

The microeconomics of structural change: recent Industrial Organization tools and topics

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The composition of the production of goods and services in the economy has important implications in terms of growth and inequality, and ECLAC has always been a privileged voice in this debate. The implications for growth rise mainly because of three factors: a) technological changes occur at different pace for different goods, b) there are different patterns of demand for different goods, and c) relative prices in the world economy do not fully reflect relative marginal productivities and marginal utilities among goods. Although structural change has clear and important macro implications, the change in the composition of what a country produces is a process that happens at the firm level in particular markets. Therefore, it is necessary to complement the macro approach with a micro approach of firms and markets in order to fully understand this process and, especially, to design policies to boost structural change.

Industrial Organization (IO) is a powerful tool for the analysis of structural change. This field of economics is concerned with the structure of industries in the economy and the behavior of firms and individuals in these industries. IO started as a response to the theory of perfect competition to accommodate real world cases in which firms face scale economies, transaction costs, strategic behavior or many other factors. The works of Jean Tirole¹, the recent winner of the 2014 Nobel Prize in Economics, are maybe the best examples of the efforts that the discipline did in the 1980s and early 1990s to build credible theoretical models that allow us to understand how different firms behave in different markets. After that period of mostly theoretical work, the discipline learned to look extensively into economic theory for guidance, and also learned that individual industries are distinct and their details are sufficiently important to justify industry-specific approaches. In the last decades the discipline has shifted towards empirics again and the so-called New Empirical Industrial Organization is the implementation of these lessons in empirical research concerning IO topics (Einav and Levin (2009)). Today most of the research has strong theoretical foundations and the studies are focused on a single industry or market, as a way to pay attention to the institutional specifics, the measurement of key variables and the econometric identification issues.

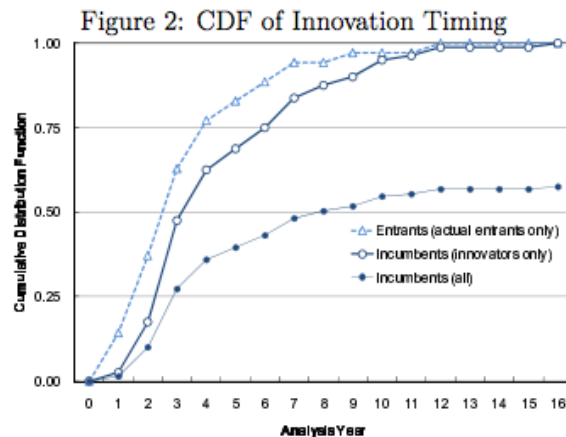
There are two main approaches in the discipline. Researchers using the so-called structural approach start with a theory of market equilibrium and rely explicitly on assumptions about behavior to estimate underlying parameters (parameters that do not change with policy changes). On the other hand, the so-called reduced form approach uses theory only to derive predictions that can be tested with the data or to interpret estimates of causal effects. Einav and Levin (2009) present a short but excellent discussion of some particularly active areas of empirical research in IO. A first topic in which the discipline has made significant advances is the estimation of consumer

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¹In particular his book Tirole (1988)

demand in imperfectly competitive markets. Consumer demand is important by itself and as a building block of other models, since it allows us to understand how consumers substitute between products as prices or product offerings change. A second set of topics includes the estimation of different models of short-run price and non-price competition. These topics are covered in both the typical markets where firms post prices and in auction markets (such as government purchases) where firms submit bids. Finally, other topics include the determinants of market structure, when problems of long-run competition, such as entry, exit and investment decisions are addressed. These long-run issues usually generate the need for a dynamic model of consumer or firm behavior in order to correctly estimate the underlying behavioral parameters. As a consequence, much of the action in the last fifteen years has happened in the estimation of dynamic models.

Let us briefly discuss two examples (each representative of a different approach) of how modern research in IO can contribute to a better understanding of topics that are directly related to structural change. The first example is a recent paper of Igami (2013), which is in the process of being published². Igami studies creative destruction in the context of the Hard Disk Drive (HDD) industry. This sector is particularly important for the discussion of pro-innovation public policies and structural change since it is a high-tech manufacturing sector with rapid growth and innovation. As stylized fact we observe that in markets with old and new technologies and firms, incumbents innovate more slowly than entrants. This fact can be explained using the concepts of cannibalization (new products cannibalize older products of the same firm) and preemption (being the first one to innovate can create competitive advantages). The predictions of the theory are that cannibalization delays incumbents innovation, while preemptive motives accelerate it. Even more, incumbents can have different cost structures than new entrants, and thus different incentives to innovate, which would further reinforce these tendencies. Empirical work on these topics can help to shed light about the importance of these alternative explanations.



Note: Total of all diameters (14-, 8-, 5.25-, 3.5-, and 2.5-inch). In each year since the industry-wide establishment of a new-generation standard, this CDF plots the fraction of firms that have already started shipping the new-generation HDDs.

Figure 1: Igami (2013)

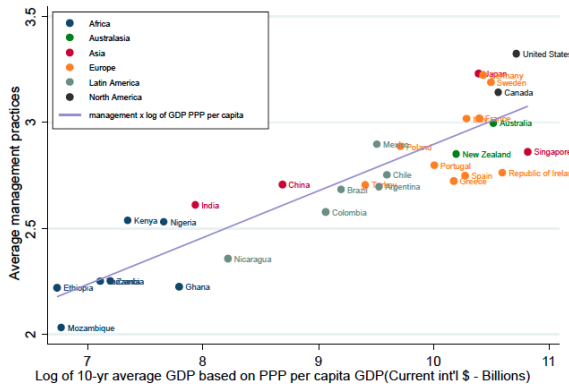
Figure 2 in Igami's paper presents the cumulative distribution function of firms that have already started shipping the new-generation HDDs. The graph is consistent with the idea that incumbents are later innovators or non-innovators at all. Only half of all incumbents ever innovated

²It has been revised and resubmitted to the Journal of Political Economy.

into a new generation, and innovation took two years longer than entrants for those incumbents that did it. The adjustment of the market is as expected: the firms that never innovated gradually disappeared along with the demand for the old products. To empirically assess the three forces in play and to discuss innovation policies, Igami develops and estimates a dynamic oligopoly model using data for HDD manufacturers from 1981 to 1998. The estimation of these dynamic models is relatively involved but in the last 15 years there have been important advances in the methods. Igami finds cannibalization can explain at least 66% of the incumbent-entrant innovation gap, even though he also finds that incumbents had strong preemptive motives and a substantial cost advantage over entrants. The estimation of the model allows Igami to simulate counterfactual policy interventions (such as broad patents and trade barriers), finding that none of these policies would outperform the industry's welfare trajectory.

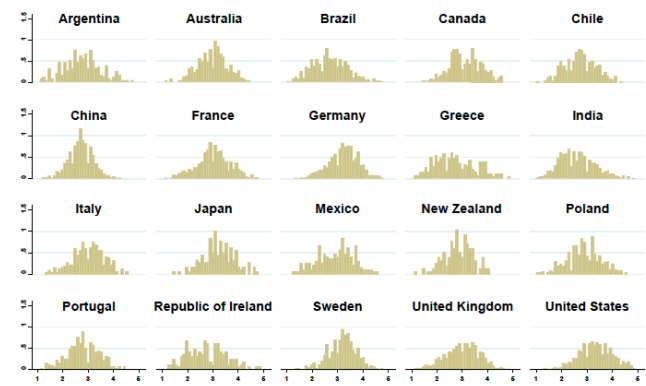
The works of Nick Bloom and coauthors are a second example of recent empirical IO research related to structural change. They started ten years ago with a project (World Management Survey, WMS) that sought to address the effects of management practices on firm productivity and its heterogeneity. Bloom and coauthors designed a methodology to measure management practices and have applied this methodology to a (growing) number of countries. Just a description of the data they created shed light on two important facts. First, in Figure 5 of their summary paper, Bloom, Lemos, Sadun, Scur, and Van Reenen (2014) show that average management scores by country are strongly correlated with GDP per capita. Second, using histograms (Figure 6) they show that there is a wide variation of management practices within countries (just like in the case of productivity). From this graph, Bloom, Lemos, Sadun, Scur, and Van Reenen (2014) observed that the US has a higher average quality of management practices and also an unusually thin left tail of very badly managed firms. It is also possible to observe from the graph that Latin American firms present a lower mean and also a high standard deviation. Therefore, structural heterogeneity seems to be clear not only in productivity but also in management practices.

FIGURE 5: AVERAGE MANAGEMENT SCORES BY COUNTRY ARE STRONGLY CORRELATED WITH GDP PER CAPITA



(a) Figure 5

FIGURE 6: LARGE VARIATION IN MANAGEMENT SCORES ACROSS FIRMS WITHIN COUNTRIES



(b) Figure 6

Figure 2: Bloom, et al. (2014)

In the last ten years, Bloom and coauthors have advanced in the explanation of the causes of these management differences. Although many theories stress the role of entrepreneurial or managerial ability to answer important economic questions, only large-scale quantitative data across firms, industries and countries made it possible to empirically investigate these hypotheses. Bloom and coauthors preliminary results suggest that management seems to be very relevant

both qualitatively and quantitatively. Their estimation is that about a quarter of cross-country and within-country total factor productivity (TFP) gaps can be accounted for by management practices. Some factors such as competition, governance, human capital and informational frictions are determinants of the variation in management among different firms. These results about the importance of management and its determinants create large room for policies that can contribute to develop better management and therefore reduce the productivity gap across countries. Also, they inspire new questions about to what extent these management differences can explain the barriers to the creation of new competitive sectors that drives structural change.

The works of Igami and Bloom and coauthors are only two examples of recent IO research that can directly benefit our understanding of structural change and the making of better policies to boost it. ECLAC has always been an important reference to understand structural change and has made important contributions to this debate. The macro implications of structural change have been studied since the early works of Prebisch and the necessary complementarities between macro and micro have been strongly highlighted, starting in the eighties with the works of Fajnzylber. Recent advances in Industrial Organization offer a new step to complement the macro approach with a better understanding of firm strategic behavior and better regulation or design of policies to favor structural change. As Einav and Levin (2009) state, after 20 years of industry studies, we know a lot about how specific industries work, but this knowledge is extremely disaggregated. Structural change has the potential to be a framework that can order this knowledge, tackling interesting and important questions about the overall organization of production in the economy. With these new tools we can contribute to improve the policies aimed towards structural change and, therefore, improve the productivity of firms and the welfare of individuals in Latin American economies.

References

- BLOOM, N., R. LEMOS, R. SADUN, D. SCUR, AND J. VAN REENEN (2014): “The new empirical economics of management,” Discussion paper, National Bureau of Economic Research.
- EINAV, L., AND J. LEVIN (2009): “Industrial organization: a progress report,” *Journal of Economic Perspectives*, 24, 145–62.
- IGAMI, M. (2013): “Estimating the Innovators Dilemma: Structural Analysis of Creative Destruction,” *Manuscript, Yale University*.
- TIROLE, J. (1988): *The theory of industrial organization*. MIT press.