International Journal of Industrial Organization 28 (2010) 359–361

Contents lists available at ScienceDirect

International Journal of Industrial Organization

journal homepage: www.elsevier.com/locate/ijio

Equilibrium, outcomes, and the economics of organization

Thomas N. Hubbard

Kellogg School of Management, Northwestern University, United States

ARTICLE INFO

Available online 20 February 2010

JEL classification:
L24

Keywords:
Productivity
Inequality
Structural
Hierarchy

ABSTRACT

Most empirical work in the economics of organization consists of theory-testing exercises, where the theories under examination rely on optimality principles but not equilibrium. This paper discusses recent attempts to bring equilibrium analysis into the economics of organization, highlighting the types of research questions that researchers can investigate and the evidentiary and analytical inputs necessary in such approaches.

© 2010 Published by Elsevier B.V.

1. Introduction

Most empirical work in the economics of organizations consists of theory-testing exercises, where the theories under examination rely on optimality principles but not equilibrium. Examples of such work include most, if not all, of the recent empirical work on the boundary of the firm. For example, Forbes and Lederman (2009) follow a long literature by taking theoretical propositions (in their case inspired by Grossman and Hart (1986)) regarding what should lead a firm to perform a function internally relative to subcontracting, then examining whether the correlation the theory predicts is borne out in the data. If firms' decision whether to outsource corresponds to the patterns in the data, this is evidence in favor of the theory. The object of this and many other papers in the literature, not just concerning the boundaries of the firm but other organizational characteristics as well, is to determine whether organizational characteristics exist for the reasons proposed in the theory. There is a good reason why the literature has concentrated on this goal: until the question of why these features exist is settled, it is not clear that one can use the theory as the foundation for further analysis.

Answers to the question of why particular organizational characteristics exist and what trade-offs they reflect are of great interest to individuals who are interested in these features themselves, but perhaps not a broader audience. For example, they are of interest to antitrust enforcers because they can shed light on whether vertical integration reflects efficiencies or attempts to gain market power. They are of interest to business people because they can shed light on whether integration is a good idea in their context or not. But they are of less interest to those who are less concerned about whether organizational characteristics arise, but are more concerned about economic questions that are directly related to welfare.

My work with Luis Garicano is an attempt to bridge this gap, using data on U.S. lawyers as a context. We examine how organizational characteristics affect economic outcomes – in particular, productivity and earnings inequality – and we bring equilibrium analysis to bear explicitly in our empirical work. Our work thus differs with most empirical analyses in the field, including most of my own. This paper describes this work and what we have learned in the process, both about lawyers and about research along these lines.

2. Hierarchies and the productivity and earnings of U.S. lawyers

Garicano and Hubbard (2009a,b) represent attempts to bring equilibrium analysis into empirical work on the economics of organizations. Specifically, our work examines how lawyers' hierarchical structure affects the productivity of law offices and the earnings of individual lawyers. To do so, we develop a structural model of law offices' production that is derived from a simplified version of Garicano's (2000) model of hierarchies. We then estimate the parameters of the model, using data from a large sample of U.S. law offices. With these parameters in hand, we derive counterfactual estimates — what would lawyers' output and earnings be, if they worked autarchically rather than in hierarchies of partners and associates? We then compare these estimates to what lawyers actually produced and earned. The difference between the counterfactual estimates and what lawyers actually produced and earned is an estimate of the "returns to hierarchy": how this important aspect of law offices' organization affects lawyers' productivity and earnings.

Our results indicate the following.

- Hierarchies increase productivity in the U.S. legal services industry by at least 30%.

Law firms' organizational structure has a large effect on lawyers' output, even if one looks narrowly at only their hierarchical structure. It is

E-mail address: t-hubbard@kellogg.northwestern.edu.

0167-7187/$ – see front matter © 2010 Published by Elsevier B.V.
doi:10.1016/j.ijindorg.2010.02.008

often taken for granted by researchers in the economics of organization that firms' organizational decisions are important in terms of their effects on economic outcomes. But, as noted above, most of the empirical work in this field has tried to explain firms' organizational structure rather than examine the impact of firms' organizational decisions. Finding that hierarchies are economically important organizational features, at least in this industry, implies that they deserve attention not just from researchers who think that firms' organizational structure is an interesting topic, but also from researchers who are interested in other topics. This result implies that researchers who are interested in productivity in this industry must pay attention to not only the contributions of human and physical capital, but also to how this is organized.

It is worth putting the 30% estimate above in context before moving on. First, this figure is an average across many lawyers and law offices, and includes many offices that have only partners and no associates — offices where hierarchies are having no effect whatsoever on productivity because they are not being used. Hierarchies' effect on productivity would clearly be greater if one looked only at offices that are organized hierarchically. Second, this estimate is from 1992 data, and hierarchies are economically more important now than they were then — more lawyers work in offices that are organized hierarchically, and associate-partner ratios have tended to increase.[1] Third, this estimate is a lower bound even when looking at the 1992 data, because it examines only the increase in productivity hierarchies afford partners, not associates. Lawyers working as associates would be less productive if they worked on their own, but our estimates do not account for this.

- Hierarchies amplify earnings inequality across U.S. lawyers.

In Garicano and Hubbard (2009a), we find that in 1992 the median lawyer earned about $77,000, but there is a large amount of earnings inequality. The 10th percentile lawyer earned $20,000, and the 90th percentile lawyer earned $257,000. Our model and estimates allow us to assess what this distribution would look like, if lawyers instead worked autarchically. We find that earnings at the 90th and 95th percentiles are 16% and 31% greater, respectively, than in a world where lawyers were not organized hierarchically. The ratio between the 95th percentile and median earnings increases from 3.7 to 4.8, moving from where lawyers work autarchically to one where they work hierarchically.

This result shows how organizational structures contribute to earnings inequality. Hierarchies are valuable because they enable individuals to apply their skill on a larger scale, and this is particularly valuable to individuals who are more skilled. Skilled individuals benefit disproportionately from hierarchies, and this leads earnings inequality to be greater than it would be absent hierarchies.

Finding that organizational structures affect earnings inequality is important, not just to researchers who are interested in organizational structure – such as those in the economics of organizations – but also to researchers in other fields who are interested in the causes and consequences of earnings inequality. It indicates that these researchers should not only examine the contributions of factors that labor economists have traditionally emphasized, such as the supply and demand for skill, but also the contribution of how these individuals are organized.

- The “coordination costs” of hierarchical production have steadily declined over time in U.S. law offices.

In Garicano and Hubbard (2009b) we report results from estimating our model using data on U.S. lawyers from 1977–1992. The key parameter in the model is the coordination costs associated with hierarchical production, a returns to scale parameter that corresponds to how much of a hierarchical team's production time is lost when a partner hires an additional associate. Our parameter estimates indicate that these costs declined steadily over time. In 1977, on average, hiring one's first associate increased a partner's capacity by 48%. In 1992, on average it increased a partner's capacity by 63% — about 30% more than in 1977.

The decline in the organizational costs of hierarchical production helps to explain why an increasing share of lawyers worked as associates during this time, despite the fact that demographic changes worked against this. During this time, the aging of the baby boom generation led younger, less experienced lawyers to become increasingly scarce relative to older, more experienced lawyers. All else equal, demographic shifts would likely have led the share of lawyers working as associates to decline, not increase.

The timing of the decline in coordination costs does not indicate that it is due to the diffusion of personal computers or the Internet, because it started far before either diffused to law offices. Instead, the timing is consistent with the hypothesis that coordination costs' decline was related to the diffusion of computer-aided legal research (e.g., Lexis and Westlaw), which began in the late 1970s and proceeded throughout the 1980s. In the paper, we present some evidence that coordination costs declined earlier in large law offices in states where state materials were available on Lexis early on, than in smaller offices or offices in states where state materials were available on Lexis only later.

- The decline in coordination costs explains the majority of increases in earnings inequality among lawyers in the upper tail, but a much smaller share of the increase in earnings inequality between lawyers in the upper tail and other lawyers.

Garicano and Hubbard (2009b) examine changes in inequality by examining earnings quantile ratios, and how they changed between 1977 and 1992. They find that the ratio between the 95th and 50th percentiles (real) earnings increased by 33 log points during this time, mostly reflecting an increase in the 95th percentile from $282,000 in 1977 to $373,000 in 1992. This increase was concentrated on the upper tail: the ratio between the 95th and 90th percentiles increased by 13 log points, nearly half of the increase in the 95th/50th ratio. We then conduct a similar exercise when using counterfactual distributions in which lawyers are not organized hierarchically. Our estimates indicate that earnings inequality would have increased during this time, absent any changes in law firms' hierarchical structure. However, most of the increase in earnings inequality among lawyers at the very top of the earnings distribution is accounted for by changes in lawyers' organization, in particular increases in the number of associates per partner. Our estimates indicate that 69% of the change in the 95th/90th ratio reflects changes in firms' hierarchical structure during this time, but only 17% of the change in the 90th/50th ratio reflects these changes. Changes in law firms' organization during this time account for most of the increase in earnings inequality among very top lawyers, but little of the increase in earnings inequality among other lawyers.

The causes and consequences of earnings inequality in general has been one of the most controversial and most researched topics in economics during the past twenty years. The increase in earnings inequality among U.S. lawyers during the time period we investigate is similar in magnitude to the increase that took place among full-time workers in general during this time period. Our results indicate that the most substantial changes in earnings among lawyers – the increase at the very top – can mostly be accounted for by changes in firms' hierarchical structure. These organizational changes, in turn, were responses to decreases in the costs of organization. Our work shows how insights from the economics of organization can be applied to understand changes in earnings inequality in this context;

[1] The most recent year of our analysis is 1992, because this is the last year in which the Census collected information on the fields that lawyers cover. We have found that our estimates are unreliable when we do not control for lawyers' fields, and hence do not have confidence in estimates using more recent data that cannot use these as controls.

our hope is that this approach can be applied toward generating insights more broadly.

3. The ingredients

My research with Luis Garicano on lawyers reflected a confluence of theory and data; these allowed us to ask and answer different questions than most of the empirical research on the economics of organization. We describe these here in the hope of guiding future research in this field that investigates how organizations, and organizational change, affect economic outcomes.

One aspect of the theory that facilitates our analysis is that the hierarchical production as derived by Garicano (2000) can be summarized by something that looks very much like a production function. This allowed us to use techniques and insights from production function estimation in estimating a model with roots in the economics of organizations. We were able to exploit the benefits of production functions – they are a useful and simple summary of how inputs are related to each other – but avoid their usual drawbacks — the absence of any explanation of how these relationships reflect the optimal organization of these inputs. The particular production function implied by Garicano (2000) is one where output is the product of the two main inputs – skill and time – for reasons that are clear from the model and have foundations in an explicit model of organization. This function is convenient, because it ultimately implies that although we neither observe lawyers' skill nor the time they spend in production in our data, we only need to have estimates of one to know the other. In our implementation, we can divide an office's revenues by our estimate of the time lawyers spend in production to obtain an estimate of what the partners in the office would produce and earn if they worked on their own.

A second aspect of the theory is that Garicano and Rossi-Hansberg (2006) have derived the organizational equilibrium when production takes the form of Garicano (2000) and agents have heterogeneous skills. We use two properties of this equilibrium when estimating coordination costs. One of these is that an office's associate-partner ratio (the partner's "leverage") is an invertible function of the associates' skill. The other is that the relationship between associates' wage and their skill (and thus associate wage and the office's associate-partner ratio) is a hedonic wage function that reflects heterogeneous agents' demand and supply of skill. These equilibrium relationships allow us to apply insights from hedonic estimation to estimate the marginal cost of leverage, and in turn, hierarchies' coordination costs. The equilibrium aspect of our theory allows us to utilize important economic variables – prices – into the analysis in a way that is common in applied microeconomics in general but is relatively uncommon in the economics of organizations literature.

Finally, our analysis greatly depended on our data — a large sample of law offices throughout the United States. These data were unusual in that they contained information on law offices' organization, for example, the number of partners and associates at each office. For each office, we knew the office's revenues and how much associates were paid, as well as enough information that allowed us to estimate how much partners at each office earned. We had what amounted to rich data on an entire labor market, including not only what individuals earned but also their organizational position within their firm. These data fit very well with the theoretical framework that we applied.

While these aspects of our framework and data made our analysis possible, our analysis depended as well on several maintained assumptions. Of these, the most important concerned how labor markets work and restricted the dimensions upon which sorting could take place between lawyers. Regarding the former, we essentially took a similar position to that in Garicano and Rossi-Hansberg (2006), in which labor markets are competitive. We therefore abstract from any differences between internal and external labor markets, and therefore from any reason why an associate's earnings at their firm does not reflect their earnings in their next best opportunity. Regarding the latter, we restrict agents' heterogeneity such that sorting between associates and partners takes place only along the dimension of skill. Both of these are necessary in order to utilize the equilibrium relationships between associate earnings and associate-partner ratio in our estimate of the hierarchies' coordination cost, but neither is necessarily reasonable in our context. However, as we show in our papers, violations of these assumptions would tend to lead the effects that we report to be larger, not smaller, and our analysis of the likely magnitudes of these biases indicates that they are most likely very small.[2]

4. Some closing words

In sum, my work with Luis Garicano is founded on theory and data that allow for an investigation of organizations as they exist in the context of a *labor market*. This *market* aspect is somewhat unusual in the economics of organizations, especially in empirical studies, but is advantageous because it allows us to bring equilibrium analysis and structural models to bear on how hierarchies affect market outcomes.

Given the clear benefits of combining market analysis with insights from the economics of organization, why is it somewhat unusual? Part of this is due to a lack of data — the data that labor economists commonly use are market-wide, but usually do not contain organizationally-relevant variables, and the data that organizational economists commonly use contain such variables but are generally not market-wide. Empiricists working in this field should not only look for existing data that enable such analysis, but also think about what variables would be interesting and feasible to collect that would augment existing data sources.[3] But part is also due to a scarcity of theoretical models that (a) have clear organizational underpinnings, (b) apply an equilibrium concept, and (c) allow for enough heterogeneity among the agents in the model so that the model can be applied to a realistic context. Research in the economics of organization would benefit from work along both of these fronts, because current approaches underutilize data that could be potentially informative — i.e., prices. And being able to say more about how much the phenomena the field investigates affect economic outcomes that the rest of the world cares about makes research in this field more broadly interesting and important.

References

Forbes, Silke J., Lederman, Mara, 2009. Adaptation and vertical integration in the airline industry. American Economic Review 99 (5), 1831–1849 December.

Garicano, Luis, 2000. Hierarchies and the organization of knowledge in production. Journal of Political Economy 108 (5), 874–904 October.

Garicano, Luis, Hubbard, Thomas N., 2009a. The Return to Knowledge Hierarchies. Northwestern University.

Garicano, Luis, Hubbard, Thomas N., 2009b. Earnings Inequality and Coordination Costs: Evidence from U.S. Law Firms. Northwestern University.

Garicano, Luis, Rossi-Hansberg, Esteban, 2006. Organization and inequality in a knowledge economy. Quarterly Journal of Economics 4 (121), 1383–1436 November.

Grossman, Sanford J., Hart, Oliver D., 1986. The costs and benefits of ownership: a theory of vertical and lateral integration. Journal of Political Economy 94 (4), 691–719 August.

[2] The relationship between associate earnings and the associate partner ratio is a component of the marginal cost of leverage because the model implies that when partners want to hire more associates, they have to hire more skilled associates — scaling up means that they have to delegate work they previously did themselves. However, this component turns out to be a small part of the marginal cost of leverage; thus misestimating this component has little effect on our estimate of the marginal cost of leverage, and thus coordination costs and the returns to leverage.

[3] I have been fortunate to follow the former approach; we all should look toward doing more of the latter. The fact that the U.S. Census happened to ask law firms interesting questions did not reflect any sense that such questions might generate interesting research. We cannot always count on being lucky in this way.