

Economic Policy and Intelligent Behavior

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1 Introduction

Robert Lucas is justly famous for his critique of economic policies that are predicated on the belief that people will continue to behave the same way after the policy is put in place as they did before. Lucas observed that policies often change the incentives that people face, and rational people react to changed incentives by changing their behavior. Thus policies conceived in the false expectation of unchanged behavior can have perverse unintended consequences.

In this lecture I propose a related critique of economic policies that are predicated on the belief that people will continue to behave as rationally after the policy is put in place as they did before. This critique is based on the idea that people are not rational in the conventional sense but they are intelligent enough to devise mechanisms and stratagems that allow them under normal circumstances to act as if they were rational. I will argue that many policies that would make sense if people reacted rationally actually undermine the very mechanisms and stratagems by which intelligent people overcome the obstacles to rationality.

In the next section I elaborate on the basic ideas underlying this policy critique, many of which are based on the view of human intelligence articulated by Clark (1997), a view that derives from modern research in robotics and cognitive science. Following that I will discuss several examples of US policies which I believe have had ill effects by undermining peoples' intelligent attempts to act rationally.

2 Rationality versus Intelligence

Most economic theory is based on the assumption that people are fully rational calculators, that we always carry out those actions that yield the highest possible expected payoff given the constraints facing us. In microeconomics, this assumption has played a central role ever since the marginalist revolution of Walras, Jevons and Menger in the late 19th Century. By the mid 20th Century Paul Samuelson was able to show in his monumental *Foundations of Economic Analysis* that all of mi-

macroeconomic theory could be unified by the paradigm of rational optimization. In macroeconomics it took longer for rationality to play a dominant role, but it was at the heart of the rational expectations revolution that took place roughly a century after the marginalist revolution. Most theoretical contributions to macroeconomics today follow the rules established by this later revolution, according to which the behavior of every agent in a model must be derived from an explicit optimization problem under rational expectations of the possible outcomes.

Although full rationality is now the dominant paradigm, there are still many dissenters. Some point to experimental evidence of systematic forms of irrationality such as money illusion, loss aversion, hyperbolic discounting, overconfidence and a preference for smaller choice sets. Others point to the practical impossibility of solving the computationally complex optimization problems that people are typically assumed to solve. Still others have pointed out that real people must often undertake economic actions in a situation of unquantifiable uncertainty, a situation where it is impossible to assign numerical probabilities to different outcomes, and hence where it is impossible to make a rational calculation.

Mainstream economists defend their assumption of full rationality against these critiques by pointing out that human intelligence can and usually does overcome the obstacles to rationality, at least to a first approximation. Consider, for example the experimental evidence of hyperbolic discounting, which to put it simply shows that the desire for immediate gratification very often leads people to save less than they had hoped before the temptation arose. People can and do take steps to protect themselves against their own destructive urges, for example by enrolling in automatic saving plans that deduct money directly from their paychecks before they have a chance to spend it.

As for the computational complexity of optimization problems, mainstream economists point out that intelligent people can and do adapt quickly when they realize that they could reap a larger benefit by changing their behavior. Such real time adaptation can often provide at least a rough approximation to the

solution of a complex optimization problem because it implies that opportunities for big improvements will not go unexploited for long. Moreover, when self interest is at stake people can be far more resourceful than any adaptive scheme the economist might devise as a model of such opportunistic behavior. So rather than getting lost in the details of the adaptive process it is better for the economist to focus on the end result, which is an approximation to fully rational behavior.

Finally, as for unquantifiable uncertainty, economists have long argued that people tend to fall back on convention and other forms of what Herbert Simon called “satisficing.” Conventional rules of behavior, such as never buying something that one cannot pay for that month, never investing more in the stock market than one can afford to lose, never putting money into a bank that does not offer deposit insurance, always charging at least some industry-wide standard markup over cost, are easily stated, easily remembered, and are validated and strengthened when adopted by one’s peer group. Although they might not be fully optimal, nevertheless if they have survived a long time then they have at least shown themselves to produce satisfactory outcomes under a wide variety of circumstances.

2.1 The embodied, environmentally imbedded mind

By and large I agree with the mainstream defense of the assumption of rationality, which I have used to underpin many of my own contributions to the discipline. But it is clear to me that rationality is not an assumption that one can always count on. This is because the processes by which an intelligent person overcomes the obstacles to rationality are not just internal to his or her own brain. Very often they involve social interactions, and as a result they can be affected by policy changes that affect the way people interact.

The idea that intelligent behavior cannot be understood by considering a person’s mental processes, independently of the person’s external environment, both the social and physical environment, has been put forth recently by Clark (1997), who claims that rather than thinking of the human mind as an abstract reasoning device whose workings can be understood

without reference to its relationship to the body and to the external world, we should think of the “embodied, environmentally imbedded mind.”

Clark starts with the idea that human intelligence evolved in a context where quick, reliable pattern recognition was essential to survival. Organisms that did not respond quickly and effectively to the presence of predators or prey were unlikely to pass their genes on to succeeding generations. The environment was more favorable to simple robust stimulus-response mechanisms than for computationally complex mechanisms that combine long chains of reasoning to arrive at accurate calculations. Indeed, he reviews evidence that attempts to program robots with complex computational capabilities and large information sets have tended to generate brittle results; such programs function well only in a restricted set of environments. It appears that something like human intelligence can be achieved only when the robots are programmed with connectionist mechanisms like neural nets that are stable and capable of recognizing patterns in a diverse range of environments, even if they are not good at long calculations.

The importance of fast pattern recognition in determining evolutionary fitness implies a premium for economizing on scarce neural resources. Humans have devised various ways for realizing such economies by off-loading cognitive tasks to the environment. So for example rather than wasting mental resources memorizing lists of things to do we write them on a piece of paper, or place reminders on a refrigerator door or a computer screen or some other place where we are likely to see them when action is needed.

Indeed it is not just the physical environment that the intelligent person learns to use as external scaffolding. In many cases we learn to off-load our cognitive tasks to other people who have learned a different set of pattern-recognition skills. Indeed this is the basis of the division of labor, as understood by economists since Adam Smith. Being able to make use of a diverse set of such skills is what generates the synergies behind the “wisdom of crowds.”

Making use of the social environment for intelligent decision making is not just a human phenomenon. We see it for exam-

ple in the behavior of termite ants that are collectively capable of constructing elaborate structures far more complex than any individual ant could possibly conceive. What is however unique to humans is our ability to create what Clark calls a “designer environment” to gain maximal leverage from our cognitive abilities through the delegation of mental tasks. We have thus created languages, computer programs, libraries, maps, telephones, organizational structures, markets, conventions, laws and customs, all of which allow intelligent behavior to be automated rather than to waste neural resources. It is these socially constructed aspects of our environment that can be disturbed or possibly impeded by policies that change the way we interact with each other.

3 US economic policy

I believe that many of the most serious challenges now facing the United States are either created or at least exacerbated by policies that degrade our capacity for intelligent behavior. I discuss these policies under the headings of regulatory policy, fiscal policy and monetary policy.

3.1 Regulatory policy

One of the most serious problems facing the whole world today is the financial crisis that was triggered by the reckless wave of borrowing in the form of subprime mortgages in the United States starting some time around the year 2000. By now everyone knows the broad outline of the story. A housing bubble fueled by easy credit burst in mid 2006, at which time many of the subprime mortgages that were taken out in the hopes that houses would continue to appreciate began to default. Large financial institutions that had invested heavily in mortgages and mortgage-backed securities either failed or needed to be rescued. When Lehman brothers, one of the pillars of Wall Street, failed in September 2008, confidence in interbank lending disappeared, leading to an almost complete shutdown of credit markets around the world. It is commonplace now to blame deregulation for this crisis.

Specifically, (1) the 1999 Gramm-Leach-Bliley Act effectively dismantled the last remnants of the Glass-Steagall Act which had prevented the merger of commercial banks and investment banks. This gave rise to a wave of bank mergers and takeovers, and allowed more and more of the financial intermediation in the United States to take place through the relatively unregulated investment bank sector, (2) the 2000 Commodity Futures Modernization Act lifted several regulations on the trading of financial derivatives such as the mortgage-backed collateralized debt obligations now commonly referred to as “toxic waste,” (3) Congress encouraged mortgage lenders progressively to relax their lending standards in hopes of allowing more low income households to share in the American dream of home ownership and (4) no one in authority called an alarm when even the government sponsored enterprises Fannie Mae and Freddie Mac started to lower their standards for insuring mortgage loans.

Deregulation is rightly regarded in many instances as a way of removing artificial obstacles to mutually beneficial trade. Exactly why in this case deregulation led to such mutually destructive trade is not easy to see from the viewpoint of the full rationality paradigm. What needs to be explained is why investment banks and their clients were so confident in acquiring securities that were ultimately backed by what even at the time could be seen as wildly unrealistic expectations of continued house-price appreciation. In order for these expectations to be seen as rational we would have to think the bursting of the housing bubble was correctly regarded as a low probability event. Yet the fact that house were rising at 10% or more per year at a time when construction costs were relatively flat, and at a time when the demographics of the baby boom were clearly leading to a slowdown in the demand for housing made it clear to almost every economist that was commenting on the situation that the bubble was certainly going to burst.

Some insight into how intelligent people have been led into such a mess can be had by considering the methods people use for finding our way through the financial world.

Three such mechanisms are crucial here. The first one is extrapolation. People look at history for trends that will help to

predict the future. In this case, as Calomiris (2008) has pointed out, those who invested heavily in mortgage-backed securities took comfort in the fact that there had never in the past been a national housing slump in the United States. Securitization of mortgages had allowed bankers to hold instruments that were backed by a regionally diversified portfolio of mortgages, so that even if there was a wave of defaults in some regions the losses would tend to be offset by good returns in other regions. Past data also indicated that during regional housing slumps that had led to waves of mortgage defaults, foreclosing banks tended to recover about 80% of the value of the loans, which also put a floor on the losses.

Deregulation helped to undermine this stratagem. The reason why there had never before been a national mortgage crisis is that there had never before been a national housing market to the extent that existed after the dismantling of Glass Steagall and the deregulation of mortgage-backed derivatives. And the reason why losses had been limited is that there had never before been such a lowering of standards in mortgage lending. Another mechanism for finding one's way through the financial world is social learning. One way to become rich is to copy others who are becoming rich. Under normal circumstances this mechanism provides a way for rational behavior to diffuse rapidly throughout the population. But when bubbles begin it can also provide a way for the bubble to gain strength. Once a housing bubble begins and people start making money peddling dubious mortgages predicated on the continuation of the bubble, it seems foolish not to join in. Indeed professional traders and money managers that do not join in are likely to find their jobs in jeopardy, given that they are judged by their recent performance relative to competitors. Even if everyone knows that the bubble is going to burst, the only intelligent thing to do is go along and hope that you can bail out in time, as it appears that Goldman Sachs managed to do just before the subprime crisis broke.⁽¹⁾ Deregulation that started the bubble in progress by

(1) See also Temin and Voth (2004) for evidence that at least one bank in the UK intentionally rode the South Sea bubble.

allowing a burst of new lending to those who were previously shut out of the mortgage market thus allowed the normally salutary mechanism of social learning to lead not to widespread rationality but widespread folly.

A third mechanism for finding one's way through the financial world is to delegate the assessment of risks to those in authority. It is wasteful of neural resources for everyone to examine the detailed situation of every financial institution. Regulatory authorities take on this job so that it does not have to be endlessly duplicated. The dismantling of Glass Steagall meant, however that more and more lending was taking place through the relatively unregulated sector, where risk assessment cannot be delegated to authorities.

Credit rating agencies also perform the role of delegated risk assessment. But in the changed environment that gave rise to mass securitization of subprime mortgages, the instruments being rated became far more complicated than existing agencies were capable of understanding. The ad hoc methods by which they had learned to provide accurate ratings for plain vanilla corporate bonds were clearly inadequate for assessing the risks of complex financial derivatives like CDOs.⁽²⁾ As a result of this, and perhaps also because of moral hazard issues related to the system by which regulated creditrating agencies are compensated by the very companies whose securities are being rated, dubious mortgages ended by being packaged into complicated securities that were given AAA ratings. Ultimate buyers of these securities learned only after the fact that they had delegated their assessments of risk to agencies that were not up to the task in the new deregulated world of financial complexity.

3.2 Fiscal policy

Another of the great problems facing the United States at the start of the 21st Century is its collective failure to provide for

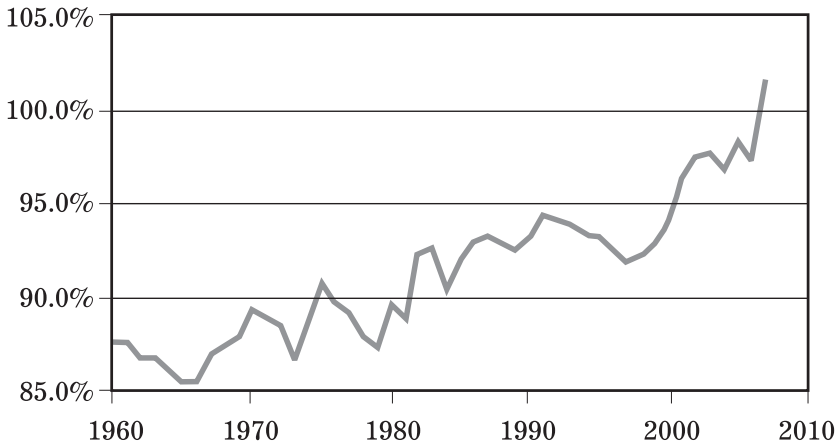
(2) This view has been espoused recently by Roman Frydman. See for example, his remarks in "What to do when you don't know everything," *The Economist*, Nov. 22, 2007.

the future, especially in the light of the impending retirement of the baby-boomer generation, those born between 1946 and 1964, who constitute over one quarter of the US population. The facts illustrated in Figure 1 below make clear the nature of this problem. Consumption expenditure (household consumption plus government consumption) in the United States, which was about 87 percent of Net National Product throughout the 1950s and 1960s, has been rising fairly steadily since the 1960s relative to NNP, to the point where by 2007 consumption was 102% of NNP.

Given that the baby boomers should now be at their peak saving years, this suggests some collective failure of rationality. If everyone were obeying the conventional lifetime expected utility maximization hypothesis we would now have a saving rate that was higher than ever, instead of being lower than it has been since 1933. It seems that either people have been paying no heed to the future or that collectively we are counting on some source of future income which is not going to be forthcoming.

Two major sources of future income are Social Security and Medicare. The average baby boomer has been promised about \$50,000 per year in Social Security, while Medicare promises

Figure 1. Total Consumption over Net National Product



in addition to provide for the boomers' health care. Kotlikoff and Burns (2004) calculate that the present value of the Federal government's implicit liabilities under such programs and the present value of all its expected tax receipts under existing tax rates is a deficit of 72 trillion dollars, or about 4 1/2 times the annual GDP of the United States. No doubt many boomers infer from such facts that the promises of Social Security and Medicare cannot be kept. But somehow we are collectively saving as if the promises were indeed going to be kept, and with no increase in taxes.

To some extent, our improvidence is attributable to fiscal deficits, which undermine some of the methods by which prudent behavior has been automated in the modern world, specifically the institutionalization of saving and the direct withholding of income taxes. The fact that both retirement saving and income taxes are withheld from most peoples' paychecks takes care of future needs in an automatic fashion, freeing us from the mental effort needed to make sensible saving decisions. As we know from the literature on Ricardian Equivalence (Barro, 1974), the rational reaction to government tax cuts that are unaccompanied by expenditure reductions is for the average household to save all of the income that is no longer being collected in the form of taxes. But instead in our modern system people are led to spend it, in the belief that paycheck withholding has automatically taken care of the need to save. Thus deficits turn public improvidence into private improvidence. Regulatory changes in finance have also had a lot to do with the current lack of saving. One such change is the movement towards defined contribution retirement plans with few regulatory constraints, which allow people to borrow against their contributions. As indicated above, one method by which people protect themselves against their own tendencies toward impulse spending is by automatic saving plans that commit them to saving. But to the extent that financial regulations allow their 401(k) plans to be used as collateral against borrowing, these automatic plans do not in fact amount to binding commitments. When the temptation arises one can always run down one's saving by borrowing against it. Regulations that allow this kind of borrowing amount to yet another policy that

tends to undermine the stratagems by which intelligent people have learned to approximate the ideal of rational behavior.

3.3 Monetary policy

Recent financial events have led me (and many other macro-economists) to reconsider the appropriate role for monetary policy in a modern economy. Until recently I was an enthusiastic proponent of inflation targeting, the policy that has been adopted by countries such as New Zealand, Australia, Canada, the UK, Sweden and to a large extent the United States. But I now believe that we would have avoided much of the folly leading up to the recent financial crisis if the Federal Reserve and other central banks around the world had paid more attention to the warning signs of asset-price bubbles than is permissible under inflation targeting.

The great virtue of inflation targeting is that it focuses on stabilizing the value of money, and thereby strengthens one of the most important stratagems by which we approximate rational behavior, namely the convention of treating money as if it were an unchanging measure of value. Although everyone knows that the value of money does indeed change, we have built a myriad of financial and accounting practices that make sense only if it doesn't.⁽³⁾ Thus a policy like inflation targeting that focuses squarely on keeping the value of money from changing rapidly helps the economy by validating the implicit premises of private decision making. Largely for this reason, until recently I shared the opinion of others such as Ben Bernanke who thought that inflation targeting would be a good policy for the US Federal Reserve to adopt. But I now realize that while inflation targeting does indeed strengthen these financial and accounting practices it can also allow other adjustment mechanisms to get badly out of control.

Inflation is a slow-moving inertial variable. It takes a long time to build up, but once it does it is very hard to bring back down.

⁽³⁾ See Howitt (1990).

An inflation targeting central bank must therefore try to anticipate latent inflationary pressures before they have started to build momentum, and to do this effectively it must focus its attention squarely on those factors that serve as leading indicators of inflation, to the exclusion of all else.

But because of this, inflation targeting also tends to blind a central bank to looming problems that do not necessarily portend inflation, but which are just as important - problems that monetary policy could help to alleviate if the central bank was not paying attention to something else.

There is now a long academic literature on whether or not an inflation targeting central bank should pay attention to asset prices as well as the consumer-good prices whose rate of increase is the focus of its policy. The idea is that asset bubbles fueled by easy credit can be harmful to the economy, but can potentially be pricked by the timely application of tight monetary policy before they have a chance to do a lot of damage. The majority view within the profession until recently⁽⁴⁾ has been that it is simply too hard to distinguish a bubble from a justifiable rise in prices, that using tight money to burst a bubble risks creating unnecessary recessions and risks hampering our ability to profit from a wave of innovations that justifiably drives up stock prices. Thus, the argument goes, a central bank should pay attention to asset prices only insofar as they provide a leading indication of consumer price inflation, and generally speaking they do not.

It is clear however that the two serious problems described above, namely financial instability and lack of saving, have both been fueled by asset bubbles that could have been prevented by the central bank. To fully appreciate this point it is important to recognize that the role of monetary policy is to keep interest rates at an appropriate level. In Wicksell's terminology, the role is to keep the market rate of interest close to the natural rate.

There is no simple formula for determining what is an appro-

⁽⁴⁾ As expressed, for example by Bernanke and Gertler (2001).

priate level of interest rates. It depends on one's diagnosis of the long-term situation facing the economy. The central bank must therefore operate through trial and error. Inflation targeting is supposed to provide a framework through which an adaptive central bank can accomplish this goal. For example, if it sets the rate of interest too low, this is supposed to result in a higher than targeted inflation rate, or at least in leading indicators that signal a higher than targeted inflation rate if nothing is done, which should then act as a signal to raise the rate of interest.

The problem now apparent in the US economy is that for decades monetary policy has been too expansionary and yet the Federal Reserve did not receive any warning signal from inflation.⁽⁵⁾ Instead, the only thing that was signalling the Fed to raise interest rates was the boom in asset prices - first the stock market, which roared throughout the 1990s and then the housing market which took over after the stock bubble burst in 1999.

The fact that the United States was on an unsustainable trajectory, not providing sufficiently for the future, was not obvious at the individual level. People were getting rich in asset markets through the sorts of stratagems indicated above. People living from paycheck to paycheck had automated their saving decisions and seemed to be doing very well indeed as the stock market went up and then their home equity went up. All the mechanisms deployed at the individual level to maintain a sustainable future were being deployed. Yet there was a collective inconsistency in peoples' expectations. The paper gains that were being accumulated by savers were not being backed by real savings at the aggregate level.

A central bank is one of the only institutions in a modern economy in a position to act in the event of this kind of collective incompatibility of expectations. At the individual level it is not important for us to forecast a sustainable rate of return; rather we make money by forecasting what is going to be profi-

(5) This is a key point of Leijonhufvud's (2007) critique of inflation targeting.

table over the next few years. And as long as others keep bidding asset prices up it is foolish for the individual not to join in. If our attempts at private rationality had been guided by a Federal Reserve that tightened money when it saw that the economy was being led onto an unsustainable path by easy credit, we would have ended up with less euphoria and more real provision for the future.

Moreover, although none of this was perfectly clear without the benefit of hindsight, it would not have been hard to make the diagnosis with real time data as early as 2002. Many macroeconomists had been sounding the alarm about the disastrously low US saving rate, and I believe the unsustainability of a housing bubble based on liar loans and no-doc loans was apparent to anyone with a modicum of sense. What was perhaps not so obvious was that this is something a central bank should rightly concern itself with. I think we know now.

These considerations do not imply a neat formula that central banks can use to replace the deceptively simple Taylor rules at the heart of inflation targeting. As Leijonhufvud has been arguing for many years,⁽⁶⁾ good policy requires wise diagnosis, and a wise diagnosis will change unpredictably from one era to the next. All that sound economics can do is to improve the central bank's diagnostic abilities and help devise policy prescriptions that are appropriate to any given diagnosis. My main point here is that a prescription is unlikely to be appropriate if it does not take into account the manner in which it impinges on social mechanisms that guide intelligent behavior.

4 Conclusion

It has long been recognized that rational expectations is a collective phenomenon, not an individual phenomenon. This is because the variables about which one person forms expectations are in turn affected by others' expectations about the same

⁽⁶⁾ See for example, Leijonhufvud (1981).

things. So for everyone to have rational expectations their expectations must be coordinated with one another. Some social adjustment process must take place for the individual to be rational in forming expectations.

The point of this lecture has been that the same is true of rational behavior in general. In order for each of us to act in a way that approximates the ideal of rationality, we require a policy and regulatory environment that allows each of us effectively to automate our decision-making by delegating cognitive tasks to others and learning from the experience of others. Failure to recognize fully this important aspect of economic policy in the United States has led to regulatory, fiscal and monetary policies that have exacerbated two of the most serious economic problems now facing the United States, namely the current financial crisis and the lack of saving. My fondest hope for the economic future is that recent advances in behavioral economics, learning in game theory and macroeconomic theory, and agent-based modeling will ultimately provide the intellectual foundation for future policies that enhance intelligent behavior instead of undermining it.

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