

## Research Digest

*The Region* often includes one or two feature articles about economists at the Minneapolis Fed and their current work. Research Digest provides shorter summaries of recent economic research papers.

In this issue, the Digest discusses Erzo Luttmer's efforts to explain employment growth patterns of U.S. companies by merging two competing theories, and a paper by Veronica Guerrieri and her coauthor on the link between asset price volatility and fund managers' career concerns.

### Explaining Growth

*Economist Erzo Luttmer blends two competing theories to generate a model that helps account for patterns of employment growth in U.S. companies.*

**G**rowth patterns—of plant and animal species, but also of cities, companies and nations—have long fascinated natural and social scientists. Economists are no exception. If economists could grasp the essential mechanisms that explain widespread patterns in growth data,<sup>1</sup> they could better understand how and why economies grow as they do. (And in the current era of high unemployment and anemic economic growth, such explanations would be of particular value.) In a recent paper, Minneapolis Fed consultant Erzo G. J. Luttmer delves into this long-term puzzle, with promising if still tentative results.

Luttmer's focus is companies—how many employees they have, how quickly those employment numbers grow and most important: Why? In "On the Mechanics of Firm Growth" (Staff Report 440, online at [minneapolisfed.org](http://minneapolisfed.org); also forthcoming in *Review of Economic Studies*), he



begins with several observations and questions:

More than half of all [U.S.] firms ... have no more than four employees. But there are also almost a thousand firms with more than ten thousand employees each and these firms employ as much as a quarter of the

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*Firms grow their organization capital by having employees work with pieces of the existing capital to create still more capital. Luttmer refers to this as “blueprints” that can be used to create new capital. “Starbucks implementing its store formula in many places would be a good example that fits my model well.”*

U.S. labor force. What accounts for the large amount of heterogeneity in firm size? How does this heterogeneity evolve over time? Some benchmark answers to these questions are needed.

Two prominent theories offer competing explanations for firm employment growth patterns, notes Luttmer, but both fail to match the facts well enough. The first idea is that the skewed distribution of firm size—where a very small number of firms employ a very large percentage of all employees<sup>2</sup>—is the result of big (and randomly distributed) differences among firms in *productivity growth*; some firms become more efficient over time than others in generating output with given levels of inputs.

A second potential explanation is that skewed firm size distribution results from random distribution of *organization capital* (a term coined by economists Edward Prescott and Michael Visscher in 1980), meaning that companies are defined by their accumulated information: ideas or methods developed by a firm. Firms grow

their organization capital by having employees work with pieces of the existing capital to create still more capital. Luttmer refers to this as “blueprints” that can be used to create new capital. “Starbucks implementing its store formula in many places would be a good example that fits my model well,” he explains.

### Theory fusion

While both theories have been studied carefully by economists, neither is entirely satisfactory. So Luttmer blends the two in a hybrid model that goes a long way toward explaining firm growth patterns as seen in U.S. data.

His model starts with organization capital theory as its base. “In the model,” Luttmer writes, “a firm produces one or more differentiated commodities using labor and commodity-specific blueprints.” In other words, by using employees and organization capital. A new firm is born when an entrepreneur produces a “start-up blueprint.” Then this new firm can hire more workers, combine them with blueprints and seek to develop more

blueprints for still new commodities. That is, it can attempt to grow. Over time, of course, blueprints can become obsolete, as the information they represent is superseded by blueprints held by other firms. (Say, for instance, a new search engine surpasses Google’s.)

This theory—based on blueprints, or organization capital—produces results that match actual U.S. size distribution of firms, but it predicts far too high an average age for big firms: about 750 years rather than the 75 years seen in actual 2008 U.S. data for companies with over 10,000 employees.

How can the theory be modified to account for the relatively young age of large firms seen in the data? By supplementing it with productivity shocks.

“Suppose,” writes Luttmer, “that some new firms enter with an initial blueprint of higher quality.” That is, they receive a random productivity shock. The higher profits that result from the high-quality blueprint encourage the firm’s managers to copy it rapidly, and “if copies stay within the firm, then these new firms will grow fast.” The

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growth rate will eventually decline (assuming that the quality advantage is transitory), but if the rapid growth period varies by company, and if it isn't expected to last too long, this variation allows for the appearance of large firms that are young—that is, a median age of about 75 years, a match to empirical reality.

This version of organization capital theory, infused with elements of productivity theory, “can match the overall size distribution, the amount of [firm] entry and exit, as well as the relatively young age of large firms,” writes Luttmer. It doesn't hold strictly to Gibrat's law—that firm growth rates are independent of firm size—but “the mean growth rates of surviving firms behave [as] in the data: roughly independent of size for most firms and significantly higher for the smallest firms.”

It is, on the whole, a strong step toward a better understanding of the mystery of why companies—and economies—grow as they do.

—Douglas Clement

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<sup>1</sup> Two examples as applied to firms: *Gibrat's law*, a firm's growth rate is independent of its size; and the *rank-size rule*, if you take all the firms in an economy and rank them top-to-bottom by employment, the second-largest firm will have half the employee count of the largest, firm no. 3 will have a third as many as no. 1 and so on. *Zipf's law* states the rank-size relationship in terms of probability—the likelihood that a firm has a size greater than  $S$  is proportional to  $1/S$ .

<sup>2</sup> U.S. firm employment data reliably exhibit this striking, skewed pattern, referred to as a Pareto distribution. Italian economist Vilfredo Pareto noted in 1906 that income, city populations and even peas in pods exhibit similar distributions. He documented, for example, that 20 percent of Italy's population held 80 percent of the nation's wealth. Zipf's law (see footnote 1) is a specific type of Pareto distribution.