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Nature of an economy

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The financial crisis and the ensuing recession have prompted reappraisals of the state of macroeconomic theory. Opinions differ on how serious are its problems but critics and defenders alike are agreed that they should be addressed by systematically examining and, where deemed necessary, modifying the assumptions of the reigning dynamic stochastic general equilibrium (DSGE) theory.

This is a rather natural reaction to conceptual failure. But is it the right strategy?

- How many critical assumptions are there that need to be reexamined?
- What is the framework within which we identify the assumptions that seem critical?
- How do we count the presumptions of which we may not even be aware?

Macroeconomics by now has a long history of responding to troubles besetting the theory prevailing at any given time by changing one or more of its assumptions – and then moving on from there.

But this collective strategy seems now to have landed us in a worse mess than ever. Might our problems lie deeper?

A look back[1]

In the *General Theory*, Keynes proposed a theory in which flexible money wages would not restore the economy to full employment and very flexible wages would produce financial catastrophe.

The IS-LM model, which originated as an attempt to formalise the verbal economics of Keynes, led after years of debate to the seemingly inescapable conclusion that unemployment had to be due to the downward *inflexibility* of money wages. This old neoclassical synthesis thus cast Keynesian economics as a stable system with a "friction", rather than a theory of an economy harbouring dangerous instabilities.

Models with "rigid wages" were not of much use when the nominal scale of Western economies came adrift in the 1960's and 70's. The 'ad hoc' response was to paste the Phillips curve onto the IS-LM model. This became the Achilles heel of the IS-LM brand of Keynesian economics.

By restating the Quantity Theory in first differences, Friedman (1968) fashioned the perfect tool of attack, accounting at the same time both for the instability of the Phillips Curve and the Fisher premium on nominal interest rates. In the course of so doing, however, he also introduced the concept of the "natural rate of unemployment."

In Monetarist theory, flexibility of wages were sufficient to guarantee that the economy would converge on this natural rate of unemployment – a doctrine that held sway in macroeconomics for 40 years.

In Keynes' theory, this proposition was false. If desired saving did not equal investment at the natural rate of unemployment, flexibility of wages would not make it converge on that rate. Monetarist theory completely neglected the saving-investment problem. This came to entail as well a neglect of the role of credit markets in furthering or hindering the coordination of saving and investment.

The main tradition in monetary policy theory since the days of Henry Thornton had focused on the stabilisation of credit in regimes with convertible money. Monetarist policy doctrine was exclusively concerned with stabilising the price level. It was certainly natural to give priority to this objective at a time when the US was shedding the last vestiges of gold convertibility and going onto a pure fiat standard. But forgetting about the potential instability of credit stored up problems for the future – or, should I say, for the present that we are now living through.

Friedmanian Monetarism did not last long. Robert Lucas believed in Friedman's theory but

1 I have tried to tell the story of the evolution of macroeconomics, for example, in Leijonhufvud (1981 and 1992).

thought it lacking in microfoundations. He showed how the instability of the Phillips curve and the Fisher premium could be explained while obeying the dictates of optimal choice theory. His model, however, had the property that only "unanticipated" changes in the growth rate of the stock of money would cause unemployment to deviate from its natural rate.

This was not a position that Friedman shared. Before very long it also became generally regarded as untenable for a combination of empirical and theoretical reasons. But this did not lead to a return to Friedmanian economics. Instead, the analytical method pioneered by Lucas and his New Classical collaborators steered macroeconomics in a radically different direction.

The problem, as it was seen at the time, was to explain variations in employment without resort to "unanticipated money" or, of course, to the saving-investment problem which was by then forgotten. The response, led by Edward Prescott, was Real Business Cycle theory. In this theory, variations in output and employment were optimal responses to exogenous (i.e. unexplained) variations in productivity growth. The business cycle was a perfectly coordinated equilibrium motion of the system. Real business cycle theory became the main vehicle for the development of DSGE theory. This theory had no independent role either for money or for finance.

Coordination in Real Business Cycle theory was only too perfect. The New Classical tradition had by and large neglected problems of short-term adjustment whereas a good deal of work on such matters had been done in a more or less Keynesian vein. In the years immediately preceding the crisis, the New Classicals and the New Keynesians began to converge in what became known as the "New Neoclassical Synthesis". The New Classicals incorporated some of the "frictions" of the Keynesians while the latter adopted the DSGE framework developed by the former.

No one would dispute that we have learned a great deal in the 50-60 years interval between the Old and the New Neoclassical Synthesis. One example is the Bernanke-Gertler Financial Accelerator and related Credit Channel work (e.g. Kiyotaki and Moore 1997) that built on the contributions of Akerlof, Stiglitz and Greenwald on the implications of asymmetric information in credit markets. Another example is the development of the matching theory of labour markets for which Diamond, Mortensen and Pissarides, building on McCall (1970)[2], have just (and justly) received the Nobel. These contributions have done away with the primitive and utterly naïve notions of "perfect capital markets" and "perfectly flexible labour markets" that I remember from my days as a student 50 years ago.[3]

Important as these advances in our knowledge of how markets work undoubtedly are, our understanding of how an economy works has failed to progress in one important respect. The Old Neoclassical Synthesis, which saw the economy as a stable general equilibrium system hampered by the frictions of sticky wages, drew the wrong lesson from the Great Depression and the dramatic wage deflation that it caused in the US. The New Neoclassical Synthesis has brought us back full circle to this notion of the economy as a stable general equilibrium system with frictions.

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The Old Synthesis was wrong back then and I believe the New Synthesis is wrong today. It does not recognise the instabilities lurking in the economic system.[4]

Getting it backwards

For a good many years, Tony Lawson has been urging economists to pay attention to their ontological presuppositions (see Lawson 1997). Economists have not paid much attention, perhaps because few of us know what "ontology" means. This branch of philosophy stresses the need to "grasp the nature of the reality" that is the object of study – and to adapt one's methods of inquiry to it.

Economics, it might be argued, has gotten this backwards. We have imposed our preconceived methods on economic reality in such manner as to distort our understanding of it.[5] We start from optimal choice and fashion an image of reality to fit it. We transmit this distorted picture of what the world is like to our students by insisting that they learn to perceive the subject matter trough the lenses of our method.

The central message of Lawson's critique of modern economics is that an economy is an "open

2 For another example of important work stemming ultimately from McCall, see Ljungqvist and Sargent (1998).

3 I must note, however, that the frequent references to these matters as "frictions" reveal that other-worldly notions of "perfect markets" still has a hold over the profession's thinking.

4 Cardoso and Palma (2009) also argue that we have gotten the relationship between method and subject matter backwards. Their complaint, however, is less that in so doing we have distorted the nature of the reality under investigation than that we have lost all definition of our subject matter, letting it become "things generally."

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system" but economists insist on dealing with it as if it were "closed." *Controlled* experiments in the natural sciences create closure and in so doing make possible the unambiguous association of "cause" and "effects". Macroeconomists, in particular, never have the privilege of dealing with systems that are closed in this controlled experiment sense.

We transmit this distorted picture of what the world is like to our students by insisting that they learn to perceive the subject matter through the lenses of our method.

Our mathematical representations of both individual and system behaviour require the assumption of closure for the models to have determinate solutions. Lawson, consequently, is critical of mathematical economics and, more generally, of the role of *deductivism* in our field. Even those of us untutored in ontology may reflect that it is not necessarily a reasonable ambition to try to deduce the properties of very large complex systems from a small set of axioms. Our axioms are, after all, a good deal shakier than Euclid's.

Optimisation, equilibrium and rational expectations

The impetus to "closure" in modern macroeconomics stems from the commitment to optimising behaviour as the "microfoundations" of the enterprise. Models of "optimal choice" render agents as automatons lacking "free will" and thus deprived of choice in any genuine sense.[6] Macrosystems composed of such automatons exclude the possibility of solutions that could be "disequilibria" in any meaningful sense. Whatever happens, they are always in equilibrium.

The extension of this formal program to "in time" behaviour required assuming that economic agents possessed the knowledge of the future required for the calculation of intertemporal optima. Previous generations of economists had shied away from assuming perfect foresight (Hicks 1938 and 1985). In the 1930s, theorists like Hayek, Lindahl and Hicks began dealing systematically with the role of expectations in the business cycle. To them, expectations about the future induce actions in the present that create the future – but the future realised seldom corresponds to what was generally anticipated. The economy is an open system in Lawson's sense. The multiplier-accelerator models that were developed a decade or so later embodied this same perspective.

It is a practical matter. George Soros' analysis of financial markets starts from the realisation that present beliefs about the future induce actions that create the future. He calls this conception "reflexivity" (Soros 2008). The investor who can assess current market sentiment and infer how it will produce a future different from what is generally expected can make a profit. If he reads the market incorrectly or makes the wrong inference, he will suffer a loss.

Rational expectations is the special, degenerate case of reflexivity where the future actually realised is always a random draw from the universally believed and true Gaussian distribution of possible futures. *This assumption makes the economy a closed system.*[7] Agents are supposed to possess (probabilistic) knowledge of an *objective* reality – a reality that they have been able to learn. The Gaussian lottery might produce a gain or a loss. But the quality of the individual investor's information about the state of the market and his ability to draw the proper inferences from it have no bearing on the outcome of the lottery.

In the general case of reflexivity agents do not only have to form expectations about a future objective reality but must also form an opinion about the expectations of other market participants. A little reflection will show that behind such second-degree expectations lurk ever higher degrees of expectations – a house of mirrors in which objective reality can get lost altogether.[8]

Muth and the Cobweb

The "Cobweb theorem" that prompted Richard Muth's original Rational Expectations paper (Muth 1961) came from agricultural economics (Ezekiel 1938). It showed that if farmers chose the acreage to plant for next year's crop on the basis of the price received for this year's, price and output would fluctuate, producing an alternating sequence of foregone profits and actual losses.[9] Farmers behaving in the manner presupposed by the Cobweb would make costly errors every time.

Muth demonstrated a way in which farmers could learn to gear their planting decisions to the statistical expectation of next year's price. Acting

6 It is interesting to compare Lawson's position to Spiro Latsis' (1972) critique of neoclassical economics. The literature that Latsis dealt with forty years ago did not take the substantive rationality of agents for granted. Instead, the common strategy for obtaining unique theoretical behavior predictions was "situational determinism", that is, to fashion assumptions that structure the decision-problem of agents so as to leave them only a "single exit."

7 As Daniel Heymann has long insisted, it is logically indefensible, therefore, to revise the structure of a rational expectations model in light of experience.

8 This problem was analysed at length and in depth – but to little effect on the profession -- by Phelps, Frydman, di Tata and others in Frydman and Phelps, eds., (1983).

9 Given the price elasticity of output and the output elasticity of demand price for most crops, the usual cobweb model should produce divergent oscillations – making it still more implausible.

on this *rational expectation* would eliminate the irrational cobweb fluctuations. The statistical inference procedure that Muth proposed is not necessarily the most plausible learning model to generate this result.[10] A farmer badly burned two years in a row just might change his behaviour on the basis of a sample size of two!

The more interesting point about Muth's case, however, is that the conditions of the problem are such as to make it plausible that the rational solution might be learned. First, there is an *objective* reality to be learned that is not subject to the whims and foibles of market sentiment, namely, the distribution of annual weather conditions and their effects on crop yields. Second, price adjustments must bring supply and demand into balance within the *fixed time interval* of the crop year.[11]The conjunction of these two conditions creates an event correspondence between weather and price that, once learned, makes rational expectation behaviour possible.[12]

Synchronicity

The conjunction of the two conditions above, which make rational expectations somewhat plausible, is seldom realised. The second condition, the existence of a fixed given time period over which "the law of supply and demand" must do its work, deserves some additional comments because it is somewhat unlikely to appear on the list of assumptions to be reexamined when macroeconomic theory runs into trouble.

Instead of markets for wheat or corn, consider the world markets for oil or natural gas or some mined minerals. In these latter cases, there is no "natural period" over which price equilibrates production and consumption. Price is not uniquely determined by "fundamentals" of tastes and production functions. It is of course generally understood how changes in fundamentals will affect prices over time. But at any given date, expectations about the expectations of other market participants play an unavoidable role in the management of inventories and in decisions to buy or sell. Learning will not eliminate the heterogeneity of expectations. Traders may not make systematic errors but they will continue to make errors.

The heterogeneity of expectations associated with the lack of synchronicity means that there will be a *range of indeterminacy* within which the market clearing price may temporarily settle. This range will be bounded. There will be prices so high (or low) that the predominant opinion of market participants will deem them unsustainable – and this will become a self-fulfilling belief. The width of this range of indeterminacy will vary over time. Prolonged periods of tranquillity when speculation tends to stabilise the *level* of the price within a narrow range will contrast with occasional bouts of speculation extrapolating its *rate of change* which will greatly extend this range of indeterminacy.

The mathematical representation of the system closed by assuming rational expectations made it possible to prove a variety of propositions -- such as Ricardian equivalence and other policy ineffectiveness theorems -- that ran counter to the received wisdom of the time.

When the conditions of Muth's case fail to be satisfied, we are not entitled to assume (1) that all market participants will learn the same thing or (2) that what they learn will be an objective truth. Yet, economists have taken rational expectations from the original context of this special case and have run with it in every conceivable direction. In macroeconomics, it has been applied to infinite dimensional state spaces spanning not only all futures markets but an infinity of non-existing markets as well.[13]

The mathematical representation of the system closed by assuming rational expectations made it possible to prove a variety of propositions -- such as Ricardian equivalence and other policy ineffectiveness theorems -- that ran counter to the received wisdom of the time. Nothing is more seductive to young recruits into a field than the debunking of received wisdom. The attraction of rational expectations was further enhanced by the challenge of explaining how things might go wrong in a world where all agents know perfectly well what they are doing.[14] Thus, rational expectations generated a good deal of

10 As Sydney Winter pointed out to me, the evidence from experimental economics is less than encouraging with regard to the ability of ordinary subjects to draw correct statistical inferences.

11 In markets for livestock where this condition does not apply a few rounds of cobweb fluctuations will occasionally be observed. Kaldor's term, "cobweb", refers to a picture on a blackboard. The older name for it -- the "hog cycle" – refers to events in an actual market.

12 It remains an open system nonetheless, of course. The correspondence between weather and realised price may shift for a number of reasons, such as a lowering of transport costs from a lower cost region – or, of course, global warming. It is not necessarily the case, moreover, that an exhaustive list of possible reasons can be compiled.

13 The market clearing conditions is even asserted to hold at each point of time in continuous time models where neither the "price" nor the equality of flow-densities of supply and demand have any sensible interpretation.

14 The answer to the many varieties of this puzzle is, of course, incentives. The further puzzle then becomes to explain what rational agents have structured incentives for people in such a manner as to produce undesirable results. The most popular answer to that one has been "politicians" or "government." The cynical innocence of modern economics has a certain mathematical inevitability about it!

revolutionary fervour in its time. The excitement has ebbed but slowly as rational expectations theory has itself congealed into a new orthodoxy deemed suitable for the indoctrination of succeeding generations.

Doing without

Rational expectations envisage the economy as a train travelling through a Markovian switching yard. Everybody on board! All with the same mental baggage neatly packed. At predetermined, constant intervals the train switches – clickety-clack – onto a new track chosen by a draw from a fair lottery. The tracks have been laid once and for all (and there are no derailments). Not necessarily the most profound image of the human condition! Yet, giving up this conception of *the nature of an economy* would force us to modify our methods. Accepting that the future cannot be known with certainty, even as a probability distribution, means recognising that we are dealing with an open system. And then the usefulness of many tools of the trade comes into doubt.

Agents in such a system have to *adapt*[15] to events the probability of which they had not estimated correctly – or which they may not even have imagined. Obviously, intertemporal optimisation cannot then be a "true" representation of behaviour. The problem is that treating behaviour as adaptive opens the door to all sorts of non-linear behaviour and one would not like to see macro theory reduced to little else than rummaging in the toy box of complex system dynamics.

Our accustomed analytical techniques may still have their uses in studying the open system. In periods of prolonged tranquillity, agents are apt to pay attention to the rates of intertemporal substitution that they see themselves as facing and to do so for some distance into the future. This will tend to dampen the economy's tendency to fluctuate. It will at least suppress high-frequency oscillations. This is captured by intertemporal optimisation models which may thus provide *approximations* of observed behaviour. In making such use of them, however, we had better remember that transversality conditions at an infinite time horizon are not to be taken seriously. Every bubble that ever burst proves transversality false. So, how far to trust these models becomes a question of judgment – and not an easy one.

In volatile times, people find themselves forced to react to current events. These events, moreover, will often disrupt plans that may not have been made at all long ago. Intertemporal planning over significant stretches of time come thus to be seen as futile. The lesson is one that Daniel Heymann has insisted on for a long time, namely, that behavioural time horizons vary endogenously and macroeconomic theory has to reflect this fact (Heymann and Leijonhufvud 1996 and Leijonhufvud 1997).

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Volatility shortens time horizons. Short-sighted adaptive behaviour generates non-linear dynamics. So volatility causes short-termism which causes volatility. This positive feedback loop runs away with the economy in a crisis. Heymann and I discussed the disappearance of intertemporal markets and the volatility of relative prices under high inflation conditions in these terms. In recent credit crises, we have seen a similar phenomenon at work when, at times, major monetary policy decisions had to be made on Sundays because they could not wait 'til Monday.

Making the distinction between tranquil and volatile conditions does not by itself take us very far. But it serves to raise a number of questions that have not received the attention by macroeconomists that they deserve. How does the behaviour of individual agents and of the economy as a whole differ in a deep recession or high inflation from normal times? What, if anything, do the two extremes of monetary instability have in common? In what respects are they each other's opposites? What will take an economy across the boundary from tranquil to volatile conditions? How can we make it back?

Budget constraints

So far I have argued that, in the "open" system, many prices will be indeterminate (albeit within limits), that economic behaviour has to be understood as fundamentally adaptive, that behavioural time horizons are variable, and that the sets of markets and relative prices may change endogenously. General equilibrium theorists are apt to think that I am making an utter mess of our subject. Probably right. But then, of course, reality may at times be even messier. To take account of that fact, I believe, we must reconsider also the role of the budget constraint in economic theory.

We have learned that an economy may still show a good measure of structured order even if its participants are not super-intelligent or all that rational. Gary Becker showed long ago (1962) that demand curves would still slope downwards even if agents were "irrational'" as long as they were disciplined by the budget constraint. More recently, Gode and Sunder

15 The Trento Summer Schools, of which there have been eleven editions so far, have all come under the general heading of "Adaptive Economic Dynamics".

(1993), in a contribution that has spawned quite a literature, demonstrated that markets would attain a high degree of efficiency even with "zero intelligence traders."[16] The mechanism that ensures this result is again the budget constraint.

The budget constraint is one of these assumptions that seem to escape attention when the real world generates yet another example of something being amiss with economic theory. Janos Kornai is a rare example of an economist who has paid attention to it. A quarter century ago, he came to focus on the budget constraint in trying to understand the inefficiencies of socialism. In a system where plan objectives would often override the break-even requirement for enterprises, the budget constraint was "soft". Kornai showed that the price mechanism would not perform the allocative functions we usually attribute to it under these conditions.

In economic crises, budget constraints are not "soft" but they are *broken* (Leijonhufvud 1998 and Heymann 2008). In deflation or depression crises, the budget constraint violations are concentrated in the private sector. In high inflation or hyperinflation crises, it is the sovereign that violates equal-value-in-exchange. The sovereign's prerogative to "create money" means that the macroeconomic consequences differ drastically from those arising from private sector financial crises.

The "normal" functioning of a capitalist economy depends on budget constraints being binding. When large and/or widespread violations of the equal-value-in-exchange condition occur, the adaptive dynamics of such a system will be very different. Nothing much works as supposed in economic theory unless budget constraints actually do bind.[17] Standard general equilibrium theory, even in its modern dynamic stochastic variants, is not particularly helpful when budget constraints are violated.

Nature of an economy: Instabilities

The image of a capitalist economy as a stable general equilibrium system somewhat hampered in its functioning by "frictions" is, I believe, an inadequate guide to the realities we have to cope with. It is in the *nature of an economy* to harbour the possibility of serious instabilities. It is possible to make some conjectures about the qualitative properties of its dynamics.[18] The most damaging instabilities stem from budget constraint violations. It is best to begin by distinguishing between budget constraint violations by private parties and by the sovereign.

Imagine first a state space representation of the private sector divided into three regions. Over the *first region (M1)* of the space the market sector would show "normal" behaviour. Negative feedback controls dominate in all markets and "stabilisation policies" in the conventional sense are not useful. In the *second region (M2),* destabilising (positive) adaptive feedbacks occur but are fairly tightly bounded. The Keynesian multiplier and the financial accelerator are examples. The economy goes through "business cycles". Monetary and fiscal policies may be useful to change liquidity or directly affect aggregate demand. In the *third region (M3)*, we find the really dangerous instabilities such as default avalanches. Somewhere in this region lies the "black hole" of a Fisherian debt-deflation catastrophe.

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In the process that can propel the economy from Region M2 into Region M3, *leverage* (Geanakoplos 2010 and Leijonhufvud 2009a) plays the crucial role. The slow build-up of leverage in the economy increases the connectivity of the network (Leijonhufvud 2009b) of debts and claims and combines with the underlying maturity mismatch to make the system more fragile. When the financial sector eventually switches into deleveraging, the connectedness of the system will bring several deviation-counteracting mechanisms into "sync".

The state space for a system governed by the finances of the sovereign would give us a *first region (S1)* with budget surpluses or credibly sustainable deficits. A *second region (S2)* has deficits that engender expected inflation with a corresponding Fisher premium on the interest rate. In this region, however, the government retains some substantial measure of control of the situation. The *third region (S3)* on the public side is one of high inflation where control has been lost. Short-term inflation expectations respond with great alacrity to government actions while longer-term expectations are too ill-defined to support intertemporal markets of any kind. The "black hole" on this side is, of course, true hyperinflation (Heymann and Leijonhufvud 1995 and Leijonhufvud 1998).

16 Of course, Becker as well as Gode and Sunder analysed simple low-dimensional cases but I am willing to believe that the general import of their results might often apply also in higher dimensions. To believe that they always apply requires too much faith in transversality however!

17 Insurable risks of default can, of course, be handled with standard tools. But the risks that materialise in a financial crisis have not been insured against. In cases of contingent contracts, deciding what constitutes breach of contract can be a tricky business. For some discussion, see Heymann (2008, p. 76)

18 The following sketch of 2 x 3 state space regions is taken from my (2010). It elaborates a bit on the "corridor hypothesis" I advanced about 40 years ago.

On this side, the main mechanism taking the system from Region S2 into Region S3 is the Olivera-Tanzi effect (Olivera 1967 and Tanzi 1977) that is, of course, well-known to all Argentine readers.

One more point under this heading. In the main, macroeconomics has dealt with relationships between flow variables. The unstated presumption is that balance sheets have developed more or less "on track".[19] In Regions 3M and 3S, balance sheets are seriously "out of balance" and *this dominates the dynamics of the system* (Koo 2003). In severe recessions, it is the attempts in the private sector to deleverage so as to restore balance sheets to a reasonably healthy state that are the main problem. In high inflation, it is the complete atrophy of the financial sector that prevents the economy from growing because growth cannot be financed.

Double jeopardy

We are used to thinking of depressions and high inflations as opposite extremes on a spectrum of possible macroeconomic conditions. But one is caused by insolvencies in the private sector and the other by the insolvency of the government. The one condition, unfortunately, does not exclude the other (Heymann 2008).

Government resources have to be used to bring the private sector out of a deep recession or depression. Resources have to be transferred from the private to the public sector to bring high inflation under control. But if the finances of one sector are already strained when the other gets into trouble, there may be no very palatable policy options. Latin American financial history contains a number of episodes where in order to avoid depression, governments nationalised the bad assets of their banking systems – and the policy so undermined the public finances as to throw the economy into high inflation.[20]

At present, as we are all aware, the policies of the US and of Europe are in conflict. On both sides of the Atlantic, governments see themselves facing a double jeopardy – a significant probability of finding yourself damned if you do and damned if you don't. Germany, so far thriving on its exports, is forcing the Eurozone to give priority to the longer-run financial stability of governments. The new UK government is moving in the same direction. So far the U.S. administration has been willing to go deeper into deficit in order to bring the private sector back towards a more satisfactory level of employment.

Both sides find themselves having to play the same game of double jeopardy but they do not perceive the options in the same way. The main difference may be that the US authorities have learned that volatility in the world economy increases the demand for dollar-denominated assets in the medium run even as the fiscal balance of the federal government looks increasingly precarious over the longer run. No other country enjoys this benefit – and the temptations that come with it.

We economists have to be clear about the limits to our knowledge.

Europe and the US acting at cross-purposes never did bode well for the economic recovery of what used to be known as the "Western powers." The Republican election victory now spells the end of renewed stimulus spending. This leaves us with redoubled efforts at "quantitative easing" by the central banks. That strategy, I am afraid, carries some risk of putting us in *triple* jeopardy.

In this situation, we economists have to be clear about the limits to our knowledge. We know something about what needs to be done to stop a high inflation or recover from a deep recession.[21] I do not think we have very reliable knowledge about how to play these games of double – or triple – jeopardy.

Distribution

Modern macroeconomics has relied heavily on the neoclassical production function and has accepted the marginal productivity theory of distribution that comes with it. Intellectual heirs of Adam Smith, who believe that economic growth stems largely from the increasing elaboration of the Division of Labour, will regard this as unsubstantiated nonsense. If the productive structure of an economy shows increasing returns in a great many of its dimensions, it cannot be true that factors are generally paid their respective marginal products.

Whatever position one takes on this, however, it is obviously an issue within equilibrium economics and that branch of our subject does not have much to tell us about the distributional consequences of highly unstable processes. The main consequences are not changes in relative earnings from productive effort but redistributions of *wealth*. Ultimately, endowments will turn out to have been reshuffled but the process of reaching clarity on "who owns what" is long, drawn out and very costly.

The distributional incidence of a great financial crash does not make sense to ordinary people. The gains and losses that they experience and observe bear no relation to the rules by which

19 This is true also, I would say, of the *General Theory* and it is a major reason not uncritically to "go back to Keynes" as so may people have argued in response to the present crisis.

20 I learned this lesson from Daniel Vaz (1999) and have referred to his work frequently ever since.

21 But had economists been able to live up to their pretensions of knowledge, Japan would not have had to languish in recession for all those years.

they have led their lives. The emergency policies needed to stop the collapse of a financial house of cards midway – which ordinary tax-payers ultimately have to pay for -- do not make sense to them either. Widespread disorientation and anger provide a favourable environment for demagoguery and scape-goating of ethnic groups, of immigrants, or of foreign nations. The loss of a sense of social solidarity makes it increasingly difficult to muster sufficient consensus for policies to deal with the crisis. Needless to say, consensus among nations is even more difficult to obtain.

One example of these distributional issues is worth discussing in some detail, not because it is of great quantitative importance, but because it illustrates the kind of problems that come to the fore in the unstable Region 3 of the system's state space. It also illustrates how some of these issues have escaped public scrutiny.

The crisis should have cured us of the "pretence of knowledge" – of the illusion that had solved problems of macroeconomic instabilityto general satisfaction.

In the heydays of Monetarism, the neutrality of money was very widely accepted although it was also conceded that money was *not quite* super-neutral. Neutrality meant that monetary policy would not have any distributional consequences except those arising from people's occasional failures accurately to predict the inflation rate. Today, in the US, the Federal Reserve System lends reserves to the banking system at an essentially zero interest rate. The banks use these reserves to buy Treasuries at close to 4%. This is a hefty subsidy to the banking system ultimately to be borne by taxpayers – but neither the subsidy nor the tax liability has been voted on by Congress. Moreover, the zero interest policy of the central bank drives down the interest rate available to savers to a small fraction of 1%. At the same time, banks leverage their capital by a factor of 15 or higher, thus earning a truly outstanding rate on their capital from buying 4% bonds with costless Fed money. Wall Street bankers are then able once again to collect the bonuses they became used to in the good old days before the crash[22] and which are supposedly well-deserved because of the genius required to perform this operation. These bonuses are in effect transfers from the mostly aged savers who cannot find an alternative safe placement for their retirement funds.

22 They are also able to use these profits to repay the money committed by the government to save them from insolvency. And the government will then claim that the bail-outs ultimately did not cost the tax payers!

Conclusion

I have stressed two themes in this paper.

- The first is that we have to think of an economy as an "open system" in the ontological sense of Tony Lawson.

This will require us to adapt out methods to the *nature of an economy* – to change how we do economics.

- The second is that the economy is not globally stable but harbours instabilities.

Some of these are fairly tightly bounded but others are potentially catastrophic to economic welfare and can be deeply damaging to social solidarity and to political stability.

Macroeconomics in the years leading up to the recent crisis had become a technically demanding subject and was naturally dominated by people who were good at that sort of thing. But unless you took much pride and joy in its technical aspects, it had also become deadly *dull*.

The crisis should have cured us of the "pretence of knowledge" (Caballero 2010) – of the illusion that we understood problems of macroeconomic instability very well and had solved them all to general satisfaction. Once cured of this pretence – which is to say, once cognizant of our ignorance – we can see that macroeconomics poses a great many important questions to which my generation did not provide good answers.

That should make the subject full of intellectual excitement for those who are a few decades younger.

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