Comments on units by Ken Judd

Units are important. You should specify them in your description of the model. For example, if you write q = D[p], you should declare the units of q, a quantity, and p, the price. If the product is oil, then the quantity unit used in the industry is barrels and prices are in dollars. The price of oil is about $60 and the total amount of oil is in the billions of barrels. A function like

p = 1 / q

Cannot be true since the number of barrels of oil is huge and would imply a tiny price. Instead, the demand function has to be

p = k / q

For some parameter k. Let's think about the dimensions

q bbls
p $
1/q 1/bbls

k is p q , which has units $ (1/bbls) = $/bbls

More natural for the case of oil is using Mbbl (a thousand barrels), MMbbl (a million barrels) or Gbbl (a billion barrels).

This applies to every good -- cars, corn, video games, socks, wine, ...

Why do we care?

Avoid ill-conditioning:
Numerical methods need to use units so that the unknowns (in optimization and nonlinear equation problems) are all "close to" 1, where 1000 is close to 1, 0.0001 is close to 1, but 10^9 is NOT close to 1 and 10^(-9) is NOT close to 1.

Validity check:
I have also found units to be very useful in checking the validity of formulas. When deriving formulas, I will check to see if the units in the expressions match. For example, if I derive a formula XX=YY, I will check that the units in XX and YY are the same.