Comments on "Animal Spirits"

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Main Idea of the Paper

- If information is dispersed and communication is imperfect, output may exhibit fluctuations that are driven by surprises about the expectations of others, "animal spirits".

Outline

Setup

- Two islands exist at **two points in time**
- Today, the home island decides **how much to produce** of the home consumption good

$$Y = An^{\vartheta}$$

  The island knows A, but not A^*.
- Tomorrow, the two islands meet, **exchange and consume** the goods they produced

$$U = \left(\frac{c}{1-\eta}\right)^{1-\eta}\left(\frac{c^*}{\eta}\right)^{\eta} - n$$

- Both islands are price-takers; use the foreign good as numeraire, $P^* = 1$.

Behavior

- Islands allocate a fixed share of their income to consumption of each good

$$c = (1 - \eta)\, Y, \quad c^* = \eta P Y$$

- How much the home island produces depends on the **relative price it expects to receive**.

$$Y = A^{\frac{1}{1-\vartheta}} \left(E\left[P\right]^{\eta} \vartheta \right)^{\frac{\vartheta}{1-\vartheta}}$$

- ... and the equilibrium price depends on how much the **other island produces**:

$$P = \frac{Y^*}{Y}$$

Market Clearing

- ... optimal production thus depends on $E\left[Y^*\right]$ (**pecuniary externality**)

$$y = \hat{\alpha} a + (1 - \hat{\alpha}) E\left[y^*\right] \tag{1}$$

where $\hat{\alpha} = \frac{\eta\vartheta}{1-(1-\eta)\vartheta}$. Equivalently,

$$y^* = \hat{\alpha} a^* + (1 - \hat{\alpha}) E^*\left[y\right] \tag{2}$$

- Taking expectations, we end up with 4 equations and 4 unknowns,

$$E^*\left[y\right] = \hat{\alpha} E^*\left[a\right] + (1 - \hat{\alpha}) E^*\left[E\left[y^*\right]\right] \tag{3}$$

and

$$E\left[y^*\right] = \hat{\alpha} E\left[a^*\right] + (1 - \hat{\alpha}) E\left[E^*\left[y\right]\right]. \tag{4}$$

Equilibrium Expectations

- Now we could make assumptions about who gets signals about what.
- Instead, let's keep it more general and **define surprises** about the other islands productivity and about the expectation that the other island has of our output:

$$E^*[a] - a = \varepsilon^* \qquad E^*[E[y^*]] - E[y^*] = u^*$$
$$E[a^*] - a^* = \varepsilon \qquad E[E^*[y]] - E^*[y] = u$$

where $var(\varepsilon) < var(a)$ and $var(u) < var(E^*[y])$.

- Applying these definitions and solving our system of equation gives

$$\begin{aligned} y &= \frac{1}{1-\hat{\alpha}^2}[(1-\hat{\alpha})a + (\hat{\alpha}-\hat{\alpha}^2)a^* \\ &\quad + \underbrace{(\hat{\alpha}-\hat{\alpha}^2)\varepsilon + (\hat{\alpha}^2-\hat{\alpha}^3)\varepsilon^*}_{\text{Surprises about Productivity}} + \underbrace{\hat{\alpha}^2 u + \hat{\alpha}^3 u^*}_{\text{Animal Spirit}}], \end{aligned}$$

Aggregate Output

- Important assumption: *u*'s **correlated, both within and across island pairs**: Islands make a systematic mistake when estimating each others estimates of output.

$$\int u(i)\, di = \bar{u}$$

  Animal Spirit=**correlated surprises (mistakes)** about the expectations of other islands.
- Finally, sum up across islands and get

$$\int y(i)\, di = \int a(i)\, di + \frac{\hat{\alpha} - \hat{\alpha}^3}{1 - \hat{\alpha}^2} \int \varepsilon(i)\, di + \frac{\hat{\alpha}^2 + \hat{\alpha}^3}{1 - \hat{\alpha}^2} \bar{u}$$

Results

- Output exhibits **fluctuations that are orthogonal to productivity** shocks; Animal spirits represent an additional source of uncertainty.
- **Sellf-fulfilling** aspect: If all islands overestimate the other island's estimate of their output, output goes up.

Outline

Comments

This is a great paper. I like the idea that individuals face uncertainty about the expectations of others.

1. Complexity of the Model

- The mechanism that operates in the model is **much more general** than it looks. There is lots of stuff in the model that you don't need. Only two critical assumptions:
  1. production takes place before you learn about prices
  2. the u's are highly correlated across islands.

2. Correlated Surprises about Expectations

- While the first assumption is an easy sell, **the second needs careful motivation**. Why do people make systematic mistakes when predicting what others predict about them? If $\int \varepsilon(i)\, di = 0$, why should $\int u(i)\, di = \bar{u}$?

- Relatedly, the ε and the u's look pretty much the same to an econometrician, **both are fluctuations in output that are not explained by** a. So why are the u's animal spirits and the ε are not?

3. Incentive to Share Information

- Islands have a **strong incentive to communicate** in the first period.
  - they are price takers and thus have no incentive to lie about their productivity
  - their welfare strictly increases if they know the other islands productivity (and expectations)
- More serious problem: individuals have **economically large incentive** to acquire **better information about the expectations** of others.
  - They would invest heavily into getting better information if there was a technology to do so.
  - Can we come up with a theory for why biases in u would persist in such a setting?

4. Magnitudes

- The **coefficients on $\bar{u}$ are small** compared to the coefficients on a. For $\eta = 0.5$ and $\vartheta = 0.3$:

$$\int y(i)\,di = \int a(i)\,di + 0.1764 \int \varepsilon(i)\,di + 0.0378\bar{u}$$

- To make things worse, the **rational model** puts very **tight bounds** on the variances of u and ε:

$$var(y) > var(E^*[y]) > var(E[E^*[y]])$$

- Under fully rational behavior, an **upper bound for the variance** in output induced by animal spirits is thus $0.0378^2\, var(y)$
- These are quantitative implications of the model that are important for the interpretation and should be taken seriously

Outline

Suggestions

- I would **simplify** the model somewhat.
- Use some muscle to **endogenize** u; Why do we get correlated mistakes in people's expectations of other people's expectations in an economy in which individuals have an economically large incentive to get it right?
- Think carefully about the magnitudes involved, c**onsider an endogenous amplification** mechanism, perhaps as in Hassan and Mertens (2010).