

# *PART I*

## *ARTICLES*

### MICROECONOMETRICS AND THE DYNAMICS OF RESOURCE ALLOCATION

*by Gunnar Eliasson*

#### **1. Business Cycles and Economic Growth**

For some time, policy makers and the population at large have believed that their economic environment was controlled by an informed body of policy makers.

This comfortable situation abruptly ended in the early 70s. Macro demand management based on such presumptions was no longer a reputable way of policy making. Neither the informed, central overview nor the means to achieve ambitious targets appeared to be present. Less ambitious macro monetary management to fight inflation became popular. It is still there, but in doubt. Supply policies became a catch word.

The long-term supply problem of the 70s is still very much unresolved. Policy makers and their advisers are both confused. The old Schumpeterian ambition to understand the Business Cycle and Economic Growth simultaneously is returning after years of oblivion. It is not clear that the economics profession is capable of satisfying that ambition.

To capture the complex, economic process that has generated the unstable stagflation state of the 70s one has to look very deeply into the underlying microeconomic market processes. One has to understand, in particular, the firm, or the entrepreneur, as a market agent. Innovative change and uncertainty associated with the ambitions and competence of competitors in the market are forms of uncertainty that should in general be conducive to economic growth. Unpredictability created by misconceived macro policies or confused market agents on the other hand may disturb the market process and be detrimental to growth. The possibility that micro agents (firms, households and even local public bodies) may be in conflict with the ambitions of policies designed at the central level has to be considered afresh in modern economics.

There is a great need for a better understanding of the more comprehensive relationships that rule the macroeconomy. Since such relationships begin where decisions are taken, macroeconomic understanding has to be based on a good theory of the microdynamics of business, household and public body behavior.

A quantitative grasp of the microeconomic processes, hence, is essential to understanding what is currently going on. This demands a new level of econometric competence based on well integrated theory and measurement, extensive data-base work and the development of new statistical methods - in short, a new microeconometric competence. The ambition to develop such theory and competence is characteristic of the bulk of ongoing IUI research.

## 2. The Market Game

### *Disorderly Economies*

An economy consists of a number of *agents* that operate in a more or less constrained *market environment*. This environment is characterized by different sets of rules. A few of them, like property rights, have to be safeguarded by the state. The stability and extent of these rules, the complexity of the market game played by actors and the consequent environmental predictability constitute the uncertainty or stability of the system. This overall problem of uncertainty and macroeconomic stability has been extensively covered within the large energy project (see p. 91), where the market instability created in the wake of the so-called "oil crisis" has been a prime focus of concern.<sup>1</sup>

The main conclusion is that the *Disorderly Economies* of the 70s have lowered predictability and increased uncertainty to the extent that caution has begun to prevail. Agents are gradually learning to cope with new complexities associated with inflation and stagnation by developing new sets of decision rules. These rules of thumb may not be optimal if growth is again somehow restored. Recovery from the 70s appears to be a long process. Long-term financial commitments - notably industrial investments - have been the first to suffer.

Reasonable predictability of rules and prices is one feature of efficient market processes. The other, equally important, feature is the notion, formulated by Adam Smith, that price signaling should be organized to promote welfare and economic growth. This is the definition of well functioning markets.

### *Non-market Economies*

We are beginning to realize that the modern welfare state incorporates practices which insulate major segments of the economy from the discipline

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<sup>1</sup> A conference report within that project, *Policy Making in a Disorderly World Economy*, (eds., Eliasson-Sharefkin-Ysander), IUI Conference Reports 1983:1, has just been published.

of the price system. No current research allows us an overview of the elements that tend to erode the economic base, and the redistributive capacity of the welfare economy.

*Widespread regulation* affects market processes in several ways. Generalizing somewhat, we can talk about *the four important prices*; (1) food, (2) shelter, (3) labor and (4) capital. None of these prices are free to move in an unconstrained market process. Farm and food prices are controlled to a varying degree throughout western Europe. Rents are normally regulated, although the degree and extent of regulation vary according to political power and fashion. Wages are subjected to more or less centralized negotiation. In many countries incomes policy programs and some form of enforcement of contracts are carried out simultaneously. Throughout the 50s and the 60s – in conjunction with the fixed parity system (also a form of price control) – interest rates in most west European countries were regulated or “constrained”. Under the pressure of a growing and functioning international credit market the Bretton Woods system, and then gradually domestic credit rationing, were abandoned.

For those who accept the Smithian idea of the role of the price system the extent of regulation in the advanced economies should be a source of worry, if only for one reason: economists do not even have a good idea of the nature of the overall efficiency and dynamic allocation effects of regulated and destabilized price systems.

To clear away much of the political controversy associated with these matters, a careful historical comparison of market imperfection today and in the past would be enlightening.

The most important market that is out of equilibrium appears to be the labor market. The grave unemployment situation among industrial countries bears witness to that. Some economists argue that the situation is a good example of overpricing and rigidity exercised by unions. Under that verdict we are now in the middle of the price adjustment period, and politicians can do nothing useful except helping the adjustment along. The European unemployment situation placed in the middle of old and inert industrial structures, however, poses a real danger of growing political instabilities, if it continues or worsens.

There is no doubt that prospective wage benefits play a role in the labor market. Holmlund (see his paper below) shows that movers do gain by moving in the market, and stayers forego gains if they stay in a situation, where they would have increased their wage, had they moved. The reason they do not move is perceived of real costs associated with moving. The higher these costs in relation to the gains from moving, the lower is the propensity to move. This relation is affected by taxes, social insurance benefits and industrial subsidies (as we will show below). In essence, the observed decreased mobility in the labor market does not have to be caused by institutional rigor or complacent workers. Pricing (wage setting) in the

labor market may well be the prime reason. Sweden is noted for the smallest wage dispersion among the Nordic countries.<sup>1</sup> This is even more apparent from Klevmarken's comparison of wage and salary setting practices in the United States and Sweden (see pp. 150 ff.). Klevmarken also demonstrates that substitution between occupations is slow. Hence, union-pushed wage equalization ambitions in Sweden can have quite long lasting effects. Real adjustments occur instead: industries get problems and unemployment is created. Especially the youth seems to have been priced out of the market into unemployment in this way. These results also illustrate that price adjustment is slow in general - something that we have illustrated in simulations on our micro-to-macro model. Too fast adjustments generate instability in the economic system; too slow adjustments create stagnation. There are intermediate market regimes associated with an optimal rate of adjustment, maximum price stability, predictability, and output growth.<sup>2</sup>

The *capital market* is more difficult to deal with. Not long ago such markets did not really exist. With the exception of the U.S. economy and the international finance system, efficient capital markets are still rare. They are also carefully protected - to the extent possible - from outside influences.

The reason for the outdated or inefficient industrial structures facing competition from aggressive competitors in the newly industrialized countries may, in fact, be the particular kind of disequilibrium that has prevailed in the capital markets of most European economies for close to three decades. Interest rates, well below what marginal investors have been willing to pay, have made firms and policy makers alike happy to accept new investments in traditional sectors that became obsolete overnight, when prices changed in the wake of the 1973 oil situation, and when real interest rates began to climb in the early 80s. The argument of the new book (on policy making in a disorderly world economy) is that this is the real cause for concern, not oil prices or the OPEC cartel. The disorderly state of western economies today was all created by policy makers in the western economies.

Let me give a few Swedish examples of how we have distorted the all important capital market to the long-term distress of ourselves and our children.

#### *Are We Witnessing a Slow Motion Collapse of some Welfare Economies?*

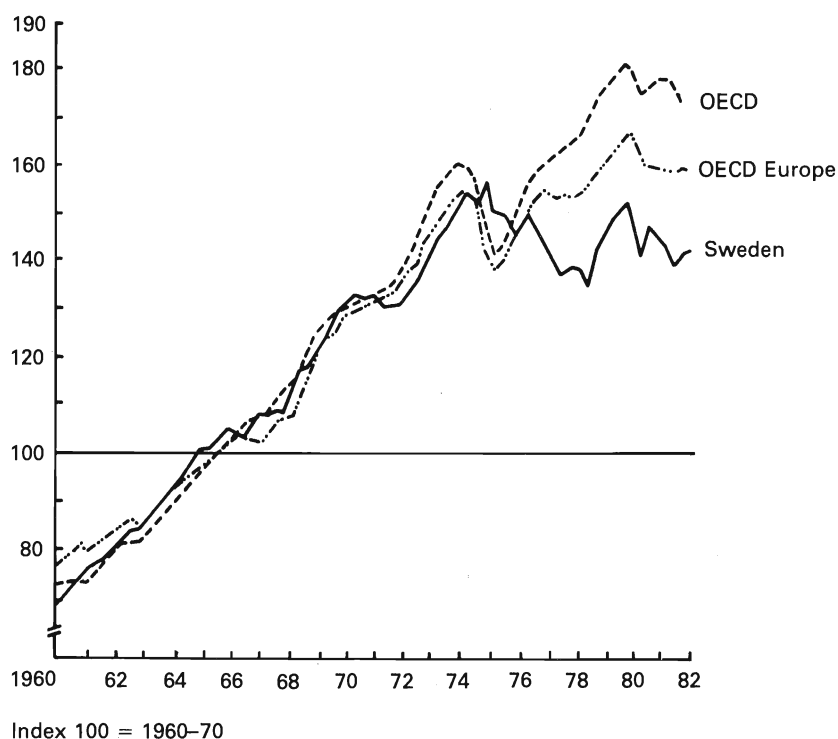
The most important factor behind Swedish stagflation - if I may mention a personal view - is the industrial subsidy program of the 70s. It is a completely

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<sup>1</sup> See Holmlund, B., *Arbetsmarknad och strukturomvandling i de nordiska länderna*, (Labor Markets and Structural Change in the Nordic Countries), IUI Booklet No. 133, 1982.

<sup>2</sup> See Eliasson, G., "On the Optimal Rate of Structural Adjustment" in *Policy Making in a Disorderly World Economy*, IUI Conference Reports 1983:1.

Figure 1. *Industrial output in Sweden and in the industrialized world 1960-80.*



Source: *Policy Making in a Disorderly World Economy*, IUI Conference Reports 1983:1 (p. 17).

alien element in the old Swedish industrial policy model that was based on the idea that market-induced structural change in the production system should be allowed to take place, and even be promoted. The growth reducing effects of subsidies are so large (see Bo Carlsson's article) that they may even be the main reason for the apparent break in economic performance in Swedish industry since 1973 (figure 1).

Industrial subsidies are one part of the general business taxation system, that is subject to several ongoing investigations at the institute (see p. 120, p. 133 and pp. 135-138). Two overall conclusions come to the fore in these studies. First of all we have the distorted price signaling caused by various forms of tax wedges. This is a phenomenon recognized in all western economies, to the extent that the institute has been engaged for a few years in an international tax comparison project together with the NBER (U.S.), Institut für Wirtschaftsforschung (Munich) and the University of Birmingham. The ambition is to study the relative degree of price discrimination associated with the choice of investment object (machinery, construction or inventories), financing and type of ownership (see the article in this volume

by Lindberg and Södersten). Differences in pretax and after tax rates of return are large.

If, in addition, after tax rates of return are more or less internationally determined - an assumption that we tend to adopt for the time being in our research - the potential effect of tax distortion on industrial investment may be substantial.

Most important of all appears to be the inelasticities associated with old supply structures that in turn refer back to the allocation effects of a tax distorted price system. Simulation results on the micro-to-macro model of the institute<sup>1</sup> suggest that it may not mean much at all if investments now and then are misallocated. This is a normal feature of a dynamic business life. The really large, socioeconomic cost is incurred if production is carried on in loss operations locking up labor for long periods. It may be all right for the individual company if production is carried on for years as long as variable costs and a little bit more are covered. But the macroeconomic costs of depriving the rest of the economy of the product of skilled labor, and of attracting a steady stream of newcomers to the labor market into unprofitable operations, are huge. In addition to this, the scarcity (of skilled labor in particular) created artificially, props up the wages share in the economy at a level that is not compatible with continued growth in other, non-subsidized industries. Negative effects are especially large in the Swedish case when subsidized crisis industries, that would be closed down within a few weeks of a withdrawal of subsidies, still - after almost ten years - pay the highest wages in industry. Abandoning mistakes and the art of scrapping, hence, is perhaps one of the most important elements in management competence.

It is also obvious that inquiries of this kind into market allocation processes require a microbased, dynamic theory and the corresponding empirical tools.

The public sector makes up a substantial part of the regulated non-market economy that is insulated from direct contact with competitive markets. However, when the important capital markets are realigning with world financial markets, this insulation (or protection) begins to erode. At the same time, the political process demands continued honoring, during an extended stagflationist unemployment period, of welfare commitments that no forecasts foresaw when the commitments were made. The economic base for this is diminishing also because economic activities are shifting out of public control. (The unobserved economy, see p. 159).

Inflation may be slowly eroding the welfare commitments themselves but inflation is also affecting the efficiency of the production system, and is

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<sup>1</sup> See Eliasson-Lindberg; Allocation and Growth Effects of Corporate Income Taxes, in Eliasson-Södersten (eds.); *Business Taxation, Finance and Firm Behavior*, IUI Conference Reports 1981:1.

destroying wealth accumulated by savers. At last even patient savers are recoiling and demanding a real after tax return in order not to shift their resources into better investments than nominal assets. Extensive foreign borrowing to cover domestic resource deficiencies is helping them in bringing the foreign market interest rate into the domestic economy. This will soon effectively block both inflationary and credit financing of public expansion in open economies like the Swedish one. By allowing huge deficits on public and foreign account, the public sector managers are exposing themselves to the market tests that industrial firms have always had to pass. The market rate of interest will eventually force a real downward adjustment of public spending and a new set of welfare rules. In this sense, the market exercises a disciplinary force on politicians even in a highly regulated economy. It is, however, still very important to ask whether the actual, political economic scenario, currently played in many western economies, really is an efficient way of managing an economy, and how much long-run harm to output and economic welfare that has been done in the process.

This discourse defines an urgent task for economic research - to understand the dynamics of a mixed market and non-market economy as a whole. It is, however, so difficult that some consider it to be too pretentious even to mention on the research agenda. Nevertheless, it has to be there. And it is not a job for traditional paper writing in journals. It requires well organized teams of highly qualified experts in several fields working together. That is the kind of research we attempt to develop at the institute.

### **3. The Market Agents**

The actors in the market game are many. We have to take at least four into account.

The *business organization* (the firms, the entrepreneurs), and especially their innovative activities are central for the long-term supply growth processes. The way innovative activity and technical change affect the growth process within the firm is the prime concern of a recently started project for the Swedish Computers and Electronics Commission (see p. 156 and Fries' article). The way firms internationalize has been, and still is, under careful study (pp. 144–149). The way they are affected or afflicted by the policies of the central government is another area of inquiry (see the articles by Lindberg-Södersten and by Carlsson on corporate taxes and industrial subsidies, respectively).

The *household* is the second, important actor in the market game. It is our ambition to engage in a large study on the household as a user of *time*, *money* and *public services* or, in short, a production unit, a *consumption* body and an

*investment, saving and borrowing* institution (see the HUS<sup>1</sup> project, p. 104 and also Klevmarken's article). Parts of households' economic activity have been studied in isolation. Practically all theory of the household and all empirical research deal with individuals. Within the HUS-project, we have decided that many partial results on individual behavior based on theory may be overthrown if the most important household activities are studied in an integrated way. As is the case with the business organization, the formation, size and character of a household to some extent depend on economic factors. Human capital as a substitute for tangible wealth in intergenerational transfers is a neglected area in economics, as is a general understanding of what human capital really is. We think improved information in this area is vital for understanding what is going on in an economy subject to economic decline and for knowing what policies to enact. We have designed a very comprehensive (and expensive) field survey that has been thoroughly tested.<sup>2</sup> However, the main study is still awaiting sufficient funding.<sup>3</sup>

*The public sector.* The tradition in economics has been to treat the public sector as a single, homogeneous and controlled policy body carrying out central decisions. This is completely misleading for most analytical purposes and our research policy has been to depart from this tradition. (See Ysander's article in this volume.) The largest public body is the set of local communities. In most western countries they have the right to tax their constituencies and to engage in economic matters without consulting any superior political body. The ambitions and goals of these public bodies, much like these of individuals, often depart from the objectives of the central political authority. The micro agents may act to block the consequences of central Government decisions on themselves. And in Sweden the local public sector employs more people than the whole manufacturing sector. But most public bodies are effectively protected from a market screening of the value of their activities.

Rapidly growing public bodies, including the transfer in recent years of crisis industries into the public sector, diminish the relative size of the economy that is guided by markets. Furthermore, the public sector through its taxation power, exercises an enormous influence on the effective price structures of the market section of the economy and on the monetary mechanisms. This poses particular stability problems in the market economy,

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<sup>1</sup> Swedish for HOUSE.

<sup>2</sup> Thanks to a generous grant from The Bank of Sweden Tercentenary Foundation and the Swedish Council for Planning and Coordination of Research (FRN).

<sup>3</sup> A brief description of the project is found on p. 141. Also see Eliasson-Klevmarken *Household Market and Non-Market Activities*, IUI Research Report No. 12, 1981. A full presentation in English of what has been accomplished so far is available in the form of the renewed application to The Bank of Sweden Tercentenary Foundation filed on October 1, 1982. An edited version will be published later.



since the whole burden of structural adjustment has to be borne by a smaller and smaller share of the economy.

Traditionally, the IUI has devoted considerable resources to research in public economics, and ongoing research includes a large project of local public economics which is currently shifting towards more microeconomic analysis (see p. 134 and Ysander's article). A particular concern is the exploding deficit on public account that the public sector as a whole seems unable to handle. New financing arrangements, including privatization and decentralization of public activities, have been discussed in several IUI publications and the institute is currently beginning a study of the macroeconomic consequences of shifting to a progressive expenditure tax (see p. 138).

*Other organizations* – a full treatment of the market and non-market behavioral characteristics of a modern industrial economy would have to deal also with the mass of all other non-market organizations, making up the socioeconomic or institutional structures which define the rules of the economic game. This side - which is important - is currently beyond our capacity to deal with. Current procedure in economics is to tacitly assume that institutions do not change. If the market is populated by constantly changing and interacting institutional forms affecting all agents, such assumptions will often result in misleading predictions. Accepting reality as it is, on the other hand, makes the measurement problem in economics an extremely tricky one. This is the reason why data base taxonomies and survey techniques will have to be important parts of microeconometrics (see papers by Klevmarken and by Brownstone).

#### **4. Integrating Micro and Macro - the Aggregation Problem**

A unified theory dealing with all these institutions, and how they interact, is completely absent from the current social science theory theater. This is quite easy to understand. We do not even have the pieces - agent and market behavior - well treated in theory (next section) and 30 years of macroeconomics have kept the mathematically versed economists looking elsewhere.

Integrating the political decision process would mean entering the theory of public choice into the economic model. This, in turn, means digging up game theory, the development of which almost came to a halt in the 50s, due I believe, to analytical difficulties.

Neither the theories of the firm, of the individual, nor of the household have been developed with a view being integrated within the same dynamic economic theory needed to deal with time properly and to understand the dynamics of resource allocation.

A macroeconomic system with all these actors would have to be explicit in its treatment of the dynamic market processes. Theoretical development in

this area has moved in a different direction, viz. towards static competitive analysis, which is of little use when it comes to understanding the dynamics of economic behavior. A dynamic market process would have to take us beyond the fixed point and steady state concepts (equilibrium analysis) and into a situation of perhaps impossible mathematical language requirements. Process modeling that is not based on static optimizing rules is a mathematical technique that is now entering economics. The solution may have to be simulation analysis - a methodological point that is argued strongly in the new book on Disorderly Economies.

The gist of this new dynamics is to remove all traditional aggregation assumptions in economics and to bring micro-to-macro aggregation through explicit market processes into the open (cf. Brownstone's article).

To address these micro-to-macro economic problems (which are truly Schumpeterian in reach) the institute is organizing an international seminar during the fall of 1983 commemorating the 100th anniversary of Joseph Schumpeter (see p. 126).

Since several years, the institute has been carrying out an experimental micro-to-macro modeling program that has slowly become an empirically based model, suitable for the analysis of endogenized growth processes (see p. 102). So far, however, this model deals with only one type of micro agent: the firm. After a massive data-base effort, this model now operates on real firm data covering 150 real firms and close to 75 percent of total manufacturing output and employment in 1976 - the base year for simulations currently used.

A vast potential of refreshed understanding of the macroeconomic cyclical and growth processes will probably be opened up on the basis of microeconomic modeling and extensive micro data-base work. We are talking about improved methods of economic measurement. To achieve results it appears that we have to modify the theoretical concepts of economics considerably. Theory has to recognize (and quantify) the character and extent of insufficient information and the ways actors respond to it through structural adjustment. This requires a micro approach. This also means that we have to (or should) give up much of the strict optimizing assumptions now routinely applied. Agents should, of course, act rationally in theory - they do in reality - but only on the basis of information known to exist. With this reformulation, economic theory will be much less constrained as to possible conjectures than we are used to. This is most likely a property of a real economy, that we should desire to have in theory. (Equilibrium analysis imposes heavy constraints on possible conclusions. Disequilibrium or rather process analysis is not necessarily more complex, but until we have changed, improved and sharpened our mathematical tools it will be immensely more difficult. Improvements in computer languages and - as I personally believe - graphical analysis may offer attractive solutions in the future.)

## 5. The Permanence of Institutions

Microeconometrics is really an improved method of measurement. Macroeconomic theory and application can survive on the law of large numbers, which under certain, restrictive, market stability assumptions reduces the aggregation problem (see Klevmarken's article). Modeling micro agent behavior is far more demanding as to complexity and relevance. A micro theory that is bad leads a vastly more precarious life in a scientific test environment than does a macro theory.

On the other hand, the aggregation problem becomes smaller in the sense that the unit of measurement becomes synonymous with a decision unit and hence more permanent as to its composition. Even at this level, however, permanence appears to be a more or less doubtful attribute. Institutions tend to blend continuously with the market characteristics by breaking up and forming new combinations. This we know from our study of the interior of business organizations. We hope to know more in the future in this respect about the households from the HUS project.

The fact that micro-to-macro theory models behavior and chooses the adequate decision units lends some stability to, for instance, the business organization. The relevant notion was phrased already by Coase (1937). He argued that relative market and nonmarket performance determines the size and transformation characteristics of a business organization. Internal and external performance can be modeled and measured. Market performance (rate of return) requirements force compliance on the interior life of a firm which - if modeled properly - leads to predictable production, employment, investment and growth behavior.

The largest project team at the institute just now is engaged in research on the *microeconomics of firm behavior*: The productivity effects of information technologies in firms, with emphasis on computer based internal guidance and control systems, computer communication and the nature of the modern firm are being investigated (see p. 117). The empirical studies concentrate on very large engineering firms. There is also a special investigation of the organizational problems associated with a large construction project (nuclear power plants) and their impact on measured productivity (see p. 119). A related group of researchers is engaged in the internal investment allocation mechanisms in a modern firm, with special emphasis on the nature of foreign investment decisions (see p. 148).

These projects will draw on and improve upon the data bases built around the micro-to-macro modeling project for econometric analysis.

## 6. Further Advantages of Microeconometrics

One aspect of the current practice of estimating macro theories on time series data, that have been aggregated in public bureaus of statistics, is that much of

the information collected is effectively killed. Much more knowledge could have been obtained if theory and estimated models had been allowed to reach all the way down into the underlying data sets. This underlines one important point. Micro-to-macro theory is superior to aggregate theory in utilizing information for a better understanding of what goes on at the macro level. Understanding the dynamics of the allocation process is the standard example that we have given.

Another aspect of the same thing is that macro theory as a rule is consistent with several conflicting micro based theories (hypotheses) that you cannot discriminate between, on the basis of a test based on the macro version of the same theories. Normally, the underlying micro structure is needed to derive useful policy rules.

Therefore, macro theory has little discriminatory power as to policy conclusions. On the same ground, micro based theory and the efficient use of micro data sets to estimate these models will leave much less room for bad theory. Tests will be more powerful in throwing out bad theory.

In addition, the quality (reliability) of micro data bases tend to be superior to that of aggregates. Statistical sources used by observation units themselves are normally sampled in the study of firms. We have several good examples of this from the micro-to-macro modeling project.

In a micro based model, like all process models, much of the information content is carried by the *initial data base*, compared to a macro model where most information is compressed through aggregation assumptions into the estimated coefficients. The influence of the initial data base repeats itself throughout the dynamic model processes, as agents respond to initial conditions and update their state for the next period decision and so on. Hence, the quality of direct measurement, that enters into the initial data base, dominates the econometric problem of dynamic micro-to-macro modeling. This may at first sight appear as a drawback, and lack of robustness. In one sense this is true, since errors of measurement, in terms of data base inconsistencies - among firms and sectors affect macro predictions. This robustness - or lack of robustness - can be investigated by studying the propagation of initial (stochastic) noise through dynamic sequences.

If, however, the economy responds very differently to the same parameter changes depending upon in what state they are enacted (policies carried out under different cyclical conditions, for instance), then we do not want to remove that quality of a model by assumption. It should be there and the investigator had better roll up his sleeves and work on improving his data base rather than changing his model. Microeconometrics requires a work effort as in all good laboratories.

Microeconometrics, hence, is something much more broadly defined than the application of least squares methods on economic data which has traditionally come to be associated with econometrics. Theory and good data base taxonomies must be an important part of this kind of research. Sample

design, data base organization and quality enter as perhaps the most important contribution to success (see Klevmarken's article). The pure statistical estimation side becomes only one side of a vastly more complex research design. The advancement of new measurement methods will set the pace of advancement of both theory and understanding. This is not surprising at all. It has always been true in science.