

# Understanding the Theoretical and Empirical Content of Critiques of U.S. Job Creation Research\*

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**ABSTRACT.** Although the hypothesis that small firms create the majority of net new jobs is widely believed, a number of researchers have attacked this using empirical data. Since these attacks have been presented as corrections of past methodological errors, their authors may influence policy makers. This paper argues that the substance of these attacks is a difference in theoretical perspectives even though the researchers claim to focus on methodological differences. This paper explains the two underlying economic theories and then reviews the job creation research to demonstrate the relationship between theory and methodology.

The theory discussion and methodological results demonstrates that all methodologies used to calculate small firms' share of net new jobs are incorrect for analyzing the dynamics of capitalism. The appropriate methodology for understanding economic growth is analysis of new employment created over time by cohorts of newly formed firms. Recognition of this fact, combined with describing the empirical research supporting this approach, reinforces the use of economic development policies designed to promote entrepreneurship.

## 1. Introduction

Nearly everyone has heard or read a political speech or a news media commentary wherein the statement is made: "Small businesses create the majority of new jobs in the U.S. economy." This is the small business job creation hypothesis. This hypothesis was created with the work of David Birch in 1979.

Prior to 1979, labor economists had analyzed

published labor statistics for many years and consistently found that most net new jobs were created by firms in the largest size classes. This analysis was done by counting the number of jobs in each size class in the current time period and subtracting the number of jobs in the same size class in a previous period. Invariably, the vast majority of net job increases occurred in the largest size classes. This method implicitly assumes that the firms in each size class in the current period are the same firms as in the previous period. In other words, interclass movement of firms is assumed to be negligible. Since no other statistical sources existed to test this assumption, there was no reason to doubt it.

Then, in 1964, Ijiri and Simon came across a strange phenomena. The distribution of firms by size as determined from published government statistics was a near perfect fit with the "skew" distribution. The reason this was strange is that the skew distribution was widely known to describe dynamic phenomena where the underlying process was one of change, not stability. The fit of the skew distribution suggested that changes in firm size among classes was apparently taking place but was unmeasured. Thus, the economists' assumption of negligible interclass movement was suddenly in doubt. Yet, no other data was available to clarify this contradiction.

In the mid-1970s, David Birch received a research grant from the Economic Development Administration to study the movement of firms across state boundaries and how such movements

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affected state employment growth. Recognizing that classified statistics from the U.S. government could not be used to carry out this research, Birch created a new data base that defined each firm in a base year and measured its individual location and employment behavior in each succeeding year for eight years. Using this new data base drawn from the credit rating files of Dun and Bradstreet, Birch found and reported in 1979 that inter-state movement of firms was a minor part of overall job changes. And, he also discovered that 82 percent of the net new jobs created were created by small firms.

Birch's results stood in sharp contrast to all previous research. Not surprisingly, few economists believed Birch. The long history of employment analysis could not be toppled by a single piece of research that used a strange and questionable data base. After all, they argued, government data is far more reliable than credit rating data and Birch was unknown in labor research.

If Birch's findings were correct, the government's published statistics were hiding the reality of a dynamic economy wherein interclass movements – i.e. firm formation, growth, decline and termination – were hidden from view in the classified form used for publication of government data<sup>1</sup> Furthermore, Birch's findings provided meaning to Ijiri and Simon's (1964) concerns about the underlying dynamics in firm size. Interclass movement was not negligible but instead was a major factor in determining overall employment growth. The small business job creation hypothesis was born.

Disbelief in Birch's work continues to dominate mainstream macro-economic thinking today. Evidence of this emerges in the surprising absence of theoretical discussion about job creation statistics in economics' journals and the rapid dissemination of the recent attacks on the small business job creation hypothesis. For example, an unpublished working paper by Davis, Haltiwanger, and Schuh, distributed in October, 1993, made its way into the hands of the OECD policy group in Paris, France by early January, 1994, and the *New York Times* by March. Information that challenges the small business job creation hypothesis receives immediate attention within the economics profession and even the news media. Researchers prefer to read results that reinforce their own views.

These attacks on the research showing that small firms create the majority of net new jobs serve a useful purpose in questioning the truth of these findings and providing evidence from other data sources. Such critiques need to be examined carefully to determine what information they add to our understanding of the dynamics of capitalist economies and to evaluate if small firms actually do create the majority of net new jobs. But, to carry out a careful review of these attacks, we need to understand the theoretical constructs that underlie the resistance of mainstream economists towards the findings of Birch and others.

This paper begins with a brief review of the conflicts between two widely acknowledged economic theories. Once these are understood, the differences in methodologies are examined with emphasis on comparing the job creation conclusions that emerge from applying them. The paper goes on to examine the research from Birch through the most recent critics to show how each adopts static or dynamic methods to demonstrate their results. Finally, the paper draws conclusions about the role of job creation research in guiding government policy development and proposes that the bulk of the job creation research is irrelevant. The dynamics that drive capitalism are firm formation and growth and these dynamics are best measured by cohort analysis where new firms are traced from formation and growth into maturity.

## 2. Economic static versus dynamic theory

The dominant macro-economic theory in the U.S. today and for most of the 20th Century is *general equilibrium theory*. This theory is built upon the neo-classical model of capitalism developed in the late 19th Century. This model proposes that capitalism consists of markets characterized by many buyers and many suppliers interacting in markets where all transactions are known by all participants. All products and services are equivalent and the only variable in the exchange process is price. No buyer nor supplier is able to control price so price is set by the operation of the market which tends toward an equilibrium between supply and demand through price adjustment. Since all transactions are known to all buyers and sellers, there is only one market price. This model, the perfect market model, is the most widely taught

model of capitalist markets and is certainly familiar to all who have had a course in capitalist economics.

The general equilibrium model's great strength is that it provides a foundation for mathematical expression of events in the market and therefore allows prediction of outcomes of events. Thus, the general equilibrium model is widely used for macro-economic policy analysis since it provides predictions of the effects of alternative policies. However, it is a static model as equilibrium is a static condition. It is assumed that any deviation from equilibrium sets in motion forces that will move the market back to equilibrium.

One assumption in general equilibrium theory, economies of scale, is of special interest to the job creation debate. Capitalist economics has incorporated this assumption since it was proposed by Adam Smith in 1776. He perceived that as the production volume of a firm increased the average cost of production per unit decreases. Thus, the largest producer will have the lowest cost of production. There is little doubt that economies of scale exist in manufacturing. In fact any qualified design engineer can calculate the cost advantages in both construction and operation of large over small manufacturing plants. Currently, economists hypothesize that economies of scale are not linear but that the average cost curve is "u" shaped such that there is one firm size where the average cost reaches a minimum and any larger or smaller size will experience greater average costs. The u shaped curve therefore dictates that there is some economically "optimum" firm size that is smaller than the largest possible size. However, there is reasonable doubt about the validity of the u shaped average cost curve (Scherer, 1980, pp. 84–88). Furthermore, the u shaped curve is non-linear and therefore makes the neo-classical model's equation set irresolvable. Economists overcome this latter problem by assuming that average cost is linear throughout the range in which their model is being applied. The assumption of a u shaped curve and linearity all in the same model is obviously logically inconsistent (Walsh, 1970, p. 270).

In spite of these short comings, economies of scale remains a powerful concept in mainstream economics. Combining economies of scale with the perfect market assumption of a uniform market price leads to the widely held conclusion (although

not exactly theoretically correct as noted above) that the larger manufacturers in the U.S. economy have lower costs and therefore greater profits. Thus, larger manufacturers will have a greater profit incentive to expand and more profits to carry out that expansion. This popular belief received reinforcement from data drawn from government statistics. Analyses of employment growth classified by size of firm, as noted by Ijiri and Simon (1964) consistently showed large firms were the major contributors of net new jobs. And, large firms (more than 500 employees) also were reported as responsible for a growing share of private, non-farm, gross product originating in the U.S., rising from 43 percent in 1958 to 50 percent in 1982 (U.S. Small Business Administration, 1989, p. 29). Thus, the available evidence seems to support the view that large firms are the major source of economic growth and should be the greatest job creators. This view seems consistent with the concept of economies of scale. Even today, most main stream economists continue to hold this view and dismiss Birch's results as erroneous.

But, the general equilibrium model is not the only theoretical model of capitalist economics. Another theory, widely believed in the Europe but not widely embraced in the U.S. is *Schumpeter's creative destruction theory*. Schumpeter did not believe that capitalism was characterized by equilibrium markets. Instead, he saw markets characterized by a constant flow of innovation driven by entrepreneurs who entered markets with the ambition of using their innovations to create new demand and take market shares from existing suppliers. In this way, entrepreneurs *create new wealth* for themselves and the overall economy while *destroying* existing market structures. Thus the name "creative destruction" (Schumpeter, 1942). Schumpeterian economists expect to find job generation dominated by firms that begin life as small, new entrants to markets, and grow as they create new demand and take market share from existing large firms. The expected dynamics are small firms growing as larger firms decline. Birch's results provide indirect confirmation of their expectations and therefore have great respect among Schumpeterian economists.

Schumpeter's theory lacks the mathematical elegance of general equilibrium theory since the

model focuses on dynamics that defy efforts to apply Newtonian mathematics (Boulding, 1981, pp. 86–87). In the absence of mathematical modeling, creative destruction does not provide predictions of future outcomes of events and therefore is unable to provide assistance to policy analysts. Thus, although Schumpeter's theory fits Birch's (1979) findings far more accurately, it is inadequate to provide policy guidance and widely ignored by the macro-economic mainstream in America.

When placed in this theoretical context, Birch's results are not merely a new set of statistics from a strange data base. Birch's results are a direct attack upon general equilibrium theory and a revitalization of Schumpeter's view of capitalism. It is no surprise, then, that criticisms of his work are quickly disseminated among mainstream general equilibrium economists and eagerly believed.

### 3. Static versus dynamic methodologies

Strangely enough, economic researchers are not debating differences in theory. Instead, the debate concerning the small business job creation hypothesis is dominated by arguments about methodologies. Thus, it seems appropriate to take a section here to discuss the two dominant research methodologies, comparative statics and dynamics.

#### *Comparative statics*

The original methodology long used by labor economists to compute job creation by size of firm is called comparative statics. One compares the employment of a size class in period  $t_1$  with the employment of the same size class in period  $t_1 + n$  where  $n$  is defined as positive integer defining an elapsed time appropriate to the interests of the researcher. The difference in employment observed in such a comparison is assigned to the size class that is measured. The implied assumption is that the firms in time period  $t_1 + n$  are the same firms as in time period  $t_1$  and employment increases (or decreases) are attributed to these firms.<sup>2</sup>

Dynamic methods identify individual firms in time  $t$  and trace their individual employment size changes until time  $t + n$ . The net gains or losses

experienced by each firm are then summed into the size class they belonged to at the beginning of the period (Birch, 1979).

In comparative static methodology, all size class firm membership changes that occur during the interval  $n$ , are credited to the ending period size class so that the implied assumption is that the firms in the size class at the ending period caused the changes in employment. This assumption is at the core of the difference between the results obtained when the same data is analyzed with comparative static and dynamic methods. As more interclass movement occurs and accounts for growth in employment, the two methods increasingly diverge.

A couple of examples may help here. Assume we are examining a period of time of ten years, say 1981 to 1990. During this period, a firm with 5 employees grows to a size of 605 employees. At the beginning period, 1981, the firm contributes 5 employees to the 1 to 19 size class. By 1990, the 1–19 size class has lost the five employees while the 500 to 999 size class has gained 605 employees. The comparative static calculation will consider that this firm was in the 500–999 size class for the entire period by measuring its total employment (605) in the 500–999 size class in 1990. Thus, although only 600 new jobs were created since 1981, comparative statics will report 605 new jobs in size class 500–999. Total net job change for all classes will still be correct because the 1990 measurement will report a loss of 5 jobs in size class 1–19.

Now assume a period of decline. A firm with 605 employees in 1981 experiences misfortune and declines to only 5 employees in 1990. Comparative statics will show a loss of 605 employees in the 500–999 size class and an increase of 5 employees in the 1–19 size class. Thus, although only 600 jobs were lost, the larger size class records a loss of 605 jobs.

From the above examples it is clear that comparative static analysis during periods of economic growth will credit employment growth to the larger size classes while penalizing the smaller size classes by showing employment losses. During periods of economic decline, comparative statics penalizes larger size classes by exaggerating job losses while giving the smaller size classes credit for jobs they did not create.

### Dynamic methodologies

Dynamic methodologies are many, as will be noted in more detail later. And, because this is a new field of research, there are no accepted standards for these methods. The problem here is that before Birch's (1979) seminal work there were no dynamic methodologies. Lacking a precedent, Birch simply worked out a methodology that is logically simple and intuitively appealing. Birch defined the size of firms at the beginning of a period. Then, he measured each firm's change in employment and credited that employment change to the size class to which the firm belonged at the beginning of the period.

Using the example given above, Birch's method treats the first firm's growth from 5 to 605 employees as a growth of 600 jobs credited to the 1–19 size class, i.e., the firm's size at the beginning of the period, 1981. The second firm's decline from 605 to 5 employees is recorded as a loss of 600 employees charged to the 500–999 size class.

This logically simple, intuitively appealing methodology may incorporate some statistical problems that are at the core of one of the current criticisms and will be explored at greater length

later. For now, it is useful to see the overall effect of these two different methodologies.

### Real data example

Beginning in 1980, the U.S. Small Business Administration created a data base modeled on that built by David Birch. The raw data was drawn from Dun and Bradstreet's Dun's Market Identifier file on a biennial basis using the even years. There are eight files for 1976 through 1990 at two year intervals. These files are also combined into a single longitudinal file. This latter file can be used to measure job creation over time. These files are called the Small Business Data Base (SBDB).

With the longitudinal SBDB file, it is possible to apply both comparative static and dynamic methodologies and examine the differences. This comparison of methodologies is shown for ten years, from the end of 1976 through the end of 1986 in Figure 1.

The left pie of Figure 1 describes the results of *comparative static analysis*. Note that the size class of 1–19 employees contributes 13.4 percent of total net employment increases while the largest size class, 500+ employees contributes 52.4

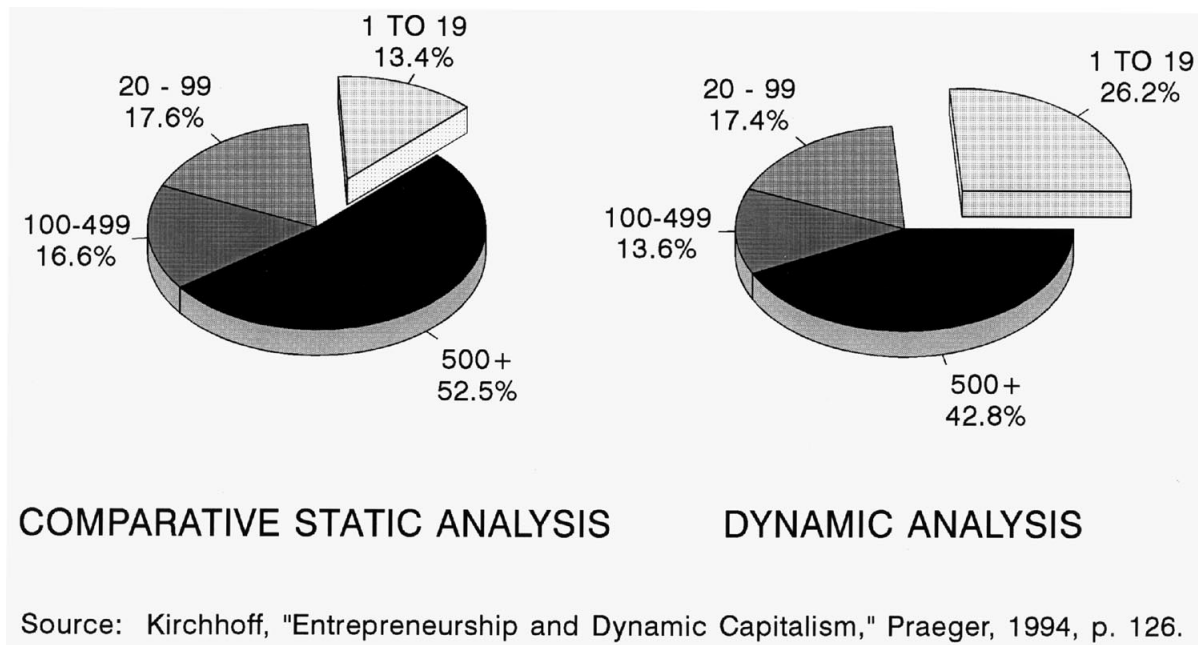


Fig. 1. Comparison of static and dynamic analysis net new job creation between 1976 and 1986.

percent of employment increases. If we define small firms as those with fewer than 100 employees, small firms created 31.0 percent of all net new jobs between 1976 and 1986.

The right pie in Figure 1 describes the application of *dynamic analysis* of the type used by Birch (1979). Since this analysis was done on the same data base, the total number of jobs created is essentially identical (differences are due to rounding) with that in the comparative static analysis. However, the 1–19 size class now accounts for 26.2 percent of the net new jobs while the 500+ size class has declined to 42.8 percent. As expected, in this period of economic growth, the comparative static analysis placed the employment gains of growing firms into the larger size classes. Dynamic analysis places these employment gains in the smallest size class as the once small firms grow large and enter the larger size classes but have their growth assigned to their beginning size class. The difference between the dynamic share (26.2 percent) and comparative static share (13.4 percent) for the smallest size class indicates that 12.8 percent of the net new jobs created are attributable to firms that were small in 1976 and grew into the larger size classes by 1986. In other words, interclass movement of firms is not negligible but instead it constitutes a significant share of net new jobs. Furthermore, if we again use the definition of fewer than 100 employees, small firms contributed 43.6 percent of net new jobs, a larger share than large firms.

Economists who believe that general equilibrium theory adequately describes U.S. capitalism accept the assumption that interclass movement of firms is negligible and find the comparative static methodology to be appropriate for measuring job creation. Economists who believe that creative destruction theory properly describes U.S. capitalism find the assumption of negligible interclass movement to be inappropriate and find dynamic analysis more acceptable. But, this form of dynamic analysis does not capture the main content of creative destruction. More about this later

#### *Static share measurement*

Another data measurement technique needs to be explained here since it becomes important later in

this critique of job creation research. *Static share of employment* is measured in a single time period, cross sectionally, as the percent of total employment provided by firms in each size class. In other words, at any one time, employment is distributed among small and large firms across the economy. The percent of employees in small firms is the small firms' static share of employment. In a typical year, firms with less than 100 employees provide 37.0 percent of total employment. This is their static share. This is different than the share of net new employment that is measured as changes in employment over time.

Proponents of dynamic analysis will often state that small firms' contribution share of net new jobs consistently exceeds their static share of employment. For example, as noted above, from 1976 through 1986, firms with less than 100 employees (small firms) created 43.6 percent of net new jobs while their static share of employment was 37.0 percent. As evident in Table I, this relationship between net new job share and static share is true for six of the seven biennial periods included in the SBDB.

Since both pies in Figure 1 were created from the same data base, the differences shown here are due solely to the methodology applied. Neither methodology is inherently wrong. Choice of one over the other depends on the theoretical beliefs of the researcher. Therefore, methodology by itself does not provide guidance in resolving this conflict. Thus, any criticism based solely upon

TABLE I  
Small firms' share of net new jobs comparison of Birch and SBA results

| Year    | Birch | SBA  | Static share |
|---------|-------|------|--------------|
| 1969–72 | 82%   |      |              |
| 73–74   | 53%   |      |              |
| 75–76   | 65%   |      |              |
| 77–78   |       | 57%  | 36%          |
| 79–80   |       | 37%  | 35%          |
| 81–82   |       | 92%  | 36%          |
| 83–84   |       | 65%  | 36%          |
| 85–86   |       | 44%  | 35%          |
| 87–88   |       | 33%  | 35%          |
| 89–90   |       | 100% | 44%          |

Source: Kirchhoff, *Entrepreneurship and Dynamic Capitalism*, Praeger, 1994, p. 122.

Note: Small firm: less than 100 employees.

methodology needs to be evaluated in terms of the theory that is being tested. Methodology arguments can go on endlessly, as will be demonstrated later, without resolution unless the methodology is evaluated relative to a theory.

#### 4. Criticisms of dynamic job generation research

Criticisms of the dynamic job generation research have taken two forms. Some criticisms mix comparative static and dynamic methodologies into a confusing argument that fails to persuade. Other criticisms focus on the statistical errors that dynamic methodologies may incur due to biases in the measurements of size. We discuss these in this order but before doing so, it is appropriate to review a research article that is often incorrectly cited as a criticism of Birch's work, Armington and Odle's article of 1982.

##### *Armington and Odle's early criticism*

The first substantive testing of Birch's work was advanced by the two researchers who developed the SBDB for the U.S. Small Business Administration. Armington and Odle (1982) of Brookings Institution were the principle investigators on a the SBA funded project to create a biennial data base from the Dun's Market Identifier file using rigorous statistical procedures in an effort to validate Birch's results. Beginning in 1979, Armington and Odle first created and compared the 1978 and 1980 data files. They cleaned the files and adjusted them to the employment totals from the Bureau of Labor Statistics. They then calculated the employment increases classifying the gains by firm size in the beginning year, 1978. The results showed that 35.8 percent of the net new jobs were created by small firms. This percent was a sharp contrast to the 82 percent reported by Birch (1979). Since Armington and Odle had discussed and coordinated their procedures with Birch, they were puzzled by the difference. The only explanation they had for this difference was the possibility that Birch had carried out his calculations incorrectly (Armington and Odle, 1982).

Armington and Odle's results created a furor as major economic writers decided that it was time

to wipe out Birch's fantasy and declare him wrong. But, little did anyone know about the effect of the business cycle upon the job creation statistics. Armington continued to work on the SBDB for six more years. During that time, using the same rigorous methods as before, she uncovered the cyclical nature of job generation statistics. Table I shows these results in complete detail including Birch's recalculation of his results into biennial periods (Birch and MacCracken, 1982). The magnitude of the small firm shares of Birch's and Armington's research are very similar. Furthermore, it is obvious that small firms' share of net new jobs declines during periods of economic expansion (1976–78, 1978–80, and 1986–88) and rises during periods of economic recession (1980–82 and 1988–90). The reason is that large firms tend to increase their employment in the later stages of an economic expansion and reduce their employment during recessions.<sup>3</sup> The small firm sector increases employment in both expansions and recessions and therefore shows a greater share of total employment gains during recessions. Nonetheless, the small firm sector's share of net new employment exceeds its static share of employment in every period except 1987–88.

Armington and Odle (1982), just by accident, did their first analysis with a time period when small firms' share was cyclically low. This turns out to be an important point because numerous critics mention Armington and Odle's research as though it is a basis for total rejection of Birch's work. And yet, their subsequent work demonstrates results entirely consistent with Birch's.

##### *Employers large and small*

One of the first critiques of dynamic analysis emerges as a mix of dynamic and comparative static analysis. Brown, Hamilton, and Medoff (1990b) attack the overall concept that small firms are the major job creators in America. They work from a thorough knowledge of the research in the field, as evidenced by their citations of the literature, but they mix statistics from a variety of sources into a confusing argument. They note that most new jobs in the small firm sector emerge from new firm births. They then argue this source of new jobs is, “. . . an accident of birth – new firms happen to be born small.” (p. 24) By this

they seem to mean that the small firm sector can not rightfully claim credit for firm birth employment. They then correctly note that the other major source of job creation in the small firm sector is a small percentage of firms that experience rapid growth. The jobs created by rapid growth of new firms are not credited to the small firm sector by them because these firms eventually become large and contribute their employment growth to the large firm sector (p. 26). They then point out the small firm sector's static share of employment is relatively unchanged over time. Thus, small firms cannot be great job creators if their static share is unchanged (pp. 24–25).

Every one of these three points is statistically correct but they do not present a logically consistent argument. Basically, Brown, Hamilton and Medoff's argument seems to be that if you eliminate new employment created by births, and new employment created by small but soon-to-become-large firms, small firms are not great job creators. In other words, if you redefine the meaning of small firms, you can show that small firms are not important job creators. It is hard to disagree, but then what does the term "small firm" mean? Their argument leaves the reader unconvinced that it has any meaning except to give the concept of small business a convoluted definition.

By definition, and in agreement with Schumpeter's theory, new small firms are the potential creative destroyers. If small firms grow, it is because they have innovations that create new demand and take market share from larger firms. Successful, growing small firms by definition of size leave the small sector and enter the large sector. Such success creates new jobs but leaves the small sector employment share relatively unchanged. It seems clear that Brown, Hamilton and Medoff have identified Schumpeter's creative destroyers as the source of job creation, i.e., births and rapid growers. Thus, in an effort to reaffirm the importance of large firms to economic growth, they have inadvertently acknowledged evidence of creative destruction dynamics. Unfortunately, as they pursue discussions of methodologies, they do not recognize the theory that underlies their observations. Nonetheless, given the widely used definition of the small firm sector, i.e., all firms with less than 100 employees, their arguments are arcane and not persuasive. The small firm sector's

share of net new jobs exceeds its static share in six of seven biennial periods between 1976 and 1990.

On the other hand, Brown, et al. (1990b) are correct that the focus on *all* small firms is not appropriate. Schumpeter's theory of creative destruction focuses on firms that are formed small and grow large, as they achieve creative destruction. By combining all small firms into a single sector, the creative destroyers are mixed in with other firms that are of little interest to Schumpeterian economists. More on this later.

### *Lean and mean*

Harrison (1994) sets out to destroy the myth of small firms as job generators in his second chapter. He begins by criticizing Birch's work for not using the same definition of small firms consistently and not providing a clear, detailed statement of his methods. Harrison, however, does not acknowledge that the SBA has carefully defined its methods and has found results that are consistent with Birch's. Harrison then notes that Lovemen and Sengenberger's (1990) analysis of job creation research for a number of nations shows that the average size of businesses is declining and that the static share of employment in firms with fewer than 100 employees is increasing. But Harrison discounts this evidence by noting that the data they use to support this conclusion is weak. Harrison believes that the static share is stable. He then uses data from *Enterprise Statistics* to show that the static share has been constant in the U.S. as well (pp. 44–45).

Next, Harrison reviews Birch's and the SBA's methodology for calculating the small firm sector's job creation. He correctly notes that the addition of 500 employees by a small firm, "... gets treated in their accounting scheme as job generation allocated entirely to the *small* firm (less than 20) sector – in other words, the small firm sector added 500 jobs – since that's where the firm was situated when it was first assigned a size. "But this is confusing, since what we are observing is not growth within a stratum, but rather a transformation from small to big, across size strata" (p. 49). This, as noted in the discussion of dynamic methodology is correct.

Harrison then provides evidence from Europe

that larger companies have a better chance of surviving over longer periods of time than small firms. This is an undisputed fact and is true for the U.S. for firms with fewer than 50 employees (Phillips and Kirchhoff, 1989).

These three facts – no upward trend in small firms static share of employment; new jobs created by a handful of successful firms and credited to their beginning size, and large firms having a greater survival rate – he believes justifies his conclusion, “So, small firms may not be the dominant job generators that the first generation of researchers – especially Birch – imagined to be the case” (p. 51).

This is basically the same arguments as put forth by Brown, Hamilton, and Medoff (1990b). So, Harrison has also discovered the dynamics that are creating new jobs but is unwilling to recognize that these dynamics are telling a story of economic growth that is contrary to the large firm story he prefers. Instead, he uses his knowledge to discount small firms as job creators under the assumption that small firm formation and rapid growth means that large firms are the job creators.

Both Brown, Hamilton and Medoff (1990b) and Harrison (1994) are critics in search of an adequate theory to explain their beliefs. In so doing, they attempt to use the static methods of the general equilibrium economist to create their argument and to explain away the obvious dynamics. The resulting convoluted arguments are not persuasive. Their analysis, however, does suggest support for Schumpeter’s creative destruction theory.

#### *Critique of statistical methods*

Davis, Haltiwanger and Schuh (1993) used the U.S. Bureau of the Census’ Longitudinal Data File (LDF) on manufacturing firms to examine job creation in manufacturing for 15 years, from 1973 through 1988. They did their analysis using three different methodologies, comparative static (they call “current size”), dynamic (called “base year”), and a new method defined as average plant size. We begin by reviewing their static and dynamic analysis which is shown in Table II. They express their results as percentage change in employment rather than number of net new jobs as shown in Figure 1. Most of their percentage changes are

TABLE II  
Net job creation rates by different definitions of base year  
1973–88

| Size class<br>number of<br>employees | Net job<br>creation<br>(percent change) | Static employment<br>share<br>(percent) |
|--------------------------------------|-----------------------------------------|-----------------------------------------|
| <i>Current year (1988)</i>           |                                         |                                         |
| <i>measure of plant size</i>         |                                         |                                         |
| 0 to 19                              | –4.5                                    | 5.2                                     |
| 20 to 49                             | –2.1                                    | 8.6                                     |
| 50 to 99                             | –1.3                                    | 10.5                                    |
| 100 to 249                           | –1.1                                    | 18.5                                    |
| 250 to 499                           | –1.0                                    | 16.0                                    |
| 500 to 999                           | –0.6                                    | 13.5                                    |
| 1000 to 2499                         | –1.0                                    | 12.3                                    |
| 2500 to 4999                         | –1.3                                    | 7.0                                     |
| 5000 to more                         | –0.2                                    | 8.4                                     |
| <i>Base year (1973)</i>              |                                         |                                         |
| <i>measure of plant size</i>         |                                         |                                         |
| 0 to 19                              | 10.3                                    | 5.2                                     |
| 20 to 49                             | 0.6                                     | 8.5                                     |
| 50 to 99                             | –0.7                                    | 10.4                                    |
| 100 to 249                           | –1.7                                    | 18.6                                    |
| 250 to 499                           | –2.5                                    | 16.0                                    |
| 500 to 999                           | –2.7                                    | 13.5                                    |
| 1000 to 2499                         | –2.6                                    | 12.3                                    |
| 2500 to 4999                         | –2.5                                    | 7.0                                     |
| 5000 to more                         | –2.4                                    | 8.5                                     |

Source: Davis et al., Small Business and Job Creation, NBER Working Paper 4492, p. 35.

negative because manufacturing employment in the U.S. declined during these 15 years.

The top half of Table II shows the results of comparative static analysis where the plants are placed in a size class based upon their size at the end of the period, i.e., 1988. Note that the greatest employment loss is 4.5 percent experienced by the smallest size class. The smallest loss is 0.2 percent experienced by the largest size class. These results suggest that large firms create more net new jobs (lose fewer jobs) than small firms.

The lower half of Table II shows dynamic analysis where plants are placed in a class based upon their employment at the beginning of the time period, i.e., 1973. Here, the greatest percent change in employment occurs in the smallest size class and it is a positive 10.3 percent. In fact, *only the two smallest size classes show positive changes* in employment. The greatest declines in employment are shared by the five largest size classes, firms with 500 or more employees.

The switch of job creation between classes evident in the upper and lower halves of Table II is due entirely to the switch in methodologies from static to dynamic just as shown in Figure 1. Clearly, Davis, Haltiwanger and Schuh's research with this entirely different data file confirms the role of methodology in defining the job creators in America. And, to the extent that dynamic methodology is appropriate, it confirms the role of small firms in job creation.

But, Davis, Haltiwanger and Schuh do not accept either of these methodologies as correct. Instead, they state that Birch and the SBA use a methodology that is flawed by "... a statistical pitfall known as the regression fallacy or regression-to-the-mean bias" (1993, p. 15). They explain this pitfall and demonstrate how the SBA's results incorporate it. Their explanation is confusing and will not be repeated here because the work of Picot, Baldwin and Dupuy (1994) provides a far better explanation of the problem. Davis et al.'s criticism of the SBA's work and data base begins with incorrect assumptions of how the SBA carries out its calculations and concludes with incorrect statements about the data base including citing Armington and Odle's 1982 paper as a critique that demonstrates that Birch's work with the D&B data base is flawed.<sup>4</sup>

Davis, Haltiwanger and Schuh's widely publicized conclusion is, "We find that large firms and plants dominate the creation and destruction of jobs in the U.S. manufacturing sector." However, they go on to state, "We find no strong or systematic relationship between net job growth rates and either firm or plant size" (1993, pp. 24-25). When examined carefully, these are not contradictory conclusions although it would have been helpful if they had published the gross job change numbers to support the first statement.<sup>5</sup> However, the latter statement clearly ignores the results in Table II. Evidence to support their conclusion comes from their "average plant size" methodology which they developed to overcome the problem of "regression fallacy." They propose that the least biased measure of plant size is the average plant size calculated as beginning employment plus ending employment divided by 2. The top half of Table III shows the results of using average plant size. There is little discernible difference in the percentages between the small and

TABLE III  
Net job creation rates by different definitions of base year  
1973-88

| Size class<br>number of<br>employees | Net job<br>creation<br>(percent change) | Static employment<br>share<br>(percent) |
|--------------------------------------|-----------------------------------------|-----------------------------------------|
| <i>Average plant size measure</i>    |                                         |                                         |
| 0 to 19                              | -1.3                                    | 4.4                                     |
| 20 to 49                             | -1.1                                    | 8.2                                     |
| 50 to 99                             | -0.9                                    | 10.1                                    |
| 100 to 249                           | -1.4                                    | 18.5                                    |
| 250 to 499                           | -1.3                                    | 16.6                                    |
| 500 to 999                           | -1.0                                    | 13.8                                    |
| 1000 to 2499                         | -1.6                                    | 12.5                                    |
| 2500 to 4999                         | -1.7                                    | 7.2                                     |
| 5000 to more                         | -0.6                                    | 8.8                                     |
| <i>Firm size</i>                     |                                         |                                         |
| 0 to 19                              | -2.3                                    | 5.2                                     |
| 20 to 49                             | -1.0                                    | 8.5                                     |
| 50 to 99                             | -0.4                                    | 10.4                                    |
| 100 to 249                           | -0.1                                    | 18.6                                    |
| 250 to 499                           | -0.1                                    | 16.0                                    |
| 500 to 999                           | -0.4                                    | 13.5                                    |
| 1000 to 2499                         | -0.7                                    | 12.3                                    |
| 2500 to 4999                         | -1.4                                    | 7.0                                     |
| 5000 to more                         | -1.3                                    | 8.5                                     |

Source: Davis et al., Small Business and Job Creation, Business Economics, 1994, p. 15.

large size classes. The largest percent loss is in the 2500 to 4999 size class. The smallest is in the 5000 or more size class. Other wise, there is no pattern to distinguish small from large firm job creation activity.

Davis et al., use average plant size because they believe it is an appropriate method to remove a statistical bias they define as "regression to the mean." They believe that this bias *may occur* when using the plant size measured either at the end or the beginning of a time period. They do not test the data to demonstrate the existence of this bias. Nor do they propose an economic theory basis for using average plant size. Neither neoclassical theory nor Schumpeterian theory suggests average plant size means anything. Thus, this measure represents data massaging in the absence of any empirical data that demonstrates the statistical bias of regression to the mean nor any economic theory that suggests using average plant size.

Furthermore, SBA analysis in seven separate time periods (Table II) can be interpreted to be

seven separate tests for statistical bias and these show consistent results suggesting the statistical bias is not present. Davis et al. do not mention SBA's published results. Furthermore, they do not note that the small firm sector's static share of manufacturing employment grew during this period of time, from 28.9 percent in 1977 to 33.0 percent in 1987 (U.S. Department of Commerce, Bureau of the Census, 1981, 1991).

Their empirical evidence is a far cry from the widely believed misconception spread by the *New York Times* (Sylvia, 1994). Sylvia states, apparently without objection from Davis, Haltiwanger and Schuh, that these researchers found evidence that large firms are the great job creators. The evidence cited by this journalist is a reproduction of Table III. Nonetheless, just as the Armington and Odle article (1982) was rapidly accepted, so was the Sylvia article.

If Davis et al. are correct about the bias in the dynamic methodology used by the SBA, then there is doubt that previous research by Birch and the SBA validly demonstrates that small firms are the job generators. In the next section, we will turn to Picot, Baldwin and Dupuy for more analysis of the issue of statistical bias.

Thus, besides identifying a possible source of statistical bias in Birch's and the SBA's methodology, Davis, Haltiwanger and Schuh's research muddles the job generation research with a new statistical methodology that is not based on theory. However, it is very important to note that none of their statistical methods creates an analysis that shows large firms create a greater share of net job growth than their static share of employment.

#### *A Canadian reassessment of the methodologies*

Picot, Baldwin and Dupuy (1994) recognize the conflict in methodologies and sought to test alternative methodologies systematically to expose the effect of each on job creation research. Theirs is an insightful analysis of methodology, but the most important general comment they make is that "... the outcome variable (the growth in employment) influences the classification variable (the size of firm)" (p. 14). By this they mean that any change in the method of size classification based on employment automatically changes the outcome of the employment change analysis in a

predictable way because of the linkage between the two. In other words, growing firms are increasing employment so classifying firms based on an employment size measure other than their beginning employment, automatically shifts employment growth into larger size classes.

Picot, Baldwin and Dupuy acknowledge the statistical bias (called "regression to the mean" by Davis et al.) caused by using beginning firm size and describe it precisely by noting that employment changes in a firm consist of two components: a long-run and a transitory component. "... many of the changes in the employment levels in firms are transitory and the observed gain (or loss) is reversed in the short-run. There may also be a longer run trend" (p. 10). Both components can be present in a measurement of firm size. They state very clearly:

When observed at the peak of the transitory movement the firm will have a greater likelihood of being classified as a large firm than in other years, and it will tend to be facing a transitory decline. Similarly, when observed at the trough of this transitory movement, when it is more likely to be classified as a smaller firm, the firm will tend to be facing a (transitory) increase in employment. Because of this, firms which tend to be classified as large in the base year ( $t_1$ ), will tend to be facing an employment decline, and firms which tend to be classified as small will tend to be facing an employment increase. And to the extent that this is transitory, it is misleading, since the long run employment level of the firm may not be changing. We would have observed, however, that the smaller the firm, the greater the tendency to create employment (p. 11).

The question to be answered is whether this logically deduced "transitory component" actually exists to such a degree as to bias the job creation analysis.

Picot, Baldwin and Dupuy then go on to use their data to test the four methodologies used by Davis, Haltiwanger and Schuh, plus one of their own invention, the "prior average size." Prior average size is calculated as employment in the year before employment growth measurement begins ( $t_0$ ) plus the beginning (base) year employment ( $t_1$ ) divided by 2. Their data set is the Longitudinal Employment Analysis Program (LEAP) data file created by Statistics Canada. This file includes longitudinal, annual microdata for all firms in Canada from 1978 through 1992. A few of their results are summarized in Table IV.

Their results show that the base year method

TABLE IV  
Job gain and loss rates between consecutive years (average 1978–92 total commercial economy)

| Firm size class<br>(number of<br>employees) | Net job change rate |                         |                       |                               |                         |
|---------------------------------------------|---------------------|-------------------------|-----------------------|-------------------------------|-------------------------|
|                                             | Base year           | Average current<br>size | Prior average<br>size | Average over<br>entire period | Current average<br>size |
| <i>Total commercial economy</i>             |                     |                         |                       |                               |                         |
| 0–19                                        | 8.1                 | 3.3                     | 8.0                   | 5.1                           | 5.6                     |
| 20–49                                       | 0.3                 | 1.7                     | 0.2                   | 4.5                           | 3.9                     |
| 50–99                                       | –0.7                | 1.4                     | –0.8                  | 3.8                           | 3.2                     |
| 100–499                                     | –0.8                | 1.0                     | –0.8                  | 2.3                           | 2.5                     |
| 500 +                                       | –1.2                | 0.1                     | –1.2                  | 0.6                           | 0.7                     |
| Total                                       | 1.3                 | 1.3                     | 1.3                   | 2.6                           | 2.6                     |
| <i>Manufacturing</i>                        |                     |                         |                       |                               |                         |
| 0–19                                        | 11.0                | 3.2                     | 11.1                  | NA                            | NA                      |
| 20–49                                       | 0.7                 | –0.1                    | 0.7                   | NA                            | NA                      |
| 50–99                                       | –0.7                | 0.1                     | –0.8                  | NA                            | NA                      |
| 100–499                                     | –1.3                | –0.5                    | –1.4                  | NA                            | NA                      |
| 500 +                                       | –3.1                | –2.0                    | –3.0                  | NA                            | NA                      |
| Total                                       | –0.8                | –0.8                    | –0.8                  | NA                            | NA                      |

Source: Picot, Baldwin and Deputy, 1994, Have Small Firms Created a Disproportionate Share of New Jobs in Canada?, Canadian Economics Assoc., June 1994.

(Birch and the SBA method) and the prior average size method both yield essentially the same results. As evident in Table IV, columns one and three, the percentage of net new jobs attributable to small firms using these two methodologies are essentially the same. This is true for the entire Canadian economy and for manufacturing. Thus, the Canadian results are consistent with Birch's, the SBA's dynamic analysis, and Davis et al.'s base year results. Notice especially that prior average size and base year net job change rates are essentially equal for each firm size class. This suggests that the transitory component hypothesized by Picot et al., and assumed by Davis, Haltiwanger and Schuh, is not a major factor in determining net job change rates.

The long run average size and "average current size" (an approximation to Davis et al.'s "firm size"), yield substantially different results than those found in either the SBA's static methodology or Davis et al.'s methodologies. Here the Canadian economy shows small firms with higher job growth for both size classification methods. Assuming the methodologies are essentially the same, the Canadian economy apparently experiences greater small firm job growth than the U.S. economy. And, this holds true for all segments

of the Canadian economy. They conclude, "This work indicates that in Canada both gross job gain and job loss, as well as net employment increase, is disproportionately located in small firms, no matter which measure is used and whether it is evaluated over the short or longer run" (p. 29).

Picot, Baldwin and Dupuy also conclude that measurement issues are important. However, they go on to note that the solutions proposed in Davis, Haltiwanger and Schuh's (1993) paper and in their own work also contain weaknesses. But, these weakness do not affect their finding that small firms are the great job generators in the Canadian economy.

This brief review of Picot, Baldwin and Dupuy's work does not adequately express the detailed and thorough content of their paper. Table IV shows only a small portion of their work. In all, they use six alternative definitions of business size class and evaluate these using three different time periods to measure growth. And, they do this for four sectors of the Canadian economy. However, the review given herein does highlight their major contributions to the debate about methodology for measuring dynamics of job generation. Interestingly, they also mention that new firm formation is the major mechanism of net new

job creation in the Canadian economy. Once again, the data hint at Schumpeterian creative destruction at work.

In response to Picot, Baldwin and Dupuy's criticism of their average plant size methodology, Davis, Haltiwanger and Schuh (1994) applied another method to their data in a later publication wherein they measure firm size as the average of employment in the base year and the next census year. Censuses are conducted every five years so this method uses the firm's average employment over a five year period. The results from this analysis appear in the lower half of Table III and there is no apparent pattern relating firm size to net employment change. No doubt Davis et al. would like to test Picot et al.'s prior average size method but since the Census longitudinal data base only has data in five year intervals, this method cannot be tested.

### *Overview of methodologies*

Picot et al. make it clear that methodology alone can determine the outcome of any test of the small business job creation hypothesis. The traditional comparative static methodology shows large firms create a greater share of net new jobs than their static share of employment thereby rejecting the small firm job creation hypothesis. Dynamic methodology developed by Birch and used by SBA, shows that small firms create a greater share of net new jobs than their static share of employment thereby creating and accepting the hypothesis. Two methodologies developed by Davis et al. show no advantage for small nor large firms thereby rejecting the job creation hypothesis. The prior average size method developed and used by Picot et al. demonstrates that the hypothesized statistical bias in dynamic methodology is not significant and therefore small firms create a disproportionate share of net new jobs. They accept the hypothesis.

In summary, Picot, Baldwin and Dupuy's work in Canada suggests that Birch's and the SBA's dynamic methodology does not suffer significant statistical bias as originally hypothesized by Davis, Haltiwanger and Schuh. Adjusting for this bias with the "prior average size" method of classifying firms resulted in the same distribution of net new jobs as the dynamic methodology, at

least in the Canadian economy. But, what about the U.S. economy where the methodology conflict originated? Ideally, this comparison of prior average size should be conducted on the SBDB by SBA, but in 1991, the SBA terminated the SBDB. It has subsequently been erased. And, unfortunately, Census' longitudinal data appears in five year increments that can only produce a five year average size that shows similar results as the fifteen year average size. In Schumpeterian terms, five years is ample time for an aggressive creative destroyer to grow from a few employees to a large firm. Apple Computer Co. did it. Compaq Computer Co. did also. Thus, the methodology argument is not resolvable.

And, the underlying economic theory is never mentioned in these discussions. For general equilibrium theory, the topic is of no importance anyway since firm size is assumed to be the outcome of market forces, not the cause. The job generation hypothesis is merely an annoyance since its outcome does not agree with the expectations of most general equilibrium believers. However, for Schumpeterian economic theory, the topic is important and inadequately addressed by the research reported on job creation so far. Several of the critiques cited herein have noted that most job growth comes from the formation of new firms and the growth of a select few of these. Yet, none of these methodologists test the fundamental principle of new firm formation and growth directly. Obviously, choice of methodologies depends upon what the investigator wants to prove, but if one wants to prove Schumpeterian creative destruction, another methodology is necessary.

### **5. Cohort analysis of dynamics**

Sociologists have long recognized that society is an evolving phenomena that is continually changing as new people are born and old people die. Within this discipline, organizational ecology focuses on organizational births, deaths, and changes (Singh and Lumsden, 1990; Aldrich, 1979; Hannan and Freeman, 1989). In order to capture these processes, Hannan and Freeman (1989) make a particularly strong case for the use of dynamic methodologies. They stress that the condition of equilibrium and therefore stasis, is

unlikely to last long for most types of organizations, and therefore it is necessary to study the rates at which organizations enter and leave populations as well as the rate at which organizational change occurs. The use of cohort methodology has proven to be especially appropriate for this type of study. Populations of organizations are classified according to some meaningful characteristic. These populations, now identified as cohorts, are followed across time in regard to organizational foundlings, deaths, and structural changes. This methods has been used in the study of many types of organization populations, including newspapers (Carroll, 1987; Carroll and Delacroix, 1982; Delacroix and Carroll, 1983), the wine industry (Delacroix and Solt, 1988) and labor unions (Hannan and Freeman, 1987 and 1988).

Two major cohort analyses have been done on job creation. The first, by Kirchhoff and Phillips (1989) used the SBA's Small Business Data Base (SBDB) to look at a single cohort of all firms born in 1977 and 1978. Brown et al. (1990a) used cohort analysis to examine firm survival and job creation in the Michigan Employment Security Commission's Longitudinal Data Base.

#### *New firms – innovation and growth*

Kirchhoff and Phillips (1989) used the SBDB to select all 814,190 firms born during 1977 and 1978 and followed these firms for six years through 1984. They classified the firms as being in high, medium, or low innovation industries. And, they measured firm growth as high, medium or low.

First, they report that the percent of firms that survive with their original owners does not differ among the innovation classes. All are essentially equal. Thus, the chances of survival are the same for all levels of innovation activity. Second, they found that the incidence of high growth was 16.9 percent among high innovation firms but only 9.0 percent among low innovation firms. Thus, innovation rate contributes to growth.

In spite of the higher incidence of high growth rate firms, high innovation rate firms created fewer new jobs than did low innovation rate firms. This is because there are five times as many low innovation firms as high innovation firms. But, only

the high innovation class employed more workers after six years than in the base year. This is because firm discontinuances<sup>6</sup> removed more jobs than the surviving firms created in the medium and low innovation rate classes. Overall, at birth, the 814,190 firms employed 4,529,413 workers. In 1984, the 312,662 firms remaining with their original owners employed 3,406,544 employees, a 25 percent employment decline. However, this cohort of firms accounted for 20.6 percent of the net new jobs added to the U.S. private work force between 1976 and 1984. And, it contributed 4.0 percent of total employment in 1984 (Kirchhoff, 1994, p. 192). Creative destruction was certainly at work.<sup>7</sup>

#### *Michigan cohort analysis*

Brown, Connor, Heeringa and Jackson (1990a) provide cohort analysis of the Michigan Employment Security Commission Longitudinal Data Base. In this data base, most changes in ownership are identified since new owners of existing firms are required by law to advise the State Department of Labor that the existing firm has new owners. Such advisement is required by law and the new ownership unit is recorded as a "successor" rather than a birth. Thus, researchers using this data base are able to trace ownership changes and therefore avoid the problems experienced by those using either the SBDB or Census' Longitudinal Data File. Brown et al., created a new cohort in each year of their data which begins in 1978 and ends in 1987. They trace the employment of each cohort longitudinally for the time allowed by their data.

Perhaps their most significant finding is that among very small manufacturing firms started in Michigan between 1978 and 1987, each cohort shows more total employment in succeeding years than in its first year of existence (Brown et al., p. 269). In fact, after eight years, the 1978 cohort had sixty percent more employment than its first year. This result was also true for very small service firms but with a lessor magnitude, about five percent increase. This is different than Kirchhoff and Phillip's findings (net job loss for the 1978 cohort in six years) although Kirchhoff and Phillips did not break down job creation by birth size. Brown et al., conclude that the

Michigan economy is clearly characterized by dynamics of birth, growth, decline and death.

Subsequent research by Jackson (1995) carries this cohort analysis further. Because of the inclusion of successors, survival rates reported by Jackson (39 to 59 percent) are much greater than that reported from the other longitudinal microdata bases. Phillips and Kirchhoff (1989) report 38 percent after six years calculated from the SBA's SBDB, and Dunne, Roberts and Samuelson (1988) report five year survival rates of 36 percent calculated from Census' Longitudinal Data File. Jackson's percentages are close to work by Kirchhoff (1994, p. 167) who incorporates estimates of ownership change successors based upon U.S. Department of Labor average successor rates. Furthermore, Jackson's results show each cohort of new, small firms increases in total employment every year after birth. Of particular interest is that after six years, the small firm cohorts (one to 50 employees at birth) show annual rates of change in number of employees (average size) and wages in excess of 1.0, i.e., positive growth. However, in both manufacturing and services, large new firms (greater than 50 employees at birth) show net annual rates of growth of less than 1.0, i.e., declines in employment.

#### *The importance of including successors*

Comparing the Michigan results (Jackson, 1995; Brown et al., 1990) with Kirchhoff and Phillips (1989) demonstrates that incorporating ownership changes (successors) into longitudinal analysis makes small firm birth and growth far more important to net new job formation than previously reported. Whereas Kirchhoff and Phillips report decline in total cohort employment after six years due largely to firm departures from the file (either due to deaths or ownership changes), Brown et al. (1990a) and Jackson (1995) incorporate ownership changes and report continuous growth in employment. Since both the SBDB and Census' Longitudinal Data File suffer the ownership change problem, Census' survival and employment numbers are also distorted (Kirchhoff, 1994, pp. 165–167).

Interestingly, this distortion due to ownership changes does not affect the share of net new employment of small firms that stay within the

small sector. Firms in the small sector that change owners have their employment deducted as a death and added back in as a birth. Thus, ownership changes create an exaggerated picture of employment volatility (or churning) but do not effect the net job changes, i.e., births minus deaths. However, when a small firm grows beyond the boundaries of the small firm sector and then changes ownership, the net effect is to subtract employment from the small sector due to a false death and add employment to the large sector due to a false birth. Therefore, ownership changes among new, fast growing small firms tend to bias employment growth towards the large firm sector.

Clearly, accurate descriptions of the creative destruction behavior of new small firms can only be attained if the problems of microdata errors due to ownership change are resolved. In the meantime, the frequent mentions of high rates of employment churning should be viewed with caution since some of this, perhaps much of it, is due to measurement error associated with ownership changes.

## **6. Conclusions**

We began this paper by noting that there are major differences in theoretical beliefs regarding capitalism and suggest that these differences need to be addressed when assessing the arguments about job creation research. We describe the two major theories, general equilibrium theory that suggests that large firms will create most net new jobs and Schumpeterian creative destruction theory that hypothesizes that small growing firms will create the most net new jobs. We go on to examine the major job creation research in the U.S. to note that most of the conflict among the researchers doing this work has been defined in terms of methodology, i.e., the different definitions of small businesses and/or size classes, or the measurement methods and data bases used to carry out research.

But, these methodological arguments can continue endlessly as evidenced by the elaborate evaluation of Picot, Baldwin and Dupuy (1994) who consider no less than six different size definition combined with three different time periods and find different results in each of 18 separate methodological analyses. There is no clear statement of right and wrong emanating from their

inquiry into methodology, and rightly so because the answer to the dilemma is in theory. Methodology is selected to test theory, not vice versa.

Since we find Schumpeter's creative destruction theory to be compelling, we proceed to analyze those few research studies that use cohort analysis to trace the formation and growth of new small firms. Kirchhoff and Phillips (1989), Brown et al. (1990a) and Jackson (1995) provide ample evidence of creative destruction. But especially Jackson's work demonstrates the vital employment contribution made by new small firms actively growing. Perhaps more importantly, Brown et al., and Jackson's work, when contrasted with Kirchhoff and Phillips' work, shows the importance of including ownership changes in longitudinal microdata files. Measurements of survival and job creation are greatly affected by the absence of ownership changes from the SBDB and the Longitudinal Data File. And, the Michigan research demonstrates the important contributions made by new small firms to overall employment growth.

The greatest concern we have is that the methodological arguments of the last few years may distract public policy makers from their efforts to give greater attention to the small business sector in economic development policy. It is important to note that no research, except when the purest static methodology is applied, has shown that large firms create a disproportionate share of net new jobs in the U.S. or Canada. Furthermore, cohort analysis demonstrates unequivocally that the dynamics of new small firm formation and growth creates a disproportionate share of net new jobs. This latter research provides strong evidence supporting Schumpeter's theory – equilibrium markets are few and creative destruction drives economic development.

Public policy must focus on encouraging new firm formation and growth. Foremost among these is destroying barriers to new firm entry into existing markets and to encourage resource mobility, both labor and capital, to encourage new firm formations and growth in all parts of the world economy.

## Notes

<sup>1</sup> It is important to note that, by federal law, U.S. government statistics must be published in a form that assures the security of individual entity data. The classification form serves this security principle very well. Birch used a private data source wherein the security of individual entity data is not promised.

<sup>2</sup> U.S. government statistics are published only in classified form in order to keep individual firm information confidential. Therefore, comparative static analysis is the only methodology that can be applied to these statistics. It is this methodology that led Ijiri and Simon (1964) to raise the question of inter class movement but not to answer it.

<sup>3</sup> Full explanation of this effect can be found in: Kirchhoff, 1994.

<sup>4</sup> For a detailed discussion of this flaw, see Dennis et al., 1994.

<sup>5</sup> Dennis et al., report the gross job change numbers as obtained from another source.

<sup>6</sup> Discontinuities include firm deaths and ownership changes. When a new owner acquires an existing firm, Dun and Bradstreet is required to change the firm's credit rating. In most cases, this changes the firm's identification number so that when the researchers examine the file, the change in ownership appears as a death (old firm) and birth (new ownership firm). This complicating factor exists in both the SBDB and Census' Longitudinal file on manufacturing firms to varying degrees and the degree of error caused by this is not known. Only the Michigan State Employment longitudinal file has a measure of ownership changes.

<sup>7</sup> Other researchers are recognizing the value of cohort analysis. Most notably, Joachim Wagner uses cohort analysis to report six year survival rates of 57 to 65 percent among new German manufacturing firms started between 1979 and 1982. See: Wagner, 1994. In private correspondence, Wagner has indicated that his data includes adjustments for ownership changes.

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