

How Wide Was the Ocean? Commodity Price Dispersion in the US and Sweden 1732-1860

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Outline

1. Price history sources
2. Research context and design criteria
3. US and Swedish sources and units
4. Price dispersion
5. HWWTO?
6. What next?

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(William Beveridge/Edwin Gay/Arthur Cole/Rockefeller Fndn)

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There are numerous studies of the LOP internationally ...

or intranationally

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A central issue is the extent and speed of convergence, as well as the causes and obstacles.

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Design Criteria

- ▶ multiple commodities (14)
bar iron, beef, butter, copper, hops, pig iron, pork, salt, saltpetre, tallow, tallow candles, wax candles, wheat, wool
- ▶ multiple countries (2)
- ▶ multiple locations within each country (6/32)
- ▶ a long time span (128 years)

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“Stockholm therefore, for the purposes of the argument may be considered as within fifty miles of Philadelphia.”

– Daniel Webster (1824)



3. US and Swedish Sources and Units

For the US, Cole (1938) has prices for Philadelphia, New York, Boston, Charleston, New Orleans, and Cincinnati, monthly for numerous varieties, from newspapers and business records.

McCusker (1978) allows conversion of local-currency prices to pounds sterling.

For Sweden, Jörberg (1972) has prices for 32 counties, from annual market price scales (rather than from institutions or wholesale markets).

Both physical and currency units changed over time. We convert to kronor then pounds sterling using the Riksbank's exchange rate series.

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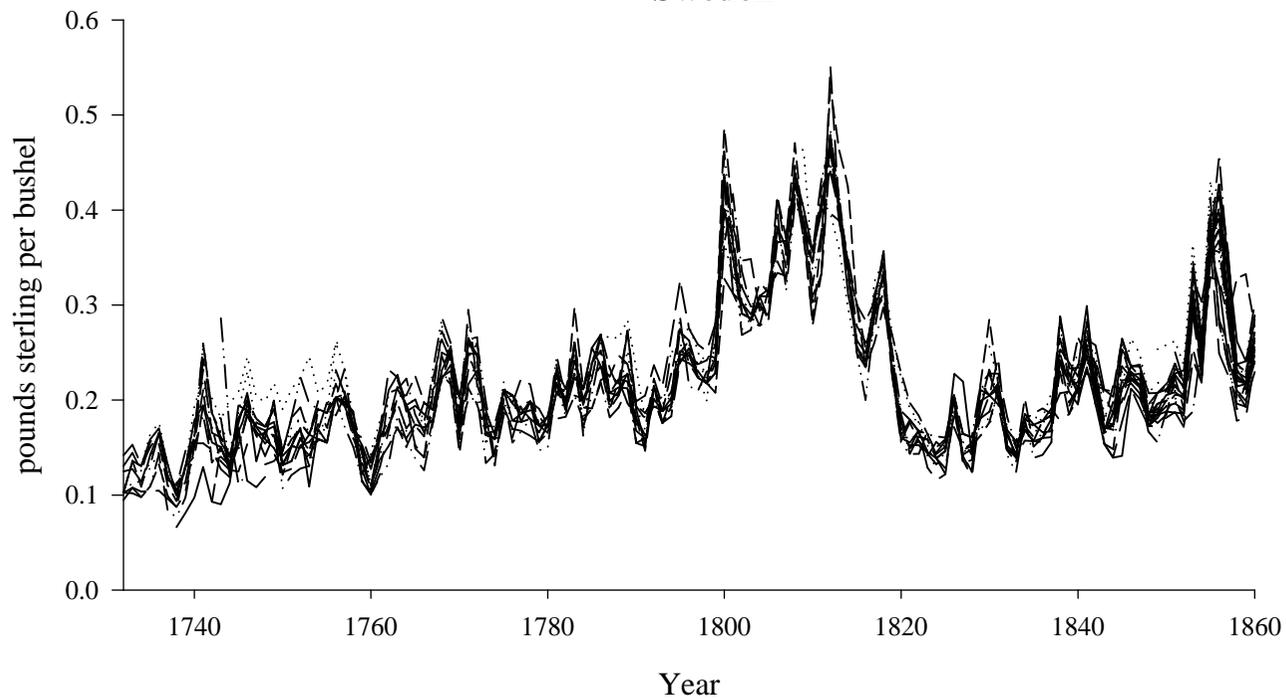
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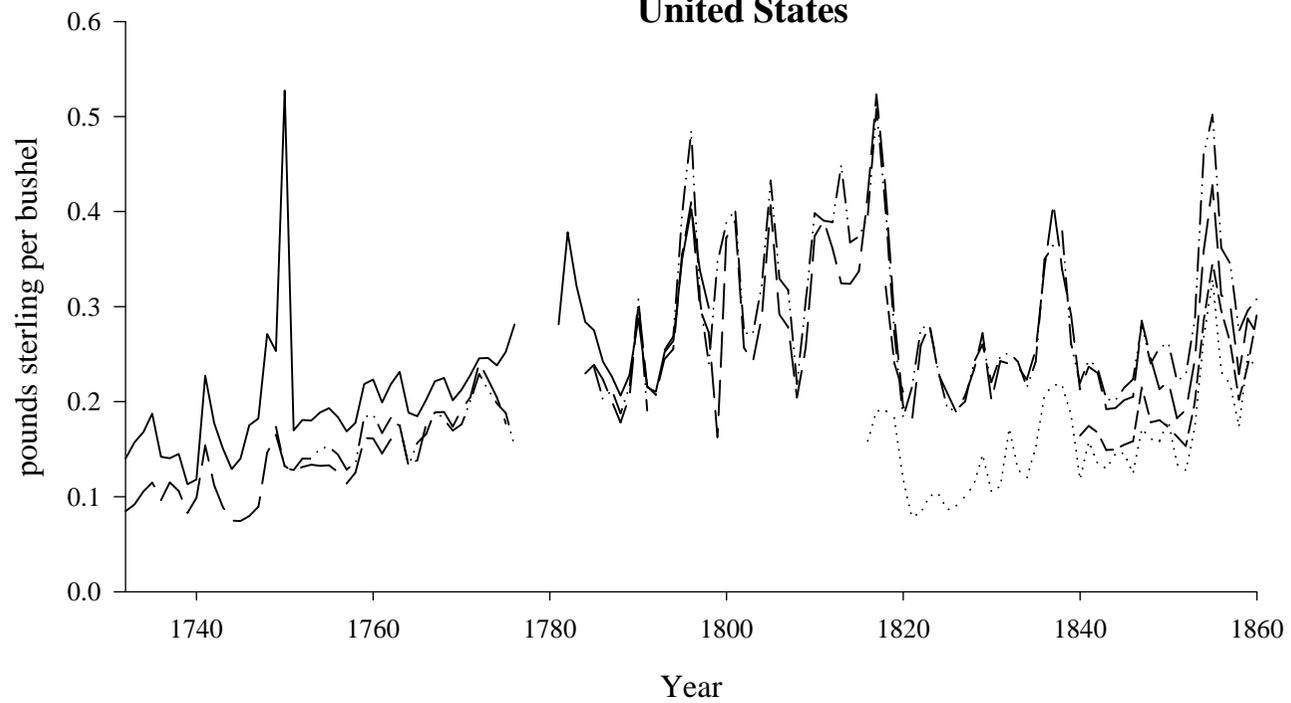
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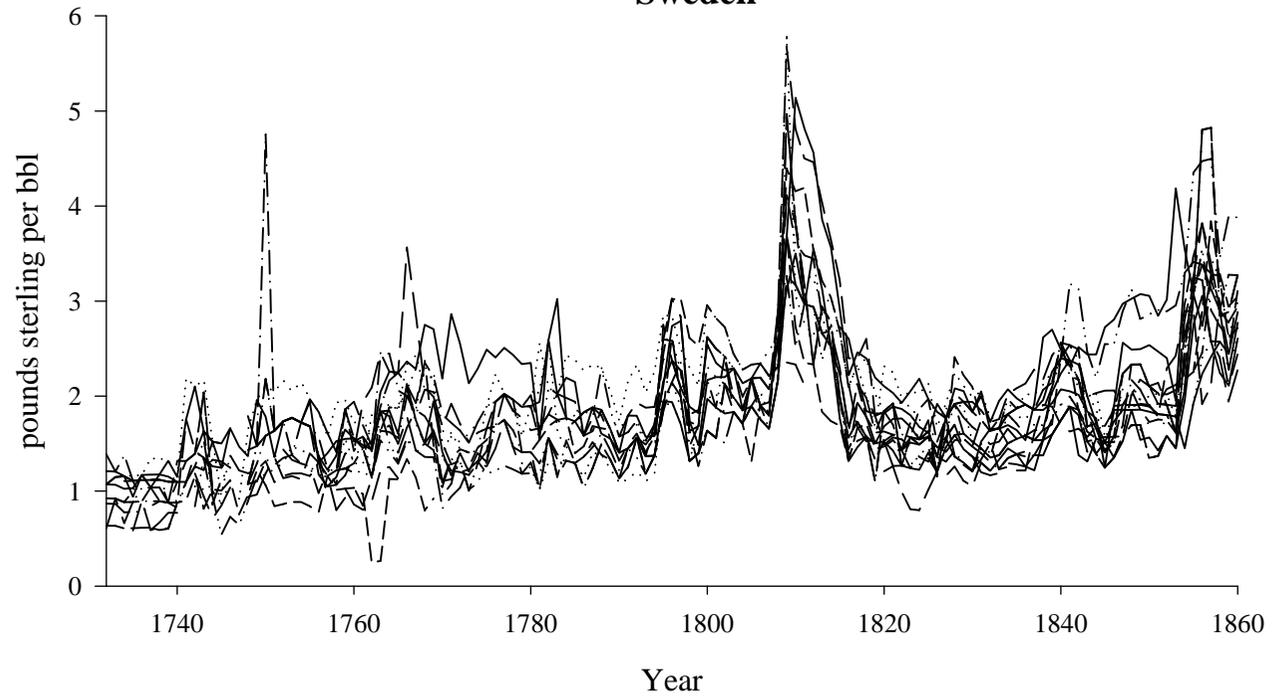
**Figure 1: Wheat Prices
Sweden**



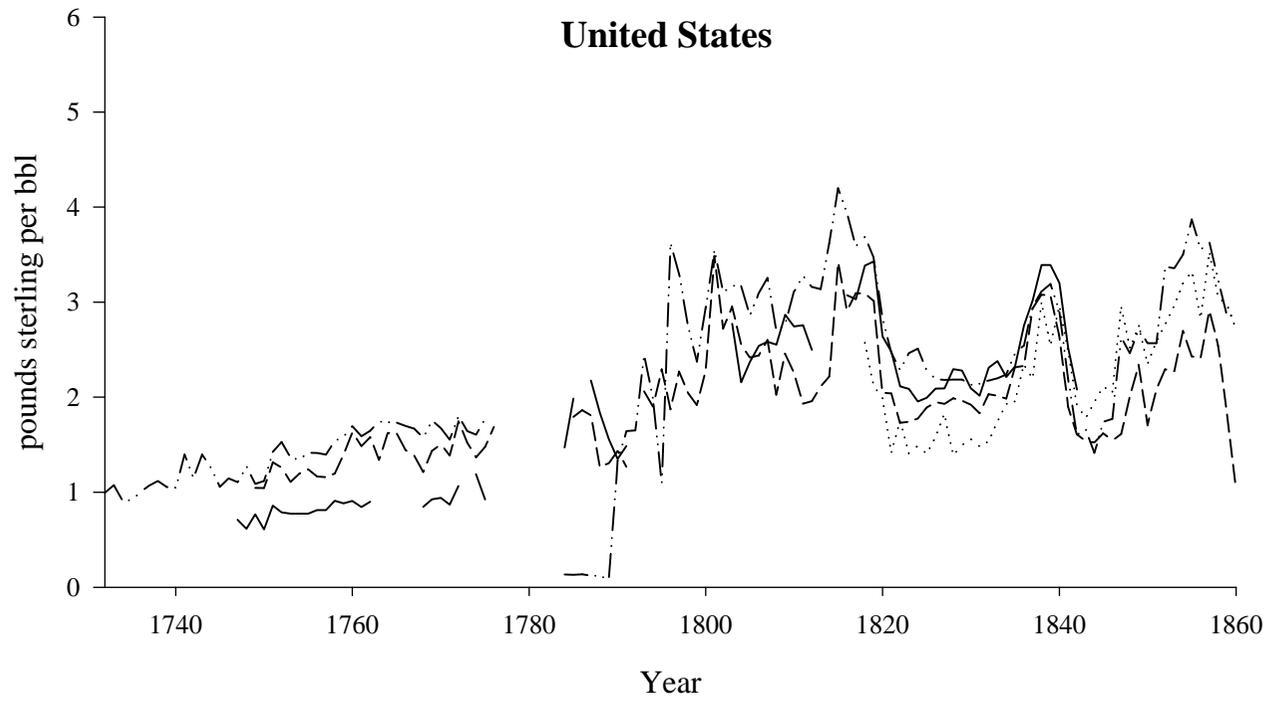
United States



**Figure 2: Beef Prices
Sweden**



United States



4. Price Dispersion

$$q_{ijk,t} = \log(P_{i,j,t}) - \log(P_{i,k,t})$$

Figure 3 shows densities for the US, Sweden, and trans-oceanic $q_{ijk,t}$.

Observations: UU: 4,093; SS: 179,156; SU: 43,531.

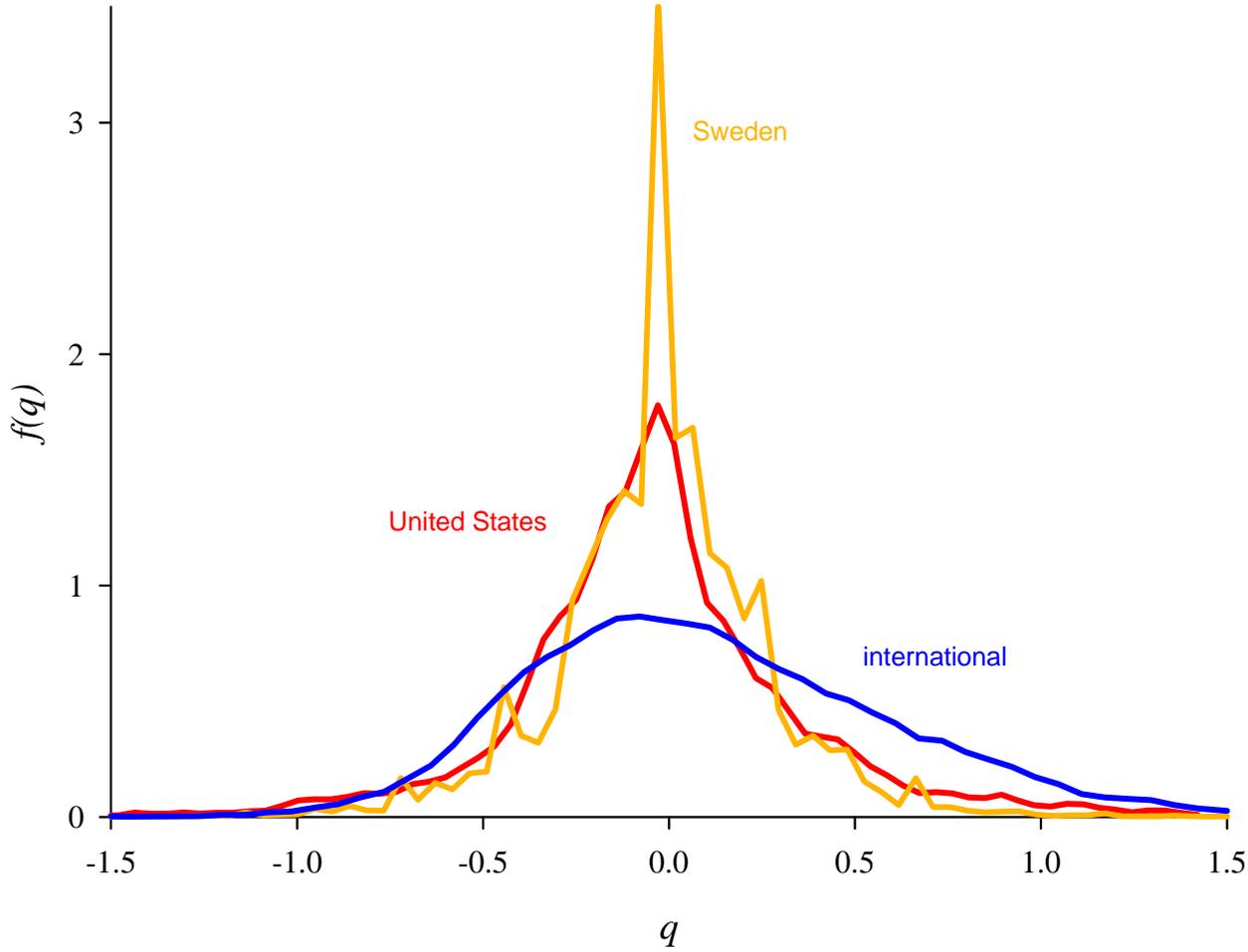
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Figure 3: Empirical Density of LOP Deviations



$$\text{Var}_{jk,t}(q_{ijk,t} | i) = \text{Var}_{jk}(E_t[q_{ijk,t} | ijk]) + E_{jk}[\text{Var}_t(q_{ijk,t} | ijk)]$$

$$V_i = T_i + F_i$$

Finding 1: F_i often exceeds T_i

5. HWWTO?

$$mda_{ijk} = \text{median}|q_{ijkt}|.$$

Next, we adopt notation for the time-series mean of each log relative price:

$$q_{ijk} = \sum_{t=1}^T \frac{1}{T} q_{ijk,t}.$$

Then the second measure of dispersion is the time-series variance:

$$\text{Var}_t(q_{ijk,t}) = v_{ijk} = \sum_{t=1}^T \frac{1}{T-1} (q_{ijkt} - q_{ijk})^2$$

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The Engel-Rogers (1996) approach:

$$v_{ijk} = \alpha_i + \beta_d \ln(\text{distance})_{jk} + \beta_o do_{jk} + \epsilon_{ijk},$$

and similarly for mda_{ijk}

Finding 2: Distance is economically and statistically significant, for individual commodities or in the pool.

Finding 3: The ocean width is insignificant or small.

The border effect is:

$$\exp\left(\frac{\hat{\beta}_o}{\hat{\beta}_d}\right)$$

For v_{ijk} this is 672,000 km with a standard error of 1,216,000 km.

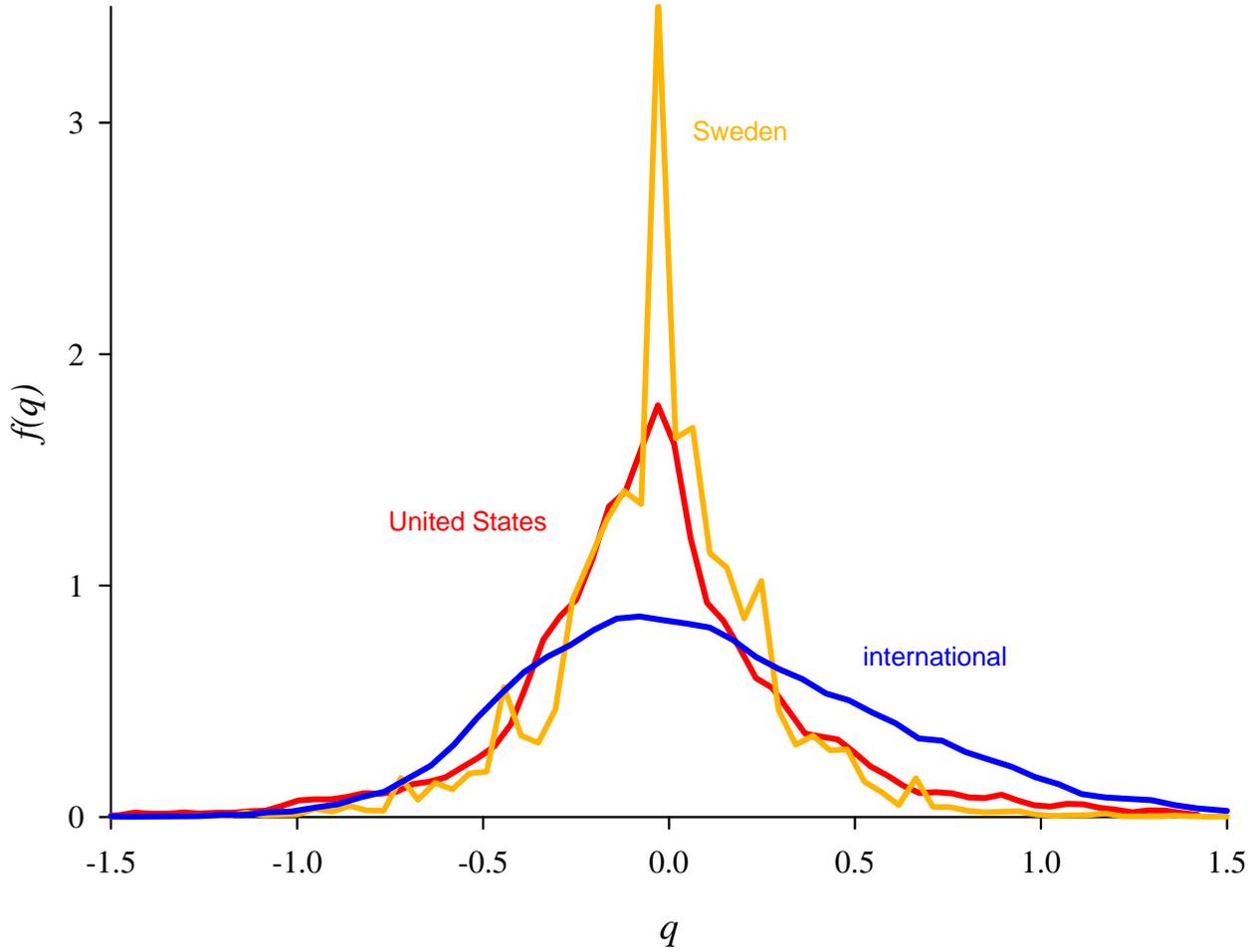
For mda_{ijk} it is 1,350 km with a standard error of 430 km.

But recall the Gorodnichenko-Tesar (2009) critique:

$$v_{ijk} = \alpha_i + \beta_d \ln(\text{distance})_{jk} + \beta_o do_{jk} + \beta_s ds_{jk} + \epsilon_{ijk}$$

Finding 4: Measuring ocean-width relative to Swedish price dispersion does not affect the conclusions.

Figure 3: Empirical Density of LOP Deviations



6. What Next I

$$v_{ijk} = \alpha_i + \beta_d \ln(\text{distance})_{jk} + \beta_o do_{jk} + \epsilon_{ijk}$$

But:

(a) $\exp(\hat{\beta}_o/\hat{\beta}_d)$ can be significant even when $\hat{\beta}_o$ is not, and vice versa

(so see Parsley and Wei)

(b) the ocean effect is measured relative to the assumed log-linear distance effect

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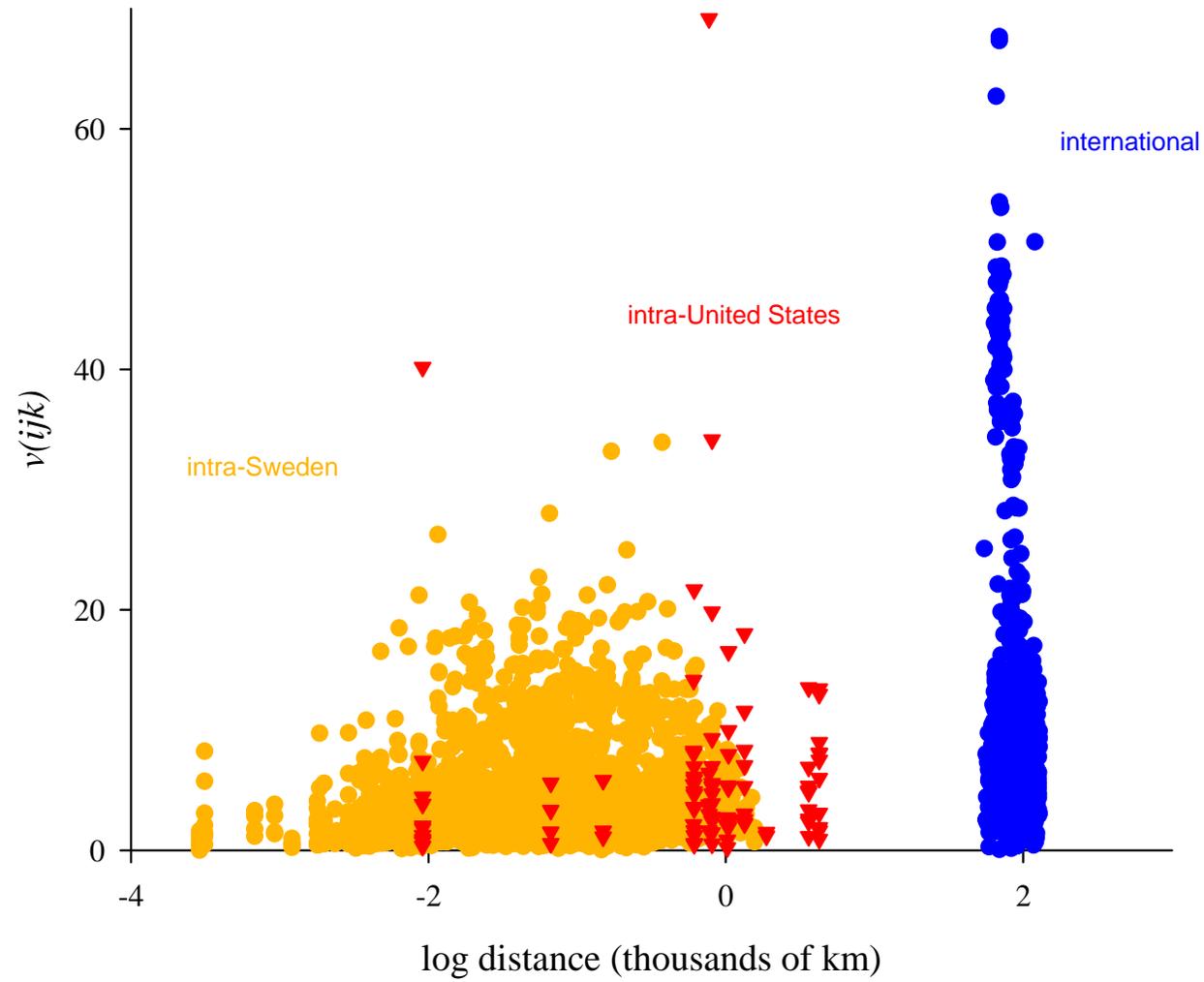
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Figure 4: Volatility and Distance



$$v_{ijk} = \alpha_i + \beta_d \frac{(\text{distance}_{jk} + \beta_o d_{ojk})^{1-\gamma_i}}{1 - \gamma_i} + \epsilon_{ijk}$$

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Given the role for F_i and the economic-historical work on convergence we'll next study time-varying covariates and time itself.

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