Axel in Wonderland: DSGE[1]

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The people who do DSGE expertly have skills that I do not possess and some of which I envy. Fortunately, the authors of this paper have already benefitted from comments and criticisms by members of the DSGE guild at eleven (11!) prior conferences. It is not false modesty to say, therefore, that I cannot hope to add anything that would be seen as valuable from the inside of this enterprise. Comments by an avowed outsider will not be helpful to the authors in improving their paper, but perhaps they might serve as a basis for discussion across a cultural divide.

The question

The strength of DSGE models, note the authors, is their "sound, microtheoretical structure." Until very recently, however, "one of (their) shortcomings …. (has been) the lack of a reference to unemployment." Until recently, a lack of reference to finance was another such shortcoming that might make outsiders somewhat doubtful of the claim in this paper that these models are "particularly suitable for forecasting and policy analysis."

Recently, several papers, referenced by the authors, have introduced unemployment in DSGE models and have attributed it to "labor market frictions." The alternative hypothesis advanced in the present paper is that unemployment is due to "market power in labor markets." The question then becomes *are changes in unemployment due to shocks to the labor market mark-up or to "preference shocks that shift the marginal disutility of labour."* The contribution made by this paper to the DSGE literature is that it offers a way to solve the identification problem between these two explanations that has bothered prior authors.

The problem for this outsider is to make sense of the question. To be frank, it makes me feel transported into a Wonderland of long ago -- to a time before macroeconomics was invented. (One has to recognize, of course, that DSGE practitioners of a New Classical persuasion do feel that it would have been altogether better if macroeconomics had not been invented.) The paper poses a choice between two hypotheses, neither of which has much intuitive appeal. The problem is that *it excludes alternative hypotheses.*

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[1] Comment on Jordi Gali, Frank Smets and Rafael Wouters, "Unemployment in an Estimated New Keynesian Model" at Research Workshop on "Analyzing the Macroeconomy: DSGE versus Agent-based Modelling", Central Bank of Austria, June 15-16, 2011.

Backtracking

I often find it useful to think of the History of Economic Thought as a growing *decision tree*. We have arrived at the present state of the subject through decisions made by prior contributors who have persuaded the entire economics profession, or some especially influential segment of it, to take a particular sequence of forks in preference to what seemed the alternatives at the time. DSGE is a branch of the tree that has prospered in recent years and here we are posed with a choice between two of its outermost twigs. (I find myself perched on another branch altogether.)

The two twigs between which we are supposed to choose are: (1) *Either* a rise in unemployment is due to an unexplained shock to the labor-leisure preferences of a representative agent such as to cause a spontaneous rise in "laziness" (as I think Modigliani characterized it years ago), *or* (2) that same optimizing representative agent somehow imposes a mark-up on his wage with the result of making himself "involuntarily (sic!) unemployed". (This sounds odd, of course, but having accumulated a lot of DSGE mileage, the representative agent has been taken into the shop and rebuilt to modern specifications. I'll have to return to that in a bit).

Partial vs general analysis

DSGE constructions are models of "general interdependence" as they were often called when I was a student. But here unemployment is treated as a *partial equilibrium* problem in the labor market.

It was one of the lessons of an older brand of Keynesian economics that a disequilibrium arising in one part of the economy will disequilibrate also markets where *ruling prices are exactly at the levels that would obtain if the economy were in general equilibrium.* In particular, if the rate of interest were above its GE level, one result would be unemployment even at the "right" (GE) level of real wages.[2]

Note that downward wage flexibility is unlikely to help in this situation. As long as intertemporal prices are wrong, lower wages will not clear the labor market. If wages were to be *very* flexible, it would make matters worse. Falling wages and prices would disequilibrate balance sheets in Fisherian debt-deflation fashion.

The point of this piece of analysis would apply with multiplied force if intertemporal markets were not just disequilibrated by a market rate higher than the natural rate of interest but were thoroughly disrupted by a financial crisis.

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[2] This old piece of analysis might be of particular interest to people preoccupied with the *zero lower bound* to the interest rate as a serious problem in our current situation. (But interest targeters had better think twice about assuming the natural rate to be negative).

We may conclude, I believe, that it is wrong to presume that either the origin or the solution to problems of unemployment must necessarily be found in labor markets.

The old model representative agent

Representative agent models will not admit fallacies of composition. Keynes taught the Paradox of Saving: if households try to save more than the business sector invests, they will not succeed; instead income will fall. Milton Friedman had his own favorite version of the fallacy: if everyone tries to add to their money balances when the money supply is held constant, most will not succeed; instead, incomes will fall. The fallacy of composition for our times might be called the Fallacy of Deleveraging: if everyone tries to deleverage, most will not succeed; instead asset prices and incomes will fall all around.

Representative agent constructions that do not admit fallacies of composition thereby eliminate from the models the major sources of *instability* in the economy.

The new model representative household

In this paper, the old representative agent is replaced with a "representative household", consisting of an infinite number of infinitesimal workers. The workers have utility functions for consumption and leisure. The populous "household" maximizes a utility function that is the double integral of the individual utility functions. (I imagine a *pater familias* who performs the calculation for all his dependents). Thus, if I understand it correctly, additive, cardinal utilities and hence also interpersonal utility comparisons are back with us.[3]

The individual workers labor under two curses but enjoy one blessing. First, they suffer from "unions" who might "exogenously" increase the wage mark-up and cause unemployment. It is not known where these "unions" come from (or what they optimize) but they are in any case not under the control of the utility maximizing "household." Secondly, there is the well-known "Calvo curse". It too is "exogenous". Each category of workers participates in a lottery each period. The losers are not allowed to adjust their wage to market conditions during the period in question. This imparts some frictional stickiness to the average wage of the economy.

However, thirdly, there is the blessing which turns the lottery losers into winners in another respect. The "household" is a risk-sharing organization which ensures that everyone enjoys the same consumption whether employed or not.[4] The authors

[3] When I was a graduate student (some time ago) we were taught that this was 19th century utility theory which 20th century economists were obliged to abandon. This is the 21st century however.

[4] Somewhat of an improvement on the "welfare home" ideal of the Swedish Social Democratic party of my childhood!

note (fn 6) that the model has a bit of a problem explaining labor force participation as a consequence. But this is the sort of problem that keeps a modern research program going. Somebody, we can be sure, will soon come up with a variant of this model where this problem is disposed of.

Perhaps we might assume, for example, that the "union" – remember there is a union? – assigns jobs to its members in order of seniority. Presto! Now the model explains one more stylized fact, namely, youth unemployment. And we have not even messed with the mathematics, so the model is as "rigorous" as ever. Pure scientific progress!

Do these modifications of the old representative agent model affect the instability issue? I do not think so. The maximization by the *pater familias* would seem to guarantee against the usual fallacies of composition. So the clever solutions that the paper devises for problems that have emerged within the DSGE program do not address the instability problem.

One additional note is in order. The usual objection to the "old" representative agent constructions has been that it ignores the heterogeneity of agents. This model can claim heterogeneity of a sort within the "household". Heterogeneity of expectations and of strategies in financial markets would make the system somewhat *less* prone to instability (as Keynes noted ages ago). Serious trouble arises when too many agents try to do the same thing at the same time. But the heterogeneity postulated for this model is of no consequence in this respect.

Instability

It is true, of course, that the DSGE literature has moved beyond single agent models. In so doing, has it reintroduced the most relevant fallacies of composition? I do not know. But I believe it is true to say that the DSGE school has paid little attention to unstable processes. The diagnoses of our current problems that we get from DSGE practitioners tend all to run in terms of *stable GE systems beset with "frictions."*

My own belief is that such explanations *misdiagnose* our problems in the most serious way. About 200 years ago, bank runs taught us the instability of fractional reserve banking. It took us more than a century to find ways to stabilize old-fashioned commercial banking systems. But the solutions proved temporary. The economic system evolved beyond the means of control that were fashioned in the wake of the Great Depression. Today, the entire financial system, not just the fractional reserve deposit-taking banks, is unstable.

Macromodels that ignore problems of instability *are dangerous* to the health and welfare of untold millions of people.

Multiple equilibria?

One reaction to the charge of ignoring instabilities that I have heard from one distinguished DSGE practitioner is that the system "cannot be unstable" because then it would either have already exploded or imploded. This argument is supposed to justify ignoring the possibility of instabilities. As pointed out by Willem Buiter, however, this mistaken view of the matter seems to be due to the practice of assuming linearity around the solution point as a supposedly harmless way of making DSGE models easier to solve.

A somewhat more plausible argument in favor of DSGE is that these models can accommodate multiple equilibria and that, when this is the case, some of these will be unstable. So, it is argued, the criticism that DSGE theory generically ignores instabilities is false. But this defense is not without problems.

One such problem, of course, is to determine which of the multiple equilibria the system will settle on. Here, theorists have often resorted to coordination by "sunspots." In astronomy, sunspots are empirically observable apart from their consequences. In macroeconomics, that is not so and the scientific status of the sunspot literature, therefore, dwells in a darkness where no sunshine ever penetrates.

But the basic stability problem with GE models is rather different. Recall Walras' problem with the possibility of "false trading." The simplest illustration assumes pure exchange in an Edgeworth-Bowley box. If some trade were to occur at a price different from the equilibrium price, the exchange process will not terminate at the solution point determined by the Walrasian equilibrum conditions. The disequilibrium trade shifts the initial endowment.

In a financial crisis, this problem becomes *infinitely worse*. Not only do defaults shift the endowments about, but they keep changing the dimensions of the box. Furthermore, a great many agents will suffer Knightian uncertainty about what their endowments may be and what they may end up being. The probability that the system would settle in *any one* of its multiple initial equilibria is basically zero.

Transversality and the Conduct of Monetary Policy

The "household" invented by the authors internalizes just about anything they please, including I suppose the entire structure of debts and claims in the economy. An economy with more than one household – if you will forgive such a flight of fancy! – would have the problem of coordinating saving and investment decisions over an infinity of future periods. A model of an economy that does that successfully would have the trading plans of all its members tied together by a transversality

condition at the end of time. This kind of structure has figured prominently in recent monetary policy .

A brief attempt at perspective: One or two centuries ago, the price level was supposed to be governed by the demand and supply of gold while central banks managed the volume of credit. Today central banks manage the price level and trust in the transversality condition to control credit.

If reliance on the gold standard meant putting your faith in a "barbarous relic", trusting in the transversality condition is surely nothing but pure and utter superstition. This figment of economic imagination simply has no counterpart in the world of experience. Every bubble that ever burst is proof of this fact. It should be removed from our models.

From the standpoint of the DSGE tradition, the consequences would of course be drastic. If you remove the capstone from a Roman arch, everything crumbles. Remove the transversality condition from DSGE models and everything unravels. Without it, there is nothing to guarantee that individual intertemporal plans are consistent with one another. The system lacking an empirical counterpart to the mathematical economist's transversality condition is likely to experience periodic credit crises. Such crises reveal widespread, interlocking *violations of intertemporal budget constraints*. Walrasian constructions, even those of recent vintage, take for granted that budget constraints are binding. To do GE without budget constraints is not easy (unless, of course, we feel free to assume that all agents are part of the same "household" so that no market exchange takes place at all).

Conclusions

One must conclude, I believe, that a Walrasian equilibrium modeling strategy is *hopelessly inadequate* for dealing with financial crises and their aftermaths. Certainly, the claims that these models have "sound microtheoretical foundations" and are "particularly suitable for forecasting and policy analysis" are without merit. It is particularly unfortunate at this time that so many central banks have sunk so much intellectual capital in the DSGE enterprise.

Disposing with transversality makes us see the economy as an 'open" system that does not evolve along some foreordained – even if stochastic – path towards a fixed endpoint. So seeing it will have two consequences. Firstly, it will force us to adapt our analytical and empirical methods to the nature of our subject matter. Secondly, after three decades of New Classical dominance, it will make *stabilization policy* once again a central concern of macroeconomics.