Discussion of "Spurious Welfare Reversals in International Business Cycles Models"

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Outline

The idea

The relevance

An example

The applicability

General idea

Methodological paper

Provides a method to improve accuracy of log-linear policy rules in DSGE

Problems with linear decision rules

- True decision rules are non linear –> This method cannot be used

- True decision rules are linear but solution method get intercept wrong –> This method can be used

The relevance

If the levels are wrong, then welfare is wrong and all problems that involve welfare comparisons (optimal policy, optimal risk sharing problems) are affected.

VERY RELEVANT !

Application to risk sharing problems

Risk sharing arrangements involve summing (pooling) risky resources.

Summing using log-linear approx. implies terms involving the variance (2^{nd} order) are lost

Gains from risk sharing are smaller or even negative (spurious welfare reversals)

Example (n countries risk sharing)

$$\begin{aligned} Y_i &= e^{y_i} \qquad y_i \sim N(0, \sigma^2) \\ C &= e^c \end{aligned}$$

True Solution

$$\begin{aligned} C^A &= Y_i \\ C^M &= \frac{1}{n} \sum Y_i \end{aligned}$$

Log-Linear solution

$$\begin{aligned} c^A &= y_i \\ c^M &= \frac{1}{n} \sum y_i \\ C^A &= e^{y_i} \\ C^M &= e^{\frac{1}{n} \sum y_i} \end{aligned}$$

Note that

$$y_1 \sim N(0, \sigma^2) \quad \frac{1}{n} \sum y_i \sim N(0, \frac{\sigma^2}{n})$$

so

$$E(C^A) = e^{\frac{\sigma^2}{2}} > E(C^M) = e^{\frac{\sigma^2}{2n}}$$

Why is average consumption in complete markets lower?

Log-linear approx. (by omitting 2^{nd} order terms) destroys resources!

Plug log-linear solution in CM budget constraint, take expectations and obtain

$$Waste = e^{\frac{\sigma^2}{2}} - e^{\frac{\sigma^2}{2n}}$$

Error can be obtained also by summing the omitted second order terms.

- Difference in average consumption between Complete Markets and Autarky is entirely due to the error.

- Error is bigger the larger the variance and more resources are pooled (large n)

- Welfare reversals are likely.

A solution

Kim and Kim propose to put the lost resources back in consumption

New linear decision rule

$$c^M = \frac{(n-1)}{2n}\sigma^2 + \frac{1}{n}\sum y_i$$

$\frac{(n-1)}{2n}\sigma^2$ is the bias correction

The applicability

Bias correction it is easy to find in a toy model

In a general model is more complicated

Need to solve analytically for the state dependent bias correction

The authors solve it for an economy with capital, but it is very simple (i.i.d shocks, no labor).

How hard is to apply the method to a standard two country international business cycle model?

(Backus, Kehoe and Kydland 1992)

I suspect it is a pain.

If it is not a pain you might want to do it!

Alternative methods

Tough competition from global non-linear solution methods (Judd, McGrattan).

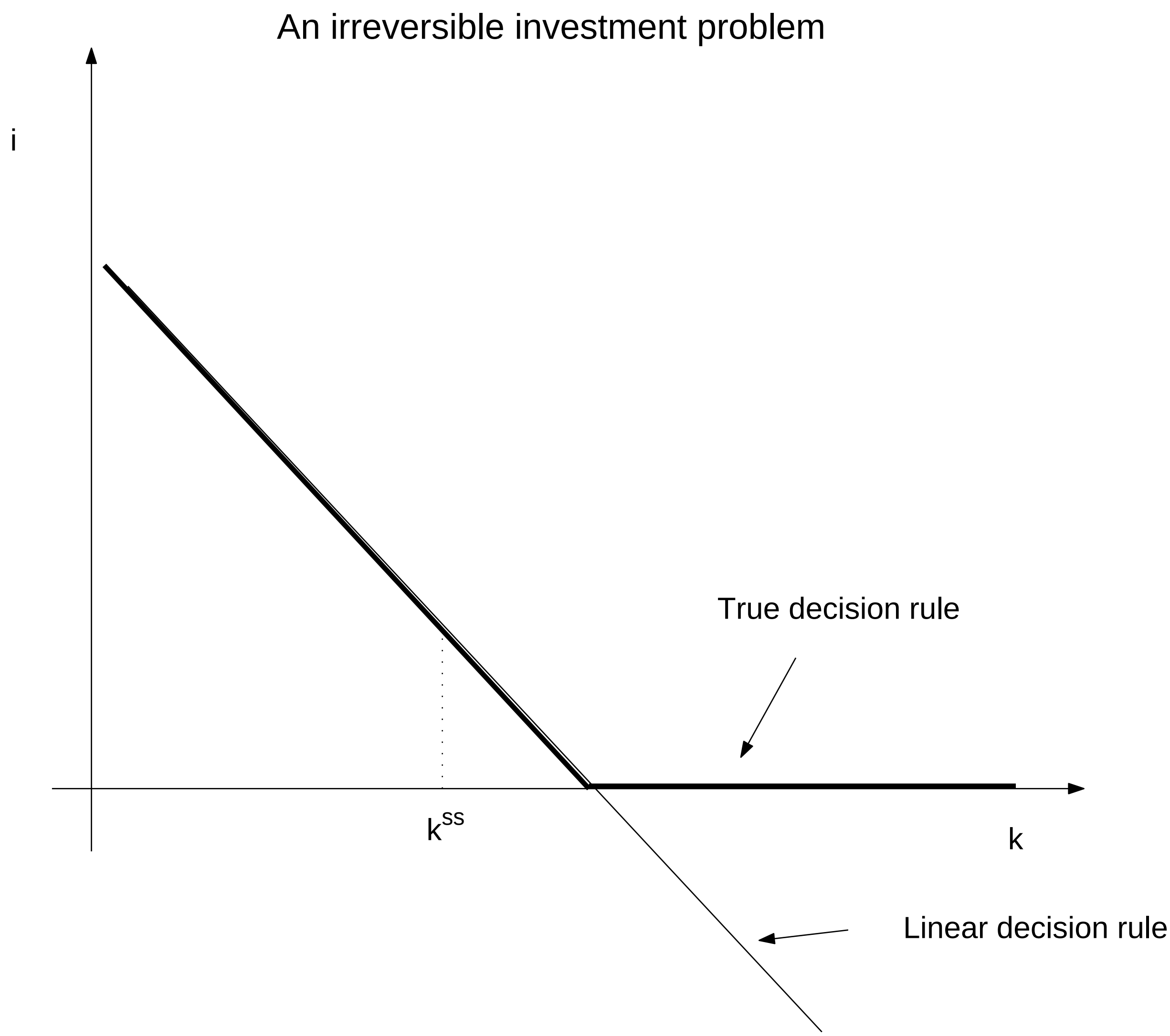
- Can handle also non-linearities
- With new computers, they are pretty fast.

Example

BKK, 1992 IRBC model (capital, labor, persistent shocks)

Welfare gain from FA-$>$CM = 0.035% – 0.089% of steady state consumption (for different risk aversions)

Time to compute it using MWR method: 4 min.



An irreversible investment problem
i
True decision rule
k^{ss}
k
Linear decision rule

A risk sharing problem