Macroeconomic Policy

The first part of this contribution discusses the emergence of the term, both historically and conception ally. In the second part a more technical account of models for macroeconomic policy from the perspective of evolutionary economics is provided. As conclusion a brief outlook is presented.

Emergence of the concept

There is a striking paradox in the history of evolutionary economic theory: While most of its proponents held very explicit, and often heretical views on macroeconomic policy, a theoretical treatment of these issues is almost completely missing[1] in their theoretical works.

To a certain degree this contradiction can be explained by adding some background information to the concept ***macroeconomics***. Indeed for the majority of modern economists macroeconomics as an independent field of economics was born with John Maynard Keynes 'General Theory of Employment, Interest and Money' in 1936. Keynes' major methodological innovation clearly consisted of a twofold shift of focus of economic theory:

1. Economics has to concentrate on the short-run ('In the long-run we are all dead') rather than looking for eternal laws governing the long-run.
2. Economics should consider measured, aggregate variables – including those describing actions of institutions (e.g. the state, unions) – rather than constructing variables describing innate properties of economic micro-units (individuals and firms).

This conceptualization of what macroeconomics is dealing with, i.e. aggregate short-run behavior of nation states, of course limits the meaning of ***macroeconomic policy***. In the sequel Keynesians further categorized such policy measures into two groups of state interventions - fiscal and monetary policy – thus further narrowing the scope for evolutionary considerations within this framework.

This already very limited meaning of the concept 'macroeconomic policy' was even further restricted by Keynes' most influential innovation with respect to the dynamics of the object of economic investigations: Economies are driven by effective demand. Even today most macroeconomic models still stick to the assumption that in developed economies growth is limited by the limits set by a slowly expanding aggregate demand rather than by restrictions on the supply side. The neglect of supply side dynamics evidently implies a neglect of supply side macroeconomic policies.

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[1] In a recent contribution Ulrich Witt comes to a similar conclusion: "However, what has so far only rarely been addressed as an own object of theoretical reflections in evolutionary economics is the theory of economic policy making." [U. Witt, 2003, p.77].

It is therefore not at all surprising that those economists after Keynes, who considered themselves as part of the still heterogeneous camp of evolutionary economics, usually were not inclined to contribute to a subject that in its Keynesian mainstream definition looked strange to them: ***excluding the interplay*** between short-run and long-run, between entities (institutions and agents) of different power and size, between production and demand. So this solves one part of the above mentioned paradox.

Dropping the narrow Keynesian definition of macroeconomic policy it remains open to explain why evolutionary economists by their very focus are driven to draw conclusions, often strong conclusions, for economic policy. For this purpose it is instructive to take a look at two representatives of classical evolutionary economics, two economists representing the two opposite poles of the political spectrum: Thomas Malthus and Karl Marx. The common basis that makes them comparable is that both consider the evolution of human society as the final outcome of an ultra long-run evolution of life on earth, thus following some 'natural' trajectories to be discovered and described. The difference in their views on intervention in this process stems from the different dynamics they propose to have discovered. Malthus sees ***more and stronger*** 'natural' forces governing the process than the policy measures of his times (partly based on Rousseau's visions) pretended to overcome. As a consequence his policy conclusions are defensive, i.e. proposed interventions are useless, they should be abandoned. Note that this is a strong – and nowadays very familiar - policy recommendation. Marx, building on Hegelian dialectics, views social evolution *less* 'natural' in the sense that self-organizing revolutions lead to ever new emergence of forms. In this framework more or less aggressive intervention of social entities at all levels are the prime motor for emergence rather than being a disturbance of a 'natural' process. Again this is (and always was conceived as) a strong policy recommendation. Both political poles refer to a long-run dynamics that includes important, intervention inducing short-run developments – either conceived as disturbances or as constituent elements. Macroeconomic policy thus for both consists of a mix between long-run and short-run measures. For Malthus type trajectories the short-run prescription is hands-off and the long-run policy consists of the installation of an institutional framework that promises to further the stabilizing processes of the hypothesized 'natural' state best. Inverting this mix, Marx type trajectories call for short-run and medium-run interventions of social entities driving the system towards something called 'progress', which is a long-run development that only can be understood in retrospect, and therefore escapes any long-run intervention.

Viewed in front of this background, Keynes position indeed is a strange brew. Insisting on short-run intervention reminds on a Marx type background, but there is a trajectory aimed at, and it surely looks rather like a Malthus type path. Upsetting this mix, Keynes' antipode Schumpeter was closer to Malthus' short-run laisser-faire but saw no long-run perspective for capitalism. And Schumpeter carefully avoided the label 'evolutionary' for his contributions.

Under this perspective the well-known bonmot makes sense: "While Keynes thought that capitalism is economically unstable but politically stable, Schumpeter thought that it is economically stable but politically unstable.", just insert 'in the short-run' for 'economically' and 'in the long-run' for 'politically'.

So while the Keynes-Schumpeter generation of economists was rather reluctant to consider themselves as evolutionary economists – the glamour of Darwin's evolutionary theory was last century and revolution seemed to be the more acute term of the time – the last great ancestor of evolutionary economics in the 19th century, Thorsten Veblen, had judged macroeconomic policy issues as follows:
"The outcome of the method [marginalist economic analysis, H.H.], at its best, is a body of logically consistent propositions concerning the normal relations of things -- a system of economic taxonomy. At its worst, it is a body of maxims for the conduct of business and a polemical discussion of disputed points of policy."[Veblen, 1898]

In other words, Veblen had identified the hidden policy agenda of the marginalist revolution of Menger, Jevons and Walras, and denounced it. At the same time he was well aware that their logical consistency was clearly an advance, in particular as compared to the 'naturalistic' type of economics of his time. An approach that much too often referred to presupposed 'normal' circumstances to which economic systems always should return. This latter attitude was the very reason why he thought that 'economics is not an evolutionary science' yet.

Taking a great leap forward in time to consider the positions of contemporary evolutionary economists towards macroeconomic policy it is striking to see how little the broad spectrum of basic attitudes – from Malthus to Marx – has changed. Despite the enormous advances in formal tools used to express these policy views, their broad diversity even became a characteristic of contemporary evolutionary economics. But at the same time it is precisely this advance in analytical and in simulation tools that makes a difference in the intellectual intercourse between the diverging streams within evolutionary economics. Taking all those aspects that were excluded by Keynes' definition on board (i.e. all three above mentioned interplays), the new language elements help to construct an evolving macroeconomic policy.

It is evident that under such circumstances a certain division of intellectual labor appears. Some contributors, who are stronger rooted in the Keynesian tradition (e.g. J. Foster [1987]), try to augment Keynesian macro-models[2] by adding evolutionary features. In particular the availability of macroeconomic data collected by statistical offices which often were a by-

[2] Some recent contributions in disequilibrium macroeconomics that combine the Keynesian approach (e.g. Flaschel et al.[1997]) with Goodwin, Schumpeter and Marx traditions (e.g. Foley & Michl[1999]) are important for evolutionary macroeconomic policy too – even if the authors do not consider themselves as evolutionary economists.

product of Keynesian economics is surely an incentive to produce evolutionary models along these lines. Others (e.g. G. Hodgson[1988], H. Hanappi [2002]) try to include emergence and exit of institutions in such macro-models as well. For a large group of evolutionary economists the emphasis on technology policy (e.g. G. Mensch[1979]) as most important part of macroeconomic policy has become their central concern. Another group is taking up the old Malthusian questions of linking demographic developments to economic aggregates (e.g. R. Day [1999, pp.157-360]), a burning macroeconomic policy topic if one considers current debates on social security funds and pensions.

Today evolutionary economics considers macroeconomic policy to be a wide field. It still includes fiscal and monetary policy[3], but it adds long-run dynamics. It still includes aggregate variables, but it adds micro-political interventions by influencing the expectations of smaller social entities. It adds other policy fields: technology, exchange rates, immigration, demography, … It can do all this - and even study non-linear disequilibrium scenarios of them - by using the new simulation tools available.

Evolutionary modeling strategies for macroeconomic policy

More to the technical detail, an evolutionary macroeconomic policy model consists of four sets of variables linked to each other by relations, which usually are formulated as computer programs, equation systems or (in a preliminary stage) as text.

The ***first set*** are the ***goal variables***, those aggregates that enter what is usually called a social welfare function. Standard macroeconomic theory typically considered five such aggregates: real GDP growth rate, unemployment rate, inflation rate, net export share in GDP and budget deficit as share of GDP. Even for short-term considerations the combination of these variables into a single welfare measure is far from trivial, they usually are strongly interdependent, often in a non-linear way, and even the sign of several relations still is open to debate. For some aggregates the optimal level seems to be obvious – no unemployment, zero inflation rate – but even that might not be true: Structural unemployment might increase welfare by enhancing technical progress, some small inflation rate might induce money owners to carry their money to the bank to get at least a small interest rate, thus increasing available funds for new investment. Other variables do not have evident optimal levels at all, not to speak of the asymmetric dynamics around these levels. Evolutionary economics adds further problems. To mention just the more important ones:
Including the long-run time horizons implies to take care of J-curve effects, i.e. there is a dynamic trade-off that can make short term utility losses smaller than long-run utility gains of vectors of goal variables.

[3] An impressive case for the enduring importance of fiscal policy was recently made by Philip Arestis and Malcolm Sawyer[Ph. Arestis & M.Sawyer, 2003].

In particular, time horizons can be long enough to allow for emergence and disappearance of goal variables[4]. Indeed, this is one of the core topics of evolutionary theory. Furthermore it has to be considered from a micro- as well as from a macroeconomic point of view. What appears as a new goal of microeconomic agents might well be invisible for macroeconomics, whereas a macroeconomic objective often can look irrelevant for micro units. Probably one of the more interesting type of evolutionary economic models deals exactly with simulation of the policy processes that make goals visible or invisible.

The new areas of possible goal variables, technology policy, environmental policy (more general: endogenous utilities), information policy (taking account of sustained expectation disequilibria, and all types of game theoretic lock-ins) and the recently booming renaissance of directly coercive policy measures (i.e. cold economic war and constrained hot war) really open up a broad spectrum of possible goals.

The choice of the set of goal variables for macroeconomic policy, including a welfare measuring procedure that combines them, is not just a matter of setting a standard. For evolutionary economists it necessarily is rather an art that the model-builder has to bring into the picture, choosing with care and intuition.

The ***second set*** of variables consists of ***exogenous variables not controlled by the entities modeled***. In mainstream macroeconomic theory these variable are often considered to be of minor importance, since they influence goals only by their assumed, exogenous values. In the Keynesian macroeconomic policy concept they typically represent slowly changing, though important influences. Since in this concept only the short-run is modeled, their role is very limited. The essentially richer approach of evolutionary economics assigns a much more important role to this set of variables. In a sense they designate the border line between what is modeled and what is not modeled. Since evolutionary views do have the tendency to include more and more neighboring problem areas, often crossing borderlines between traditionally separated economic fields, the choice of where to stop is far less trivial. Since a longer time-period is involved, these borders eventually can shift, their specification really is as important as any other part of the modeling work. Not only the case that uncontrolled exogenous variables might become endogenous goals (e.g. carbon dioxide emissions) is rather common, sometimes important endogenous variables suddenly vanish (e.g. exchange rates between European currencies after the introduction of the Euro).

This also sheds some light on the ***methods*** preferred by evolutionary macroeconomic policy: While the Keynesian tradition typically was based on comparative statics, i.e. two static equilibria with different sets of exogenous variables were compared, evolutionary economists compare different sets of dynamic trajectories with possibly changing roles of variables and with no special emphasis on equilibrium paths. Moreover, since sudden changes in relationships might occur due to a sudden change in the status of a variable at certain points in

[4] The introduction of endogenous preferences, in particular in evolutionary economics, has been the topic of volume 97 of the Journal of Economic Theory [L. Samuelson, 2001a], see also [L. Samuelson, 2001b].

time, these changes are rather inconvenient to model by use of the standard mathematical apparatus (difference-differential equation systems) – but they almost naturally lend themselves to algorithmic formulations in computer simulations. So instead of distinguishing cases were different functional relationships are valid, the algorithmic formulation simply contains a jump to a new sub-program that is conditioned by the variables hitting thresholds. The switch from the continuous developments in one regime to a sudden break towards a new regime – from quantity to quality, as the older methodological discourse would call it – thus looks quite plausible if algorithmic formulations are used.

Now turn to the ***third set*** of variables, the ***exogenous variables controlled by social entities***, those variables that often are referred to as ***instruments*** of macroeconomic policy. Again the evolutionary approach dramatically increases the number as well as the specification details of these variables, in particular if compared to the Keynesian framework. The latter typically starts with just two variables in this set, government expenditure and money supply, and then proceeds mainly to include a few refinements. Tax rates, instruments influencing repercussions in open economies, and instruments that enter behavioral equations of wage and price setting are typical candidates for such refinements. As mainstream Keynesian economists try to include more and more of these improvements to provide a better picture of what happens in real economic policy, they more and more are doing what evolutionary economists do. If they finally drop the technical trick of introducing equilibrium conditions to get rid of hard to describe dynamics, then this asymptotic methodological convergence comes close to its qualitative jump towards evolutionary macroeconomics. But there still is something missing.

One element that is missing is the micro-macro relation referred to earlier[5]. Indeed, the conservative reaction to Keynesian macroeconomic policy that surfaced in the eighties as the theoretical arm of Reagenomics, the so-called new classical macroeconomics, pointed at exactly that problem: If micro-units anticipate the actions of macro-units (the setting of instruments), then the standard results of Keynesian macroeconomic policy can easily be reversed. This is the economic content that the so-called rational expectations school (e.g. Thomas Sargent [1980]) emphasized. The merit of this school doubtless was to highlight the importance of the expectation processes of economic micro-units, a task that it shares with evolutionary economics. But as one of the most innovative scholars of the social sciences, Herbert Simon, realized long before, anticipation of real-life micro-units takes place with rather limited information processing capacities of the latter. The overriding economic policy objective of the rational expectations school, namely to prove that an increase in government expenditure will not increase real GDP but will only lead to more inflation[6], seduced the

[5] A similar consideration can be found in [J. Foster, 1987, p.204], where the notion of *micro-macro consciousness* is introduced.

[6] Conservative economic policy was directed mainly against Keynes' idea to increase effective demand by increasing government expenditure. In particular, the higher propensity to consume of poorer parts of the

proponents of this school to sacrifice realism, to assume a counterfactual world where knowledge is complete and all micro-units are hyper-rational and unconstrained in their problem-solving capacities. Of course, in such a world there is no room for Keynesian politics, and there is no room for evolution. So with respect to the content of the anticipation models that are suggested to describe micro- and macroeconomic entities there is a sharp contrast between the rational expectations school and evolutionary economics. The latter insist on models that are adequate to the actual, heterogeneous information processing possibilities of economic actors.

In fact, this view held by evolutionary economists opens up an extremely important ***new area of instrument variables***: Since models used by entities can evolve and are learned, there exist two major sources from where they come. They are either developed in direct interaction with the non-human environment, or they are learned from other social entities[7]. To teach others, or in a less friendly language, to ***manipulate their models***, is only a straight-forward extension of the concept of coercive power. By making perception and communication processes as well as their capacity constraints explicit evolutionary economics is in principle prepared to grasp the peculiarities of the current global information and communication technology (ICT) revolution – something totally out of reach for the new classical macroeconomics.

This latter aspect, i.e. manipulating models and using models manipulated by others, evidently calls for game theoretic considerations. Much of the work done in the area of ***macroeconomic game theory*** started with simple extensions of the usual comparative statics approach to comparisons of Nash equilibria (e.g. in games played by central banks, ministry of finance, unions, …). More recently, the new interpretation of Nash equilibria as evolutionary stable strategies has given these extensions an evolutionary twist. Nevertheless, the further development hinted above, the inclusion of dynamic strategic manipulation of models from macro- to micro-agents and the counter-running political feedback process, are still only rarely touched upon by recent research papers. The potential of such work for actual macroeconomic policy, of course, is tremendous. In a sense, one pre-condition is to develop applied game theory in an appropriate direction, that is taking information process characteristics serious, shaping formal tools according to the needs of the content of our discipline rather than vice versa. Another pre-condition surely consists of extensive empirical work concerning the actual model-building and decision-making process of social entities. If manipulation (teaching) enters the scene as an instrument variable, then its effects – as perceived, communicated or even actually existing – have to be empirically disentangled to allow for a first set of model hypothesis. After more than 200 years the French Enlightenment thus could be re-interpreted as evolutionary macroeconomic policy!

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population would have implied to direct additional expenditure towards these social strata. Ironically enough, Ronald Reagen initiated an enormous increase of government expenditure in 1980 – though not by increasing social transfers but by military expenditure on the *Star Wars Initiative* - making him an extraordinary Keynesian.

[7] The overwhelming majority of economically relevant human behavior stems from this second type of learning process.

The fourth and final set of variables to be considered has the seemingly uninteresting label of ***auxiliary variables***. For many economists the introduction of these variables is just a matter of notational convenience: They are names for results of simple, repeatedly occurring sequences of computations (disposable income), or names used to ease the understanding researchers working in competing theories (e.g. primary deficit), or names invented and used by those providing empirical data (in particular central statistical offices). From an evolutionary perspective these variables are far less arbitrary than is usually assumed. First, several important concepts that finally lead to measurable essential variables made their first appearance as some vague auxiliary influence (the best known example comes from physics: the concept of heat). Second, auxiliary variables, though easily replaceable by a sequence of calculations involving other variables, might bear an important meaning for a social entity using it, a meaning, which could explain actual actions taken better than anything else (e.g. budget deficit quota).

These considerations suggest that evolutionary macroeconomic policy should look at the set of auxiliary variables as a kind of pool for potentially important variables. Sure, they are just of latent importance in the model at hand, but there is a reason why they are in this pool – and there is every reason to handle entry and exit from this pool very consciously. Building evolutionary macroeconomic models is itself an evolutionary process: Once a model is set up, it is continuously further adapted to advice the on-going policy process. It ***never*** is designed to work on the basis of eternal economic laws, it necessarily has to change with changing views of modeled entities, entry and exit of variables and agents in the course of disequilibrium processes that hit thresholds. In this endlessly pulsating flux the pool of auxiliary variables serves as a buffer, keeping vanishing variables for some time before they finally are discarded or experience a renaissance, or storing new ones for testing their importance. In short, the pool of auxiliary variables enhances the flexibility of evolutionary macroeconomic modeling.

All four sets of variables are connected by ***relations*** that link them over time. Since any reaction in the real world takes time – not only in physics the notion of contemporaneity is fictious – a large part[8] of a macroeconomic policy model will be dynamic. Using the model for the study of comparative dynamics then involves assumptions about starting values to derive more qualitative general results, or additional macroeconometric estimations to arrive at some quantitative issues. In the latter case it nevertheless should be kept in mind that that the purpose of an evolutionary macroeconometric model always is the ***exploration of possible futures***, of implications of diverging and converging processes, bottlenecks, quantitative and qualitative change and break. Since the foundation of the approach is ***not*** the discovery of the one and only correct model that governs actual system behavior, it would be misleading to

[8] Only some definitions of variables can be static.

judge models only by forecasting accuracy. Though prognostic quality surely still is a virtue, it is just one ingredient. What is of central importance for evolutionary macroeconomic policy is their usefulness with respect to welfare increase. They can throw some light on possible future states of the world and show some trajectories that without the use of the model would not have been noticed. They also help to assess quantitative magnitudes involved in the dynamics, something often ignored even by the specialists in the field. But once used, these models easily can change the course of events they forecast, they can be self-destroying prophecies. While this does terrible damage to their forecasting accuracy it often can be welfare increasing, so the latter is the only ultimate measure for an evolutionary macroeconomic policy model.

Outlook

Of course, such detailed and multi-facetted work does not result in an overall general policy prescription. What it actually does, is to transform ill-posed and often too general questions into operational and clearer options to be chosen from. E.g. the question of more market processes or less market processes in a policy field leads to an algorithmic specification of possible market mechanisms to be combined with several types of non-market mechanisms. Properties of simulated combinations of these can be compared in their short- and long-run implications - and instead of a grand ideological decision down-to-earth options become visible.

Indeed this property of being specific, close to the disequilibrated, non-linear world we are living in, is the great advantage of evolutionary macroeconomic policy. This is exactly what makes it attractive for political decision makers – at least those interested in rational decisions. It is, or at least tries to be, the opposite of a religious economics, a system of faith in general principles that are fitted to every newly appearing situation.

Despite its most promising future, evolutionary macroeconomic policy must said to be still in its infancy. The tasks and methods of evolutionary macroeconomic policy described so far certainly bypass Keynesian macroeconomic policy, not to speak of (the avoidance of) policies implied by the new classical macroeconomics. They are, what postmodern chatting would denounce as ‘grand story’. And a grand story will need a grand community of researchers for its evolution.

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