INFORMATION AND UNCERTAINTY IN TODAY'S LATIN AMERICA

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ABSTRACT

This paper presents a brief introduction to the topics covered by the Economics of Uncertainty and Information. We focus on the impact of this field to issues relevant for Latin America.

SÍNTESIS

Este artículo presenta una breve introducción a los temas analizados por la Economía de la Incertidumbre e Información. Nos centramos en el impacto que tiene esta especialidad en temas de relevancia para América Latina.

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Until recently and with few exceptions, economics training in Latin America has largely ignored developments in modern microeconomic theory. Tools and ideas of enormous impact in the profession at an international level have been underutilized in our countries, due partly to the emphasis on macroeconomic problems and partly to a "vintage effect" of leading economists in the Region. Both the emphasis on macroeconomics and the vintage effect are starting to revert.

During the last few decades, inflation, stagnation and indebtedness, directed research efforts to macroeconomic issues. The combination of such demand effect, with the characteristics of supply (comparative advantage and the training of economists in the Region) led to a style of discussion quite different to that of international academia. Obviously, there are idiosyncratic characteristics of regions and of countries that require idiosyncratic analysis, but the strength of economics as a discipline lies in its methodological consistency and in its ability to evaluate research on different areas with common standards of rigor. As our economies attempt to move from old models of development to new ones, and as our generations of young economists try to balance the wisdom and experience of their intellectual fathers with the insights of modern economic theory, better analysis and policy are bound to emerge.

The papers presented in this issue are in this new spirit. They use recent developments in (micro) economic theory to approach old and new phenomena. In particular, they use the tools of the field known as the Economics of Uncertainty and Information.

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1. THE ECONOMICS OF UNCERTAINTY AND INFORMATION

This field of microeconomic theory is based on the recognition that most economic decisions are made without a complete knowledge of the current and future environments (including reactions of other people) that the decision-maker faces. Moreover, people spend resources to reduce the uncertainty of outcomes and to acquire information. Even though it is considered a field on its own, it is a natural generalization of standard (micro) economic analysis. As Hirshleifer and Riley (1992) point out, the certainty/perfect information case is only a special one.

The Economics of Uncertainty, in a simple way, is the extension of standard economic analysis to study choices made when the final effects of actions are not known with certainty, but depend on the realization of (random) variables beyond the decision-maker's control. These choices in turn determine the overall market equilibrium, reflecting the social distribution of risk bearing.

In the Economics of Uncertainty, the state of knowledge is assumed fixed. In the Economics of Information, individuals can to, some extent, overcome their lack of knowledge by "informational" actions. As usual, the analysis centers first on the individuals' decision on how much information to acquire, and then on the overall equilibrium resulting when individuals undertake informational actions. Within this strand of literature, search theory and principal agent relationships are two salient areas, rich in applications.

The theory of search, as a field in economic theory, was born in the 1960's with George Stigler's seminal paper "The Economics of Information". What Stigler did (very much in the Chicago spirit) was to apply the standard model of choice in economics to another "good": information. This provided a rationale for price dispersion and a natural generalization of the Walrasian model (the law of one price is only in effect if the costs of acquiring information are zero). As most seminal pieces, Stigler's paper opened more doors than it did in fact close.

The first article of this volume (written by the two other economists whose names are associated with the emergence of the economic theory of search) enriches our understanding of the historical development of the theory, from its origins to our days. Lippman and McCall review the mathematical developments leading to the modern formulation of the search problem and discuss applications to job search, minimum wages, unemployment, bargaining, customer loyalty, advertising, technological progress and a variety of new contexts. They conclude by arguing that search is a concept of enormous scope.

The theory of Principal-Agent has given a whole new insight into a class of problems involving delegated choice. This is where one individual has the responsibility of taking decisions in the interest of others, in return for some kind

of payment. Uncertainty and asymmetric information are inherent to this problem. In many situations agents can take actions that are unobservable by the principal. This is known as a moral hazard situation (*hidden action*). There is a second type of informational asymmetry which can also characterize principal-agent relationships. This is where the agent possesses some information (*hidden knowledge*) prior to choosing an action, which if known by the principal, will affect his decision on what to require from the agent. This induces the agent to behave strategically and to reveal only the information most beneficial to him. This is known as an adverse selection problem.

2. LATIN AMERICA TODAY: NEW CHALLENGES AND NEW VIEWS ON OLD PROBLEMS

Two forces are moving the Economics of Information and Uncertainty into the center of the stage of economic research in Latin America. The first one is the economic transformation taking place, with its shift from macro to microeconomic issues. The second one is the recognition that even "old" problems can be better understood and acted upon with an extended tool box.

2.1. Microeconomic Problems

Latin American countries are moving (at different speeds and from different starting points) in the direction of market-based economic organization. Macroeconomic stability, integration into international markets and reliance on private ownership are now considered superior to alternatives, by policymakers and scholars alike. It is clear that once the macroeconomic noise is minimized, we can concentrate on the real problems in the economy, most of which are microeconomic in nature, dealing primarily with incentives.

From an analytical point of view, this requires leaving the grounds of perfect information shared by all economic agents into the world of imperfect and asymmetric information. The principal-agent problem is the standard description of this type of situations. One party, the principal, delegates to the agent an action that influences his welfare (such as output in an employment relationship). If the action is observable and enforcement feasible, this is a simple problem. In general, though, the action is not directly observable, and contracts (output sharing rules) have to be designed to obtain outcomes that provide efficient incentives and risk sharing.

In his paper, **Da Rocha** provides a complete survey on contract design under asymmetric and imperfect information. He analyzes the characteristics that contracts should have in order to induce the agent to produce what the principal

wants. He provides several applications, as for instance on royalties, volume discounts, tax evasion and pollution taxes.

Many times the principal-agent problem is a multi-level one, as when a regulatory agency controls a natural monopoly. This is a case of growing importance in Latin America, where privatization has proceeded at breakneck speed over the last few years, sometimes without an adequate regulatory framework in place. In order to develop adequate regulation, it is essential to understand the distortions emanating from the asymmetry of information between the regulated companies and the regulators, as well as the possible deviations from social objectives by independent regulatory agencies. **Porto** and **Urbiztondo** provide a theoretical framework to study that problem and use it to analyze the control of public enterprises in Argentina.

The problem of public goods has received a great deal of attention in economics since Samuelson (1954). However, its implications when information is not perfect are less known. In countries rich in natural resources (as most of Latin America), this is an issue of considerable importance. The "correct" rate of exploitation of renewable resources, and "sustainable development" are concepts of increasing importance for economists and policymakers. Even though they are at the core of Natural Resource Economics, a theoretical understanding of the problems of rotation and exploitation of resources in an uncertain world is far from being complete. **Gallastegui**, **Iñarra** and **Macho-Stadler** analyze the case of fishing contracts between a country with the right to fish and a firm or country willing to exploit that resource. Since both have different objectives and the fishing agent's effort is not observable by the other party, this is a typical principal-agent situation.

Healthy financial markets are essential for economic development. Many Latin American countries have witnessed a spectacular growth in their financial markets. The financial and assets markets of Argentina, Chile and Mexico have been classified as "emerging markets". The effects of opening the capital accounts and the incentives to import and export capital must be understood at the micro level. Risk and informational problems are at the heart of the operation of these markets, hence making this application of the Economics of Information and Uncertainty an issue of increasing relevance for Latin America. **Gregoire** and **Zurita** survey the fascinating topic of the informational role of prices. They provide a guided tour on rational expectations models and its implication for financial markets, the incentives to acquire information in efficient markets, the effect of the arrival of new information, and the role and consequences of insider trading. They also analyze the microstructure of the market, i.e., the institutional environment in which these transactions are held. They show how information is disseminated in a real world market, and the way this dissemination depends on market characteristics, spreads, transaction strategies, and so on.

2.2. Macroeconomic Problems

Not only new realities are being studied with these new tools, but we are also attempting to better understand the old problems with the tools of modern microeconomic theory. The inflation theory is one of the traditional "macro" bunker under attack by the microeconomic forces.

It is almost schizophrenic to live through a high inflation experience and at the same time read what economists have to say about inflation. Most of the literature on the welfare effects of inflation[1] has tended to concentrate on a very simplistic (no friction, representative-agent, symmetric information, perfectly competitive) framework. In such a framework, money is grafted on top of a real model, without any good justification. Models based on such an inappropriate description of monetary exchange have failed to generate an adequate analysis of the costs of inflation. Two fronts of modern literature are encouraging. On the one hand, there is an attempt to trace more carefully the (to some extent informational) motives for the use of money. Ostroy and Starr (two microeconomic theorists) survey the literature on the "Transactions Role of Money" in their (1990) article. The revival of micro models of monetary exchange (from Kiyotaki and Wright 1989, on) is rooted on the work of Peter Diamond,[2] the leading macroeconomist who has been advocating a search-theoretic foundation to macroeconomics for many years.

On the other hand, careful inclusion of microeconomic considerations of pricing and information acquisition in product markets is bringing theoretical and empirical work to bear on the ways in which inflation affects the economic system.[3] As Bonomo describes in his paper, it is surprising that countries with a history of inflation like many in Latin America have tended to ignore recent theoretical developments that shed light on the ways inflation affects the interactions among agents at the microeconomic level. Bonomo surveys the growing literature on search and optimal pricing policies under inflation. He looks at the consequences of inflation on firms' pricing decisions and consumers' search strategies, and shows how inflation affects monopoly power and social welfare.

Fortunately, we are making progress in understanding not only the consequences of inflation, but also its underlying causes. If inflation has the large welfare losses so well know to citizens of high inflation countries and is in the process of being understood by academic economists, the big question is why do some countries "choose" those inflation levels. The answer clearly lies in a

[1] See for instance the chapter in the *Handbook of Monetary Economics* by Driffill et al (1990).

[2] See for instance Diamond (1984).

[3] For a recent collection of theoretical and empirical work in the area, see the book edited by Sheshinski and Weiss (1993).

complex interaction of economic characteristics, political instability, pressure group activity and political institutions. Persson and Tabellini (1990) and Cukierman (1992) are recent books that survey the substantial progress made on this subject. Edwards (1993), Mondino, Sturzenegger and Tommasi (1992) and Zarazaga (1992) are recent papers with special emphasis on the Latin American experiences. In this venue, **Galetović** gives us a fresh view on the role of Strategic Theory in understanding monetary policy and inflation.

Galetović's paper sheds light on the causes of inflation, by studying strategic interactions among optimizing players -private agents, fiscal authorities and monetary authorities (Central Bank). He looks at two settings: a) one in which the Central Bank can precommit itself and b) one in which precommitment is not possible. In the first case inflation is due entirely to fiscal needs. In the second case, a time consistency problem arises and the inflation rate is higher than that which would be necessary to satisfy the fiscal needs.

Another typical macroeconomic situation in Latin America is exchange rate volatility. **Cortázar** looks at the decision process of a firm that has the alternative of exporting its products. He shows, using a model of options from the finance literature, that extra volatility of exchange rate favors some firms. When the economy is open to free trade, the firm has two markets, and thus has and option on the exchange rate. The value of this option is increasing in exchange rate volatility.

3. FINAL REMARKS

This introductory article is obviously not a complete survey of the Economics of Information and Uncertainty, but just an invitation to explore the field. For more thorough introductory treatments, we suggest Hirshleifer and Riley (1992), Hey and Lambert (1987) and Milgrom and Roberts (1987). For some of the classics, see Akerlof (1970), Alchian and Demsetz (1972), Arrow (1970), Riley (1979), Rothschild and Stiglitz (1976) and Spence (1974). For some high-quality selective surveys and interesting applications to Latin American problems, we suggest the rest of the papers in this issue.

REFERENCES

AKERLOF, GEORGE (1970): "The Market for 'Lemmons': Quality Uncertainty and the Market Mechanism," *Quarterly Journal of Economics*, Vol. 84, 488-500.

ALCHIAN, ARMEN and HAROLD DEMSETZ (1972): "Production, Information Costs and Economic Organization," *American Economic Review*, Vol. 62, 777-795.

ARROW, KENNETH (1970): *Essays in the Theory of Risk Bearing*, Amsterdam: North Holland.

CUKIERMAN, ALEX (1992): *Central Bank Strategy, Credibility and Independence. Theory and Evidence*. Cambridge, MA: The MIT Press.

DIAMOND, PETER (1984): "Money in Search Equilibrium", *Econometrica*, Vol. 52, 1-20.

DRIFFILL, JOHN, CRAYHAM MIZON and ALISTAIR ULPH (1990): "Costs of Inflation" in *Handbook of Monetary Economics*, Edited by B. Friedman and F. Hahn, Amsterdam: North Holland.

EDWARDS, SEBASTIÁN (1993): "The Political Economy of Inflation and Stabilization in Developing Countries," NBER *Working Paper* No. 4319.

HEY, JOHN and PETER LAMBERT eds. (1987): *Surveys in the Economics of Uncertainty*, Oxford: Basil-Blackwell.

HIRSHLEIFER, JACK and JOHN RILEY (1992): *The Analytics of Uncertainty and Information*, Cambridge: Cambridge University Press.

KIYOTAKI, N. and RANDALL WRIGHT (1989): On Money as a Medium of Exchange", *Journal of Political Economy*, Vol. 97, 927-954.

MILGROM, PAUL and JOHN ROBERTS (1987): "Informational Asymmetries, Strategic Behavior and Industrial Organization," *American Economic Review*, Vol. 77, 184-193.

MONDINO, GUILLERMO, FEDERICO STURZENEGGER and MARIANO TOMMASI (1992), "Recurrent High Inflation and Stabilization: A Dynamic Game". UCLA *Working Paper* No. 678.

OSTROY, JOSEPH and ROSS STARR (1990): "The Transactions Role of Money", in *Handbook of Monetary Economics*, edited by B. Friedman and F. Hahn, Amsterdam: North Holland.

PERSSON, TORSTEN and GUIDO TABELLINI (1990): *Macroeconomic Policy, Credibility and Politics*. Harwood Academic Publishers.