%) responding firms, the survey determined that 104 (80%) were true births. The average birth employment was 3.3 in size class one and 16.8 in size class two. Two of the sample units in size class one reported birth employments greater than ten. A few such cases are expected, since firms having no employment figures are placed in size class one. One of these firms had 110 employees at birth, significantly raising both the employment estimate and its variance. This large firm formed as the result of a sale in which only part of another firm was acquired. It was a birth, even though it had a predecessor.

Half of the nonbirths in the June sample received new UI accounts due to ownership changes. Of the remaining nonbirths, nine were incorporations, two were branches of in-state firms, and one was a sale. Five branches were births because they were branches of out-of-state firms. Similarly, one sale and one ownership change were births because the firms had hired no employees prior to the sale or ownership change.

For firms found to represent births, the average lag between hiring employees and receiving a UI account was three months in size class one and six months in size class two. The median lag in both size classes was only one month, but a few firms with very long lags (e.g. 44 months) increased the means. Table 1 shows, for the June '87 sample units in size class one that represent births, the cumulative distribution of the birth month and lag. The distribution represents the percentage of units born in or after the birth month. The final percentage in the table is less than 100 because some of the births occurred outside of the time interval shown. To accurately estimate monthly birth employment, the estimation procedure must account for the lag structure.

5. BUSINESS BIRTH EMPLOYMENT ESTIMATION

Methodology

In the methodology discussed here, the birth employment estimate for a target month, labelled k, will consist of two components: 1) an estimate of the number of births occurring in month k that will ever be assigned a UI account, and 2) the estimated average employment of these births in the month after they first hired employees. For the first component, the methodology estimates the number of

births in the target month that have been captured on the UI file during a certain time period, and then inflates this figure to account for the effects of the lagtime between birth and entry onto the file. The average employment component is estimated using data collected from UI accounts assigned over a period of several months. Estimates will be calculated separately for each of the two employment size classes. As more data about the target month becomes available, the estimates, their variance, and their relative standard errors will change. The estimated number of births should become less variable and stabilize around some value.

Data are collected from a sample of UI accounts assigned in months $i=I_0,I_0+1,...,I$, where here, $I_0<=k<=I$. The data consist of whether the account is a birth or not, and if so, the birth date and birth employment. Additionally, counts, N_i, of the number of UI accounts (births and nonbirths) assigned in month i are available. The window of available data opens wider or narrower by moving the endpoints I_0 and I. Some establishments in the sample will be nonbirths, others will be births. Some of the births will have occurred in month k. Other births will have occurred prior to or after month k. The lagtime for a birth in month k receiving a UI account in month i is i-k. Over the window of data, the lagtime for month k births will range from I_0-k to I-k. This range will be referred to as the window lagtime, and is a function of the window endpoints as well as the target month.

For each month in the window of data, calculate $p1_{ik}$, the proportion of sample units assigned a UI account in month i that were births in month k. The weighted sum $X_k= \Sigma N_i p1_{ik}$ (summed over $i=I_0,...,I$) is an estimate of the total number of month k births assigned a UI account in months I_0 through I. X_k will be referred to as the sample-based estimator. Some of the month k births will be assigned accounts prior to month I_0 or after month I. X_k needs to be inflated for the accounts that are not seen through the window. This will be determined by estimating the proportion of births that had a lagtime in the window lagtime.

In order to estimate the inflation factor, the model used assumes that the distribution of account lagtime is the same for all months. To find the inflation factor, for each month in the window calculate $p2_i$, the proportion of sample units assigned a UI account in month i that were births occurring in any month. $A= \Sigma N_i p2_i$ is an estimate of the total number of new UI accounts in months I_0 through I that represent births. Also calculate $p3_{ik}$, the proportion of sample units assigned a UI account in month i that were births and whose lagtime fell within the window lagtime, [I_0-k, I-k]. The weighted sum $B_k= \Sigma N_i p3_{ik}$ is an estimate of the number of births assigned accounts in months I_0 through I that had lagtimes in the window lagtime. The ratio B_k/A is an estimate of the proportion of all births in month k expected to receive a UI account during months I_0 through I. The reciprocal $R_k=A/B_k$ is used as the inflation factor.

The estimated number of births in month k that will ever be assigned a UI account is $Y_k = X_k R_k$. Y_k will be referred to as the model-based estimator. The estimated birth employment in month k is $E_k = Y_k e$, where e is the average employment of births in the month after they first hire employees.

This study found average birth employment to be roughly the same for each target month, and the methodology pools together survey data from four months to estimate average employment and the variance of the average employment estimate in each of the two size classes. These estimates are shown in table 2.

The variances of X_k, A, and B_k, were derived by treating the collected data as independent Bernoulli trials, i.e., birth in month k or not, birth or not, birth within window lagtime or not. R_k was treated as the ratio of correlated random variables, and Y_k and E_k were treated as the product of uncorrelated random variables.

Application

This study uses survey and frame data for new UI accounts assigned in August 1986 through July 1987 in New York. The state assigned a few accounts before the birth establishment first hired employees, e.g. a birth assigned an account in August actually first hired employees in October. The greatest lead time was 2 months. For consistency in estimate calculation, the left endpoint of the data window, I_0, is set equal to k-2. Thus, for producing estimates for the births in month k, survey and frame data for new UI accounts assigned in months k-2,k-1,...,I are available.

Initially, I, the right endpoint is set equal to k-2 and the estimates are computed using only data from new UI accounts assigned in month k-2 (lag equal to -2 months). It is expected that X_k, the estimate of the number of month k births assigned a new UI account in month k-2 will be relatively small and will have a large relative standard error. Consequently, the inflation factor, R_k, will be large and the estimates of birth establishments, Y_k, and birth employment, E_k, will have large variances.

At the next step, I is set equal to k-1 and estimates are computed using data from new UI accounts assigned in months k-2 and k-1. It is expected that X_k should increase and R_k should decrease. The relative standard error of X_k, R_k, Y_k, and E_k should decrease since more survey data are being used.

At each subsequent step, I is increased and estimates are computed using the enlarged pool of sample and frame data. As I increases, the inflation factor R_k should decrease towards 1, and the sample-based estimate of business birth establishment should approach the model-based estimate. Over the small values of I, Y_k may fluctuate, eventually stabilizing as I increases.

The analysis of the results will focus on three areas. As I increases, what value does the relative standard error of X_k, R_k, Y_k, and E_k approach and how quickly does it approach the value? For what value of I does the model-based estimator stop fluctuating and begin to stabilize near a "final" value? Finally, how quickly does the sample-based estimator approach the model-based estimator?

From the data, monthly estimates were computed for births occurring in October 1986 through July 1987. Twelve sets of estimates were computed for October by first setting I equal to August, then September, and so on up to July. Fewer sets were computed for later months (11 for November, 10 for December, etc.).

Table 3 presents the set of estimates produced for size class one, November 1986 births. The first row of estimates was computed using only data on new UI accounts assigned in September 1986 (lag equal to -2 months). Estimates in the row with lag equal to 2 are based on data for new UI accounts assigned in September 1986 through January 1987. Initially, the sample-based estimator X is small and the inflation factor is large since only about 2 percent of the births are assigned a UI account two months prior to hiring employees. As additional data are used, the relative standard error of X decreases rapidly, approaching 13 percent. Similarly, the estimate of R and its RSE decrease as the lag increases. As a result, the RSE of the model-based estimate Y decreases as well, with the efficiency rising to 76 percent of its final value (0.131/0.173) when the lag equals 2. Note that the variability of the inflation factor R has only a minor influence on the RSE of Y. The difference between the RSE of Y and E is due to the variance of the average employment estimate.

Table 4 and Figure 2 present the model and sample-based total birth establishment estimates for November 1986. For lags between -2 and 0 months, the model-based estimator fluctuates greatly, stabilizing when the lag is 1 month. The sample-based estimate requires a long lagtime, 4 or 5 months, to near the model-based estimate. For comparison purposes,

the October 1986 estimates are presented in Table 5 and Figure 3. Again, the model-based estimator fluctuates and then stabilizes when the lag is around 1 or 2 months. The sample-based estimate requires a long lag to approach the model-based estimate.

6. SUMMARY

Economic surveys and studies of the importance of new business employment often rely on frames that are inadequate due to misclassification of births and nonbirths and time delays in obtaining birth information. The Bureau of Labor Statistics and the New York Department of Labor have been studying these problems as they affect new unemployment insurance account assignment in the state. New York is conducting a monthly survey of a sample of the new UI accounts to obtain data on the rate of misclassification and the distribution of the time delay between birth and UI account assignment.

The survey collects data using CATI, with mail questionnaires being used only in cases where telephone interviewing is impossible (usually because telephone numbers are unavailable). Through a series of questions about the sample firm's formation, data collectors determine whether or not the firm represents a true birth according to the study's definition. The firm's birth date (the date employees were first hired) is also obtained from each responding firm.

Within each monthly sample, these birth dates span a period of about one year. This wide spread of lags between hiring employees and receiving unemployment insurance accounts creates one of the main problems encountered in estimation. Since firms born in a given month continue to enter the UI file for about one year after the birth month, a model-based estimator is needed to produce timely estimates of the number of births and birth employment.

The model-based estimator presented in this paper is a product of three component estimates: 1) an estimate of the number of target month births assigned a new UI account within a certain time period, 2) an inflation factor that accounts for the lagtime between the birth date and the account assignment date, and 3) an average birth employment estimate. In order to reduce the variance of the birth employment estimate, the methodology uses two employment size classes for sampling and estimation.

The results indicate that the model-based estimator performs well in terms of timeliness and relative standard error. The estimates stabilize in a short time, 1 or 2 months after the birth month that is being estimated. The relative standard error of the estimator decreases rapidly as well, nearing the value obtained when a larger pool of data is available at a much later date. The short lagtime is a considerable improvement over the 14 to 24 month lag in the current CES benchmarking process.

Research will continue in this area as additional frame and survey data are collected in New York in 1988. This study will also provide information about New York's inactivated accounts. The inactivated accounts overestimate deaths since they include establishments that should have been assigned a successor as well as true deaths. The account inactivation process is also subject to long lagtimes. The quality of the birth and death estimation methodology will be evaluated in the context of CES program requirements.

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Table 1. Cumulative Distribution of Birth Month Based on June '87 Sample Units Determined to be Births

Birth Month	Percentage	Lag (months)
August '87	0	-2
July '87	4.4	-1
June '87	23.2	0
May '87	53.6	1
April '87	62.3	2
March '87	66.7	3
February '87	78.3	4
January '87	89.9	5
December '86	91.4	6
November '86	94.3	7
October '86	94.3	8
September '86	95.8	9

Table 2. Average Birth Employment by Size Class

Size Class	Sample Size	Average Employment	Estimate Variance
1	257	2.580	0.150
2	27	12.905	4.120

Table 3

COMPONENTS OF THE ESTIMATORS

Estimates for November 1986, Size Class One

LAG	X	RSE(X)	R	RSE(R)	Y	RSE(Y)	E	RSE(E)
-2	46	0.918	53.200	0.916	2,455	1.546	6,335	1.570
-1	180	0.551	18.558	0.386	3,340	0.706	8,619	0.729
0	732	0.266	4.807	0.146	3,519	0.306	9,079	0.344
1	1,276	0.189	2.471	0.078	3,154	0.205	8,138	0.256
2	1,702	0.164	1.856	0.053	3,159	0.173	8,152	0.230
3	1,967	0.150	1.529	0.038	3,008	0.155	7,761	0.217
4	2,557	0.133	1.211	0.022	3,097	0.134	7,991	0.203
5	2,764	0.133	1.132	0.018	3,139	0.134	8,074	0.203
6	2,764	0.133	1.092	0.014	3,018	0.134	7,788	0.202
7	2,872	0.131	1.079	0.012	3,100	0.132	7,998	0.201
8	2,872	0.131	1.079	0.012	3,100	0.131	8,000	0.201

Table 4
COMPONENTS OF THE ESTIMATORS
Total Estimates for November 1986

LAG	X	RSE(X)	Y	RSE(Y)	E	RSE(E)
-2	57	0.769	2,563	1.483	7,734	1.325
-1	201	0.502	3,474	0.680	10,339	0.638
0	770	0.255	3,674	0.295	11,073	0.320
1	1,322	0.184	3,306	0.199	10,094	0.250
2	1,782	0.158	3,310	0.166	10,083	0.210
3	2,071	0.144	3,152	0.149	9,622	0.194
4	2,688	0.127	3,250	0.129	9,959	0.181
5	2,894	0.128	3,279	0.129	9,994	0.181
6	2,894	0.128	3,161	0.129	9,627	0.180
7	3,003	0.126	3,245	0.127	9,870	0.179
8	3,003	0.126	3,250	0.126	9,920	0.179

Table 5
COMPONENTS OF THE ESTIMATORS
Total Estimates for October 1986

LAG	X	RSE(X)	Y	RSE(Y)	E	RSE(E)
-2	162	0.821	7,747	1.525	21,970	1.423
-1	254	0.571	4,397	0.776	13,032	0.719
0	857	0.269	4,094	0.314	12,312	0.332
1	1,573	0.189	3,931	0.205	11,935	0.252
2	1,912	0.168	3,669	0.172	11,100	0.214
3	2,369	0.147	3,607	0.152	10,909	0.196
4	2,782	0.131	3,364	0.134	10,237	0.183
5	2,997	0.127	3,380	0.128	10,279	0.180
6	3,204	0.127	3,498	0.128	10,519	0.180
7	3,267	0.126	3,522	0.127	10,547	0.179
8	3,267	0.126	3,511	0.126	10,544	0.179
9	3,388	0.124	3,589	0.124	10,782	0.177

QUESTION SEQUENCE TO DETERMINE BIRTH STATUS

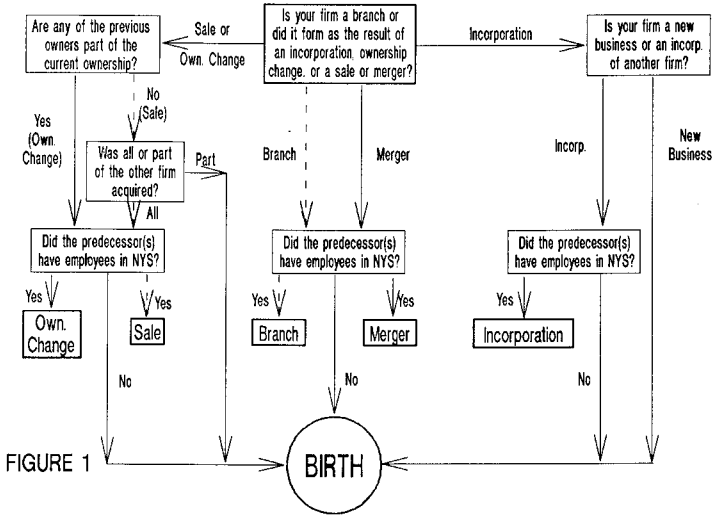

FIGURE 1

Figure 2

NUMBER OF BUSINESS BIRTH ESTABLISHMENTS
November 1986

Based on data from new UI accounts assigned in Sep. '86 through Jul. '87

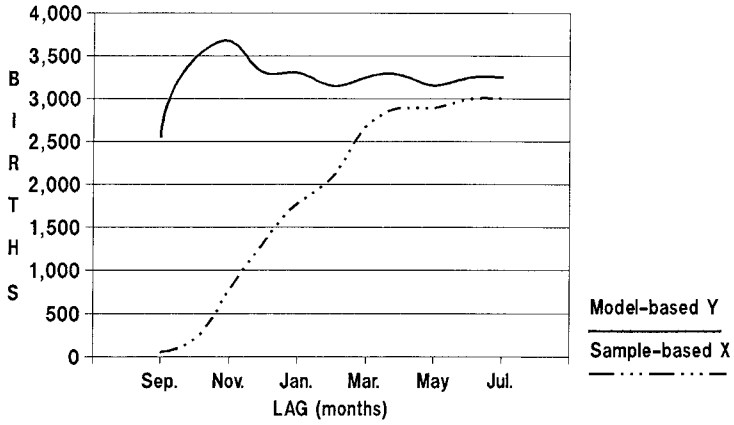

Figure 3

NUMBER OF BUSINESS BIRTH ESTABLISHMENTS
October 1986

Based on data from new UI accounts assigned in Aug. '86 through Jul. '87