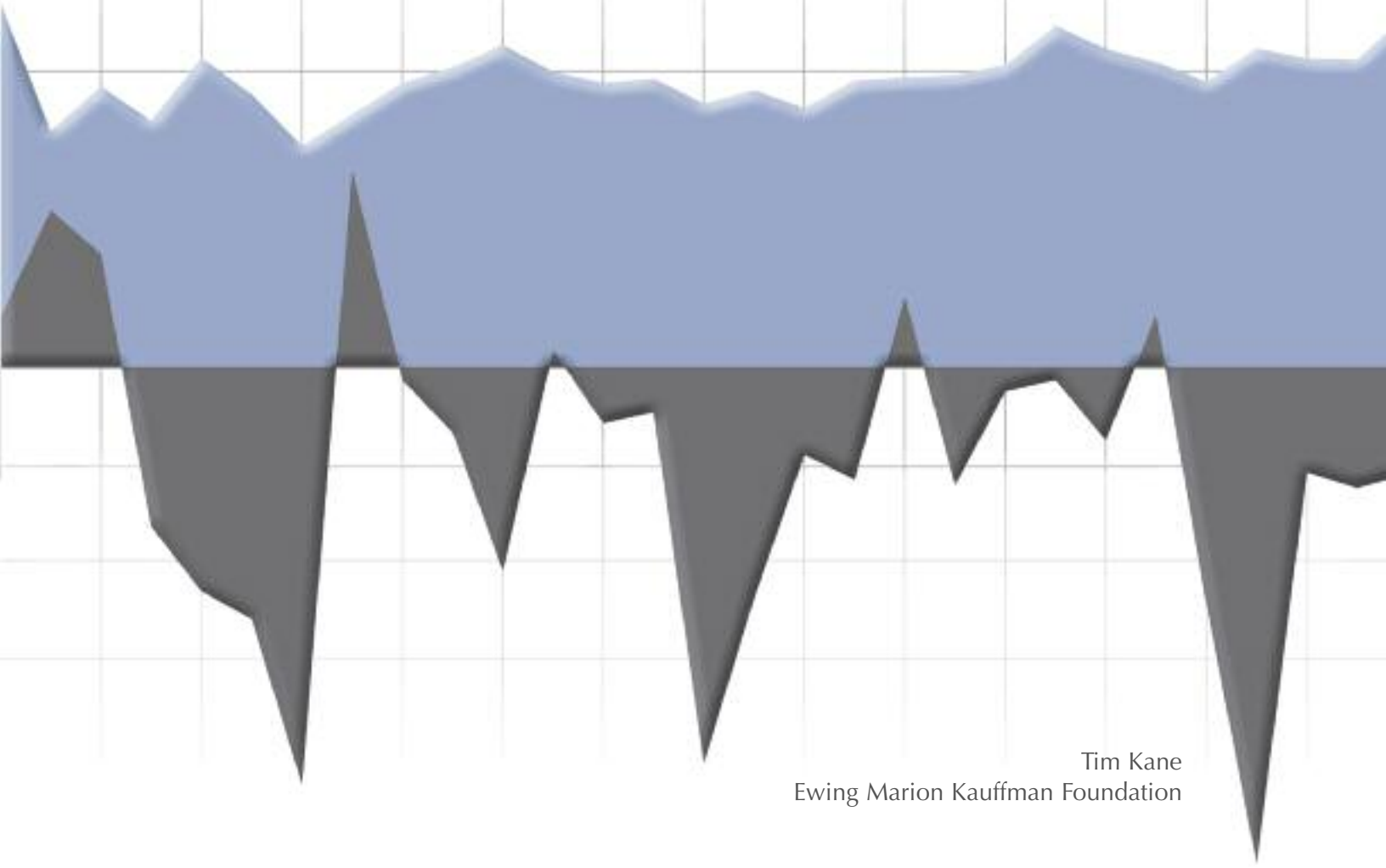
Kauffman Foundation Research Series:
Firm Formation and Economic Growth

The Importance of Startups in Job Creation and Job Destruction

July 2010



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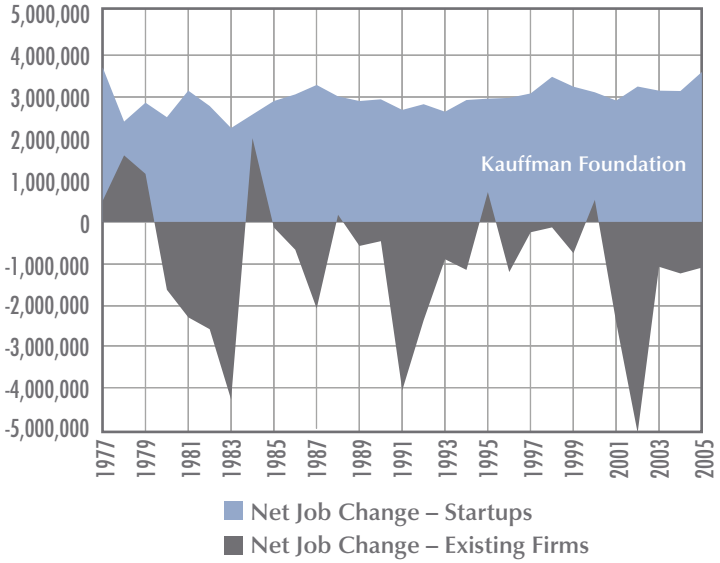
The oft-quoted American sports slogan, "Winning isn't everything. It's the only thing!" could well be attributed to the economic importance of firm formation in creating jobs. A relatively new dataset from the U.S. government called Business Dynamics Statistics (BDS) confirms that startups aren't everything when it comes to job growth. They're the only thing.

By now it is well understood that firms large and small are continuously and simultaneously destroying and creating jobs. Even a mild level of this creative-destructive churn points to a dynamic economy much different than static economic models can describe. However, beyond the job churn at existing firms, there is a dynamic in firm birth that seems to be very important for understanding job creation—specifically, the unique effect of new firms, or startups. Put simply, this paper shows that without startups, there would be no net job growth in the U.S. economy. This fact is true on average, but also is true for all but seven years for which the United States has data going back to 1977.

The BDS is the first publicly available dataset that incorporates the age of firms in a dynamic format (Haltiwanger, Jarmin, and Miranda, 2008). Figure 1 presents summary data from the BDS,[1] showing that firms in their first year of existence add an average of 3 million jobs per year. By construction, the BDS defines an *existing firm*—age one up to age twenty-six and beyond—such that it can both create and lose jobs. In contrast, a *startup*, or age zero firm, only creates jobs because it experiences no gross job destruction. We might anticipate that the net job gain also would be positive at existing firms, but that is decisively not the case during most years on record. Notably, the figure shows that, during recessionary years, job creation at startups remains stable, while net job losses at existing firms are highly sensitive to the business cycle.

An important caveat is that existing firms are so diverse that it can be misleading to think of a "typical" firm. For example, there are two simple categories of existing firms: those that go out of business (Deaths) and those that continue

Figure 1: Startups Create Most New Net Jobs in the United States



Source: Business Dynamics Statistics, Tim Kane

1. See http://webserver03.ces.census.gov/index.php/bds/bds_database_list.

(Survivors). On balance, existing firms lose more jobs than they create. But once Deaths are set aside, Survivors usually create more net jobs than startups do. Among Survivors, so-called gazelle firms are certainly more important still.

For a technical note on the construction of the data in this paper, see Appendix 1. One needs to be careful when glancing at the economy-wide BDS tables, because categories are described in terms of establishments rather than firms. Since a firm can have multiple establishments, there can be confusion between continuing *firms* (which may experience establishment births and deaths) and continuing *establishments*. This paper focuses on firms, since that is how startups are defined, and so reconfigures BDS aggregates using sub-aggregate numbers. To avoid confusion I introduce the term Survivors to describe continuing firms

In sum, the new firm-level summary data in Figure 1 reveal that startup firms are responsible for all net job creation during most years, while existing firms (aged one year and older) are usually net job losers. To be fair, startups have a definitional advantage because they can't lose jobs, and some of their created jobs will surely be lost by next year's age one firms. Only a closer annual look will clarify that matter. Also, these are counts of jobs within the firm itself, not its impact on other firms (which could cut either way). What Figure 1 doesn't reveal then is the gross flows within the firm age categories, which is the inspiration for this study. We would like to know whether age one firms are net job creators. Ideally, we would like to pinpoint the transition year when firms become net job destroyers, or find if a consistent pattern even exists.

The seminal study of the BDS data by Haltiwanger, Jarmin, and Miranda (2008) describes the data in great detail and provides this context: "The annual job creation rate is about 18 percent (as a percent of employment), suggesting that, on average in any given year, about 18 percent of jobs are newly created. About one-third of the annual job-creation rate is due to establishment entry. The very high rate of gross job creation is balanced with a very high rate of gross job destruction. The gross job destruction rate is around 16 percent on average, indicating that about 16 percent of jobs that existed one year prior no longer exist. About one-third of the job destruction is accounted for by establishment exit."

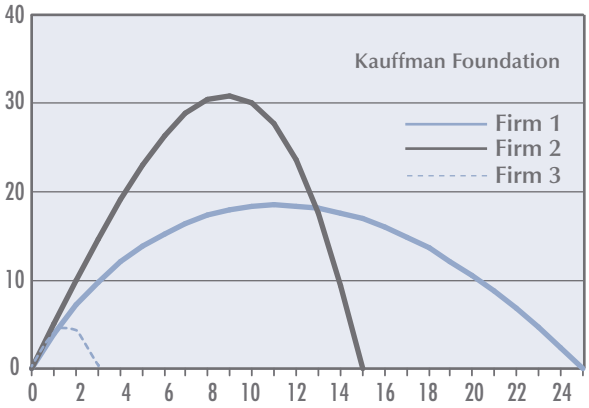
The vital role of startups, distinct from new firms ages one to five, can be revealed by taking a close look at the time series of job creation and destruction. The next section provides a cursory theoretical view of such a time series, followed by a section on the empirical patterns found in the BDS.

Theory

Describing aggregate job creation and job destruction curves over the age of firms is essentially summing up the life cycle of all firms in the economy, but doing so at a point in time. Most business executives might imagine the aggregate pattern of job creation as a large-scale version of a highly simplified life cycle of a typical firm: a bell-shaped curve with rapid net employment growth during the first phase, followed by stability and then a slow decline.

Jovanovic (1982) presented one of the first models of a firm's life cycle, which shows a more complex growth path. We know that firms start and end with zero employees, but there is no "typical" pattern to hiring given the various factors that influence each

Figure 2: Employment Over Time at Three Theoretical Firms



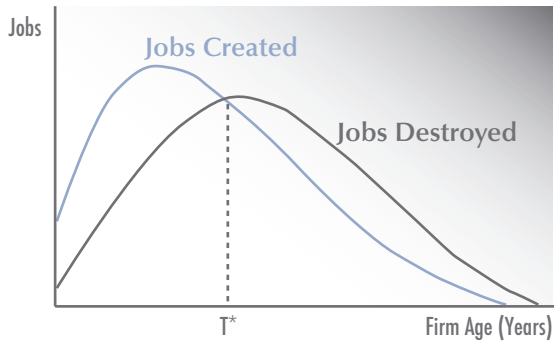
Source: Business Dynamics Statistics, Tim Kane

individual firm. The sketch provided here in Figure 2 is highly simplified for purposes of discussion, using a life cycle pattern that is mathematically described by a concave function. Firm 1 peaks at nineteen employees and closes after twenty-five years. Firm 2 peaks higher at the nine-year point with more than thirty employees, but is shuttered six years later. Firm 3 has five employees, but closes within three years of its founding. If we summed up net job creation across all firms, we would get a concave curve, as well, but it would skew left toward the origin.

Next, we can imagine separate curves for aggregate job creation (JC) and aggregate job destruction (JD). Figure 3 shows what the theoretical national job creation and job destruction curves might look like over a given period. Logically, JD is greater than JC at the end of the aggregate life cycle, and vice versa. There must be a transition time, T*, when the number of jobs created at the aggregate, or "average," firm equals the number destroyed. Before T*, the firm was a net creator of jobs, but after T* it becomes a net destroyer. Surely, a firm will hire even while in decline, just as it lays off employees during the growth phase, so both curves will have non-zero values during the life cycle of the typical firm.

With the BDS, we should be able to reveal the shape of such aggregate curves based on empirical data, as well as how the curves shift during periods of economic recession and recovery.

Figure 3: Hypothetical Aggregate Job Creation and Job Destruction, by Firm Age



Source: Business Dynamics Statistics, Tim Kane

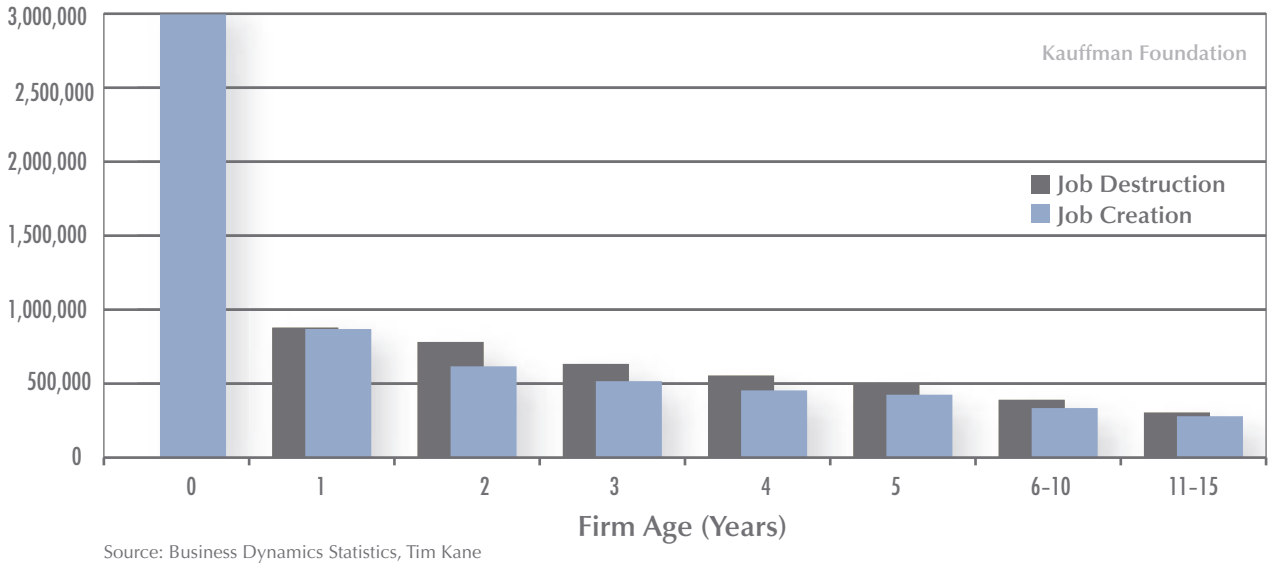
Empirics

The most "novel aspects" of the BDS, per Haltiwanger, et al., are its treatments of business dynamics by firm age. In any given year, BDS has disaggregated job flows for all firms that originate that year (i.e., year 0), as well as prior years one, two, three, four, five, and then five-year aggregates of years six to ten, eleven to fifteen, etc., through twenty-six plus. The first year of data availability is 1977, so all firms established in prior years are left uncategorized.

By averaging the time series of gross flows across all firms of the same age, researchers can map out an empirically-based aggregate JC–JD curve like the theoretical Figure 3. Haltiwanger, et al., did this in terms of JC and JD rates (see their charts 8–13). However, their comparative JC–JD rates do not allow analysis of startup firms, because each one has a combined churn rate of 200 percent, by construction. The authors do provide a chart showing net job creation (their chart 15) that includes a dimension for firm size as well, then show separate gross measures (their charts 16 and 17).

In Figure 4, I present gross aggregate job flows by firm age from the BDS years 1992–2005, which show JC and JD together with just the age dimension. Cropping the data at the years 1992–2005 allows for complete age groups up to the eleven- to fifteen-year bracket. To make the age brackets comparable, I divided bracket sums by the number of years in each bracket. Doing so reveals that gross job creation at startups in the United States averaged more than 3 million jobs per year during 1992–2005, four times higher than any other yearly age group. For comparison, there are an average of 800,000 jobs created at firms in their first *full* year and 500,000 at firms in their third full year. In a given year, firms in the age group six to ten total 335,000 gross jobs created, for a typical year. That means that *all firms in a latter age group create one-tenth the jobs created by startups.* For example, in 2005, startups created 3.5 million jobs, compared to the 355,000 gross jobs created that year by firms founded in 1995. However, the 1995 firms also lost a gross 422,000 jobs. Indeed, existing firms in all year groups have gross job losses that are larger than gross job gains.

Figure 4: Job Creation and Loss by Firm Age
(Average per year, by year-group, 1992–2006)



Source: Business Dynamics Statistics, Tim Kane

This paints a picture surprisingly different from what informed, conventional wisdom presumably imagines. In other words, Figure 3 is wrong. The reality is that the JC and JD curves are (or appear to be, based on BDS data) convex rather than concave. Moreover, the transition point T* is distinctly at or below year one. This means that early assessments of the BDS claiming that all net job growth comes from firms less than five years old is correct, but now appear pessimistic. The five-year claim is based on aggregating firm ages zero to five. A closer analysis presented here indicates net job growth in the United States comes from firms less than *one* year old, formally defined as startups. Since the BDS uses annualized data, we can measure T* only as precisely as the first year, but it stands to reason that it lies at the three- to nine-month point after firm founding.

It must be said that Figure 4 is not inclusive of all possible firms since it leaves out those aged sixteen and above. The BDS shows that older firms (those founded prior to 1977) have large relative JC and JD flows. However, this older category includes firms that are twenty-five, fifty, and even 100 years old, so we can only guess that their specific year groups would have continually declining measured flows if included in Figure 4, which clearly shows a monotonic decline of gross flows with firm age. What we can say from the BDS aggregate of these older firms is that their total JD flow exceeds JC, similar to the pattern identified here.

Analysis

This paper presents a newly constructed national time series of job creation by startup firms, using annual data from the BDS for age zero firms. Startups create an average of 3 million new jobs annually. All other ages of firms, including companies in their first full years of existence up to firms established two centuries ago, are net job destroyers, losing 1 million jobs net combined per year. Patterns of job growth at startups and existing firms are both pro-cyclical, although existing firms have much more cyclical variance.

The implication of this finding could, and perhaps should, shift the standard employment policy paradigm. Policymakers tend to reflect common media stereotypes about job changes in the economy, which is to say a focus on the very large aggregate picture (such as the national or state unemployment rate) or on news of very large layoffs by individual companies. That attention is almost certainly misplaced. Nationwide measures are a blunt tool for analysis, and net employment growth reveals little that policy can affect.

Similarly, the common zero-sum attempts to incentivize firm relocation are oblivious to the important pattern of gross job creation revealed by the BDS. States and cities with job creation policies aimed at luring larger, older employers can't help but fail, not just because they are zero-sum, but because they are not based in realistic models of employment growth. Job growth is driven, essentially entirely, by startup firms that develop organically. To be sure, Survivors create zero to 7 million net jobs (half of which are at establishment births), while Deaths account for a net loss of 4 million to 8 million jobs, which are large flows for the context of the steady job creation of 3 million startup jobs. But, in terms of the life cycle of job growth, policymakers should appreciate the astoundingly large effect of job creation in the first year of a firm's life. In other words, the BDS indicates that effective policy to promote employment growth must include a central consideration for startup firms.

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Appendix 1. Constructing JC-JD Data by Firm Age

Business Dynamics Statistics (BDS) are made publicly available in a variety of ways through the government Web site http://www.ces.census.gov/index.php/bds. The data are described this way:

> BDS are created from the Longitudinal Business Database (LBD), a confidential database available to researchers throughout the network of Census Research Data Centers. BDS development at CES was partially funded by the Kauffman Foundation. A unique feature of the BDS is its longitudinal source data that permit tracking establishments and firms over time. The public-use BDS tabulations are an effort to make information from the confidential LBD accessible to a broad range of data users. Other efforts under way include creating a fully synthetic microdata file based on the LBD. The BDS series provides annual statistics for 1976–2005.

The "economywide" spreadsheet, which can be found at http://www.ces.census.gov/index.php/bds/bds_database_list, has a column for annual "Job_Creation" (which I will abbreviate JC) and its subcomponents in columns "JC_Births" and "JC_Continuers." The BDS definition of JC_Births is not the same as JC at startups, however, since births include new establishments at existing firms (e.g., the Sears store at a newly constructed shopping mall). I constructed a new series called JC_Startups by culling the gross job creation from the annual BDS spreadsheet table titled "Firm Age." An example of 1997 Firm Age data is presented in Table 1.

The cell for JC_Births of Firm Age 0 in 1997 is 3,059,236. I culled this cell from each annual table for the entire series to make a column comparable to the economy-wide data. Note, Table 1 shows JC_Births for firms age one, age two, and all the way up to age bracket sixteen to twenty, as well as uncategorized (i.e., "left uncensored") firms that were founded prior to the BDS series (1977).

Next, I created a second new series for *net job change of continuing firms*. This includes JC_Continuers (which is limited to existing establishments at existing firms) as well as JC from

Table 1: Annual BDS Data for 1997 by Firm Age

Firm Age	Estabs	Employment	Job_ Creation	JC _ Births	JC_ Continuers	Job_ Destruction	Job_ Destruction Deaths	Job_ Destruction Continuers
a) 0	526,670	3,072,093	3,059,236	3,059,236	0	0	0	0
b) 1	401,523	2,926,411	912,142	115,507	796,635	861,247	506,110	355,137
c) 2	342,514	2,664,950	620,174	84,505	535,669	789,865	438,741	351,124
d) 3	291,957	2,489,348	521,568	82,156	439,412	628,216	312,872	315,344
e) 4	250,710	2,218,589	426,307	71,334	354,973	535,341	243,660	291,681
f) 5	225,278	2,242,027	422,028	69,240	352,788	459,255	201,106	258,149
g) 6–10	969,745	11,077,695	1,842,539	383,615	1,458,924	2,027,856	772,626	1,255,230
h) 11–15	745,874	9,879,301	1,552,703	367,340	1,185,363	1,582,429	578,638	1,003,791
i) 16–20	617,835	10,110,977	1,564,806	455,928	1,108,878	1,478,215	444,970	1,033,245
l) Left Censored	1,679,212	56,743,897	7,631,252	2,169,939	5,461,313	7,377,465	2,436,215	4,941,250
m) ALL	6,051,318	103,425,288	18,552,755	6,858,800	11,693,955	15,739,889	5,934,938	9,804,951

Source: Business Dynamics Statistics.

births not at startups (i.e., new establishments at existing firms) less JD_Deaths. Job creation at births, not at startups, averages around 2 million jobs annually. My two series, Net Job Change at Startups (identical to JC at startup, since JD is zero) and Net Job Change at Existing Firms, are presented in Table 2, as well as in Figure 1. To confirm the accuracy of my counts, I checked the sum of these two series against net job creation overall, and they aligned perfectly.

Table 2: U.S. Job Growth at Startups versus Existing Firms, 1977–2005

Year	Net Job Change – Startups	Net Job Change – Existing Firms
1977	3,678,254	505,053
1978	2,389,561	1,584,463
1979	2,839,666	1,143,865
1980	2,493,488	-1,615,875
1981	3,126,098	-2,271,818
1982	2,759,993	-2,554,516
1983	2,235,799	-4,227,716
1984	2,558,051	1,994,505
1985	2,878,640	-132,860
1986	3,036,472	-663,117
1987	3,261,050	-2,060,647
1988	2,988,404	169,818
1989	2,878,562	-572,196
1990	2,919,266	-458,161
1991	2,666,705	-4,008,737
1992	2,802,951	-2,341,570
1993	2,623,685	-888,863
1994	2,902,461	-1,142,396
1995	2,935,062	710,181
1996	2,953,276	-1,193,941
1997	3,059,236	-246,371
1998	3,455,186	-130,450
1999	3,220,463	-744,582
2000	3,086,508	524,335
2001	2,890,248	-2,397,512
2002	3,223,919	-5,021,578
2003	3,125,422	-1,067,903
2004	3,116,725	-1,226,832
2005	3,569,440	-1,088,343

Source: Business Dynamics Statistics, reconfigured by Tim Kane, The Kauffman Foundation.

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