Gibrat’s Law\textsuperscript{1}

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In one of the first studies on the firm size distribution (FSD) Gibrat (1931) observed that the size of firms followed the lognormal distribution very closely, from which he concluded that the firms’ rate of growth ought to be a random process. In particular, he reasoned that growth should not depend on the initial size of firms, as such a process would inevitably produce a lognormal distribution. This assertion became known as Gibrat’s Law.

Denoting the size of the firm at time $t$ by $S_t$ and the proportional growth between $t$ and $t - 1$ by $\varepsilon_t$

\[
(S_t - S_{t-1})/S_{t-1} = \varepsilon_t
\]

\[
S_t = S_{t-1}(1 + \varepsilon_t) = S_0(1 + \varepsilon_1)(1 + \varepsilon_2)\ldots(1 + \varepsilon_t)
\]

Taking logs and using the approximation $\log(1 + \varepsilon_t) \approx \varepsilon_t$ leads to

\[
\log S_t = \log S_0 + \varepsilon_1 + \varepsilon_2 + \ldots + \varepsilon_t.
\]

As $t \to \infty$, $\log S_0$ becomes less important relative to $\log S_t$ and, if $\varepsilon_t$ is drawn from a normal distribution with mean $\mu$ and variance $\sigma^2$, $\log S_t$ can be approximated by a normal distribution with mean $\mu t$ and variance $\sigma^2 t$. The result that the variance of the FSD is bound to increase over time due to the sole action of chance is probably responsible for the popularity of Gibrat’s Law in Industrial Organization, as it provided a nice explanation for the observed empirical regularity that industrial concentration increased over time.\textsuperscript{2}

It is not surprising that soon after the publication of Gibrat’s book, different studies tried to test the Law empirically (see Sutton 1997 for a survey). Some proceeded to compare the observed firm size distribution with the lognormal distribution, others analyzed the relationship between firm size and

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\textsuperscript{2}Other fields in which the application of Gibrat’s Law has been discussed include those of distributions of income (Sahota 1978) and the size of cities (Eeckhout 2004).
firm growth. By and large, the results coincided. The firm size distribution seemed to conform well to the lognormal distribution, and firm growth seemed to be largely independent of firm size.

The studies in this first wave typically used data that were readily available in public sources, that is, data on the largest firms in the economy. In an influential study published in the early 60s, however, Mansfield (1962) collected data on “practically all firms” in three American industries in different time periods and analyzed the relationship between the size and the growth of firms. He suggested that different interpretations regarding the extent to which Gibrat’s Law was applicable were possible, and tested the validity of the Law according to these different interpretations. According to the first interpretation Gibrat’s Law would hold for all firms including those that exit; with this interpretation, a negative relationship between initial size and growth was discovered in the majority of the samples that were considered. The second interpretation posited that the Law would hold only for all those firms that had not exited; a significant relationship showed up only in a minority of samples. The third interpretation stated that the law would hold only for those firms whose size exceeded a given threshold. Setting this threshold as the minimum efficient scale in the industry, Mansfield found no significant relationship in any of the samples. Yet, even with this restricted interpretation, Mansfield’s samples failed to pass a second test of Gibrat’s Law, that the variance of growth would be independent of size.

The topic did not attract much attention during the rest of 60s and the 70s. When it again came under scrutiny in the mid-late 80s, new data sources had became available. These new data sources covered many more firms than before, providing a much better coverage of the smallest firms in the economy. Furthermore, their longitudinal dimension, which allowed researchers to follow firms over time, led to the discovery that the entry, exit and growth movements that were taking place in most industries of developed countries were of a previously unsuspected large magnitude (see Caves 1998 for a survey).

Concerning Gibrat’s Law, the major consequence was that attention was this time mostly drawn to the relationship between firm growth and size and problems of sample selection became routinely addressed, using econometric techniques that had meanwhile become available. Whether or not sample selection was taken into account, however, the results of the studies using these recently developed data bases suggested that firm growth was not independent of firm size, smaller firms growing faster than their larger counterparts.
Another systematic concern of this literature was heteroscedasticity; most studies found that large firms display a less variable pattern of growth than do smaller units. Although consistent with the idea that the diversification associated with size reduces risk, this is a pattern that does not conform well to Gibrat’s postulate.

A negative relationship between size and growth does not imply that concentration does not increase. This point can be clearly seen by imagining that there are firms of only two sizes, small and large, present in equal numbers in an economy. If those firms which are small in one period become large in the next period and vice versa, the overall distribution remains constant despite the obvious relationship between growth and size. There have been few studies in this new wave that have specifically examined the FSD. McGloughan (1995) simulated the effect of different violations of Gibrat’s postulates upon the development of market structure and concluded that the nature of the size-growth relationship (in contrast to the effect considering entry and exit) was the most important determinant of the evolution of concentration.

In one of the few studies that have used these new comprehensive data sets to analyze the actual development of the FSD, Cabral and Mata (2003) found that the FSD is considerably more skewed than the lognormal in the earliest years, but gradually approaches it as firms get older. Convergence to the lognormal is what would be expected from a Gibrat process, and the fact that the lognormal is approached from a more skewed distribution may seem to be unimportant from the strict standpoint of Gibrat’s Law, as the Law posits that the starting point does not matter in the long run. The finding, however, creates an additional challenge: if we are to rely on random forces to explain the evolution of the FSD, what can possibly explain its starting position? How can this be part of a theory of the evolution of firm size, and how can it co-exist with models such as Jovanovic’s (1982), in which skewness emerges gradually as firms learn about their abilities? One possibility is that the size of firms at start-up be the minimum of two sizes: a size to be achieved in the long run – determined by the ability of the entrepreneur in the spirit of Lucas (1978) – and a short run size, given by some constraint. Cabral and Mata suggested that this constraint could to be a financial one, but other constraints might do the job as well.

An unaddressed question is the extent to which the FSD converges to a position which depends on a pre-existing distribution of abilities, and to what extent are abilities a product of explicit decisions made by firms as to the learning process (Ericson and Pakes 1995). Another question pertains to
the appropriate level of analysis. Machado and Mata (2000) report that failure to control for industry-specific conditions leads to a significantly greater departure from the lognormal than when these conditions are controlled for. It is also not obvious that the FSD should be governed by the same forces and evolve along the same lines irrespectively of the specific competitive conditions in the industry (Sutton 1997), but little work has been done on how these conditions affect the FSD. Perhaps one of the streams of the literature that has given more attention to the evolution of industries is the one following the work by Klepper and Graddy (1990), which shows that, over their life-cycle, industries exhibit significant variation, namely with respect to the changes in the number of firms and their patterns of growth. The implications of these changes to the evolution of the FSD of industries are still underexplored.
References


