Does a Rising Tide of Small Business Jobs Lift All Boats?

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Table of Contents

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Executive Summary

United States labor market performance has been very strong in the 1990s, but all groups have not benefitted equally. We have observed rising inequality in wages: high skilled workers have made gains in real hourly compensation while low-skilled workers' compensation has declined. Growth has been geographically varied as well, with some regions experiencing rapid growth and others net declines. The changing labor markets of the 1990s have altered demand for skill as well as the mix of employers. Because of these many changes, it is difficult to determine whether job prospects for particular groups of workers in particular labor markets have improved and whether small businesses have played a role.

This investigation examines local employment opportunities for low-skill men and women focusing on the role of changes in the number and size distribution of employers and job flows in local labor markets. Distinguishing between employer sizes is important for several reasons. Small and large employers may differ in their responsiveness to changing conditions with small employers being much more dynamic than large employers. Small employers are also widely viewed as an engine for net employment growth. Small employers may be especially crucial in determining the job opportunities for low-skill workers because they hire disproportionate numbers of less skilled workers and because of the well-known positive association between employer size and wages.

The investigation uses data from the Census Bureau's 1989-97 County Business Patterns (CBP) files to characterize the number and size distribution of establishments (or business locations) by county over time. The CBP data are useful because they are publicly-available and describe small geographic areas. The main drawback is that they do not include firm-level characteristics; so, they do not provide a complete picture of employment by different-sized businesses. Also, the CBP does not follow individual establishments over time; so, it cannot distinguish between entry, exit, growth and decline of establishments. The investigation examines how the number of establishments of different sizes has changed over the 1990s. It finds

- the expected cyclical pattern for all but the smallest establishments and
- that the number of moderate-sized establishments (those with 100-999 employees) has been the most sensitive to business cycle changes.

The investigation also uses data from the Business Information Tracking System (BITS), a longitudinal database of individual employer establishments jointly developed by the Office of Advocacy of the U.S. Small Business Administration and the Center for Economic Studies of the U.S. Census Bureau. The BITS shares many of the strengths of the CBP while also addressing several of the CBP's weaknesses. In particular, the BITS is a microdatabase of individual establishments that includes both establishment and firm characteristics so that a more accurate description of business size can be provided. The BITS also follows establishments from year-to-year and thus can be used to measure flows in employment. An analysis of trends in employment flows from the BITS confirms findings of several previous studies that

- rates of job reallocation (changes in employment associated with newly-opened establishments, closing establishments, expanding establishments and contracting establishments) are much higher than rates of net employment change,
- changes in employment from continuing establishments are larger than the changes from entering and exiting establishments,
- rates of net employment growth do not vary greatly across business sizes while rates of job reallocation do,
- rates of job reallocation decrease with business size, and
- rates of net employment growth and job reallocation are higher in the service and retail trade sectors than in the manufacturing sector.

The investigation next uses data from the 1990-98 Annual Demographic Supplements (March files) of the Current Population Survey (CPS) to examine employment and earnings outcomes for individual workers who differ by gender, age and schooling level. The investigation uses the gender, age and schooling information as crude indicators of market skills. The CPS also includes self-reported information from individuals on the size of their employers. The investigation examines how employment and earnings outcomes have varied over time by skill level and business size. Consistent with previous studies, the investigation finds that

- women, younger workers, and less educated workers make up a disproportionate share of small business employees,
- employees of large businesses receive higher earnings than employees of small business, even after accounting for skill differences,
- the proportion of employment in the small- and medium-sized businesses did not change much over time, and
- there was little change over time in average earnings.

The investigation links the local area establishment measures from the CBP and job flow measures from the BITS to the person-level data on employment, earnings and other personal attributes from the CPS. To make the link, it uses special versions of the CPS that identify each person's county of residence. The report investigates the relationship between local business conditions and individual employment using multivariate probit models and the relationship between business conditions and individual earnings outcomes using regression models. Besides the business condition variables, the models include personal characteristics of the workers, state-level policy variables, year indicators and county indicators. The models are estimated separately by gender, age and schooling level. The empirical results using the linked CBP and CPS data show that changes in the size distribution of businesses have both general and skill-specific effects on employment and earnings. Specifically, the results indicate that

- increases in the number of establishments with 100-499 employees lead to higher levels of employment for less-skilled men and women,
- increases in the number of establishments with 10-99 employees are positively associated with earnings for most workers with the largest effects appearing for younger workers, and
- increases in the number of establishments with fewer than 10 employees are negatively associated with employment and earnings for younger, more-educated men and women.

The empirical results based on the linked BITS and CPS data provide less conclusive

evidence of the importance of local area job flows on individual outcomes. In the multivariate employment equations, the job flow measures are statistically significant for most groups, and in several cases, the estimated effects accord with expectations. For instance, local employment gains associated with newly opened establishments appear to increase employment among men and women with a high school education or less. Similarly, employment gains among expanding establishments contribute positively to employment among some groups of less-educated workers. However, other results, such as the positive effects of job losses from contracting establishments on individual employment outcomes for several groups, appear to be at odds with standard economic explanations. In the multivariate earnings regressions, the job flow measures are generally not even statistically significant.

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1. Introduction

By some general measures, labor market conditions in the United States could hardly be brighter than they have been in the past few years. Aggregate unemployment was recently at a 30-year low, and productivity continues to rise. By several other measures, however, labor market performance has been disappointing. Real average wages and compensation for workers have remained essentially flat over the 1990s. Employment trends have been demographically uneven with high-skill workers benefitting more than low-skill workers. There have also been large regional differences; some areas have experienced tremendous growth while other areas have suffered net declines. Because of these disparities, it is difficult to determine whether job prospects for particular groups of workers in particular labor markets have improved.

This investigation examines local employment opportunities for low-skill men and women focusing on the role of changes in the number and size distribution of employers and job flows in local labor markets. Distinguishing between employer sizes is important for several reasons. Small and large businesses differ in their responsiveness to business cycles with small businesses being more responsive. Small businesses are also widely viewed as an engine for net employment growth. For instance, Robb (1999) reports that businesses with fewer than 500 employees accounted for just over 70 percent of net job growth in the U.S. nonfarm business sector between 1994 and 1995.

Small businesses may be especially crucial in determining the job opportunities for low-skill workers. The U.S. Small Business Administration (SBA; 1998a) documents that small businesses with less than 500 employees hired a greater proportion of part-time employees, less educated employees, very young and very old employees, and public assistance recipients than

larger firms (on welfare recipients, see also Holtzer and Stoll 2000)). Small businesses are also strongly represented in industries such as construction, retail trade, and services that employ large proportions of low-skill workers. Beyond this, the well-known positive relationship between firm size and wage provides indirect evidence of the importance of small businesses for less-skilled workers.

Employment changes among large employers are also likely to be important. While firms with 500 employees or more accounted for only ¼ of one percent of all firms in 1995, they accounted for almost half of all business sector employment (Robb 1999). Within small labor markets their role may be further magnified; a mass lay-off or failure by a single large plant can have devastating, long-lasting effects on a local economy.

This investigation uses information from the Census Bureau's 1989-97 County Business Patterns (CBP) files to characterize the number and size distribution of establishments within counties and data from the 1989-96 Business Information Tracking System (BITS) to characterize employment flows within counties. It links these local area business measures with individual-level data on earnings, employment, and other personal characteristics for people with different skill attributes from the 1990-98 Annual Demographic files of the Current Population Survey (CPS). It then examines the effects that changes in local business conditions have on different types of workers. The study classifies workers by gender, age, and education. This classification permits us to look specifically at how numbers of employers of different size affect earnings and employment of less skilled and more skilled workers.

The report is unusual and differs from many other studies on business behavior by focusing on the effects of business changes on general outcomes of workers. Instead of taking the perspective of a business looking at its own operations or looking out at the market of

workers, the analysis is framed from the perspective of a worker looking back at an changing set of businesses. An advantage of adopting this perspective is that it not only accounts for the direct impacts of businesses on their own employees but also the indirect effects on other people in the same labor market (e.g., interaction effects that arise from competition for workers).

The remainder of this report is organized as follows. Section 2 reviews previous theoretical and empirical research on issues related to local business opportunities and job growth and outcomes for less-skilled workers. Section 3 describes recent trends in business growth, employment and earnings. Section 4 discusses the CBP, BITS, and CPS data that are used for the detailed analyses. Results from the multivariate analyses of the relationship between changes in the number of local business establishments and individual employment and earnings outcomes are reported and discussed in Section 5. Results from analyses of the relationship between local job flows and individual economic outcomes follow in Section 6. Section 7 concludes.

2. Literature and background

A simple supply and demand analysis predicts that if jobs disappear from a local labor market, employment rates and wages for residents are likely to fall. Conversely, if jobs are added, employment rates and wages for residents will rise. It less clear, however, how much employment and wages will change and which workers will be most strongly affected. Numerous studies suggest that employment and earnings outcomes for women, minorities, and less-skilled workers are especially sensitive to changes in local labor demand (see, e.g., Bartik 1993, Bound and Holzer 1993, Freeman 1991, Freeman and Rogers 1999, Hoynes 1999, Ribar 2000, 2001, and Topel 1986). Most of these studies have considered either general measures of

labor market conditions such as overall employment or unemployment rates or considered industry-specific measures such as manufacturing employment. The studies have not considered the effects that changes in the numbers and employment patterns of different-sized businesses and establishments have on outcomes for skilled and unskilled workers.[1]

It is reasonable to suppose such changes might have differential effects depending on skill level. For instance, there is a large research literature which has documented a positive relationship between firm size and worker wages. Additional evidence indicates that large firms offer more fringe benefits than small firms (Brown, Hamilton and Medoff 1990, SBA 1998a). One explanation for the relationship between employer size and compensation is that larger firms hire workers with stronger skills. Hamermesh (1980) argued that large firms demand more skill because of greater capitalization and capital/skill complementarity. However, wage differentials persist even when standard measures of skill, such as education and experience, are taken into account (Brown and Medoff 1989). The remaining wage differentials could reflect other unmeasured components of human capital. Indeed, Brown and Medoff (1989) found that this may explain half the remaining effect, and Reilly (1995) reported that the wage differential disappeared when he controlled for technological skills using a measure of computer access. Davis and Haltiwanger (1995) examined a corollary hypothesis that skill heterogeneity varied with plant size. They found evidence that wage dispersion fell with plant size. However, they found that variation in observable characteristics rose with plant size while variation in unmeasured characteristics fell. They concluded that large plants have relatively high levels of worker heterogeneity due to task variety but that pay policies at those plants more closely reflect

[1]An establishment is a physical location or plant where a firm (business) conducts its activities. A firm can include multiple establishments. Previous studies have not always been careful about making the proper distinction between establishments and businesses.

worker characteristics.

Several other explanations for the wage differential between small and large employers have been put forth. For instance, large employers may offer worse working conditions. However, Brown and Medoff discounted this explanation, and in a direct analysis of this hypothesis, Kwoka (1980) found no evidence of a relation between job satisfaction and employer size. Furthermore, employment turnover is higher at small firms (Anderson and Meyer 1994, Brown and Medoff 1989, Davis et al. 1996). Thus, if a compensating differential is paid according to the risk of separation, wages should be higher, not lower at small firms. Evans and Leighton (1989) argued that the less stable small business jobs are taken by workers who value stability the least. So workers with higher expected separation rates may opt for small firms. This might explain the higher percentage of teens and women at small firms. Evans and Leighton found evidence that workers at small firms did have less stable job histories.

Other explanations of the wage/size relation are based on higher information costs at larger firms which results in higher costs of monitoring workers (Barron, Black and Loewenstein 1987, Bulow and Summers 1986) or screening their abilities (Garen 1985). Hence, larger firms pay higher wages to induce better performance. Large firms may also pay more to forestall unionization. Alternatively, they may face different hiring costs (Weiss and Landau 1984).

While numerous studies have examined the empirical relationship between employer size and wages, this work has relied on direct matches of workers and employers. Effects of the local size distribution of and employment changes among businesses or establishments have not been considered. Measures of these local conditions are important for characterizing the array of choices that workers face.

The empirical analyses in this investigation consider two different general types of

business condition measures. The first type of measure is simply a count of the number of establishments in an area. Other things being equal, more establishments should translate into higher labor demand. Moreover, if small and large establishments differ in their skill requirements, a change in the size distribution should lead to changes in skill-specific demands.

Why might we expect there to be differences in the way that small and large establishments in an area evolve? There is evidence (based on firms rather than establishments) that small firms are more responsive to business cycles than large firms. Jovanovic (1982) proposed a model based on learning. If firms only can learn their efficiency as they operate, then through time, the efficient firms get larger, and the inefficient drop out. Thus smaller, younger firms are likely to grow faster and to fail more often than larger, older firms. Hamermesh and Pfann (1996) suggested that adjustment costs are higher for firms with more skilled labor. Hence, larger firms with presumably more skilled labor will adjust less to changes in demand. Campbell and Fisher (1998) combined the adjustment and learning arguments and rephrased it in terms of organizational flexibility. When plants are young, managers experiment with different technologies, and when the managers hit upon a successful method, they give up flexibility to lock in the new method. In a business cycle, the young plants can respond while the old cannot. To the extent that small firms are young and operate young plants, small firms will be more responsive to cycles.

Other explanations for differential cyclical responses include differential access to capital markets. Gertler and Gilchrist (1994) offered evidence that small firms decline more quickly than large firms when monetary policy tightens. They reasoned that large firms have better capital market access (are less likely to be liquidity constrained) and do not rely as much on intermediate credit (banks). Gertler and Gilchrist also considered non-financial explanations such as that

large firms may contract out to small firms in good times and do work internally in bad times and that small firms tend to be concentrated in cyclical industries.[2]

The second general type of business condition measure that the investigation uses is job flows by different types of establishments. Davis et al. (1996) conducted a comprehensive study of job flows based on the Longitudinal Research Database (LRD), a panel of data on manufacturing plants and firms. They concluded that small businesses create more jobs (i.e., that job creation rates decline with size) but also suffer from greater job destruction. When the effects are combined, they found no effect of employer size on net job growth. Expanding the scope beyond manufacturing firms, Acs et al. (1999) investigated flows based on the BITS, a broader panel of private, non-farm, employer establishments (which is considered in this study). They found that larger, older firms were more stable. They also found a positive relation between net job growth and average firm size over time. Neither study directly addressed job growth for less skilled workers.

Anderson and Meyer (1994) examined linked, longitudinal records from state unemployment insurance systems. The records allowed them not only to characterize firm employment patterns but also to follow workers within and across firms. Although the records provided only limited direct information on worker characteristics, Anderson and Meyer could use fixed effects (essentially dummy variables for each person in their sample) to control for

[2]Some of the explanations in this and the preceding paragraph involve firms, while others involve establishments. Because of limitations in the CBP, we can only examine impacts of changes in establishments in several of our empirical analyses. It is not clear what impact this has on the analysis. On the one hand, most establishments (three-quarters) come from single-establishment firms (Robb 1999). On the other hand, large firms are much more likely than small firms to have multiple establishments. The SBA (1998b) reports that in 1995 firms with fewer than 500 workers averaged 1.1 establishments while firms with more workers averaged 52.7 establishments.

individual time-invariant characteristics such as education or ability. They found that worker turnover decreased with firm size even after controlling for these effects.

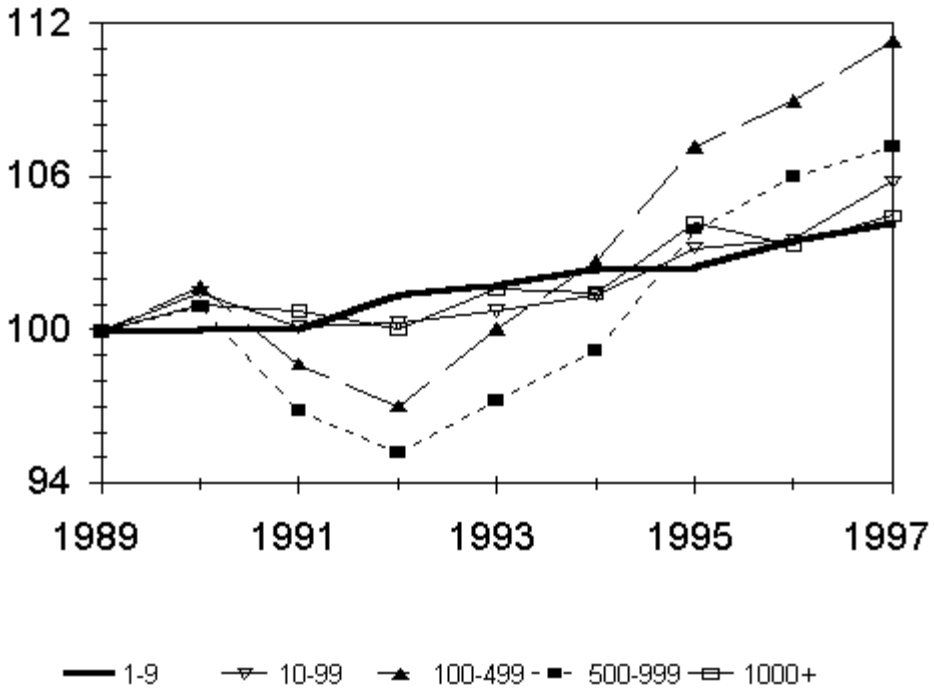
In summary, the literature tells us how small and large employers differ in their wages, workforce composition, response to business cycles, and job flows. We know that small firms hire a disproportionate share of less-skilled workers. The literature thus suggests that the mix of employer sizes affects the earnings and employment of the less-skilled. However, studies have not directly examined how changes in the number and employment patterns of different-sized firms and establishments affect low skilled workers, which is the focus of this report.

3. Trends

The report begins with an analysis of aggregate trends in business growth and labor market outcomes. The goals of this broad descriptive analysis are to (a) document specifically what the patterns of business and job growth have been and where growth has been most volatile, and (b) show which segments of the population have the strongest interactions with and are most likely to be impacted by different types of businesses.

Trends in the size distribution of establishments. The investigation first examines how the number and distribution of different-sized establishments changed from 1989 to 1997. One difficulty in analyzing trends in establishment growth is the widely-varying scales of the underlying establishment figures. For instance, in 1989 the CBP database indicates that there were 6.1 million establishments. Of these, 4.6 million had fewer than 10 employees, 1.4 million had 10 to 99 employees, just over 100,000 had 100 to 499 employees, just under 10,000 had 500 to 999 employees, and just over 5,000 had over 1,000 employees. A second difficulty with comparing figures over time—and in subsequent analyses across geographic space—is that the

Figure 1. Change in establishments per working age adult since 1989



size of the potential labor force changes. Because the empirical investigation is concerned with the effects of establishment growth on worker outcomes, it is natural to consider the number of establishments relative to the number of workers in the economy.

Figure 1 uses information from the 1989-97 CBP data sets to graph the national trends in the number of establishments in five different size classes: those with 1 to 9, 10 to 99, 100 to 499, 500 to 999, and 1000 or more employees. To make the figures comparable across size classes over time, Figure 1 scales the numbers of establishments in each size class by the numbers of establishments in 1989 and by the approximate population of working-age adults (population aged 15-64 years) in each year. The graph therefore depicts the percentage change in the number of establishments of each size per working age adult relative to the number in 1989.

It should be noted that this categorization of establishments differs in several respects from the classifications typically employed by the SBA. Specifically, the SBA defines a small

business as a firm with fewer than 500 employees. The figure displays results for a finer size classification than the standard over- and under-500-worker dichotomy. Even narrower establishment size classifications are available in the CBP data; however, the qualitative results from Figure 1 do not change much when these are used. Also, because of limitations in the CBP data, the figures are based on establishment size rather than firm size. While the CBP data might lead to some misleading inferences regarding business size effects, it is useful to keep in mind our earlier note that most establishments come from single establishment firms. Also, the two largest size categories of establishments in Figure 1 necessarily come from large businesses.

Figure 1 indicates that establishments with fewer than 10 employees grew modestly but steadily relative to the size of the working age population over the entire period. By 1997 there were roughly 4 percent more establishments of this size per working age adult than in 1989. The number of establishments with 10 to 99 employees grew from 1989 to 1990, fell slightly during the recession in 1991, and grew steadily thereafter. The trend for establishments in the largest size class (over 1,000 employees) followed a similar pattern rising before the recession, falling slightly during the recession, and then rising modestly thereafter.

The trends were much more volatile for establishments in the other two middle size classes. The numbers of establishments with 100 to 499 and 500 to 999 employees each grew from 1989 to 1990, but fell sharply during 1991 and 1992. At the bottom of the trough in 1992, there were 3 percent fewer establishments per working-age adult in the 100-499 size category and 5 percent fewer establishments per working-age adult in the 500-999 size category than in 1989. After 1992, the numbers of establishments in these two categories grew much more rapidly than establishments in other categories. By 1997, the number of establishments per working-age adult sized 100-499 and 500-999 were 11 and 7 percent higher than in 1989. Figure

1 clearly indicates that changes in the size distribution of establishments over the 1990s have resulted mostly from variation in middle of the distribution. Changes have been concentrated in establishments which straddle the standard dividing line between small and large.

It is possible that changes in the overall size distribution of establishments simply reflect changes in the industrial composition of businesses. The size distribution of employers varies greatly across industries. For instance, manufacturing establishments tend to be larger than other establishments and are over-represented in the middle and large size categories. While manufacturing accounts for only 1-in-20 establishments overall, it accounts for roughly 1-in-4 establishments in the 100-499 size category and 1-in-3 establishments in the 500-999 category. If the size distribution within industries was constant but the number of manufacturing establishments varied disproportionately over the business cycle, we might obtain a pattern similar to Figure 1. Alternative suppositions regarding the size distribution patterns can be offered using other industries.

Figure 2 breaks out the changes in the size distribution across different industries. As the figure indicates, the disaggregated industry trends varied greatly from one another and also from the aggregate trends. In the manufacturing sector, the number of establishments declined over the period for all size categories except the smallest. In contrast, the number of service establishments grew for all size categories. In the retail sector, the trend for the smallest and largest establishments was essentially flat; however, the trend for middle-sized establishments was similar to the aggregate for all establishments. In the other industries, the number of very small establishments grew while the number of other establishments remained constant or declined. Taken together, the trends for the different industries indicate that the changes in the overall size pattern of establishments reflect some changes in industrial composition but also

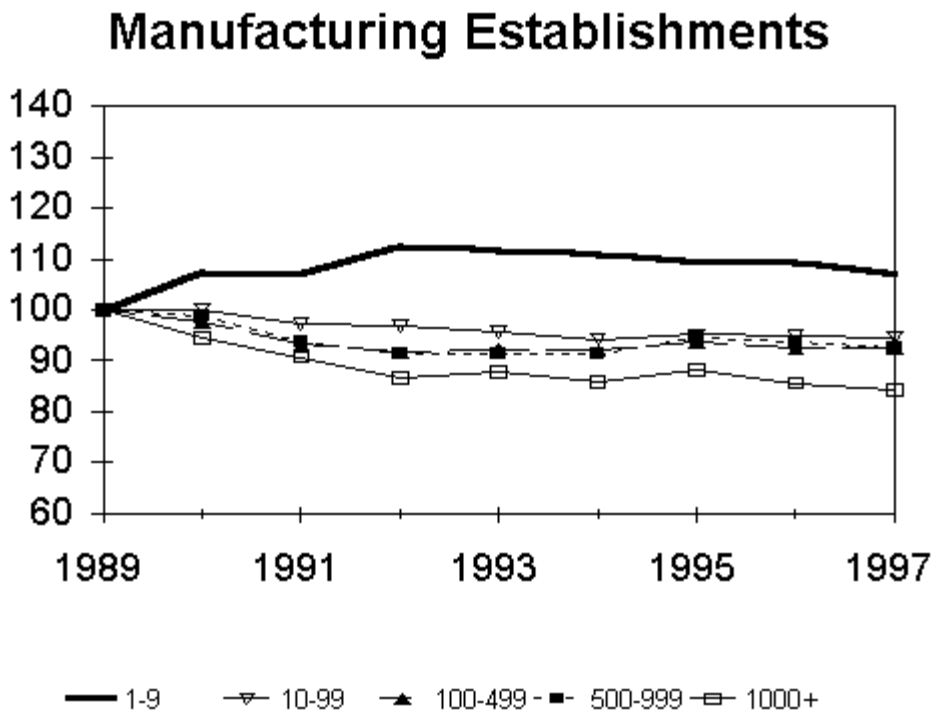
changes in the size patterns within industries.

Trends in job flows. To examine trends in job-flow dynamics, the investigation uses 1989-96 data from the BITS. The BITS was prepared by the U.S. Census Bureau and partially funded and developed by the Office of Advocacy of the U.S. Small Business Administration. The BITS is a panel database with information on employment and earnings in individual business establishments with positive payrolls (see Robb 1999 for a complete description). Like the CBP, the BITS covers virtually all private, non-farm employer businesses in the U.S. and provides annual information on employment and earnings. Unlike the CBP, however, the BITS contains longitudinal data on individual establishments and thus can be used to track changes in establishment employment as well as openings and closings. The BITS also identifies multiple establishments within the same firm; so, it can be used to generate both establishment and firm size statistics.

Following Davis et al. (1996), the investigation considers net changes in employment at firms and decomposes these net changes into four types of job flows:

- gains in employment associated with newly opened establishments (i.e., establishment "births"),
- losses in employment associated with newly closed establishments (i.e., establishment "deaths"),
- gains in employment associated with expanding establishments, and
- losses in employment associated with contracting establishments.

Figure 2. Change in establishments per working age adult for different industries



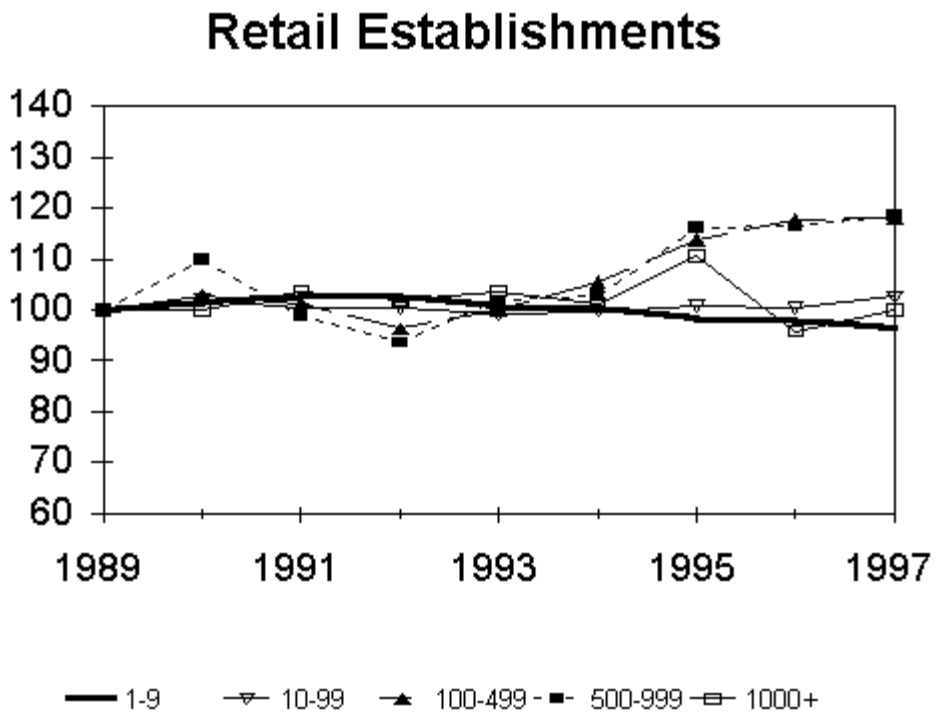
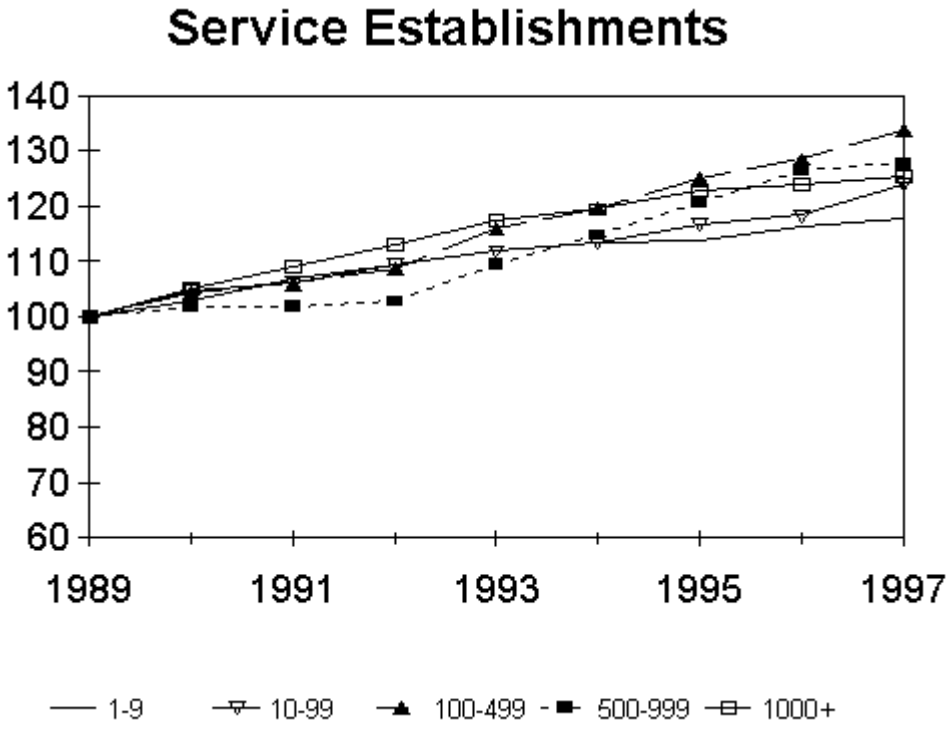


Figure 2 (cont.). Change in establishments per working age adult for different industries



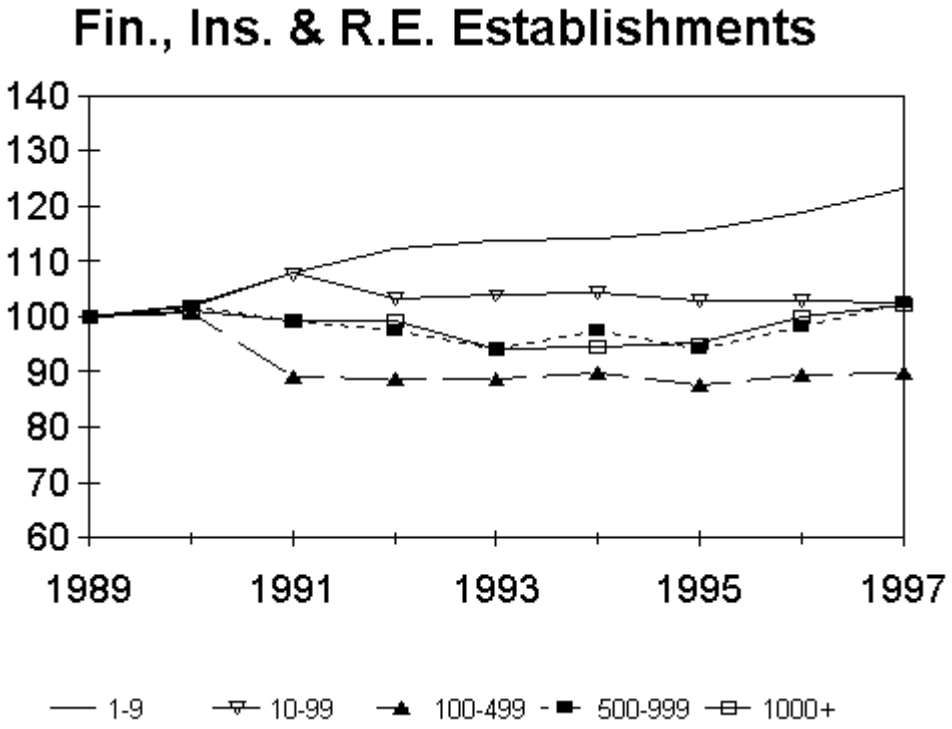
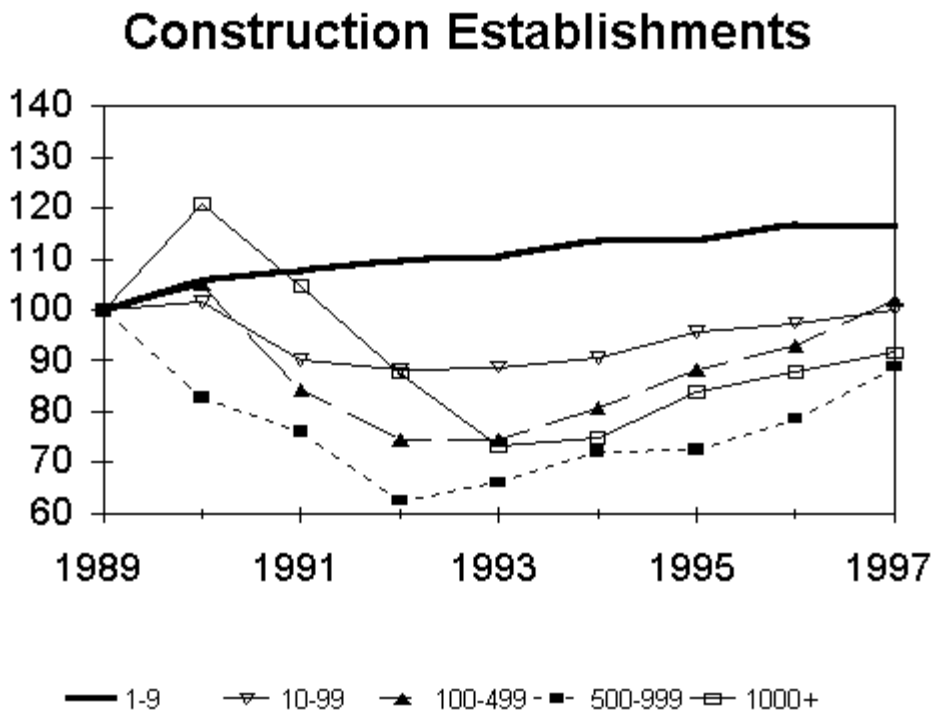
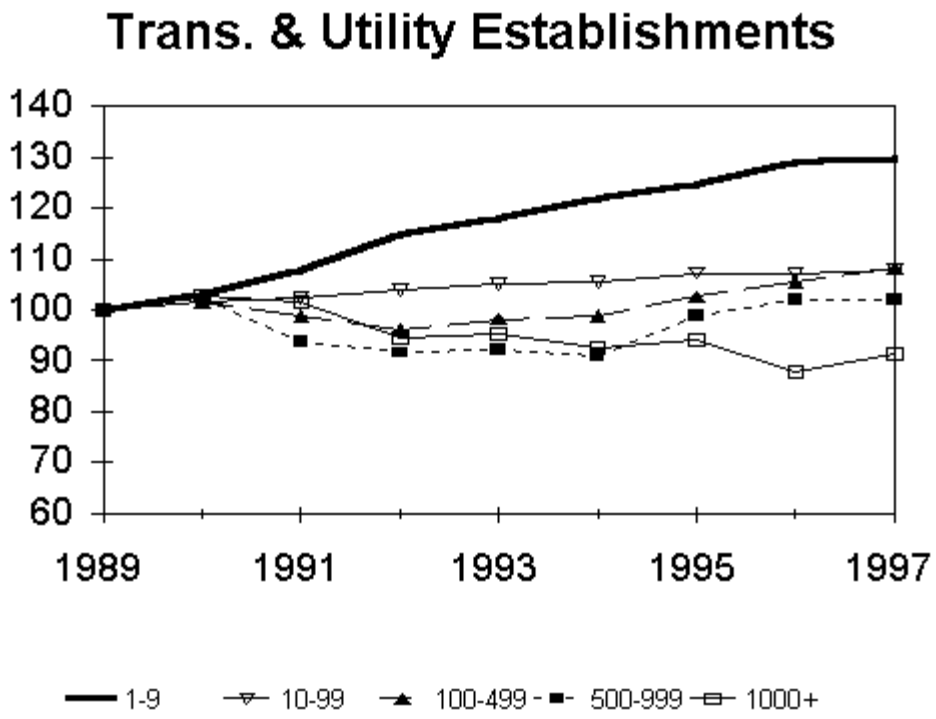


Figure 2 (cont.). Change in establishments per working age adult for different industries





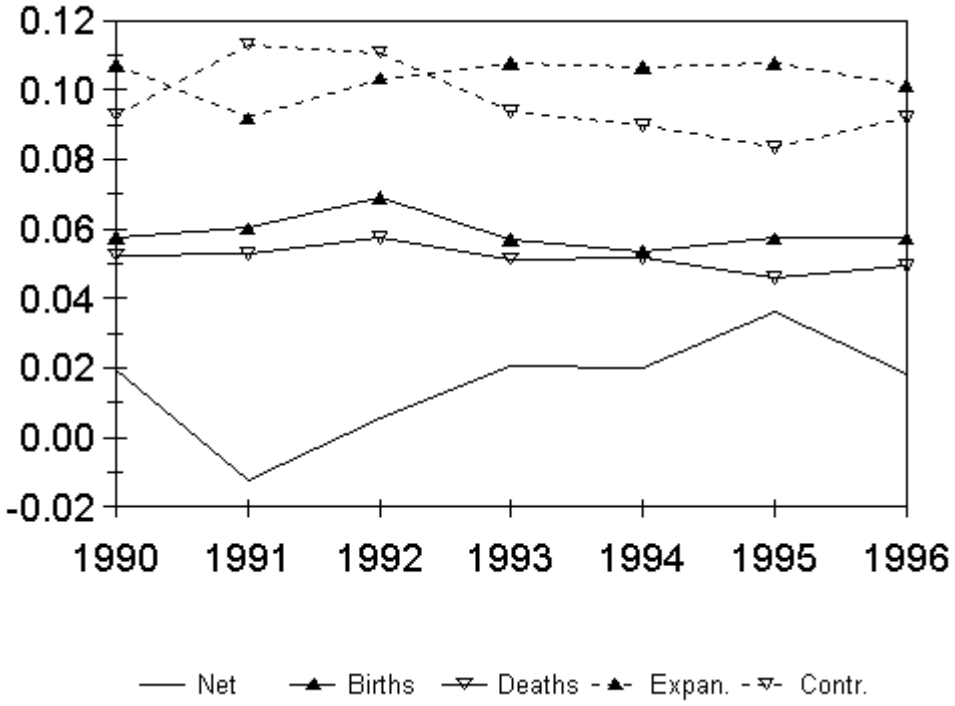
For the analysis of trends, the investigation constructs job flow rates by taking the year-to-year differences in employment at establishments in different categories and dividing the differences by the corresponding two-year averages of employment at the establishments. The use of two-year employment averages, rather than just initial employment, in the denominator of the rate calculation avoids a well-known regression to the mean problem and leads to symmetric gain and loss rates.[3]

Figure 3 shows the trends from 1989-96 in aggregate annual employment flows across all industries and business sizes (the annual flows are labeled in terms of their end years—e.g., the 1990 figure represents the change from 1989-90 and so on) calculated from the BITS data. The bottom line in the graph shows that the net change in business sector employment followed a cyclical pattern. Specifically, net job growth was positive at roughly 2 percent from 1989-90, negative at just under –1 percent during the recession from 1990-91, close to zero in 1992-93, and positive at 2-3 percent thereafter. The figure does not account for population growth; when this is factored in, the growth pattern is consistent with the employment to population rate falling through 1992 and recovering thereafter.

Consistent with previous studies, the component job flows (measures of job reallocation)

[3]Davis et al. (1996) discuss both of these issues at length. In the context of job flows, the "regression to the mean" problem occurs because firms with low levels of initial employment include a disproportionate share of firms that suffered negative random employment shocks in the prior period while firms with high levels of initial employment include a disproportionate share that experienced positive shocks in the prior period. If the shocks are indeed random, both types of firms will tend to revert to their mean employment levels in subsequent periods. This implies that measured growth will be artificially higher for smaller firms and lower for larger firms. An asymmetry between gains and losses also arises if rates are based on initial employment figures. Consider a firm that increases from 5 to 10 employees in one year then returns to 5 employees in the next. If growth rates are based on initial employment levels, the increase is 100 percent while the decrease is only 50 percent, even though firm gained and lost the same number of employees. If two-year averages are used, the gain and loss are a symmetric 67 percent.

Figure 3. Aggregate Employment Flows



were much larger than the net flows. The growth rate in jobs from establishment births was relatively stable at roughly 6 percent per year over the period. This was slightly higher than the loss rate associated with establishment closings indicating that newly-formed establishments were adding jobs slightly faster than closing establishments were terminating jobs. Neither rate exhibited particularly strong cyclical behavior.[4]

The job flows associated with continuing establishments were another matter. On average, the job flows associated with expanding and contracting establishments were nearly twice as high as the flows associated with openings and closings. The job flows for continuing

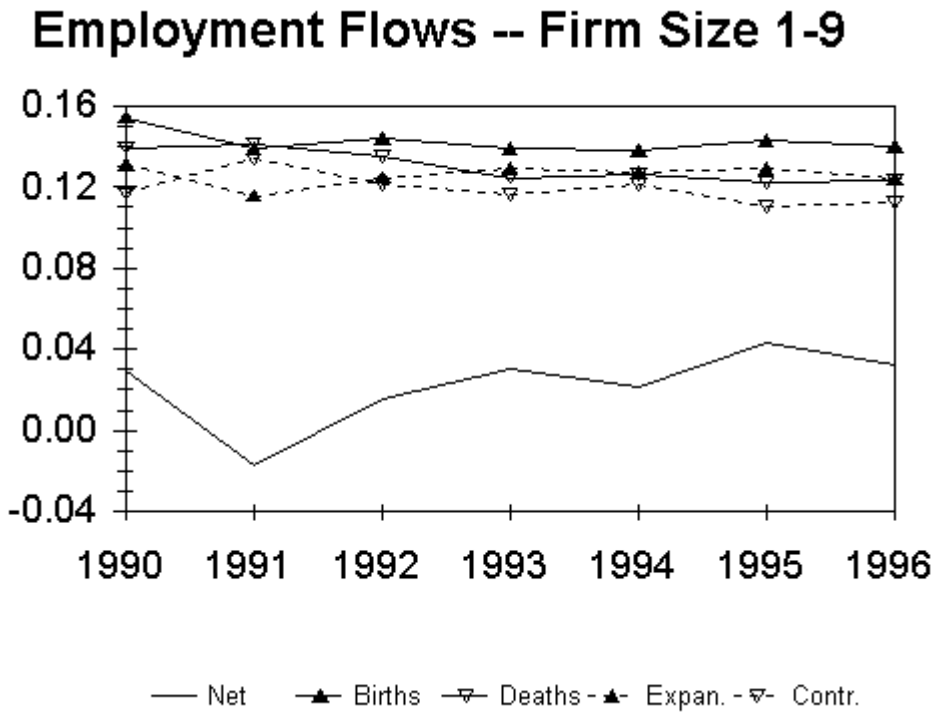
[4]One concern with these figures is that the "birth rate" for establishments may be overstated in 1991-92 and understated in other years. There appears to be some misreporting in the BITS of the dates when establishments in multi-establishment firms split off. A relatively complete count of establishments is obtained when the Economic Census is conducted (this occurs in years that end in 2 and 7). However, some new establishments in multi-establishment firms are missed in other years. This leads to a small artificial spike in measured establishment births in the economic census years (Robb 1999).

establishments were also much more cyclical. Flows associated with expanding businesses declined during the recession while flows associated with contracting businesses increased. Taken together, the figures for entering, exiting and continuing establishments suggest that the changes over time in the number of different-sized establishments documented in Figure 1 likely reflect movements of continuing establishments from one part of the size distribution to another rather than changes in the overall number of establishments.

Similar to its earlier analyses of establishment changes, the investigation next considers changes in job flows by business size and by industry. Job flows disaggregated by business size are shown in Figure 4. Unlike the figures from the CBP, the measures constructed from the BITS account for business rather than just establishment size. The categorization by business size fits more closely with the standard definitions of small and large businesses.

If we first consider the net employment changes, overall employment growth was more cyclically sensitive at small businesses than large businesses. The net declines in employment during the recession were sharper at small businesses than at large businesses while the net increases during the recovery were mostly higher.

Figure 4. Employment Flows by Firm Size



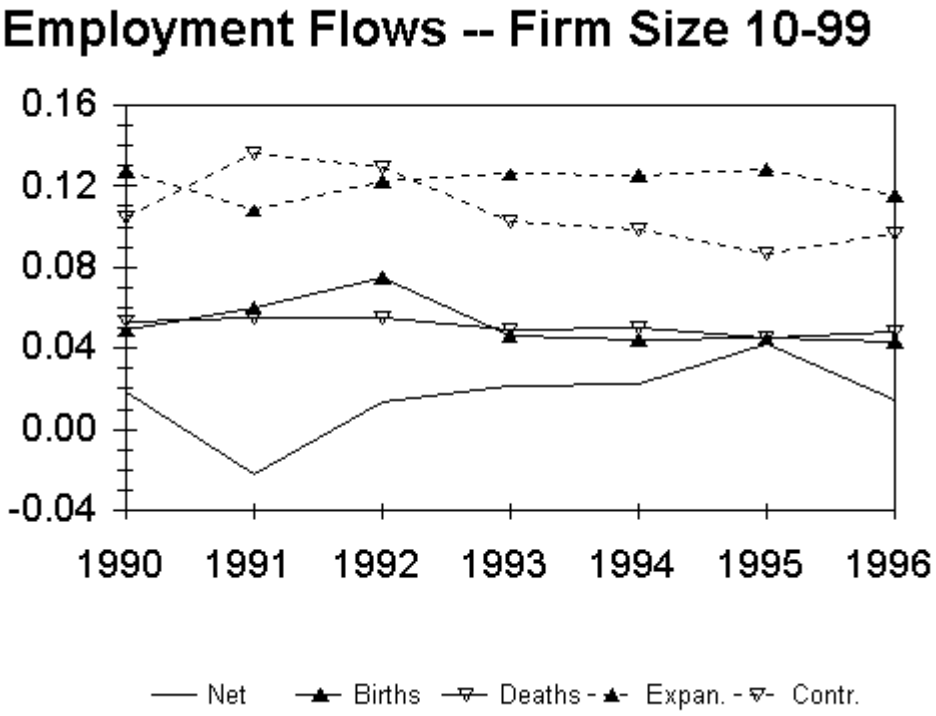
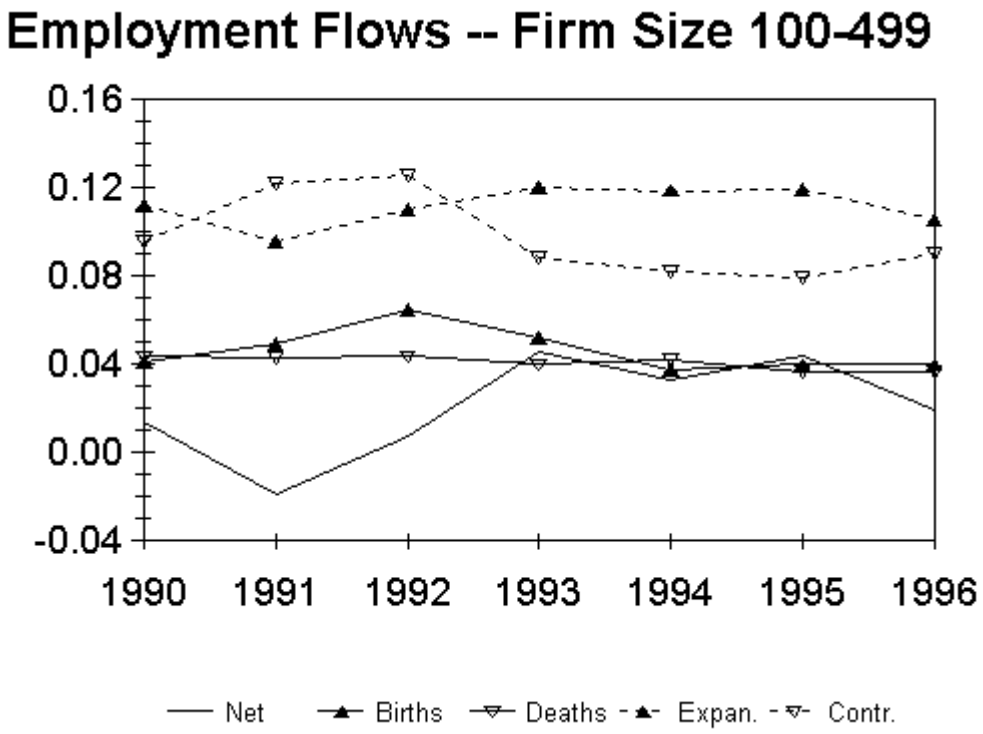


Figure 4 (cont.). Employment Flows by Firm Size



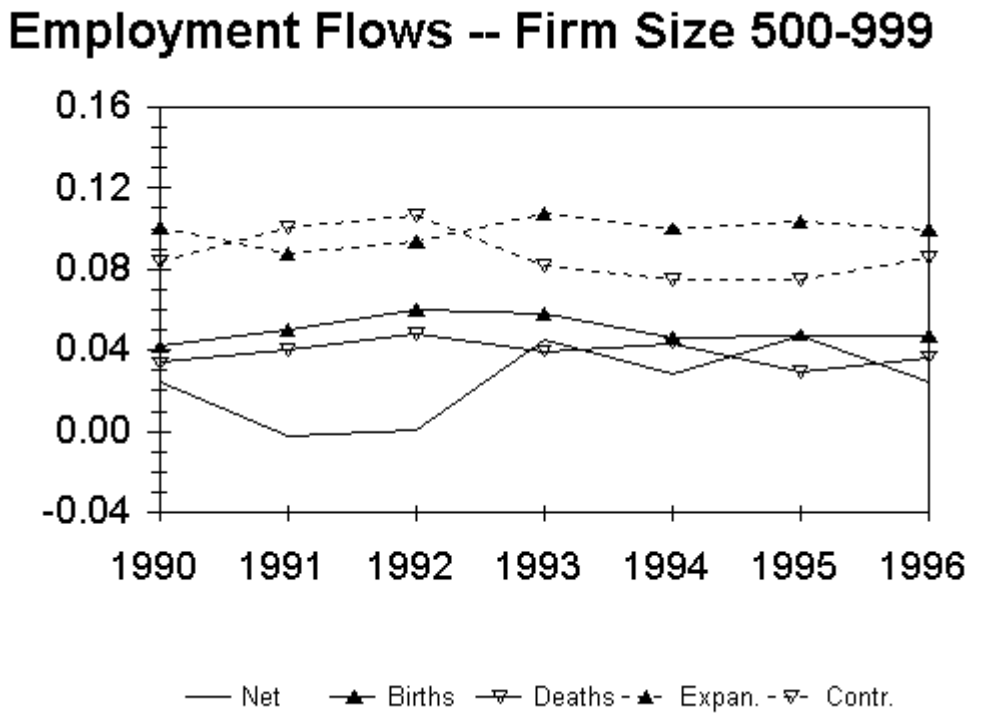
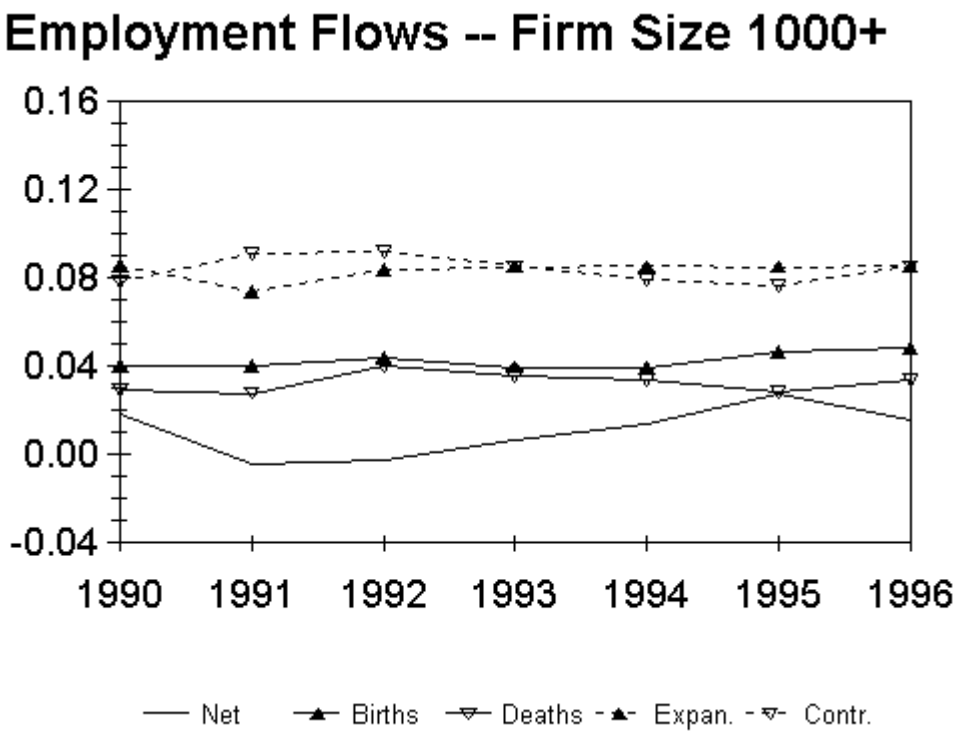


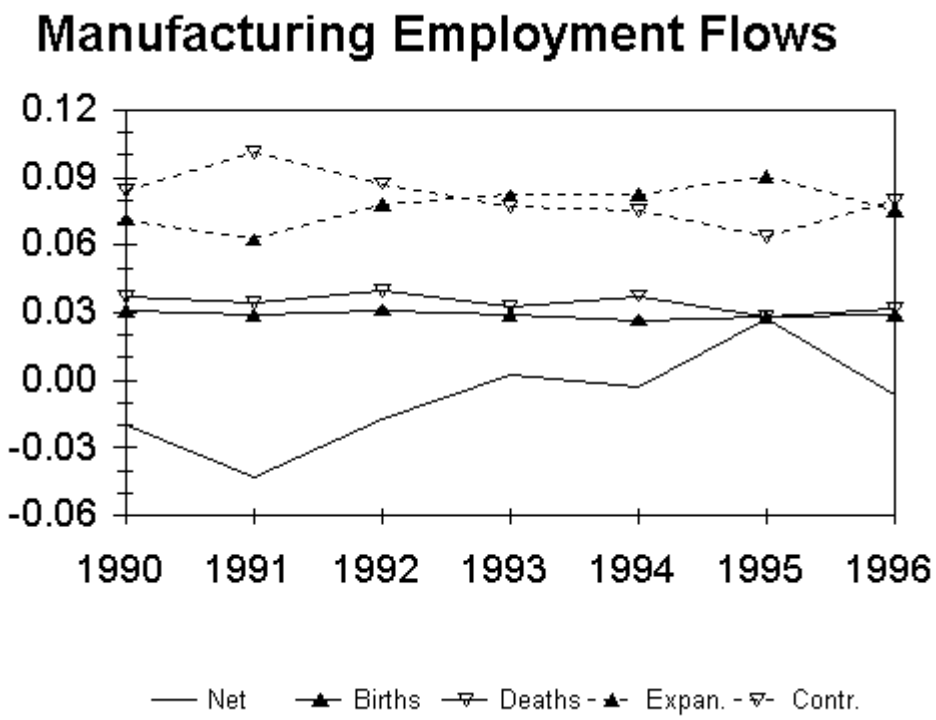
Figure 4 (cont.) Employment Flows by Firm Size



Overall rates of job reallocation also declined with business size. Rates of job gains and losses from establishment openings and closings were especially high (13 to 15 percent) for businesses with fewer than 10 employees. Rates associated with establishment openings and closings were dramatically lower for business with 10 to 99 employees (the rates were typically 4 to 5 percent) and fell only slightly thereafter as business size increased. As with the aggregate figures, the job flows associated with establishment openings and closings did not exhibit a strong cyclical pattern. The job flows associated with continuing establishments fell more smoothly with business size and were more cyclical. Taken together, the trends in Figure 4 confirm findings by Davis et al. (1996), Acs et al. (1999) and others that employment was much more volatile at small businesses than large businesses.

Figure 5 displays job flows for the three largest industries—manufacturing, retail trade and services. Much of what we know about year-to-year employment flows is based on data from the manufacturing sector. Figure 5 shows how job flow patterns in other sectors differed. Net employment flows were negative in manufacturing from 1990 to 1992 and only weakly positive in most of the following years. In contrast, the service sector added jobs in every year, and the retail trade sector added jobs in every year but 1991. While the retail trade and service sectors added jobs at a faster rate, they also experienced more volatility in employment. The average growth rate of jobs from newly-opened establishments was roughly 7 percent for retail businesses and 6 percent for service businesses versus about 3 percent for manufacturing businesses. The loss rate from closing establishments followed a similar pattern. Among continuing establishments, the growth rate for expanding service establishments was higher than the other two industries at roughly 11 percent per year; the growth rates for expanding retail and manufacturing establishments were about 9 and 8 percent respectively. For contracting establishments, the loss rate among retail establishments was highest at roughly 10 percent per year following by service establishments at 9 percent and manufacturing establishments at 8 percent. As with the previous figures, the industry-specific job flow rates for continuing establishments were cyclical while the rates for entering and exiting establishments were not.

Figure 5. Employment Flows by Industry



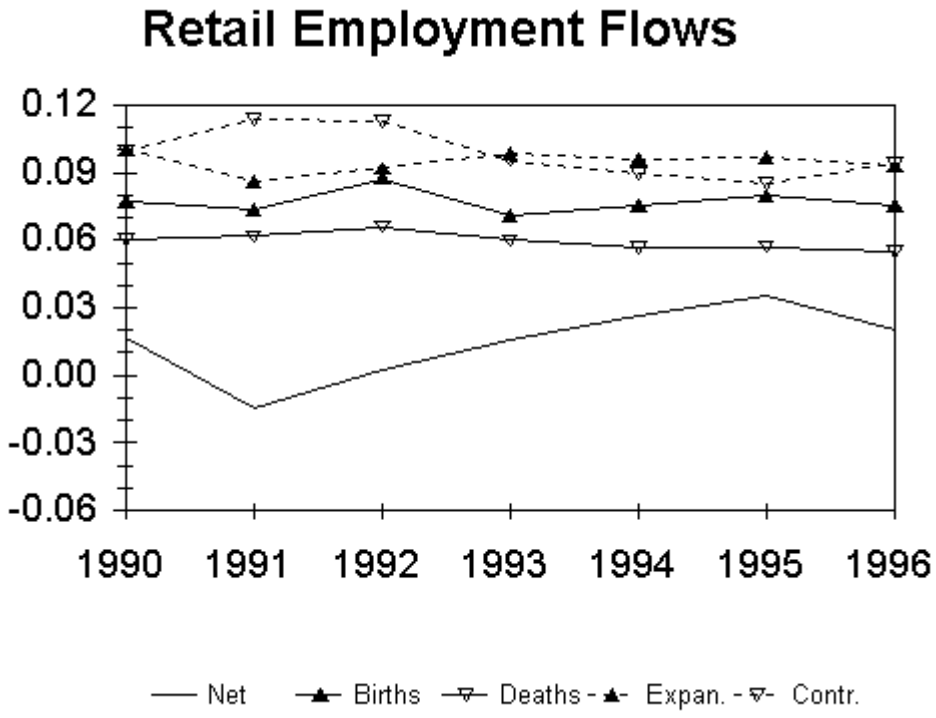
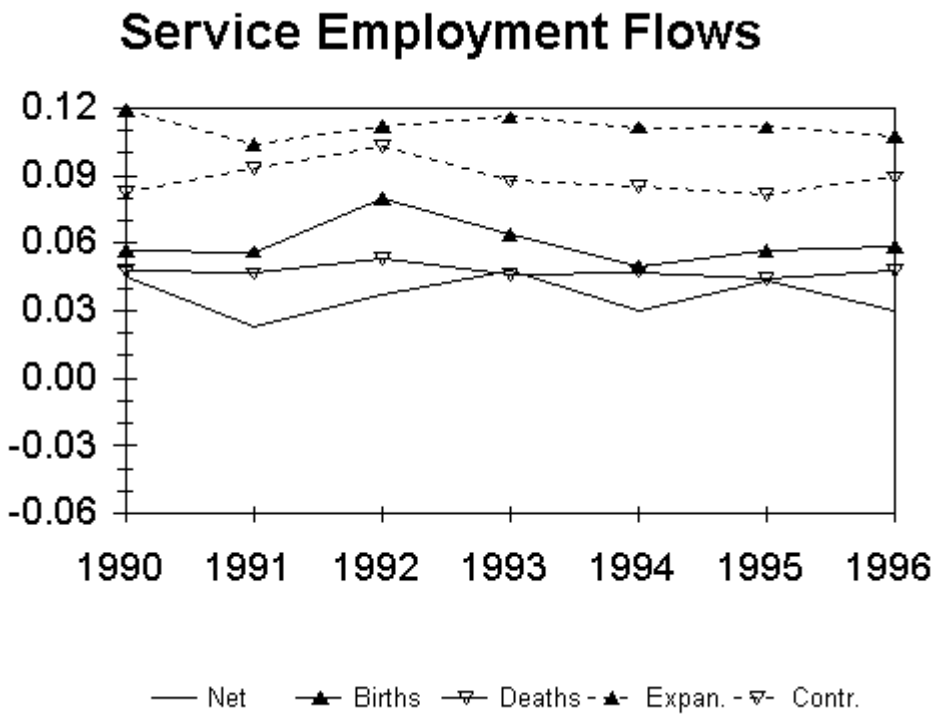


Figure 5 (cont.). Employment Flows by Industry



Trends in employment and earnings outcomes. Looking at the other side of the labor market, Figure 6 shows the trends from 1989 to 1997 in the proportion of working age (ages 16-64) men and women employed in private businesses with 1-99 workers, private businesses with 100-999 workers, private businesses with 1,000 or more workers, the public sector, and not employed.[5] The data used to produce the figure were aggregated from individual-level information from the March files of the CPS. Because the CPS uses employee self-reports and records firm size rather than establishment size, the data are not entirely comparable with the previous figures. To account for differences in skill levels, the graphs in Figure 6 further disaggregate the data by age, which proxies for potential work experience, and education level.

[5]The private business categories include non-profit firms and self-employed individuals (proprietors).

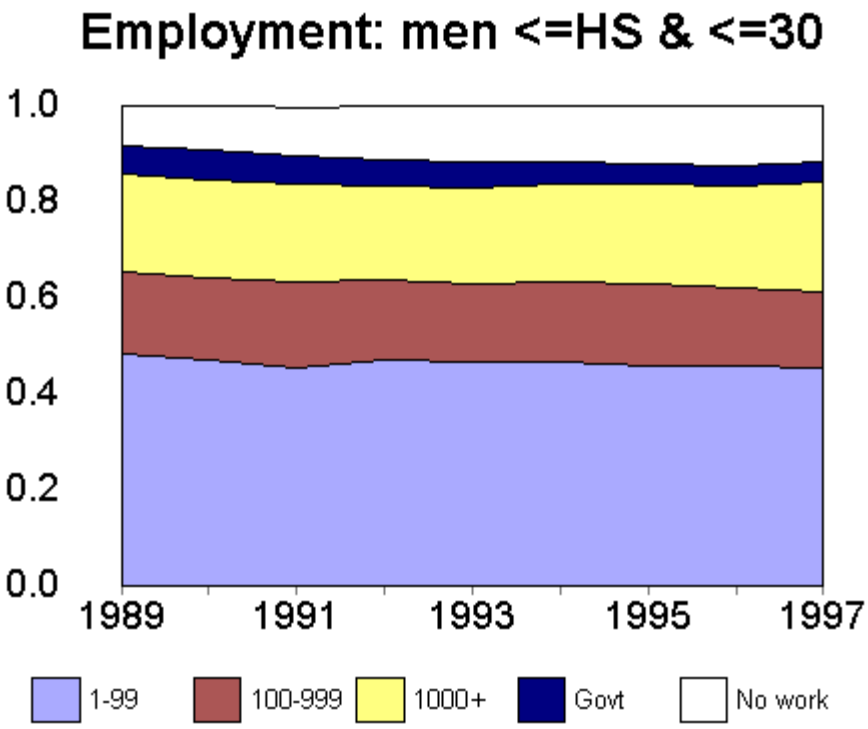
To make the graphs more readable, some of the size categories from the previous figures have been collapsed. In particular, small firms are defined as those with fewer than 100 employees; medium firms are defined as those with 100 to 999 employees, and large firms are defined to be those with 1,000 or more employees.[6]

As with the figures reported by the SBA (1998a), the graphs in Figure 6 show that businesses with fewer than 100 employees accounted for a substantial share of employment in all years for all gender, age and education groups. The graphs also show that businesses in the smallest size category accounted for a disproportionate share of employment for women workers, younger workers and less-educated workers. Government employment was more important for older and more-educated workers than for other workers.

If we examine the trends in the different employment categories, the proportion of employment in small and medium sized businesses did not change very much over the period for any of the groups. The volatility in medium-sized establishment growth and small-business job flows from the previous graphs does not carry through to Figure 6. Employment in large businesses was cyclical for young women with low levels of schooling. Over the entire period, employment in large businesses increased slightly for women. For women with a high school education or less, the percentage employed by large businesses increased from 18.8 in 1989 to 20.4 in 1997; for women with more education the percentage increased from 21.0 to 23.9. Government employment fell for all groups. On net, employment for women rose slightly over the period while employment for men declined.

[6]The decision to collapse the data this way was based on the analysis of Figure 1 and other data. A disadvantage of this scheme is that is does not allow us to identify the exact trends for businesses with fewer than 500 employees—the standard dividing line for small businesses. The collapsed categorization is only used for the present graphical analysis; the subsequent multivariate statistical analyses return to the 5-size categorization.

Figure 6. Trends in employment by gender, schooling and age



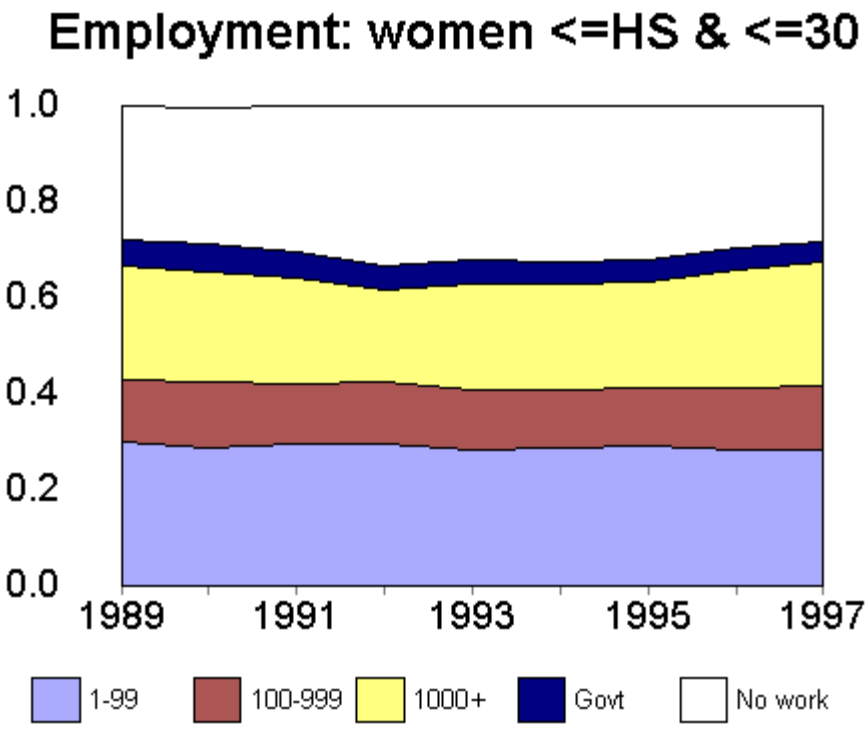
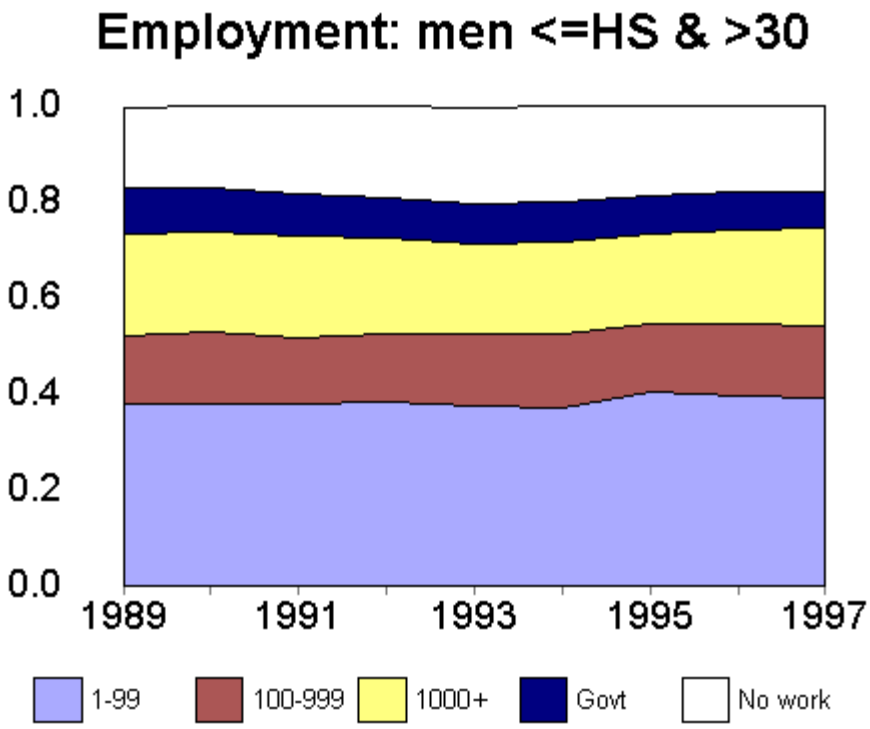


Figure 6 (cont.). Trends in employment by gender, schooling and age



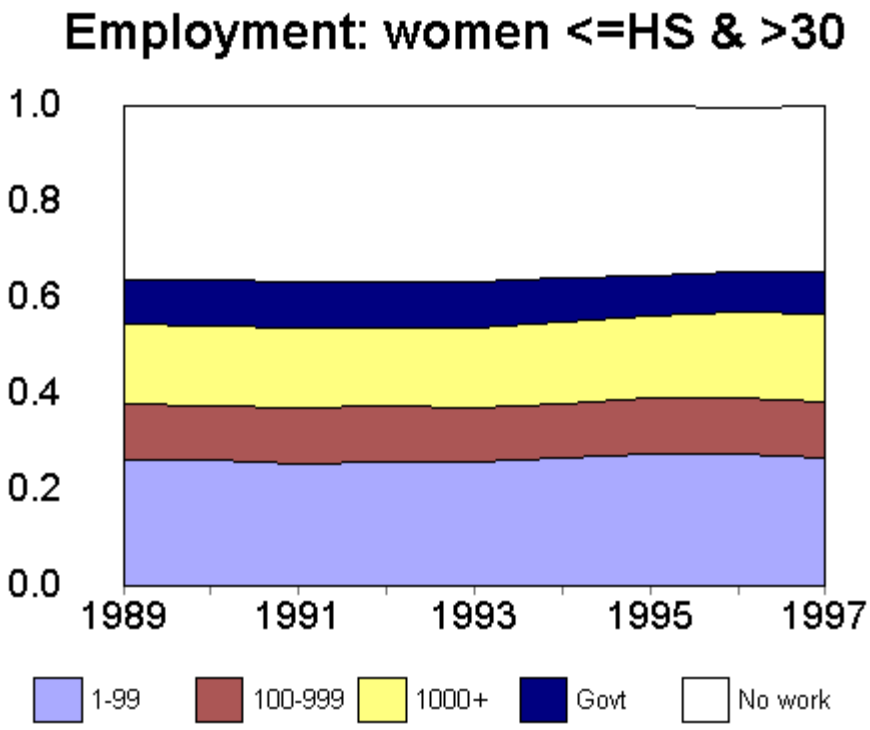
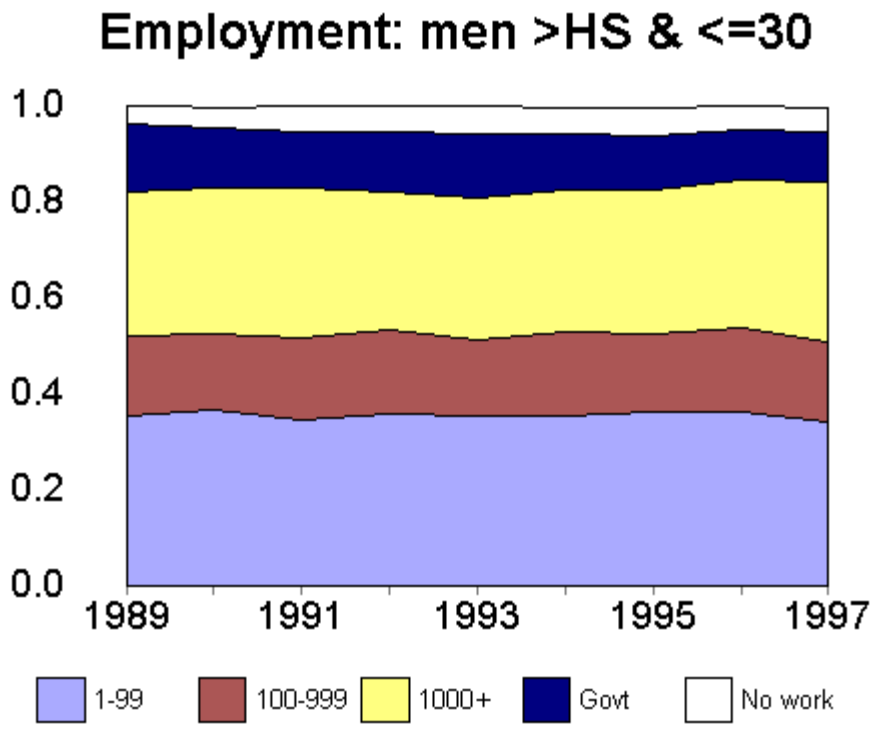


Figure 6 (cont.). Trends in employment by gender, schooling and age



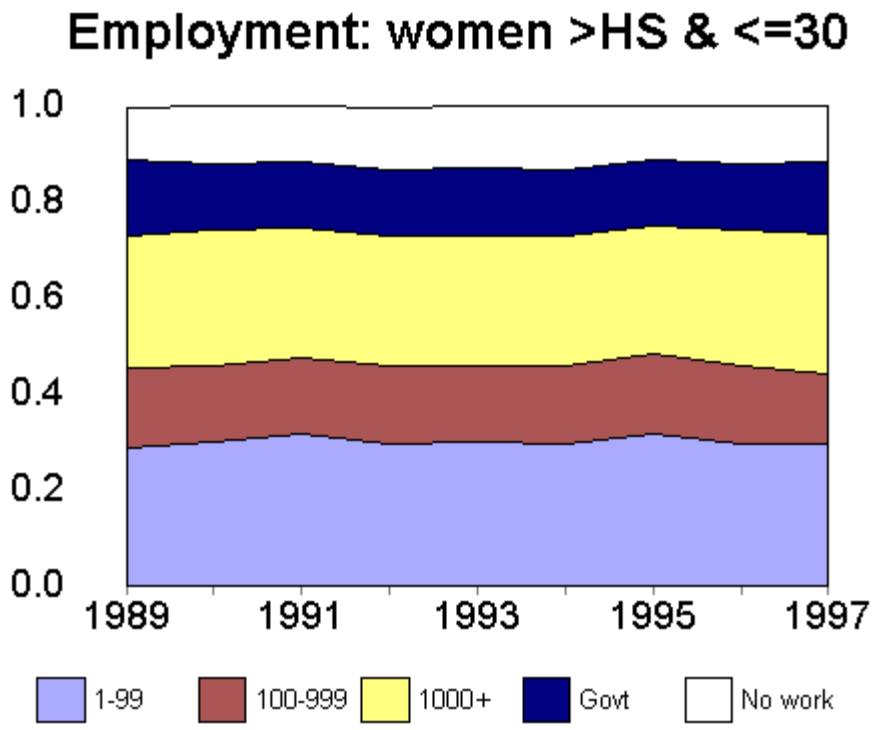
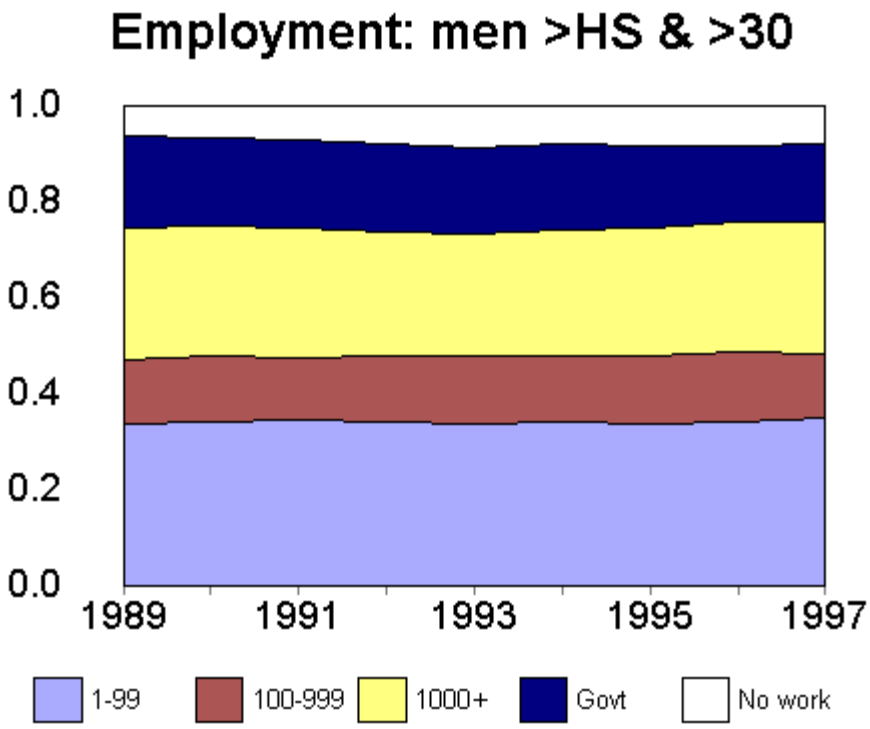
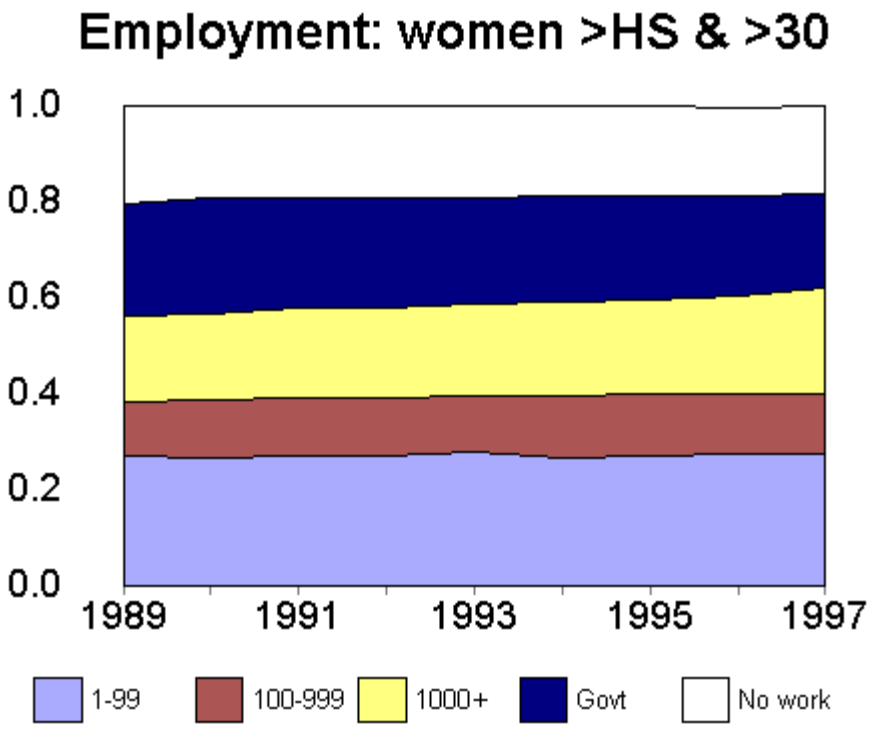


Figure 6 (cont.). Trends in employment by gender, schooling and age

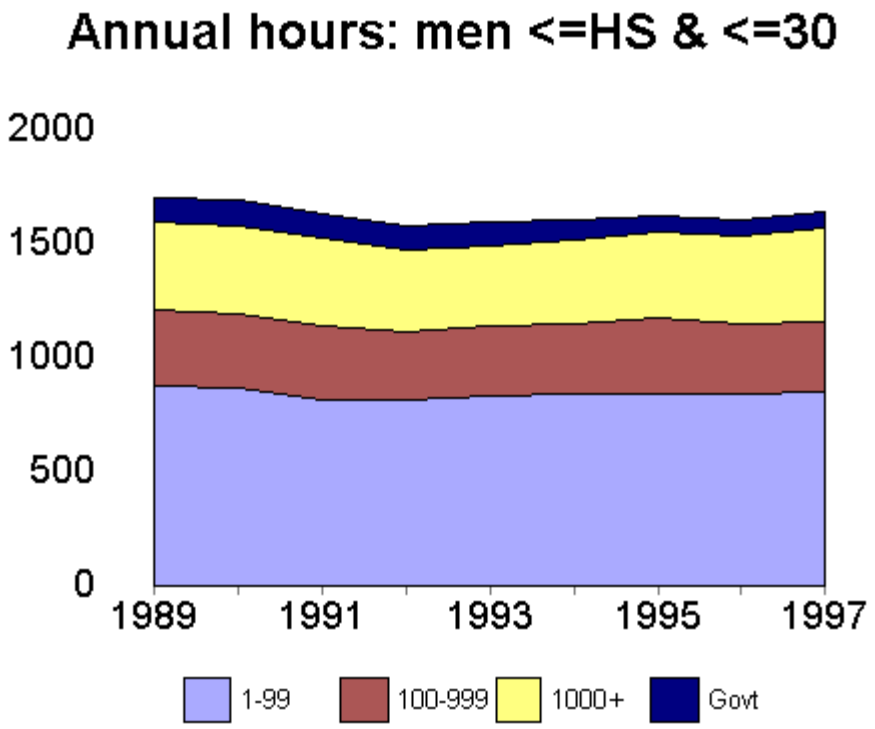




The lack of time series variability in Figure 6, especially in the trends for medium-sized businesses, is a little surprising. One shortcoming in the data that might account for this is that the CPS only records characteristics of the longest job held during the previous year. Thus, the data do not indicate changes in jobs from one type of employer to another that occur during the year. The use of a simple binary measure for employment may also mask some variation in work outcomes since "no work" refers to no work during the entire previous year. Most spells of unemployment are relatively brief and last less than a year; changes in the size distribution of businesses that affect workers through such brief spells would not be detected using the binary annual employment measure.

Figure 7 repeats the analysis from Figure 6 but uses annual hours (reported weeks worked times usual hours) in place of the binary employment measure. The hours measure still suffers from the problem that the employer type (small, medium, large or government) is assigned to all hours worked during the year; so, it fails to capture individual job changes between different types of employers. Nevertheless, the measure may provide a better indication of intensity of employment over the year by accounting for within-year joblessness and for differences in typical hours across different sized employers. As expected, Figure 7 shows more cyclical variability in employment trends than the previous graph. Aside from the cyclical variability, many of the general patterns from Figure 6, such as expanding large business employment and contracting government employment, are replicated in Figure 7.

Figure 7. Trends in annual hours by gender, schooling and age



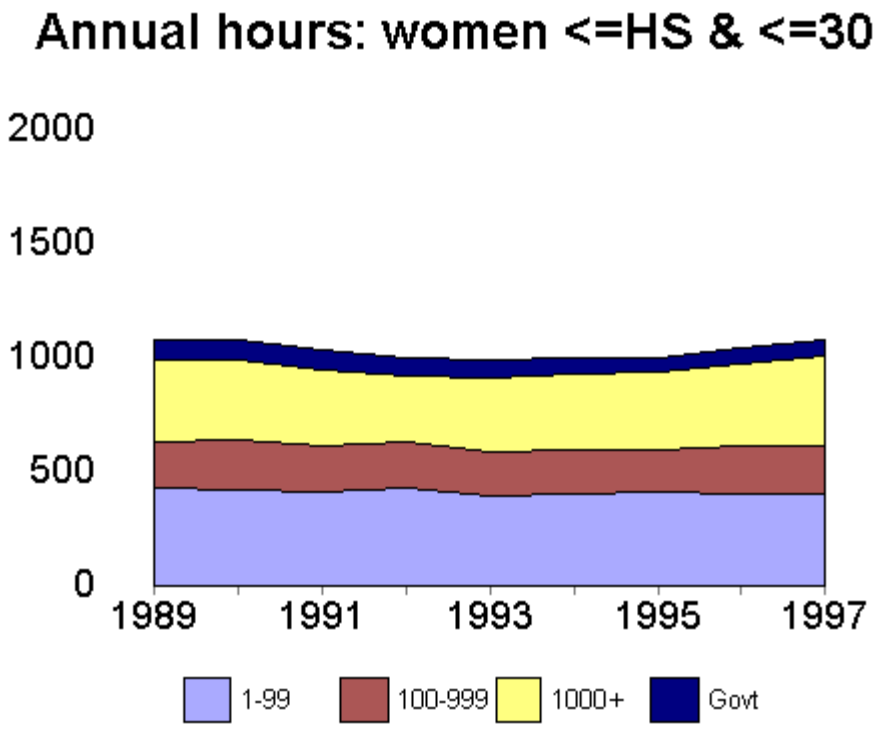
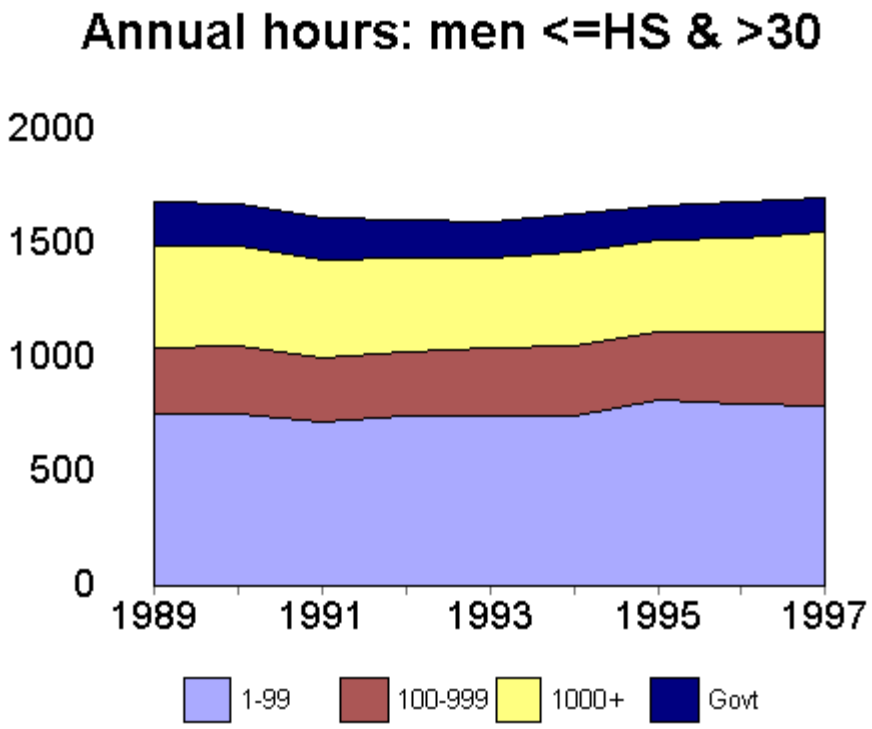


Figure 7 (cont.). Trends in annual hours by gender, schooling and age



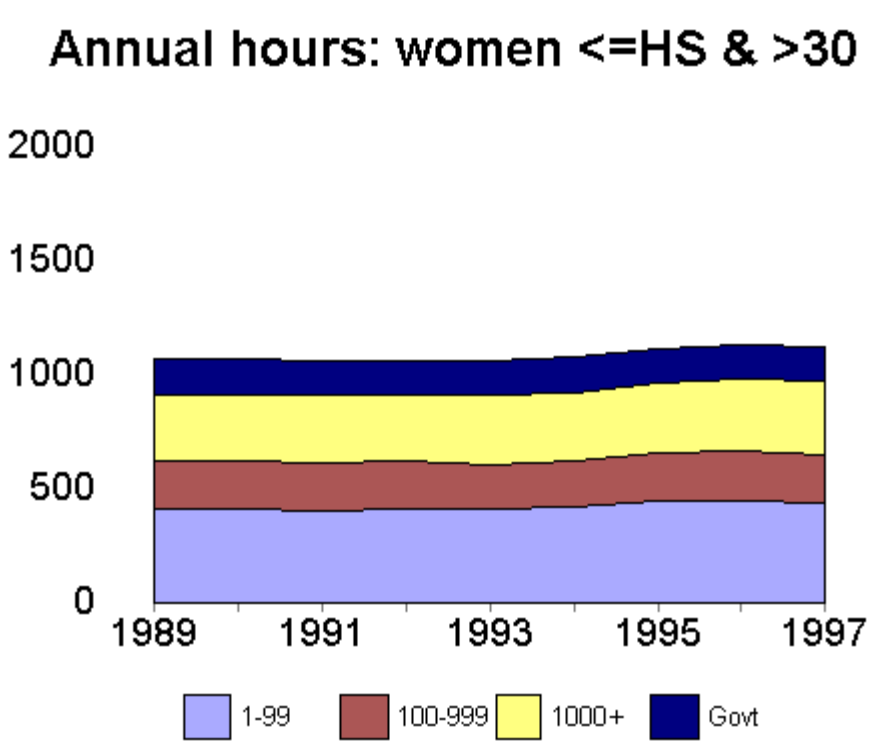
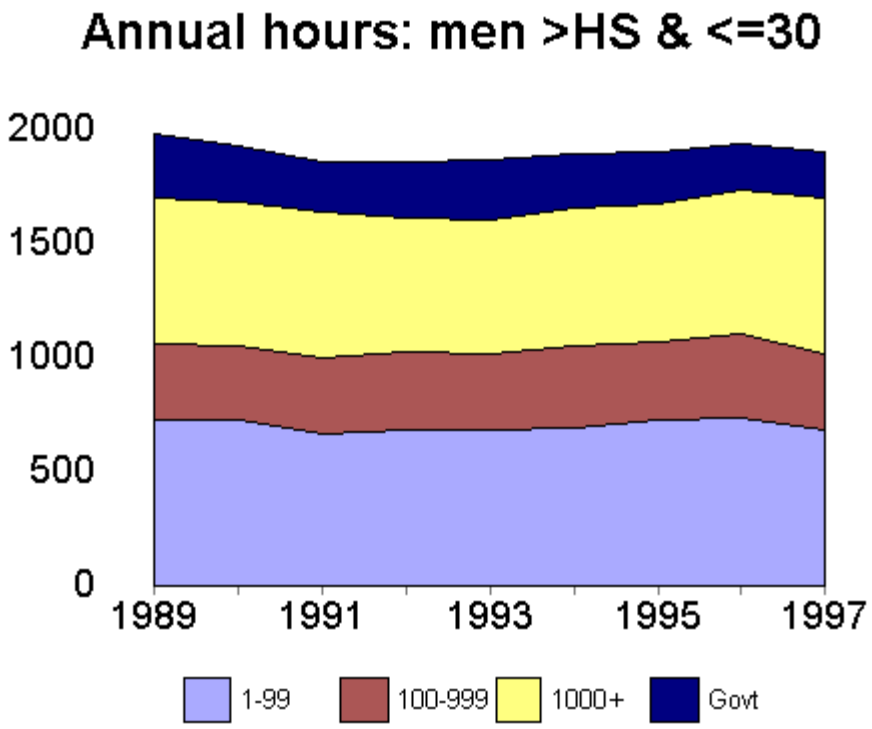


Figure 7 (cont.). Trends in annual hours by gender, schooling and age



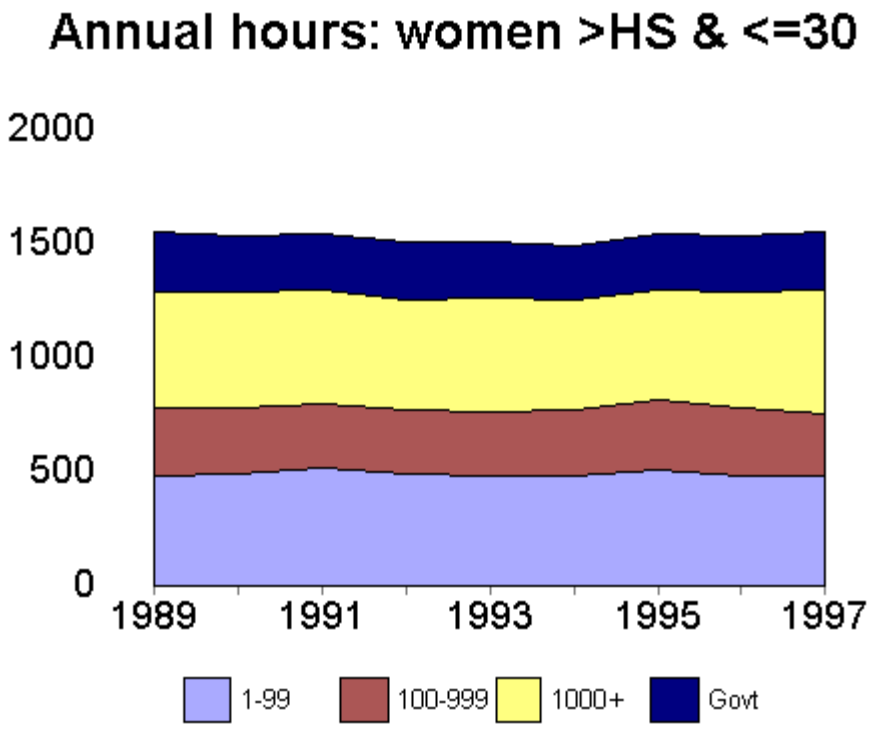
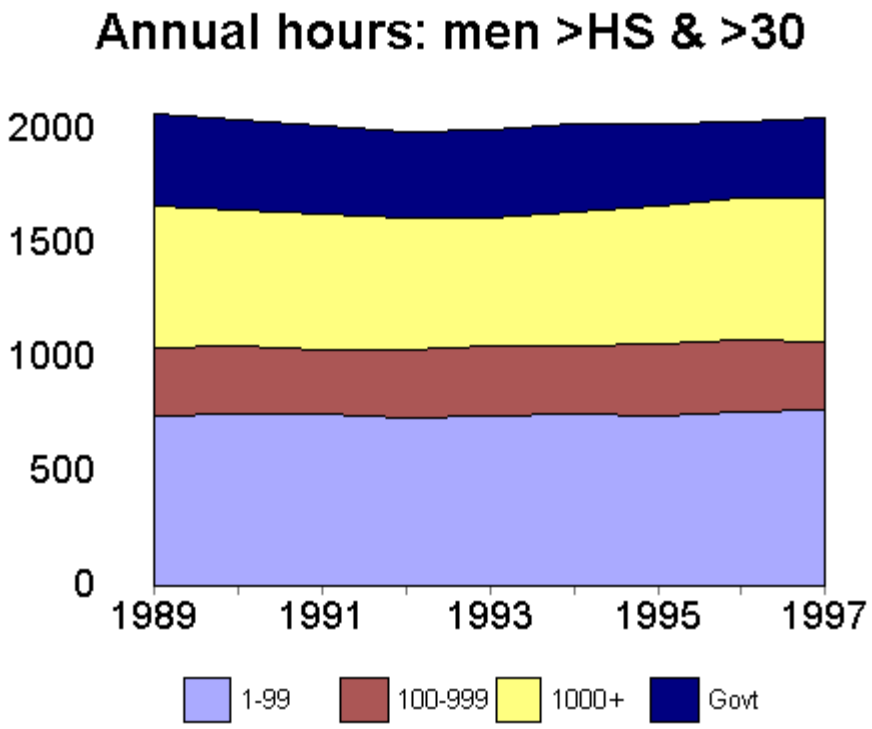


Figure 7 (cont.). Trends in annual hours by gender, schooling and age



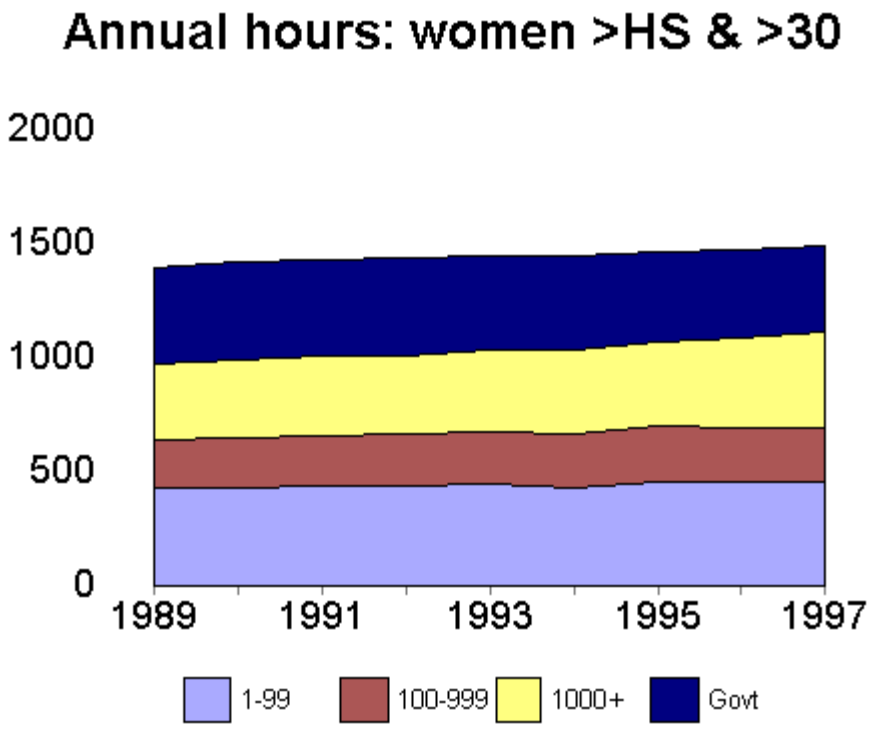
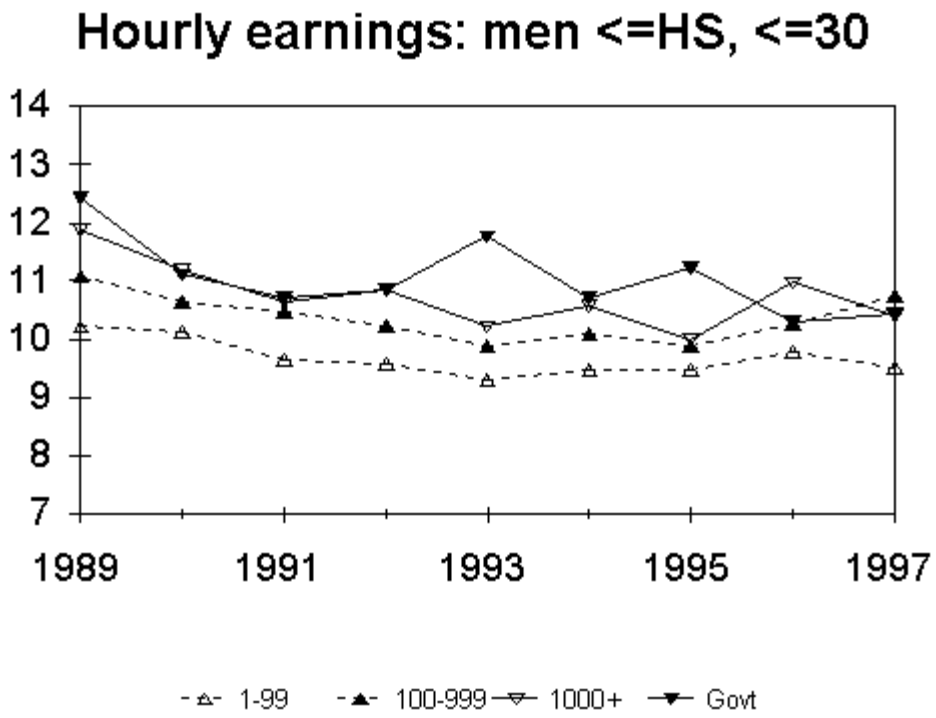


Figure 8 shows the trends in real hourly earnings across the four employment categories for men and women with different ages and levels of schooling. The vertical axis in this case is gross earnings per hour adjusted to 1998 dollars. Figure 9 shows similar trends using real weekly earnings, where the vertical axis is gross earnings per week in 1998 dollars. The employer-size effect is evident in the graphs for both types of earnings. Hourly and weekly earnings are consistently positively related to employer size for men and women in each age and education group, although the differences are more compressed for younger and less-educated workers. The differentials persist despite some large changes in the overall level of wages. For men as a whole, average weekly wages in private sector employment fell by roughly $100 during the early 1990s and remained roughly constant thereafter. For women, there was relatively little change in wages over time. The figures illustrate that despite gradually tightening labor market conditions during the mid- to late-1990s, workers as a whole did not see substantial improvements in their hourly wages or weekly paychecks.[7]

[7]One shortcoming of these data is that they reflect only money wages and not the total value of wages and fringe benefits; however, trends based on the Employer Cost Index lead to the same general conclusion.

Figure 8. Trends in real hourly earnings by employer type, gender, schooling and age



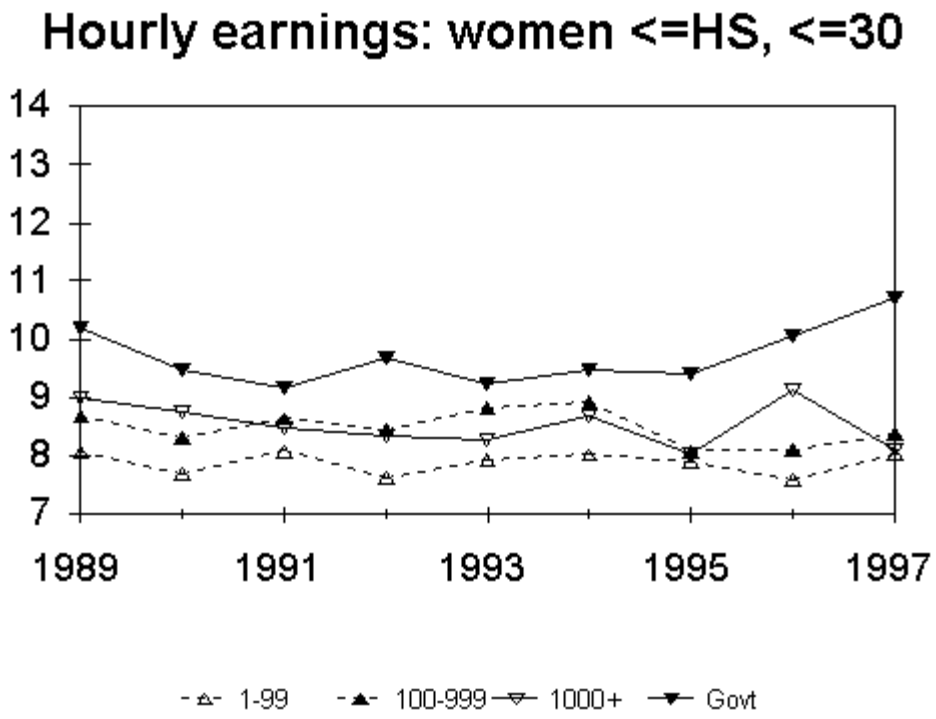
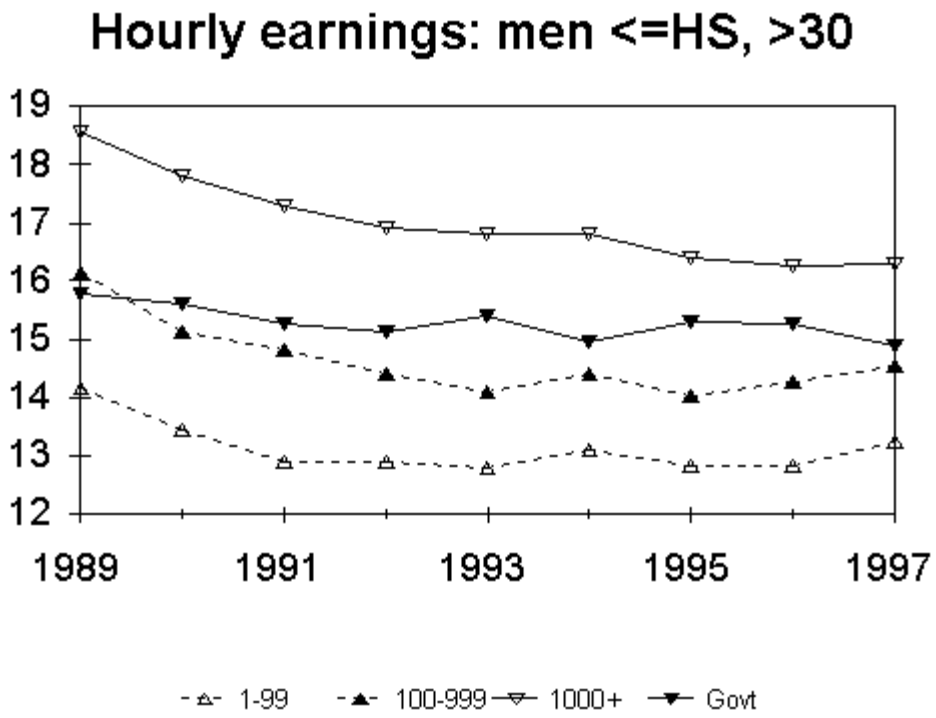


Figure 8 (cont.). Trends in real hourly earnings by employer type, gender, schooling & age



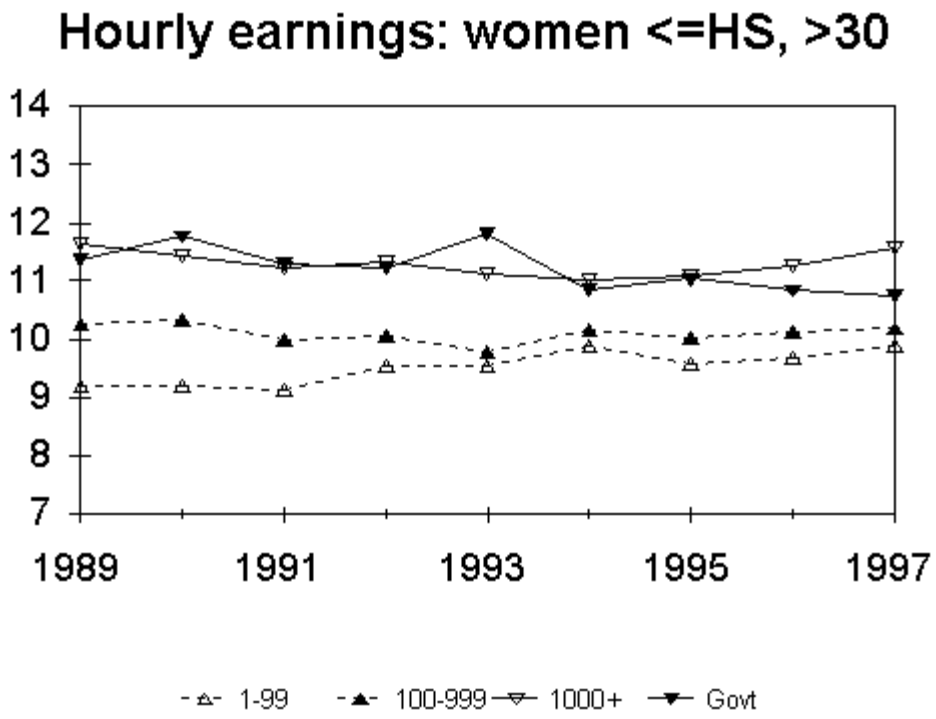
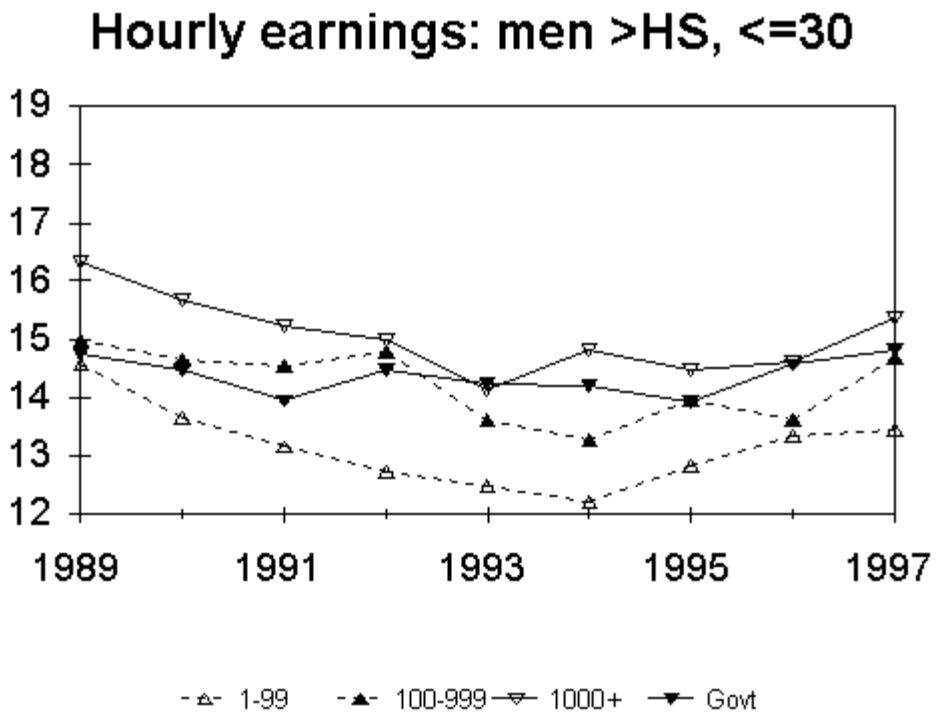


Figure 8 (cont.). Trends in real hourly earnings by employer type, gender, schooling & age



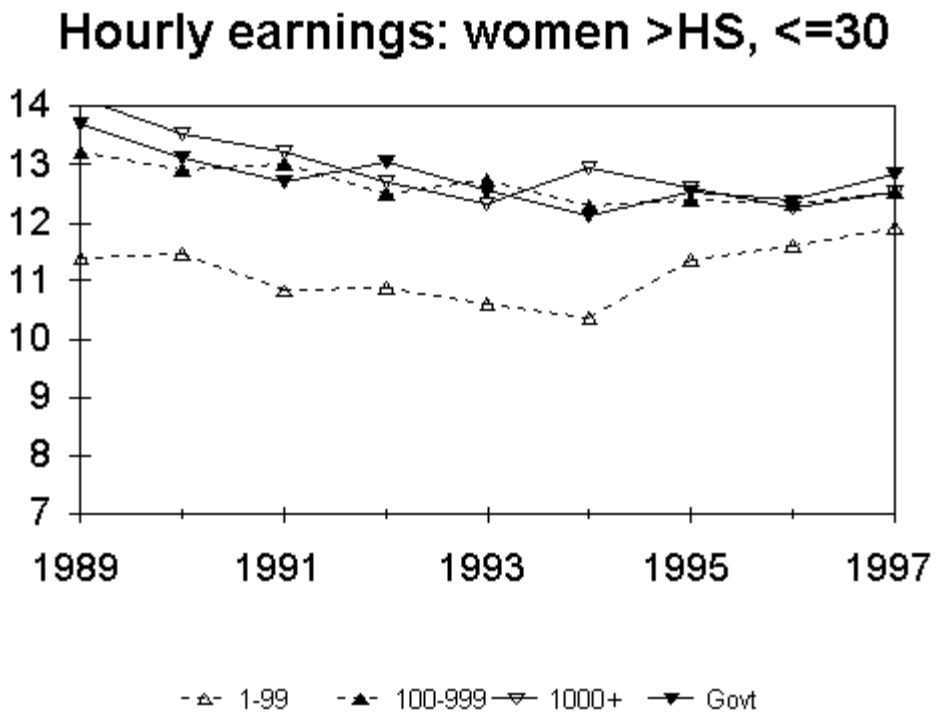
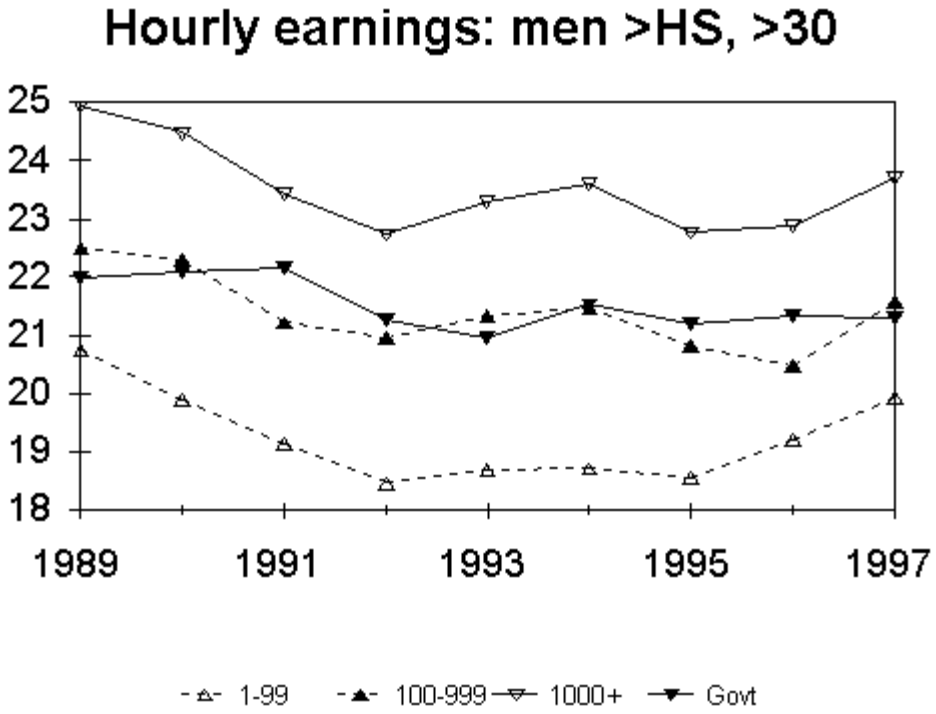


Figure 8 (cont.). Trends in real hourly earnings by employer type, gender, schooling & age



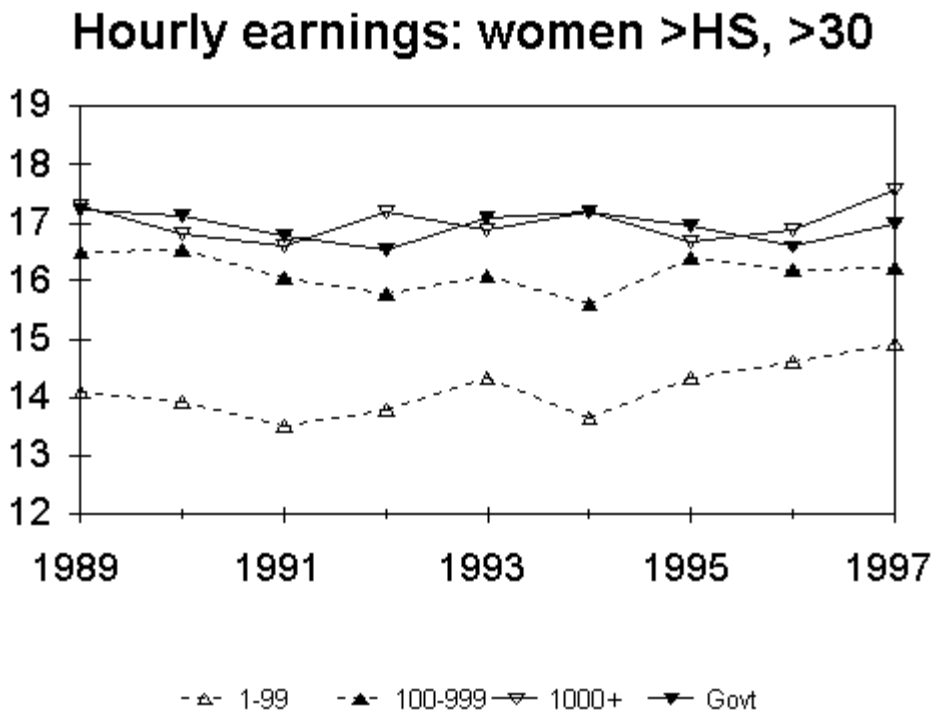
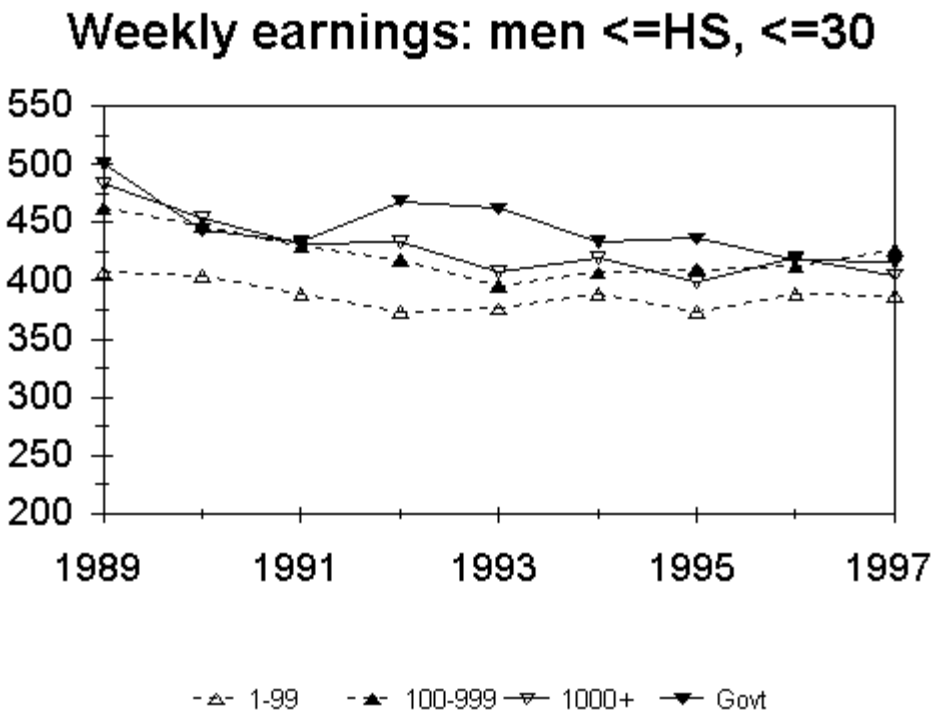


Figure 9. Trends in real weekly earnings by employer type, gender, schooling and age



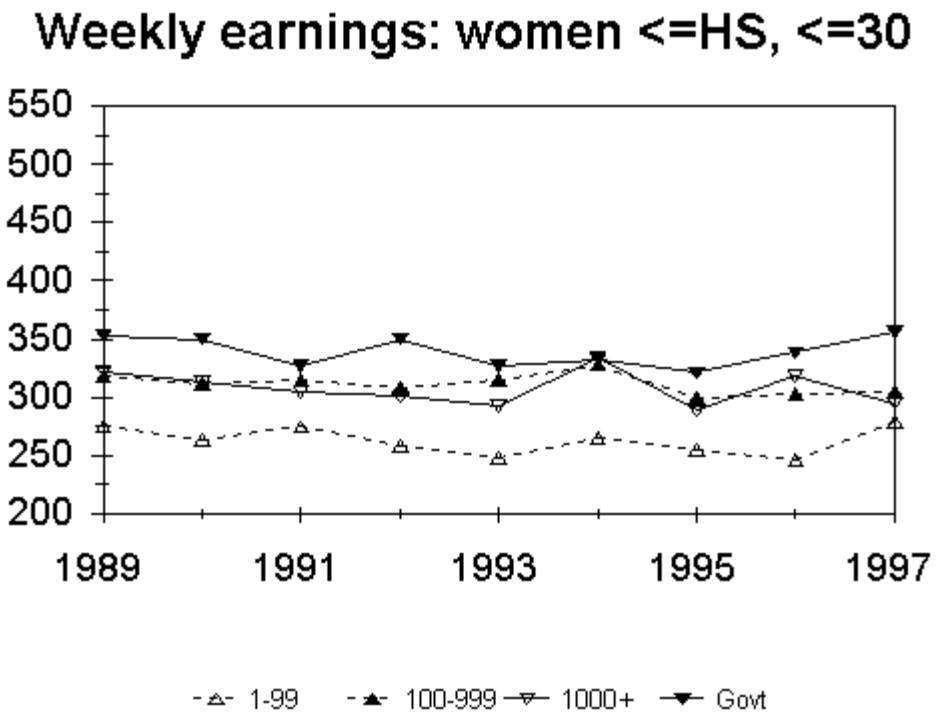
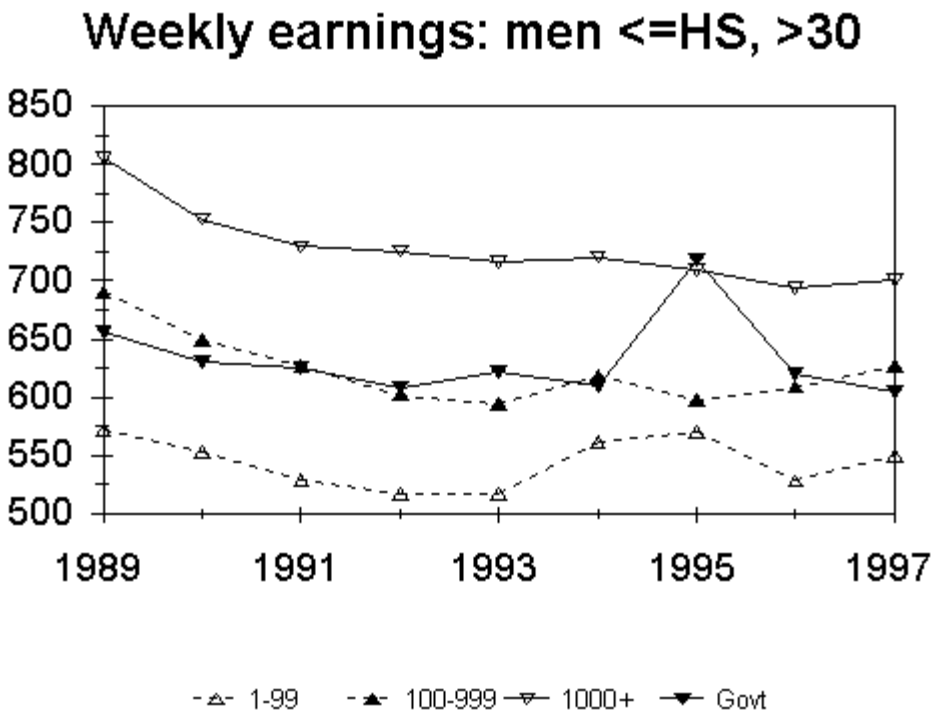


Figure 9 (cont.). Trends in real weekly earnings by employer type, gender, schooling & age



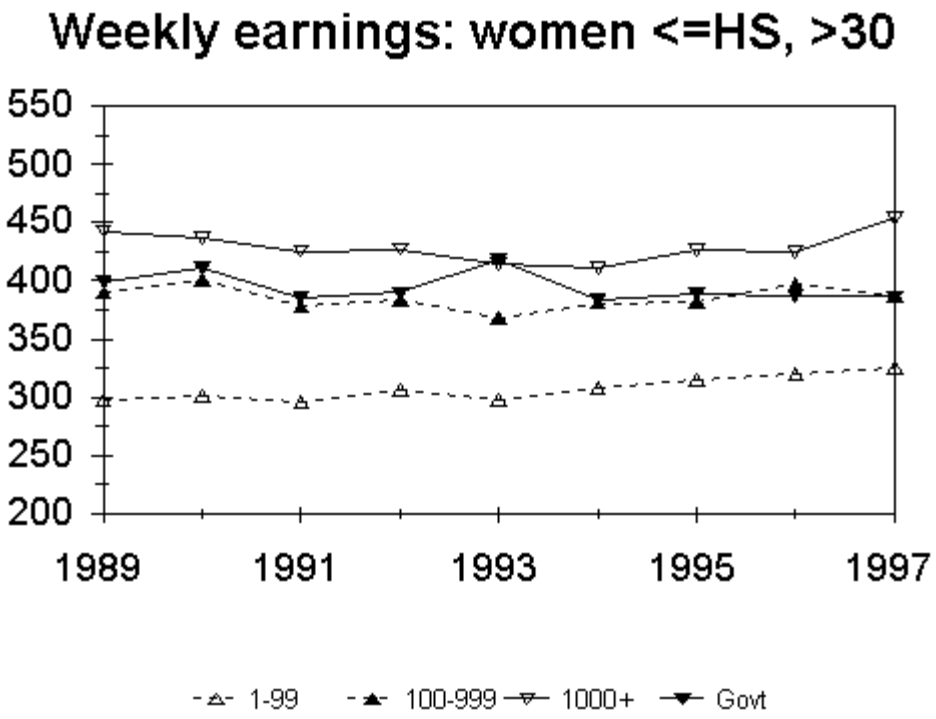
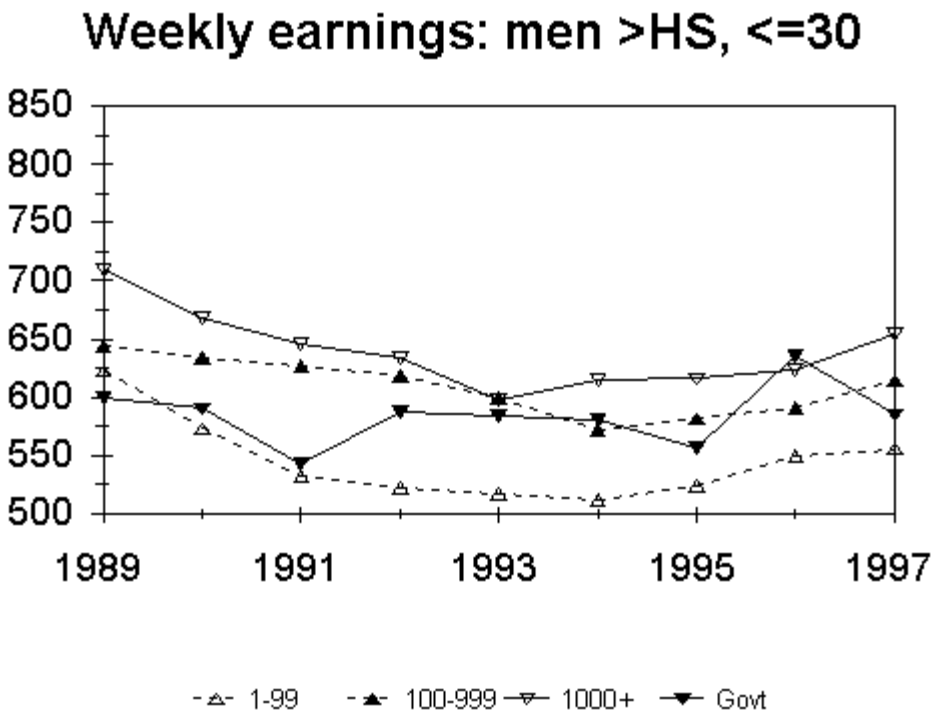


Figure 9 (cont.). Trends in real weekly earnings by employer type, gender, schooling & age



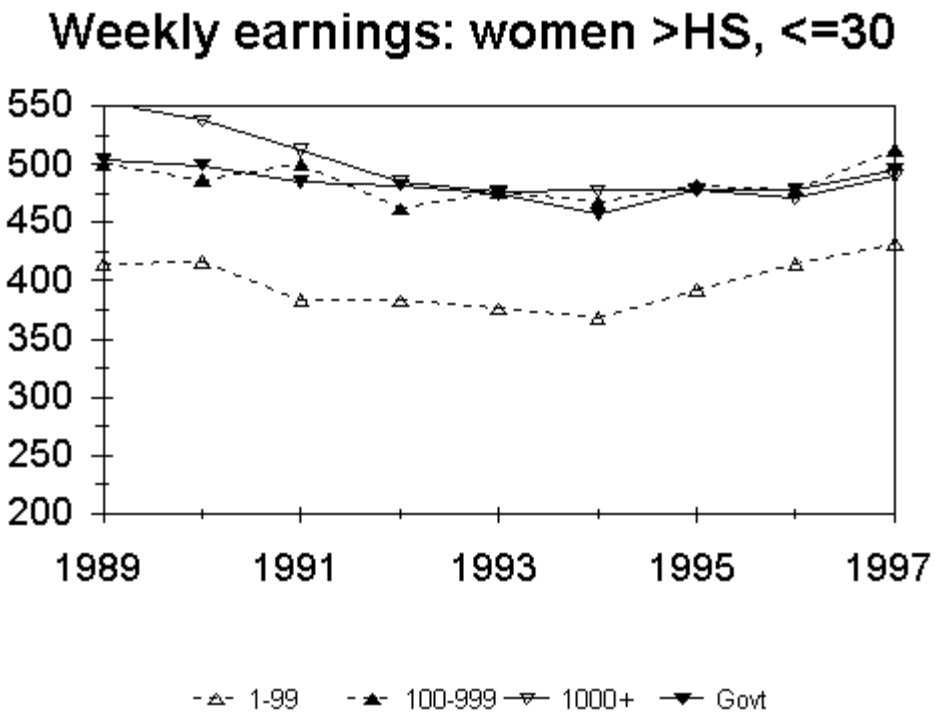
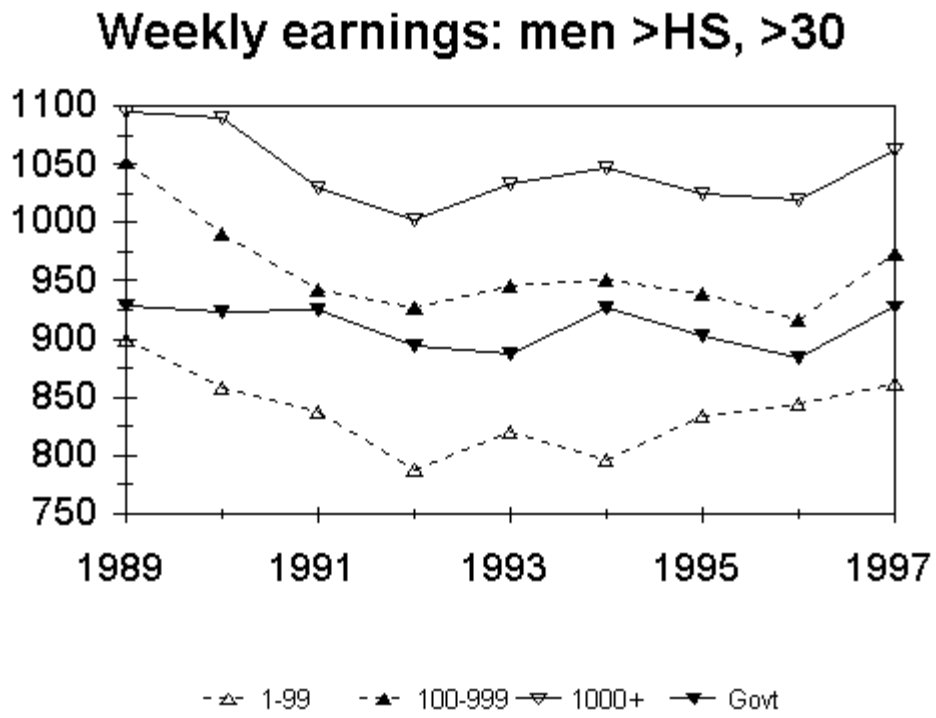
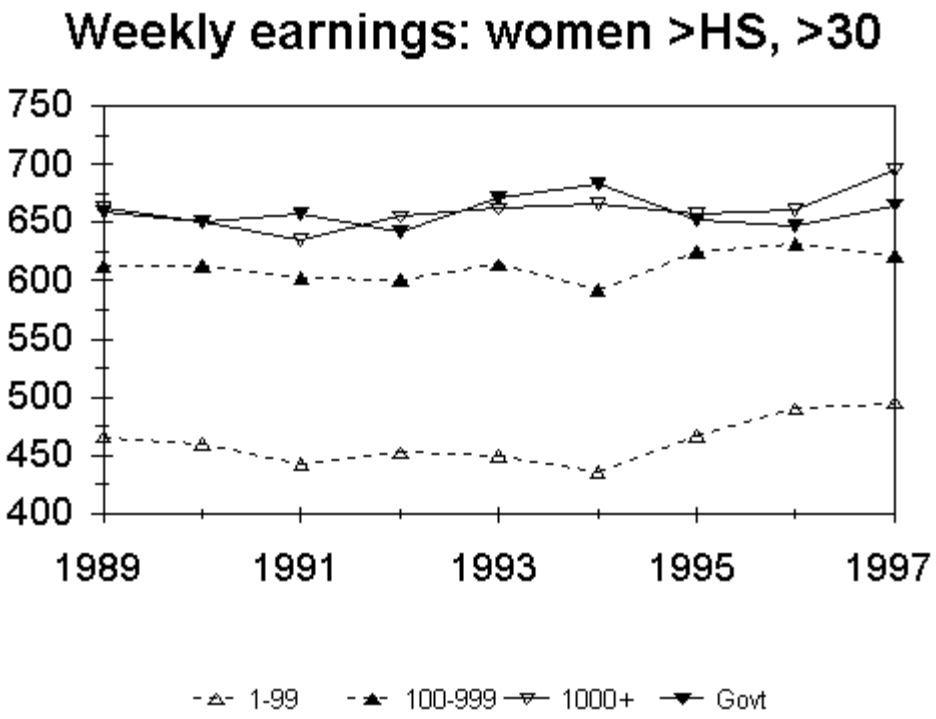


Figure 9 (cont.). Trends in real weekly earnings by employer type, gender, schooling & age





4. Data

Current Population Survey. The primary data for the detailed analyses for this report come from the 1990-98 Annual Demographic (March) Supplements of the CPS. The CPS is a large monthly survey of roughly 50,000 U.S. households. For the adults in each household, the CPS gathers information about current labor force behavior and other personal characteristics. In addition to these regular data items, the March supplements also collect information on work behavior and the receipt of different types of income during the preceding year. When sampling weights are used, the data for each year are nationally representative.

Specifically, the March Supplements record whether a person was employed during the previous year, the number of weeks the person worked, the number of hours worked in an average week, and the amount of money earned from different sources (e.g., wage and salary, self-employment and farm employment). From these measures, the investigation constructs three primary variables: a dummy variable indicating employment during the previous year, weekly earnings during the previous year (total gross personal earnings from all sources divided by weeks worked), and hourly earnings during the previous year (total gross personal earnings from all sources divided by weeks and typical hours worked). Nominal amounts are re-expressed in constant 1998 dollars using the Consumer Price Index for Urban Consumers (CPI-U). Because the economic data from each supplement refer to the preceding year, the period covered by the combined data is 1989-1997. The employment, hourly earnings and weekly earnings variables serve as the dependent variables in the subsequent multivariate analyses.

The CPS also contains information on each person's sex, age, ethnic origin, and schooling level. The analysis uses the sex and age information as recorded. From the ethnic origin data, the analysis constructs dummy indicators for people of African origin and people of

other non-European origins (mostly native Americans, Asians, and Pacific Islanders); the omitted category is European origin. The analysis also constructs a separate dummy variable for Hispanic origin which may overlap with the other racial/ethnic categories. Using the schooling information, the analysis distinguishes between people who obtained no more than a high school education and those who went on to complete at least some college. For the detailed analyses, the investigation separately examines results for eight different groups cross-categorized by gender, age (under and over 30 years of age) and education. As the previous graphical analyses indicated, the labor market experiences and employment patterns for these groups varied greatly.

From the CPS, the investigation selects non-institutionalized civilians who were 16 to 64 years of age. The analysis then makes several other exclusions. First, it excludes people who reported being enrolled in school. Second, it drops observations for individuals whose earnings were in the top one percent of all earnings for each year or whose average weekly hours exceeded 98.[8] Third, it excludes observations if the calculation of real hourly or weekly earnings was unreasonable—below 75¢ or above $250 for hourly earnings and below 75¢ or above $10,000 for weekly earnings. Fourth, it drops observations with allocated economic or demographic data.[9] Fifth, to avoid statistical complications, the study drops observations each year from the

[8]The CPS masks (top-codes) information for people with earnings above certain levels; however, the levels differ over years. The percentile cut-off trims the data more uniformly than dropping the top-coded observations would.

[9]If a survey question in the CPS was unanswered, the Census Bureau "allocated" a response using a hot deck procedure. Instead of using the allocated information, this study treats these data as missing and drops the corresponding observations. See Lillard et al. (1986) for a thorough discussion of allocation procedures and their potential effects on empirical labor analyses. Dropping observations with allocated data reduced the sample sizes in the CPS files by about ten percent.

"outgoing" rotation groups.[10] Finally, the investigation excludes all observations from counties with fewer than ten respondents and counties with no variation in employment outcomes within the gender×age×education categories (the reasons for this last exclusion are explained in the results section). Dropping these counties produces a sample that is skewed toward urban residents from larger counties. All of the statistical analyses incorporate the sampling weights supplied with the CPS scaled to the annual sample sizes.[11]

State-level policy variables. Two state-level policy variables relevant to the low-skill labor market have been merged into the analysis data set: the maximum AFDC/TANF benefits available to a family of three with no other income and the minimum wage in the state. The benefits measure is taken from various editions of the *Green Book* (U.S. House of Representatives, Committee on Ways and Means, various years) and captures the income available if a family head does not work. The minimum wage measure is taken from papers by Neumark, Schweitzer and Wascher (1998) and Neumark (1999). Over the period of the study there were several increases in the federal minimum wage that may have affected both the supply of and demand for low-skill and contingent labor.[12] Additionally, a small number of states set minimum wages above the federal level and changed their wages at different times. The analysis adjusts the public assistance and minimum wage measures to 1998 dollars using the CPI-U.

[10]In the CPS, households are interviewed for four consecutive months, left alone for eight consecutive months, then interviewed again for four consecutive months. When the annual surveys are appended (as is done in this investigation), the same individuals can appear in two consecutive years. Removing the respondents who are in their second round of interviews eliminates this possibility. This simplifies the computation of standard errors since we do not need to consider multiple non-independent observations.

[11]These sampling weights do not account for the exclusions made by the analysis.

[12]The federal minimum wage was $3.35 in 1989. It increased to $3.80 in 1990, $4.25 in 1991, and $4.75 in 1996.

County Business Patterns. A distinguishing feature of this research is that it relies on special internal versions of the CPS that contain detailed geographic information for each household. The regular, public-use versions of the CPS identify each respondent's state of residence and for a subset of urban residents, the metropolitan area of residence. The lack of geographic detail hampers what can be done in the public-use files to control for local economic conditions. In contrast, the internal versions of the CPS, which were accessed through a special arrangement with the Center of Economic Studies of the U.S. Census Bureau, identify the county of residence for all respondents. The present research uses these county identifiers in two ways: first, to form dummy variable controls for the factors within counties that are time-invariant over the period (such as general business climate, resident attitudes and area amenities) and might be associated with both business success and individual work behavior, and second, to link to time-varying, county-level information on business conditions from the County Business Patterns and Business Information Tracking System databases.

The CBP database contains information on the aggregate employment, payroll, number of establishments, and number of establishments in different size categories for detailed industries in each county. While the data are very comprehensive, there are some omissions and qualifications which limit the data set's usefulness. For instance, the CBP only tallies information for employer establishments and thus omits people who are self-employed or work in private households (e.g., maids and nannies). The CBP also omits certain types of employers such as governments, agricultural producers and railroads. In addition, some data items are suppressed to preserve confidentiality when there are only a few businesses in particular categories in a county. The existence, industry classification and general size classification of a business are not considered to be confidential information; so, the number of establishments and

size distribution for an industry are not suppressed. However, the exact number of employees and total payrolls are viewed as confidential and thus subject to suppression.

As with the earlier descriptive analyses, the investigation considers the number of establishments in five size categories: 1 to 9, 10 to 99, 100 to 499, 500 to 999 and 1000 or more employees. It scales these figures by the estimated number of people aged 15 to 64 in each county to form approximate measures of the number of establishments in each size category per working-age adult.[13] For some sensitivity analyses, the investigation also considers the total number of establishments (for all size categories) in the manufacturing, retail and service sectors per working-age adult in the county.

Business Information Tracking System. The study's measures of local job flows are drawn from the BITS. The BITS is a confidential database and is only available through a special arrangement with the Center for Economic Studies of the U.S. Census Bureau.[14] The BITS is subject to some of the same limitations as the CBP database—it omits non-employer establishments, self-employed and private household workers, and government establishments. However, it has several useful features. First, it contains individual establishment data and thus avoids the suppression problems of the CBP (though at the cost of greatly restricted access). Second, it identifies multiple establishments within firms, so it can be used to classify

[13]The population data are from the U.S. Census Bureau county estimates program and were graciously provided by Alfred Nucci. The data come from Census Bureau research that he and Larry Long are conducting on migration and population densities. For 1989, intercensal estimates are used; for 1990, decennial census figures are used; and for the period 1991-1997, post-censal estimates are used.

[14]It took a considerable amount of time to obtain permission to access the BITS. Because of this, the data were not available until very near the end of the investigation. These time constraints, in turn, greatly limited what the research team could accomplish with the data. Priority was given to constructing and analyzing the job flow measures.

establishments by firm size. Third, it follows establishments over time and thus can be used to generate job flow statistics.

The investigation constructs measures of job flows associated with establishment births, deaths, expansions, and contractions in each county in each year. As with the local area measures constructed from the CBP, the investigation scales the job flow measures by the number of people aged 15-64 in each county. Thus, the local measures differ from the job flow measures from the trend analyses which were expressed as a proportion of jobs.[15] For some analyses, the investigation uses job flow measures that are disaggregated by industry (manufacturing, retail trade, services, and other). For other analyses, it uses job flow measures that are disaggregated by firm size.

Descriptive statistics for analysis variables. Means and standard deviations for the analysis variables from the linked individual- and county-level CPS and CBP observations are reported in Table 1. The columns in the table list separate estimates for the eight gender×age×education categories; they also indicate the sample sizes for the categories. Descriptions of the variables appear in the rows. Most of the descriptions are self-explanatory. For example, "Estabs. in county with 1-9 employees" is an indicator for the number of establishments with 1-9 employees divided by the county population of working age adults (for display purposes, the establishment figures are actually shown in terms of thousands of workers). Table 1 reproduces the overall differences in employment and earnings levels for the alternative gender and skill groups that were evidenced in the earlier figures.

[15]Another difference from the measures used in the trend analyses is that establishments which continue to operate across years but "move" from one county to another are treated as closing in the first county and opening in the second. Because so few establishments move, this does not greatly affect the results.

Table 1. Descriptive Statistics for Analysis Variables from the Combined CPS/CBP Data Set

	Men				Women			
	high school or less		more than high school		high school or less		more than high school	
	≤ age 30	over age 30	≤ age 30	over age 30	≤ age 30	over age 30	≤ age 30	over age 30
Employed last year	0.86	0.78	0.93	0.91	0.66	0.61	0.86	0.79
	(0.34)	(0.41)	(0.26)	(0.29)	(0.47)	(0.49)	(0.34)	(0.41)
Real hourly earnings	10.28	14.76	14.85	21.70	8.32	10.34	12.61	16.07
	(6.38)	(9.27)	(9.24)	(12.80)	(6.83)	(8.06)	(7.98)	(10.76)
Real weekly earnings	419.32	622.24	626.70	949.84	296.30	372.10	481.67	601.06
	(268.79)	(370.26)	(381.30)	(533.26)	(233.24)	(280.98)	(312.95)	(395.80)
Estabs. in county with 1-9 employees[A]	28	28	30	29	28	28	29	30
	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)
Estabs. in county with 10-99 employees[A]	9.1	8.7	9.9	9.4	8.9	8.7	9.7	9.4
	(2.3)	(2.5)	(2.4)	(2.3)	(2.4)	(2.5)	(2.4)	(2.4)
Estabs. in county with 100-499 employees[A]	0.79	0.74	0.88	0.80	0.77	0.74	0.84	0.80
	(0.29)	(0.30)	(0.30)	(0.30)	(0.30)	(0.31)	(0.31)	(0.31)
Estabs. in county with 500-999 employees[A]	0.060	0.057	0.066	0.060	0.058	0.057	0.064	0.060
	(0.034)	(0.039)	(0.033)	(0.034)	(0.035)	(0.039)	(0.034)	(0.036)
Estabs. in county with 1000+ employees[A]	0.037	0.033	0.044	0.037	0.035	0.033	0.041	0.03.7
	(0.024)	(0.026)	(0.025)	(0.025)	(0.024)	(0.026)	(0.025)	(0.026)
Manufacturing estabs. in county[A]	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.3
	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)
Retail establishments in county[A]	9.1	9.3	9.1	9.2	9.2	9.3	9.2	9.3
	(1.9)	(2.3)	(1.7)	(2.1)	(2.2)	(2.3)	(2.0)	(2.2)
Service establishments in county[A]	13	13	15	14	13	13	15	14
	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)

Civilian employment per working-age adult in cty.	0.85 (0.21)	0.82 (0.22)	0.92 (0.25)	0.87 (0.22)	0.84 (0.22)	0.82 (0.22)	0.90 (0.25)	0.87 (0.23)
Real max. monthly AFDC benefits (fam. 3)	483.03 (197.65)	454.92 (182.11)	502.28 (184.99)	482.93 (183.33)	470.95 (193.49)	452.58 (181.60)	479.33 (186.46)	476.79 (181.50)
Minimum wage	4.89 (0.33)	4.87 (0.29)	4.91 (0.30)	4.90 (0.29)	4.88 (0.30)	4.87 (0.29)	4.89 (0.29)	4.90 (0.29)
Age	24.17 (3.91)	45.28 (9.92)	25.93 (2.89)	43.79 (9.00)	24.18 (3.94)	46.36 (10.00)	25.81 (3.00)	43.15 (8.84)
African origin	0.16 (0.36)	0.14 (0.34)	0.11 (0.30)	0.08 (0.27)	0.18 (0.38)	0.13 (0.34)	0.13 (0.33)	0.10 (0.30)
Hispanic origin	0.22 (0.41)	0.11 (0.31)	0.09 (0.28)	0.04 (0.20)	0.18 (0.38)	0.10 (0.30)	0.07 (0.26)	0.04 (0.20)
Other non-white origin	0.04 (0.20)	0.03 (0.18)	0.07 (0.26)	0.05 (0.22)	0.04 (0.20)	0.04 (0.20)	0.06 (0.23)	0.05 (0.21)
Individual observations	18,543	49,523	11,087	44,874	22,539	64,110	17,030	50,811
Counties	509	1,077	246	744	668	1,176	446	892

Note: Statistics estimated using weighted data from the 1990-98 March CPS and CBP files. Standard deviations appear in parentheses.

[A] Establishment figures expressed per 1,000 working-age adults in county of residence.

Additionally, Table 1 shows why it may be important to control for other attributes besides age and schooling in examining economic outcomes. For example, the table indicates that people of African and Hispanic origins are over-represented among the younger and less-educated population groups. People of other non-European origins are also slightly over-represented among the younger population but under-represented among the less-educated population. Analyses that fail to account for these racial and ethnic differences could end up confounding the effects of skills with the effects of discrimination or culture.

Means and standard deviations for the analysis variables from the linked CPS and BITS data are reported in Table 2. Besides using job flow measures rather than establishment numbers to control for local business conditions, the combined CPS/BITS data set has fewer observations and covers fewer counties than the combined CPS/CBP data set. This is due to the fact that there are fewer years of data in the BITS than in the CBP data set. Despite the differences in coverage, the descriptive statistics for the overlapping variables in Tables 1 and 2 are very similar.

Table 2. Descriptive Statistics for Analysis Variables for Combined CPS/BITS Data Set

	Men				Women			
	high school or less		more than high school		high school or less		more than high school	
	≤ age 30	over age 30	≤ age 30	over age 30	≤ age 30	over age 30	≤ age 30	over age 30
Employed last year	0.85	0.78	0.92	0.91	0.65	0.61	0.86	0.79
	(0.35)	(0.41)	(0.27)	(0.29)	(0.47)	(0.49)	(0.34)	(0.41)
Real hourly earnings	10.20	14.63	14.87	21.56	8.33	10.37	12.62	16.13
	(6.49)	(9.15)	(9.70)	(12.54)	(7.22)	(8.25)	(7.97)	(10.93)
Real weekly earnings	414.37	616.94	625.13	944.13	296.56	372.73	480.07	601.78
	(270.18)	(369.04)	(388.31)	(526.30)	(246.72)	(286.11)	(310.91)	(395.63)
Jobs gained from estab. births in county	0.0439	0.0405	0.0491	0.0459	0.0429	0.0405	0.0479	0.0454
	(0.0189)	(0.0201)	(0.0210)	(0.0205)	(0.0190)	(0.0204)	(0.0206)	(0.0212)
Jobs lost from estab. deaths in county	0.0399	0.0360	0.0452	0.0408	0.0385	0.0359	0.0429	0.0403
	(0.0184)	(0.0197)	(0.0211)	(0.0198)	(0.0186)	(0.0196)	(0.0204)	(0.0208)
Jobs gained from estab. expansions in county	0.0605	0.0555	0.0677	0.0618	0.0590	0.0555	0.0649	0.0611
	(0.0213)	(0.0218)	(0.0225)	(0.0218)	(0.0211)	(0.0220)	(0.0224)	(0.0224)
Jobs lost from estab. contractions in county	0.0580	0.0523	0.0651	0.0580	0.0562	0.0523	0.0619	0.0572
	(0.0210)	(0.0219)	(0.0235)	(0.0217)	(0.0212)	(0.0224)	(0.0232)	(0.0228)
Jobs gained from manu. estab. births in county	0.0047	0.0046	0.0049	0.0047	0.0047	0.0046	0.0048	0.0047
	(0.0047)	(0.0066)	(0.0050)	(0.0051)	(0.0057)	(0.0064)	(0.0049)	(0.0055)
Jobs lost from manu. estab. deaths in county	0.0055	0.0052	0.0058	0.0053	0.0053	0.0052	0.0054	0.0051
	(0.0059)	(0.0072)	(0.0051)	(0.0052)	(0.0066)	(0.0069)	(0.0057)	(0.0054)
Jobs gained from manu. estab. exp. in county	0.0084	0.0085	0.0085	0.0082	0.0082	0.0084	0.0081	0.0082
	(0.0056)	(0.0062)	(0.0047)	(0.0051)	(0.0052)	(0.0062)	(0.0046)	(0.0053)
Jobs lost from manu. estab. contr. in county	0.0095	0.0091	0.0097	0.0090	0.0092	0.0090	0.0091	0.0088
	(0.0058)	(0.0066)	(0.0057)	(0.0058)	(0.0060)	(0.0065)	(0.0057)	(0.0058)

Jobs gained from retail estab. births in county	0.0108 (0.0042)	0.0106 (0.0049)	0.0116 (0.0041)	0.0115 (0.0045)	0.0108 (0.0043)	0.0106 (0.0048)	0.0117 (0.0044)	0.0115 (0.0047)
Jobs lost from retail estab. deaths in county	0.0088 (0.0033)	0.0085 (0.0040)	0.0095 (0.0035)	0.0092 (0.0037)	0.0087 (0.0034)	0.0084 (0.0039)	0.0094 (0.0035)	0.0092 (0.0040)
Jobs gained from retail estab. exp. in county	0.0112 (0.0034)	0.0109 (0.0038)	0.0118 (0.0033)	0.0116 (0.0035)	0.0113 (0.0036)	0.0109 (0.0039)	0.0119 (0.0035)	0.0116 (0.0036)
Jobs lost from retail estab. contr. in county	0.0122 (0.0037)	0.0115 (0.0041)	0.0130 (0.0034)	0.0124 (0.0037)	0.0121 (0.0038)	0.0115 (0.0042)	0.0129 (0.0036)	0.0123 (0.0038)
Jobs gained from service estab. births in county	0.0150 (0.0088)	0.0134 (0.0095)	0.0173 (0.0096)	0.0159 (0.0098)	0.0145 (0.0089)	0.0135 (0.0099)	0.0167 (0.0095)	0.0156 (0.0100)
Jobs lost from service estab. deaths in county	0.0125 (0.0076)	0.0109 (0.0081)	0.0148 (0.0085)	0.0130 (0.0085)	0.0119 (0.0076)	0.0108 (0.0082)	0.0139 (0.0084)	0.0128 (0.0088)
Jobs gained from service estab. exp. in county	0.0221 (0.0100)	0.0195 (0.0105)	0.0258 (0.0105)	0.0228 (0.0105)	0.0213 (0.0101)	0.0195 (0.0107)	0.0244 (0.0105)	0.0225 (0.0107)
Jobs lost from service estab. contr. in county	0.0178 (0.0087)	0.0155 (0.0091)	0.0211 (0.0097)	0.0182 (0.0090)	0.0170 (0.0087)	0.0155 (0.0093)	0.0198 (0.0095)	0.0179 (0.0094)
Jobs gained from other estab. births in county	0.0135 (0.0075)	0.0119 (0.0077)	0.0154 (0.0085)	0.0139 (0.0080)	0.0130 (0.0075)	0.0119 (0.0078)	0.0147 (0.0085)	0.0137 (0.0082)
Jobs lost from other estab. deaths in county	0.0131 (0.0075)	0.0114 (0.0077)	0.0152 (0.0088)	0.0133 (0.0081)	0.0126 (0.0074)	0.0114 (0.0078)	0.0143 (0.0085)	0.0131 (0.0084)
Jobs gained from other estab. exp. in county	0.0188 (0.0088)	0.0167 (0.0087)	0.0216 (0.0094)	0.0191 (0.0089)	0.0183 (0.0086)	0.0167 (0.0088)	0.0204 (0.0094)	0.0189 (0.0092)
Jobs lost from other estab. contr. in county	0.0186 (0.0090)	0.0163 (0.0092)	0.0214 (0.0106)	0.0185 (0.0094)	0.0179 (0.0091)	0.0163 (0.0094)	0.0200 (0.0103)	0.0182 (0.0099)
Real maximum AFDC benefits in state	485.46 (192.65)	455.24 (179.06)	503.18 (183.44)	484.69 (181.10)	475.19 (189.70)	452.85 (179.10)	483.79 (183.40)	477.58 (180.90)
Real minimum wage in state	4.89 (0.23)	4.87 (0.23)	4.89 (0.25)	4.89 (0.24)	4.89 (0.23)	4.87 (0.23)	4.89 (0.24)	4.88 (0.24)

Age	24.18	45.20	25.94	43.78	24.19	46.32	25.81	43.15
	(3.88)	(9.91)	(2.93)	(8.99)	(3.93)	(9.98)	(3.01)	(8.84)
African origin	0.16	0.14	0.10	0.08	0.18	0.14	0.13	0.10
	(0.36)	(0.35)	(0.30)	(0.27)	(0.38)	(0.34)	(0.33)	(0.30)
Hispanic origin	0.23	0.11	0.09	0.04	0.19	0.10	0.08	0.04
	(0.42)	(0.31)	(0.28)	(0.21)	(0.39)	(0.30)	(0.26)	(0.20)
Other non-white origin	0.05	0.04	0.07	0.05	0.04	0.04	0.06	0.05
	(0.20)	(0.18)	(0.26)	(0.22)	(0.20)	(0.20)	(0.23)	(0.21)
Individual observations	13,278	37,224	8,054	34,087	16,204	48,598	12,553	39,304
Counties	404	961	202	650	526	1,076	362	808

Note: Statistics estimated using weighted data from the 1991-97 March CPS and BITS files. Standard deviations appear in parentheses.

5. Multivariate analyses of the effects of the size distribution of establishments on employment and earnings outcomes

Probit models of annual employment. The investigation estimates probit models of the determinants of annual employment outcomes, with dependent variables that equal one if a person was employed during the year and zero otherwise. Among the explanatory variables, the primary measures of interest are the numbers of establishments per working-age adult in the five size categories in each county. The probit models also include controls for each person's age, age squared, African origin, Hispanic origin, other non-European origin, the prevailing minimum wage, and the prevailing AFDC/TANF benefit level. Age-squared is included to allow for non-linear age effects, such as diminishing marginal returns to age, that are commonly observed in employment and wage profiles. In addition, the models include year-specific dummy variables as general controls for national economic trends and policies and county-specific dummy variables as controls for time-invariant local factors. Thus, the models account for two-way (time and location) fixed effects. Initial specification tests indicated that the demographic variables, year effects and county effects were jointly significant.

The use of county-level fixed effects in the probit models comes at some cost. In contrast to the linear regression model, where the fixed effects can be "conditioned out" by mean-differencing the dependent and independent variables across counties, the non-linear probit model requires that separate coefficients be estimated for each county. The fixed effects probit procedure is therefore computationally intensive. Worse, because it is not possible to condition out the fixed effects, the model estimates are only consistent in the number of observations per county, rather than the sample size generally. Also, if there is no variation in the outcome variable within a county, the associated fixed effect is either infinitely positive or negative and cannot be identified. Accordingly, the investigation restricts the fixed effects probit analysis to

counties where there are at least ten observations and some variation in employment outcomes (i.e., counties with both working and non-working individuals) for a given sub-sample.

The effects of these restrictions on the analysis sample can be seen at the bottom of Table 1. The combined data from the 1990-98 CPS files contain observations from roughly 1,600 different counties (just over half the counties in the U.S.). Imposing the other sample exclusions and disaggregating by gender, age and education reduces the potential coverage within each of the eight sub-samples to between 1,284 to 1,507 counties. When small counties and especially when counties with no employment variation are excluded, the coverage drops further to the final range of 246 to 1,176 counties shown at the bottom of Table 1. The loss in individual observations from the county size and variation exclusions is not nearly so dramatic ranging from 3 to at worst 34 percent of the observations, depending on the sub-sample.[16] Despite the loss of data, the resulting sub-samples remain large in absolute terms (the smallest sub-sample contains more than 11,000 individual observations) and include a wide range of geographic areas.

Another property of the county and year fixed effects is that they eliminate the pure cross-section and time series variation in the local business size variables. Because of this, the coefficients on the business and policy variables in the multivariate models should be interpreted as the effects of these variables within counties that are distinct from national trends. More substantively, there may be little relevant variation left in the business and policy variables after the county and year controls are applied. Indeed, preliminary analyses revealed that the controls removed 97-99 percent of the variation in the three smallest establishment size measures and

[16]To put things in a different perspective, the most affected subsamples are still more representative than the CPS samples used by Freeman (1991) and Freeman and Rodgers (1999) which only included individuals from identifiable metropolitan areas.

roughly 90 percent of the variation in the two largest establishment size measures. Weak results for the coefficients on these measures could reflect this lack of variation.[17]

Table 3 reports the coefficient estimates and standard errors for the establishment size variables and state policy measures from annual employment probit models run on the eight different sub-samples. For brevity, detailed results for the demographic variables, year effects and county effects are not shown.

Increases in the number of establishments with 100-499 employees are estimated to increase the employment of older men with low levels of schooling, younger men with higher levels of schooling, and younger women from both education groups. To get some idea of the size of the results from Table 3, consider the impact of a single new "big-box" retail establishment with 100-499 employees in a county with 50,000 working age adults.[18] Such an opening would increase the probability of employment among each of the groups with significant coefficients by between 0.2 and 0.3 percent.

Increases in the number of establishments with 500-999 employees are estimated to raise the employment of younger women with low levels of schooling and older women with more schooling. The estimates indicate that younger, less-educated women (the group most likely to participate in welfare) have been significantly affected by the swings in the number of middle-sized establishments. The employment of other groups has also been affected by changes in these establishments.

[17]The loss of variation in the investigation's local economic measures is not unusual for this type of study. A similar analysis of the civilian employment rate shows that county and year effects account for 99 percent of its variation.

[18]An example would be Wayne County, Indiana (largest city Richmond) where a new WalMart opened in the spring of 2001.

Table 3. Employment Probit Results

	Men				Women			
	high school or less		more than high school		high school or less		more than high school	
	≤ age 30	over age 30	≤ age 30	over age 30	≤ age 30	over age 30	≤ age 30	over age 30
Estabs. in county with 1-9 employees[A]	1.73	-14.19	-72.44*	-16.16	4.05	0.57	-36.73*	-4.97
	(20.01)	(9.54)	(34.76)	(13.61)	(14.24)	(7.11)	(21.13)	(9.25)
Estabs. in county with 10-99 employees[A]	67.29	18.34	9.85	7.80	13.90	-10.51	6.55	32.34
	(51.54)	(23.43)	(91.94)	(35.80)	(35.59)	(17.62)	(54.22)	(24.30)
Estabs. in county with 100-499 employees[A]	52.2	351.9*	1015.5*	137.3	367.3*	201.6**	-32.2	-224.7
	(273.6)	(127.6)	(540.4)	(208.8)	(199.2)	(94.6)	(309.1)	(140.4)
Estabs. in county with 500-999 employees[A]	-1410.4	56.3	2076.0	-919.4	1371.5*	465.2	-1494.3	1062.4*
	(1095.1)	(479.9)	(2151.4)	(844.7)	(749.2)	(369.7)	(1224.0)	(558.0)
Estabs. in county with 1000+ employees[A]	-2380.8	1647.4*	-7050.6*	1938.7	-626.6	61.4	-1857.7	1924.4*
	(2194.6)	(968.3)	(3856.1)	(1541.6)	(1486.1)	(736.0)	(2356.6)	(1053.9)
ln maximum AFDC benefits	-0.56*	-0.07	0.80	-0.15	0.43*	0.17	0.02	-0.27
	(0.32)	(0.18)	(0.51)	(0.25)	(0.24)	(0.14)	(0.32)	(0.18)
ln minimum wage	-0.04	-0.15	-1.02*	0.50*	0.05	0.24	0.21	0.25
	(0.33)	(0.21)	(0.53)	(0.28)	(0.25)	(0.16)	(0.35)	(0.19)
ln likelihood	-6,288.0	-21,126.2	-2,585.8	-11,007.6	-12,975.5	-38,405.7	-6,289.5	-24,245.3
Individual observations	18,543	49,523	11,087	44,874	22,539	64,110	17,030	50,811
Counties	509	1,077	246	744	668	1,176	446	892

Note: Models estimated using weighted data from the 1990-98 March CPS and CBP files. Models also include controls for age, race, county effects and year effects. Estimated standard errors appear in parentheses.

[A] Establishments expressed per working-age adult in county of residence.

* Significant at .10 level. ** Significant at .05 level. *** Significant at .01 level.

Changes in the number of establishments in the smallest employment size category (those with fewer than ten employees) are estimated to reduce the employment of young men and women with more than a high school education. As Figures 8 and 9 indicated, very small firms offer the lowest wages on average. If we interpret a rise in the number of very small employers as an expansion in low wage opportunities and possibly wage variability in a market, the negative coefficients in Table 3 could reflect well-educated labor force entrants in such markets voluntarily extending their initial job searches and initial periods of unemployment.

At the other end of the distribution, changes in the number of very large establishments are estimated to have mixed effects on individual employment outcomes. For older men with low levels of schooling and older women with higher levels of schooling, increases in the number of establishments with 1,000 or more employees increase the probability of employment. However, for young men with higher levels of schooling, the opposite is true—growth in the number of large establishments is negatively related to employment. A variant of the earlier explanation might apply where expansion at the extreme ends of the size distribution increases the variability in wages and thus, makes prolonged job search by young, educated labor force entrants more attractive. An alternative explanation for these results might be that larger establishments are more likely to be unionized and thus harder for young job seekers to enter.

Among the policy variables, more generous public assistance benefits are estimated to reduce young, less-educated men's employment but increase young, less-educated women's employment. Higher minimum wages are estimated to decrease employment among younger men with high levels of education and increase employment among older men with high levels of education. The results for younger, educated men run counter to the findings of Ribar (2001) and others.

In addition to the specification tests to check whether the demographic and fixed effects controls should be included, all of the models in Table 3 were re-estimated to include the total number of manufacturing, retail and service establishments per working-age adult and the total number of civilian jobs per working-age adult in each county. The coefficient estimates reported in Table 3 were generally robust to the inclusion of these controls for overall industry and job market effects. Further, the models were re-estimated including a measure of total working age population in the county to control for growth effects. The results of Table 3 were again robust.

Regression models of hourly earnings. Table 4 reports coefficient estimates and heteroskedasticity-consistent standard errors from hourly earnings regressions that are specified and stratified similarly to the employment probits from Table 3. The dependent variable in the regressions is the natural logarithm of hourly earnings. Because earnings are only reported by workers, the models in Table 4 rely on possibly selective samples. Consequently, each of the regressions controls for selectivity using Heckman's (1979) two-stage procedure. Besides the county employer size distribution and state minimum wage variables indicated in the table, the earnings regressions include controls for demographic factors, time effects and county effects. As with the employment models, initial specification tests indicated that these additional controls were jointly significant and belonged in the regressions. Specification tests also indicated that selectivity controls were necessary for some of the sub-samples.[19]

[19] Coefficient estimates from the employment probit models reported in Table 3 are used to form the selection controls (the λ terms). In addition to the identification from the non-linearity of the selection terms, the selection controls also rely on an exclusion restriction (welfare benefits are included in the probit models but not the wage models).

Table 4. Hourly Earnings Regression Results

	Men				Women			
	high school or less		more than high school		high school or less		more than high school	
	≤ age 30	over age 30	≤ age 30	over age 30	≤ age 30	over age 30	≤ age 30	over age 30
Estabs. in county with 1-9 employees[A]	-7.94 (7.23)	-4.14 (4.32)	-4.92 (10.49)	-2.73 (4.79)	-11.03 (7.32)	-7.28* (4.18)	1.34 (8.69)	8.02* (4.74)
Estabs. in county with 10-99 employees[A]	56.90*** (17.69)	17.20* (10.22)	34.72 (24.89)	30.35** (12.14)	47.90*** (17.75)	21.29* (10.35)	41.13** (19.64)	-11.80 (11.89)
Estabs. in county with 100-499 employees[A]	23.4 (100.4)	27.7 (57.3)	285.1* (159.5)	31.3 (70.3)	70.4 (114.4)	11.3 (57.2)	190.0* (112.7)	181.1* (71.1)
Estabs. in county with 500-999 employees[A]	-1.6 (397.1)	164.3 (208.7)	877.6 (619.1)	287.4 (277.8)	-430.7 (401.0)	70.6 (208.6)	709.0 (445.6)	485.8* (276.5)
Estabs. in county with 1000+ employees[A]	2685.6*** (798.6)	-195.6 (442.0)	-1020.2 (1180.1)	-72.3 (527.9)	793.1 (704.1)	-59.2 (415.4)	-661.9 (881.9)	239.6 (526.0)
ln minimum wage	0.19 (0.12)	-0.05 (0.10)	0.08 (0.15)	-0.05 (0.09)	0.39*** (0.14)	0.17* (0.10)	-0.08 (0.13)	-0.04 (0.10)
λ	0.22* (0.13)	0.17** (0.07)	0.25 (0.22)	-0.10 (0.29)	0.10 (0.27)	0.13 (0.12)	-0.45 (0.28)	0.33* (0.17)
R^2	0.211	0.144	0.197	0.108	0.175	0.113	0.208	0.093
Individual observations	16,114	39,569	10,339	40,921	14,741	38,830	14,680	40,111
Counties	509	1,077	246	744	668	1,176	446	892

Note: Models estimated using weighted data from the 1990-98 March CPS and CBP files. Models also include controls for age, race, county effects and year effects. Heteroskedasticity-consistent standard errors appear in parentheses.

[A] Establishments expressed per working-age adult in county of residence.

* Significant at .10 level. ** Significant at .05 level. *** Significant at .01 level.

In Table 4, an increase in the number of establishments with 10-99 employees is estimated to raise hourly wages for seven out of the eight gender×age×education groups and is statistically significant for six of those groups. The estimated impacts are larger for younger workers than for older workers. An increase in the number of establishments in the next larger size category (100-499 employees) also consistently appears to increase wages; however, the coefficients are only significant for more-educated women and younger, more-educated men.

There is less of a pattern in the coefficients for establishments in the other size classes. A larger number of very small establishments decreases wages for older, less-educated women but increases wages for older, more-educated women. Negative coefficients with the same or slightly larger magnitudes as the coefficients for older women are estimated for young, less-educated men and women; however, the standard errors on these coefficients are large. These results are consistent with small employers offering lower wages. The positive coefficient for older, more-educated women might reflect a business ownership effect.[20]

An increase in the number of establishments with 500-999 employees is estimated to raise hourly earnings for older, more-educated women. Even larger positive effects are estimated for younger, more-educated men and women, but these estimates are less precise and not statistically significant. A rise in the number of establishments with 1000 or more employees is estimated to raise hourly wages for younger, less-educated men. The statistically significant results for larger businesses are consistent with a positive employer-size wage effect.

Turning last to the minimum wage variable, the estimated coefficients are positive, large and statistically significant for younger, less-educated women and weaker, though still

[20]The SBA (1998a) reports that female ownership declines with business size. Figures from the U.S. Census Bureau (1997) indicate that female owners of businesses with 1-9 employees have higher levels of education than other women.

significantly positive, for older, less-educated women. A higher minimum wage raises wages for less educated women. The point estimates indicate that the elasticity of younger, less-educated women's wages to a change in the minimum wage is 0.39 while the elasticity for older, less-educated women is 0.17. For younger, less-educated men, the estimated elasticity is 0.19, but the estimate falls just short of being significant.

Regression models of weekly earnings. Table 5 presents results for weekly, rather than hourly, earnings from selectivity-corrected regressions with time effects and county effects. Weekly earnings capture more of an element of labor supply than do hourly earnings. They also provide a better indication of the availability of part-time versus full-time work. To the extent that different types of employers might be more likely to offer part-time jobs or different types workers might be more willing to accept them, allowing work week variability could affect the estimation results. Despite the differences in the measures, however, the estimation results for the weekly earnings regressions are quite similar to the results from Table 4.

Specifically, an increase in the number of establishments with 1-10 employees is estimated to significantly reduce weekly earnings for less-educated women. An increase in the number of establishments with 10-99 employees raises weekly earnings for all workers except older, more-educated women. In the next size category, the pattern is reversed—the coefficients are insignificant for most groups but significantly positive for older, more-educated women. A larger number of establishments with 500-999 employees raises weekly earnings, but the coefficient is insignificant for all groups. For the largest size category, the coefficient indicates that more large firms raise weekly earnings for younger, low-skilled workers, but the coefficient is insignificant for other workers. Higher minimum wages are estimated to raise less-educated women's weekly earnings but have insignificant effects on other groups' earnings.

Table 5. Weekly Earnings Regression Results

	Men				Women			
	high school or less		more than high school		high school or less		more than high school	
	≤ age 30	over age 30	≤ age 30	over age 30	≤ age 30	over age 30	≤ age 30	over age 30
Estabs. in county with 1-9 employees[A]	-13.34 (8.23)	-6.54 (4.82)	-10.10 (11.99)	2.08 (5.19)	-19.07* (8.99)	-9.99* (5.44)	5.98 (10.80)	6.13 (6.13)
Estabs. in county with 10-99 employees[A]	69.51*** (20.93)	22.91** (11.46)	59.86** (28.80)	29.99** (13.26)	47.60** (21.85)	28.81** (12.83)	44.13* (24.45)	-2.38 (15.26)
Estabs. in county with 100-499 employees[A]	45.0 (114.2)	59.3 (64.2)	263.2 (194.3)	9.3 (77.7)	206.2 (138.9)	12.7 (74.6)	225.1 (141.7)	222.33** (92.2)
Estabs. in county with 500-999 employees[A]	110.0 (469.8)	249.4 (236.1)	413.3 (714.4)	390.1 (305.8)	90.1 (487.4)	206.9 (262.8)	898.6 (555.4)	504.9 (359.3)
Estabs. in county with 1000+ employees[A]	3039.3*** (890.0)	181.6 (494.2)	-1739.7 (1324.9)	-84.6 (577.7)	978.3 (841.4)	262.7 (524.9)	-146.5 (1090.7)	146.0 (686.7)
ln minimum wage	0.21 (0.14)	-0.05 (0.11)	0.13 (0.17)	0.01 (0.09)	0.50*** (0.13)	0.23* (0.13)	0.07 (0.16)	-0.05 (0.13)
λ	0.08 (0.15)	0.04 (0.09)	0.13 (0.25)	-0.36*** (0.11)	0.28 (0.33)	0.01 (0.16)	-0.31 (0.35)	-0.34 (0.22)
R^2	0.240	0.142	0.217	0.108	0.172	0.100	0.184	0.073
Individual observations	16,114	39,569	10,339	40,921	14,741	38,830	14,680	40,111
Counties	509	1,077	246	744	668	1,176	446	892

Note: Models estimated using weighted data from the 1990-98 March CPS and CBP files. Models also include controls for age, race, county effects and year effects. Heteroskedasticity-consistent standard errors appear in parentheses.

[A] Establishments expressed per working-age adult in county of residence.

* Significant at .10 level. ** Significant at .05 level. *** Significant at .01 level.

The hourly and weekly earnings regression models were re-estimated to include the total number of manufacturing, retail and service establishments per working-age adult, the total number of civilian jobs per working-age adult, and the total working age population in each county as well as the self-reported information on employer size. The coefficient estimates reported in Tables 4 and 5 were generally robust to the inclusion of these additional variables.

6. Multivariate analyses of the effects of job flows on employment and earnings outcomes

Probit models of annual employment. Table 6 presents estimates from multivariate probit models of the determinants of annual employment estimated using the combined CPS and BITS data. The specifications are very similar to the specifications used in Table 2. As with the earlier specifications, the models are stratified by gender, age and education. They also include controls for age, age squared, race and ethnicity, state minimum wages, state welfare benefits, county effects and year effects. The main difference from the earlier specifications is in the controls for local business conditions. Whereas the previous models included measures of the number and size distribution of businesses, the models in Table 6 contain measures of local job flows. Because fewer years of data are available from the BITS database, the specifications in Table 6 also include fewer observations and cover fewer counties than the earlier models.

Initial specification tests revealed that the county effects, year effects, age controls, and race and ethnicity controls were jointly significant. Comparisons of the listed models with simpler, nested models that just included net employment flows indicated that the disaggregated flows were also jointly significant for most of the gender×age×education groups.[21]

[21]Recall that

net employment flows = gains from establishment births − losses from establishment deaths

The estimation results from Table 6 present a mixed picture. Job flows are statistically significant (just over a third of the coefficients across the models are individually significant), and several of the estimated coefficients are consistent with expectations. For instance, job flows associated with establishment births have statistically significant positive effects on individual employment for less-educated men and for older, less-educated women. The coefficient for flows from establishment births for younger, less-educated women is also positive but just shy of being significant (*p* value .17). Flows associated with establishment deaths are estimated to have statistically significant negative effects on older, more-educated women's employment. Flows associated with establishment expansions have significant positive effects on older, less-educated men's and younger, less-educated women's employment.

However, there are nearly as many significant coefficients with unexpected signs. For example, job losses from contracting establishments are estimated to have significant positive effects on employment for older, more-educated men, older, less-educated women, and younger, more-educated women. Job gains from expanding establishments have significant negative effects on employment for younger, more-educated women. Job gains from establishment births are also estimated to have negative effects on employment for younger, more-educated men and women. The coefficient for men is statistically significant while the coefficient for women is marginally insignificant (*p* value .11).

+ gains from establishment expansions – losses from establishment contractions.

So a model that just includes net employment flows restricts the effects from the components to be equal in magnitude but opposite in sign depending on whether the component is a gain or loss.

Table 6. Employment Probit Results – Aggregate Job Flow Measures

	Men				Women			
	high school or less		more than high school		high school or less		more than high school	
	≤ age 30	over age 30	≤ age 30	over age 30	≤ age 30	over age 30	≤ age 30	over age 30
Jobs gained from estab. births in county	5.126*** (1.885)	1.492* (0.812)	-5.031* (2.577)	-0.192 (1.193)	1.780 (1.294)	1.834*** (0.609)	-2.745 (1.696)	0.284 (0.771)
Jobs lost from estab. deaths in county	-0.680 (1.829)	-0.174 (0.798)	1.300 (2.519)	-1.242 (1.193)	1.197 (1.334)	0.304 (0.652)	1.013 (1.787)	-1.436* (0.782)
Jobs gained from estab. expansions in county	-1.068 (2.568)	2.599** (1.268)	1.429 (4.068)	0.538 (1.757)	5.003*** (1.866)	0.947 (0.931)	-4.974* (2.584)	1.630 (1.204)
Jobs lost from estab. contractions in county	-0.246 (2.423)	1.247 (1.144)	0.103 (3.392)	2.863* (1.627)	-1.677 (1.696)	1.588* (0.863)	4.070* (2.294)	-0.084 (1.092)
ln maximum AFDC benefits in state	-0.036 (0.397)	0.338 (0.232)	1.787*** (0.642)	-0.168 (0.306)	0.696** (0.299)	0.064 (0.179)	0.114 (0.421)	-0.222 (0.218)
ln minimum wage in state	-0.522 (0.596)	-0.748** (0.364)	-1.948** (0.835)	-0.171 (0.436)	-0.116 (0.433)	-0.006 (0.268)	-0.501 (0.579)	0.157 (0.307)
ln likelihood	-4,602.3	-16,028.1	-1,956.4	-8,556.5	-9,305.2	-28,919.8	-4,644.5	-18,626.6
Individual observations	13,278	37,224	8,054	34,087	16,204	48,598	12,553	39,304
Counties	404	961	202	650	526	1,076	362	808

Note: Models estimated using weighted data from the 1991-97 March CPS and BITS files. Models also include controls for age, race, county effects and year effects. Estimated standard errors appear in parentheses.
* Significant at .10 level. ** Significant at .05 level. *** Significant at .01 level.

There may be explanations for some of the unexpected results. The coefficients for gains from newly-opened establishments for younger, more-educated employees have the same signs as the corresponding coefficients for very small establishments from Table 3. To the extent that very small businesses are disproportionately represented in establishment births, we might expect these results to be similar. Elsewhere, the job flow coefficients for younger, more-educated women all run counter to expectations; similar (though largely insignificant) results appear in Table 3. The results may reflect marriage, fertility, or added-worker effects from men's, rather than women's, opportunities. More generally, some of the unexpected job flow coefficients could reflect positive effects from job market volatility or the absence of employment frictions.

To examine whether the estimates from Table 3 reflect business size or industry effects, the investigation re-estimated the probit models (a) adding net employment flows by firm size, (b) adding net employment flows by manufacturing, retail trade, and service industries, (c) allowing for separate component job flow measures for each firm size, and (d) allowing for separate component job flow measures for industries. Adding net employment flows by firm size and disaggregating the component job flow measures by firm size did not significantly improve the explanatory power of the models. Allowing for industry flows and interactions did, however, improve the models. Put another way, specification tests indicated that the effects of job flows did not vary across firm sizes but did vary across industries.

Estimation results from employment probit models that disaggregate the local job flow measures by industry (manufacturing, retail trade, service, and other) are shown in Table 7. Like the results from Table 6, there is no strong pattern in the coefficients—some are consistent with expectations while others are not. To organize the discussion, the report describes the results in terms of the general findings from Table 6. Focusing first on establishment births, the positive

effects for younger, less-educated men from Table 6 appear to come from sectors other than service. For older, less-educated men, the positive employment effects of establishment births come primarily from the retail sector. For younger, less-educated women, the benefits of establishment births come from the service sector while for older, less-educated women, the benefits of establishment births come from the manufacturing and "other" sectors. The negative effects from establishment births for younger, less-educated men from the preceding table derive mostly from service sector births while the negative effects for women derive mostly from the "other" category.

Turning next to establishment deaths, the negative effects for older, more educated women from the preceding table come largely from the retail trade sector. For establishment expansions, the positive effects for older, less-educated men and younger, less-educated women come from all sectors while the negative effects for younger, more-educated women come mainly from the manufacturing, retail and service sectors.

Looking finally at establishment contractions, the positive effects for older, more-educated men come from all sectors; the positive effects for older, less-educated women come from the manufacturing, retail and service sectors, and the positive effects for younger, more-educated women come primarily from the retail trade sector.

Regression models of earnings. Table 8 reports results from selectivity-corrected regression models of the determinants of log hourly earnings using the linked CPS and BITS data. As with the specifications from Table 4, the models include controls for age, race/ethnicity, state minimum wages, county effects, and year effects. The selectivity-correction terms (inverse Mills ratios) are computed from the probit models reported in Table 7. The terms are significant in two of the models but, for consistency, are included in all the models.

Table 7. Employment Probit Results – Industry-specific Job Flow Measures

	Men				Women			
	high school or less		more than high school		high school or less		more than high school	
	≤ age 30	over age 30	≤ age 30	over age 30	≤ age 30	over age 30	≤ age 30	over age 30
Jobs gained from manu. estab. births in county	9.558*	0.982	-3.178	-2.957	-1.683	2.353*	0.652	-0.825
	(5.034)	(1.563)	(5.828)	(2.745)	(2.825)	(1.260)	(4.283)	(1.734)
Jobs lost from manu. estab. deaths in county	3.019	0.704	10.555	3.691	3.732*	1.326	-3.393	-2.836
	(3.407)	(1.406)	(7.312)	(2.990)	(2.252)	(1.145)	(3.622)	(1.812)
Jobs gained from manu. estab. exp. in county	0.921	3.950	-10.681	3.963	3.413	2.126	-8.616	1.754
	(5.488)	(2.531)	(10.624)	(4.244)	(4.342)	(1.782)	(6.518)	(2.873)
Jobs lost from manu. estab. contr. in county	4.854	-1.384	12.777	1.533	-7.702**	2.275	-6.381	-0.735
	(5.807)	(2.223)	(9.599)	(3.716)	(3.741)	(1.700)	(5.527)	(2.551)
Jobs gained from retail estab. births in county	8.366	5.437*	-2.845	-3.719	4.344	-0.325	-3.750	1.853
	(7.009)	(2.940)	(11.052)	(4.148)	(4.716)	(2.199)	(6.415)	(2.806)
Jobs lost from retail estab. deaths in county	31.895***	-7.350**	-17.587	-8.346*	6.742	0.976	4.245	-9.562***
	(9.803)	(3.518)	(13.576)	(4.936)	(6.151)	(2.723)	(8.113)	(3.364)
Jobs gained from retail estab. exp. in county	-27.552**	2.351	32.059*	4.655	1.857	-2.357	-8.785	14.668***
	(10.827)	(4.777)	(17.679)	(6.801)	(7.492)	(3.591)	(10.919)	(4.800)
Jobs lost from retail estab. contr. in county	1.374	5.521	-19.101	2.103	-2.708	5.177	35.418***	6.302
	(10.281)	(4.686)	(16.024)	(6.862)	(7.065)	(3.576)	(10.439)	(4.668)
Jobs gained from service estab. births in county	-3.119	1.266	-9.925*	1.421	5.543**	1.184	-1.320	1.839
	(3.327)	(1.457)	(4.683)	(1.841)	(2.413)	(1.041)	(3.140)	(1.414)
Jobs lost from service estab. deaths in county	-7.847*	1.298	0.444	-1.782	-0.184	-1.073	8.187**	1.373
	(4.127)	(1.858)	(5.721)	(2.252)	(2.917)	(1.423)	(3.996)	(1.625)
Jobs gained from service estab. exp. in county	0.453	2.592	18.212**	-1.669	6.423**	3.746**	-5.134	0.382
	(4.708)	(2.172)	(7.643)	(2.843)	(3.214)	(1.606)	(4.579)	(2.000)

Jobs lost from service estab. contr. in county	-5.529 (5.219)	0.734 (2.460)	4.503 (7.667)	2.837 (3.196)	-8.923** (3.751)	4.602** (1.822)	2.806 (4.949)	0.160 (2.269)
Jobs gained from other estab. births in county	13.674*** (4.610)	0.482 (2.127)	1.066 (6.498)	0.442 (2.933)	-2.265 (3.104)	3.530** (1.647)	-7.757** (3.873)	-1.681 (1.990)
Jobs lost from other estab. deaths in county	-8.687* (4.606)	0.367 (2.227)	5.235 (6.371)	-0.604 (2.995)	-3.849 (3.241)	0.019 (1.693)	-4.364 (4.059)	0.874 (2.012)
Jobs gained from other estab. exp. in county	6.426 (5.604)	1.279 (2.822)	-20.059*** (7.702)	-0.458 (3.823)	5.402 (3.919)	-3.720* (2.087)	0.075 (5.255)	-0.870 (2.550)
Jobs lost from other estab. contr. in county	-1.460 (4.986)	2.982 (2.429)	0.227 (6.967)	5.033 (3.516)	10.611*** (3.598)	-3.597* (1.852)	1.512 (4.753)	-2.168 (2.333)
ln maximum AFDC benefits in state	0.080 (0.405)	0.334 (0.234)	1.752*** (0.662)	-0.168 (0.311)	0.657** (0.305)	0.124 (0.181)	0.130 (0.431)	-0.283 (0.221)
ln minimum wage in state	-0.780 (0.603)	-0.701* (0.365)	-1.760** (0.849)	-0.131 (0.437)	-0.030 (0.435)	0.014 (0.269)	-0.400 (0.583)	0.232 (0.308)
ln likelihood	-6,288.0	-16,023.4	-1,941.6	-8,552.0	-9,292.6	-38,405.7	-4,634.0	-18,615.8
Individual observations	13,278	37,224	8,054	34,087	16,204	48,598	12,553	39,304
Counties	404	961	202	650	526	1,076	362	808

Note: Models estimated using weighted data from the 1991-97 March CPS and BITS files. Models also include controls for age, race, county effects and year effects. Estimated standard errors appear in parentheses.
* Significant at .10 level. ** Significant at .05 level. *** Significant at .01 level.

Table 8. Hourly Earnings Regression Results

	Men				Women			
	high school or less		more than high school		high school or less		more than high school	
	≤ age 30	over age 30	≤ age 30	over age 30	≤ age 30	over age 30	≤ age 30	over age 30
Jobs gained from estab. births in county	0.777 (0.688)	0.029 (0.361)	0.558 (0.758)	0.059 (0.397)	0.592 (0.684)	0.266 (0.377)	0.867 (0.651)	0.494 (0.376)
Jobs lost from estab. deaths in county	-0.360 (0.729)	0.448 (0.406)	0.448 (0.786)	-0.037 (0.432)	0.171 (0.738)	-0.225 (0.419)	-0.681 (0.659)	-0.416 (0.424)
Jobs gained from estab. expansions in county	2.009** (0.947)	0.640 (0.580)	1.434 (1.114)	1.015* (0.576)	-0.733 (1.011)	-0.529 (0.519)	1.980** (0.985)	0.364 (0.578)
Jobs lost from estab. contractions in county	1.776* (0.914)	-0.149 (0.523)	1.015 (0.947)	-0.001 (0.526)	-1.003 (0.912)	0.632 (0.498)	1.413* (0.849)	0.573 (0.524)
ln minimum wage	0.045 (0.206)	-0.114 (0.148)	-0.022 (0.212)	-0.073 (0.133)	0.171 (0.238)	0.279* (0.154)	0.197 (0.203)	-0.116 (0.151)
λ	0.073 (0.117)	0.134 (0.082)	0.295* (0.163)	-0.065 (0.101)	0.294* (0.167)	0.046 (0.117)	-0.210 (0.188)	0.171 (0.157)
R^2	0.216	0.144	0.194	0.107	0.166	0.117	0.216	0.093
Individual observations	11,448	29,570	7,472	31,003	10,438	29,443	10,780	31,070
Counties	404	962	202	650	526	1,076	362	808

Note: Models estimated using weighted data from the 1991-97 March CPS and BITS files. Models also include controls for age, race, county effects and year effects. Heteroskedasticity-consistent standard errors appear in parentheses.
* Significant at .10 level. ** Significant at .05 level. *** Significant at .01 level.

Alternative initial specifications were run to examine the joint significance of the component job flow measures–that is, to determine whether these measures belonged in the model. Unlike the probit employment models, the component job flow measures were not jointly significant in most of the specifications (models without these variables explained earnings nearly as well).[22] The net flow measures also were not generally significant. For comparability with the employment results (and because they are the focus of the investigation), models with the component flow measures are reported in Table 8.

The results from Table 8 indicate that job flows associated with establishment expansions were significantly positively related to individual wages for younger, less-educated men, older, more-educated men and younger, more-educated women. The results also indicate, however, that flows associated with contractions were negatively related to wages for two of these groups. The offsetting results suggest that higher employment volatility is related to wage gains for younger, less-educated men and younger, more-educated women. The flows associated with establishment births and deaths were insignificant for all groups.

Table 9 lists results from selectivity-corrected log weekly earnings regressions. Most of the results for the weekly earnings regressions are similar to those reported for hourly earnings. In particular, flows associated with births and deaths are insignificant for all groups, and flows associated with expansions are significantly positive for younger, less-educated men, older, more-educated men, and younger, more-educated women. The most noticeable difference from the hourly earnings results is that flows from expansions and contractions are each estimated to have significantly negative effects for younger, less-educated women.

[22]The component flow measures were jointly significant for younger, less-educated men (column 1 in Table 8) and younger, more-educated women (column 7).

Table 9. Weekly Earnings Regression Results

	Men				Women			
	high school or less		more than high school		high school or less		more than high school	
	≤ age 30	over age 30	≤ age 30	over age 30	≤ age 30	over age 30	≤ age 30	over age 30
Jobs gained from estab. births in county	0.720 (0.812)	-0.104 (0.404)	0.727 (0.910)	0.001 (0.440)	-0.025 (0.842)	0.667 (0.473)	1.087 (0.774)	0.624 (0.487)
Jobs lost from estab. deaths in county	-0.638 (0.844)	0.313 (0.452)	0.218 (0.906)	0.019 (0.475)	0.349 (0.859)	-0.303 (0.538)	-0.827 (0.788)	-0.093 (0.539)
Jobs gained from estab. expansions in county	2.677** (1.052)	0.873 (0.651)	1.403 (1.289)	1.520** (0.628)	-2.355* (1.217)	-1.108 (0.674)	2.312* (1.228)	0.594 (0.749)
Jobs lost from estab. contractions in county	1.638 (1.017)	-0.205 (0.595)	0.209 (1.139)	-0.350 (0.583)	-2.358** (1.141)	0.157 (0.656)	1.243 (1.047)	0.379 (0.675)
ln minimum wage	-0.004 (0.229)	-0.139 (0.157)	0.075 (0.235)	-0.030 (0.147)	0.068 (0.296)	0.411** (0.201)	0.176 (0.252)	-0.282 (0.189)
λ	-0.022 (0.138)	0.008 (0.099)	0.129 (0.183)	-0.357*** (0.121)	0.212 (0.207)	-0.055 (0.153)	-0.150 (0.237)	-0.364* (0.205)
R^2	0.247	0.143	0.215	0.107	0.167	0.105	0.188	0.075
Individual observations	11,448	29,570	7,472	31,003	10,438	29,443	10,780	31,070
Counties	404	962	202	650	526	1,076	362	808

Note: Models estimated using weighted data from the 1991-97 March CPS and BITS files. Models also include controls for age, race, county effects and year effects. Heteroskedasticity-consistent standard errors appear in parentheses.
* Significant at .10 level. ** Significant at .05 level. *** Significant at .01 level.

The hourly and weekly earnings regressions were re-estimated to include firm-size and industry-specific net flows and to incorporate firm-size and industry-specific component flows. Except for a few isolated instances, the respecifications did not significantly improve the fit of the models. Thus, there is no evidence of effects associated with job flows from particular types of businesses.

7. Conclusion

This investigation examines the relationship between the number and size distribution of employers and job flows in local areas and individual employment and earnings outcomes. In particular, it uses information from the CBP database to characterize the local size distribution of establishments and data from the BITS to characterize job flows and links these measures with individual-level data on labor market outcomes from the CPS. With these data, the investigation analyzes trends in the size distribution of establishments, job flows, employment, and earnings. It also estimates probit models of employment outcomes and selectivity-corrected regression models of earnings outcomes. Separate analyses are conducted for men and women of different ages and with different levels of schooling. The purpose of disaggregating the data this way is to examine whether changes in business conditions have disproportionate effects on people who are less-skilled in terms of their formal education and potential work experience.

The multivariate estimation results using the linked CBP and CPS data show that changes in the size distribution of businesses have both general and skill-specific effects on employment and earnings. For instance, estimates from the models indicate that increases in the number of establishments with 100-499 employees lead to higher levels of employment for less-skilled men and women. Increases in the number of establishments with 10-99 employees are positively

associated with earnings for most workers, but the effects appear to be largest for younger workers. Increases in the number of establishments with fewer than 10 employees are actually negatively associated with employment and earnings for younger, more-educated men and women.

The multivariate estimation results based on the linked BITS and CPS data provide less conclusive evidence of the importance of local area job flows on individual outcomes. In the multivariate employment equations, the job flow measures are statistically significant for most groups, and in several cases, the estimated effects accord with expectations. For instance, local employment gains associated with newly opened establishments appear to increase employment among men and women with a high school education or less. Similarly, employment gains among expanding establishments contribute positively to employment among some groups of less-educated workers. However, some other results, such as the positive effects of job losses from contracting establishments on individual employment outcomes for several groups, appear to be at odds with standard economic explanations. In the multivariate earnings regressions, the job flow measures are generally not even statistically significant.

The investigation also considers a policy variable, the prevailing minimum wage, that is generally viewed as important both to low-skill workers and small businesses. Estimates from the models indicate that changes in the minimum wage have few negative effects on employment but some positive effects on earnings for the less-skilled. The earnings effects are largest for women who are 30 years of age or younger and who have no more than a high school education.

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