Comments on
What Drives Long-Term Biodiversity Change?

By Hanley, Angelopoulos, Tinch, Davies, Watson, and Barbier

Main Contributions

- Excellent analysis of species change in Northern Europe as connected to grazing, the most important economic factor historically
    - Stunning combination of historical ecological and socio-economic data.
    - Sets high bar for future work in ecological-economic modeling.

A Reduced-Form Model

- Species Count = f(Livestock)

- $S_{Livestock}$ = s(Price$_{Livestock}$)
  - Exogenous demand shocks instrument for Price

- => Species Count = h(Price$_{Livestock}$)

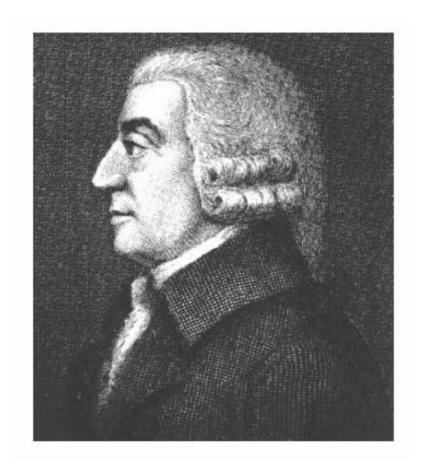# H'(.) is positive. What is hypothesis?

- Is f'(Livestock) positive or negative?
  - Hypothesis I: Livestock does damage which is reflected in species counts/diversity.
  - Hypothesis II: Frequent disturbances increase diversity as no species can dominate.
    - --An equilibrium or disequilibrium story?
  - What is next-best use of land?

Hypothesis cont'd.

- Is s'(Price$_{Livestock}$) positive or negative?
  - Is price the input or the output in production?
  - What if graziers respond to income effects by consuming their own livestock?
  - How will <u>stock</u> of renewable resources react to a price shock?
    - In long-run, permanently high prices would lead to investment in stock.
    - In short-run, stock could be reduced to ship animals to market immediately.

Variation in Time-Series Data is Crucial to Identification Here

- Prices same everywhere 1880-2000 and closely tracking 1580-1880

- Instruments do not vary spatially

- Limitations imposed by missing data on error structure AR(1)

- What is spatial scale wrt to pollen dissemination?

- => concerns about omitted events

Our woollen manufacturers have been more successful than any other class of workmen, in persuading the legislature that the prosperity of the nation depended upon the success and extension of their particular business. They have not only obtained a monopoly against the consumers by an absolute prohibition of importing woollen cloths from any foreign country; but they have likewise obtained another monopoly against the sheep farmers and growers of wool, by a similar prohibition of the exportation of live sheep and wool.

By the 8th of Elizabeth, chap. 3. the exporter of sheep, lambs or rams, was for the first offence to forfeit all his goods for ever, to suffer a year's imprisonment, and then to have his left hand cut off in a market town upon a market day, to be there nailed up; and for the second offence to be adjudged a felon, and to suffer death accordingly….By the 13th and 14th of Charles II. Chap. 18. the exportation of wool was made felony, and the exporter subjected to the same penalties and forfeitures as a felon.

For the honour of the national humanity, it is to be hoped that neither of these statutes was ever executed….[The first] may, however, perhaps be considered as virtually repealed by the 12th of Charles II. Chap. 32 sect. 3. which…imposes a new penalty, viz. That of twenty shillings for every sheep exported, or attempted to be exported, together with the forfeiture of the sheep and of the owner's share of the ship. The second of them was expressly repealed by the 7th and 8th of William III. Chap. 28 sect 4. [Exporter still forfeits wool and pays 3 shillings/lb fine (about 4-5x market value)]

In order to prevent exportation the whole inland commerce of wool is laid under very burdensome and oppressive restrictions. It cannot be packed in any box, barrel, cask, case, chest, or any other package, but only in packs of leather or pack-cloth, on which must be marked on the outside the words *wool* or *yarn*, in large letters not less than three inches long, on pain of forfeiting the same and the package, and three shillings for every pound weight… (WN IV.viii)

The wool of Scotland fell very considerably in its price in consequence of the union with England, by which it was excluded from the great market of Europe , and confined to the narrow one of Great Britain. The value of the greater part of the lands in the southern counties of Scotland, which are chiefly a sheep country, would have been very deeply affected by this event, had not the rise in the price of butcher's-meat fully compensated the fall in the price of wool. (WN I.xi)

Minor Comments

- Management variables: could intensity, size, management be endogenous?
  - Economies of scale
  - Capital constraints force investment to be out of current profits
- Tenure variables: just "change"?
- Interact breed with q in structural equation? What are implications of quality-adjusted prices?
- Simpson index instead of species count?

$$S = 1 - \frac{\sum_i n_i (n_i - 1)}{N(N-1)}$$

- Site intensity – what do we know about specific seasons?

Settling the Frontier

- Data on livestock?
  - Ground truth the model with 1860-2000 data?
- Structural model of ecological relationships