

The path of economic growth and the role of central planners

One of the simplest dynamic systems is the harmonic oscillator. Big word for a yo yo or a weight on the end of a rubber band or spring. The motion (dynamics) of such a system is described by a second order differential equation.

$$m \frac{d^2x}{dt^2} + b \frac{dx}{dt} + wx = F(t)$$

m is mass. b is drag, w is the elasticity of your rubber band or spring. $F(t)$ is what you do with the other end of the spring, or your finger in the case of a yo yo.

Lets assume for the moment that $F(t) = 0$, a constant. What this equation describes is the bouncy bouncy motion of the weight at the end of a spring. If the drag term is big enough, there isn't much bouncy bouncy, think of the suspension of a car but with dampers, or 'shocks' as the Americans call them. By arranging the right ratios of m , b and k , you get either a smooth ride a la Lexus, or bouncy bouncy like a Land Rover Defender. Forget about the $F(t)$ for now.

Economic growth is cyclical and can be modelled as an oscillation like we described above. If all the long term policies are right, rule of law, demographics, industry diversification, etc etc, then there is less chance of bouncy bouncy. Like a Lexus. If an economy has concentrations of risk, imbalances, poor corporate governance, then bouncy bouncy. In fact if you solve the equation for the path of the economy, the general solution is such that the set of solutions for which there is no bounciness, is very small, almost infinitesimal compared to the set of solutions for which there is a lot of bounciness.

Lets get back to $F(t)$. This term is like economic policy, both fiscal and monetary. Its how the government or central planner can 'guide' the economy and try to smooth out the bounciness of growth. The central planner basically tries to obtain the solution to the Left Hand Side of the equation, figure out how bouncy things will be and then use $F(t)$ to try to smooth things out. The risk here is that if you time things wrong, then $F(t)$ can make things even more bouncy. This is bad. Also, things are path dependent. Once you start your $F(t)$, managing the system down the road is dependent on what you did before.

If the central planner has perfect information, i.e. knows everything there is to know about the economy, then it can obtain a solution to the Left Hand Side and design an $F(t)$ to damp the oscillations. Alas, life is not like that and the central planner either doesn't have perfect information, or makes mistakes, is plain dumb, or has been trading their PA a bit too actively. Using the wrong $F(t)$ can lead to big bouncy bouncy. Which is bad.

Technically, the solution to the second order differential equation is

$$x(t) = A \exp(pt) + B \exp(qt)$$

If any of p or q are real numbers, you have an exponential blow up (bad, and not going to happen) or exponential decay (good). If even one of p or q is positive, you will have a blow up. For exponential decay, you need both p and q to be negative. If p and q are complex, and they are the roots of a second order polynomial and are very very likely to end up being complex, you have an oscillation, within an envelope which could be a diverging envelope or an exponentially decaying one. The chance of all the stars lining up so that $F(t)$ is countercyclical is almost surely zero. In other words the chance that $x(t)$ is mildly cyclical within a converging envelope (which is the whole idea of economic stability), is next to zero regardless of $F(t)$ (economic policy). At all

other times, oscillations are the norm and the probability of booms and busts is high.

In order to have a stable growth path, policy needs to be a function of all the parameters of the left hand side of the equation. This is likely to be the mother of complicated functionals. Nimble monetary and fiscal policy might dampen the volatility of growth in certain periods of time, but they almost always store up unstable pressures that eventually burst the floodgates.

So what does it mean that $F(t)$, the right hand side, needs to be a complex function of the parameters on the left hand side? It means that automatic stabilizers in the form of appropriate frameworks need to be built in to an economy and once established, government intervention should be kept to a minimum. It is implicit that instabilities are caused by tinkering with the right hand side, that is interventionist government policy. Unilaterally setting short rates, is one great example.