“Gravity in the Weightless Economy”

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The Model in a Nutshell: Assumptions

How do affiliates of US MNCs source inputs for production?

a. **Local production** of inputs by the affiliate in the host country:
   - saves on trade costs;
   - subject to communication costs.

b. **Import** inputs from the parent:
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Key assumption:

- Trade costs depend on distance, not on knowledge intensity.
- Communication costs depend on knowledge intensity, not on distance.

The Model in a Nutshell: Predictions

- The **Cost Share of Imported Inputs:**
  - is decreasing in trade costs (τ) from the US;
  - the rate of decrease is smaller in knowledge-intensive industries ("low" ϕ).

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- **Affiliate Sales:**
  - are decreasing in trade costs from the US;
  - the rate of decrease is larger in knowledge-intensive industries.

Quantitative Performance: a Back-of-the-Envelope Calculation

- Is the model able to match **quantitatively** observed import cost shares and affiliate sales?

- Does the model replicate **quantitatively** the sensitivity of import cost shares and affiliate sales to trade costs and knowledge intensity?

Quantitative Performance: a Back-of-the-Envelope Calculation

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  - For the average industry, the model-generated magnitudes can be consistent with the summary statistics from the data.

- Does the model replicate **quantitatively** the sensitivity of import cost shares and affiliate sales to trade costs and knowledge intensity?
  - For the average industry, the model-generated responses are NOT consistent with the results of the baseline regressions.

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- Choose λ to match average import share of total costs in the data:

$$\frac{IM}{TC} = 5.56\% \Rightarrow \lambda = 0.6854,$$

which means that only 50.39% of potential problems arising from disembodied technology transfer are solved successfully.

[1] R&D expenditure as a percentage of sales.

Import Cost Shares, Trade Costs, and Knowledge Intensity

- Imported inputs cost share is decreasing in trade costs.

  Elasticity from calibrated parameters:

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- The rate of decrease is lower in more knowledge-intensive industries.

  Elasticity from calibrated parameters:

$$\frac{\partial^2 \log\left(\frac{IM}{TC}\right)}{\partial \log(\tau)\partial(1/\phi)} = \frac{1}{\lambda}\left(\frac{1}{\phi}\right)^{-2} = 583.64$$

  while the elasticity from the baseline regression is 32.02.

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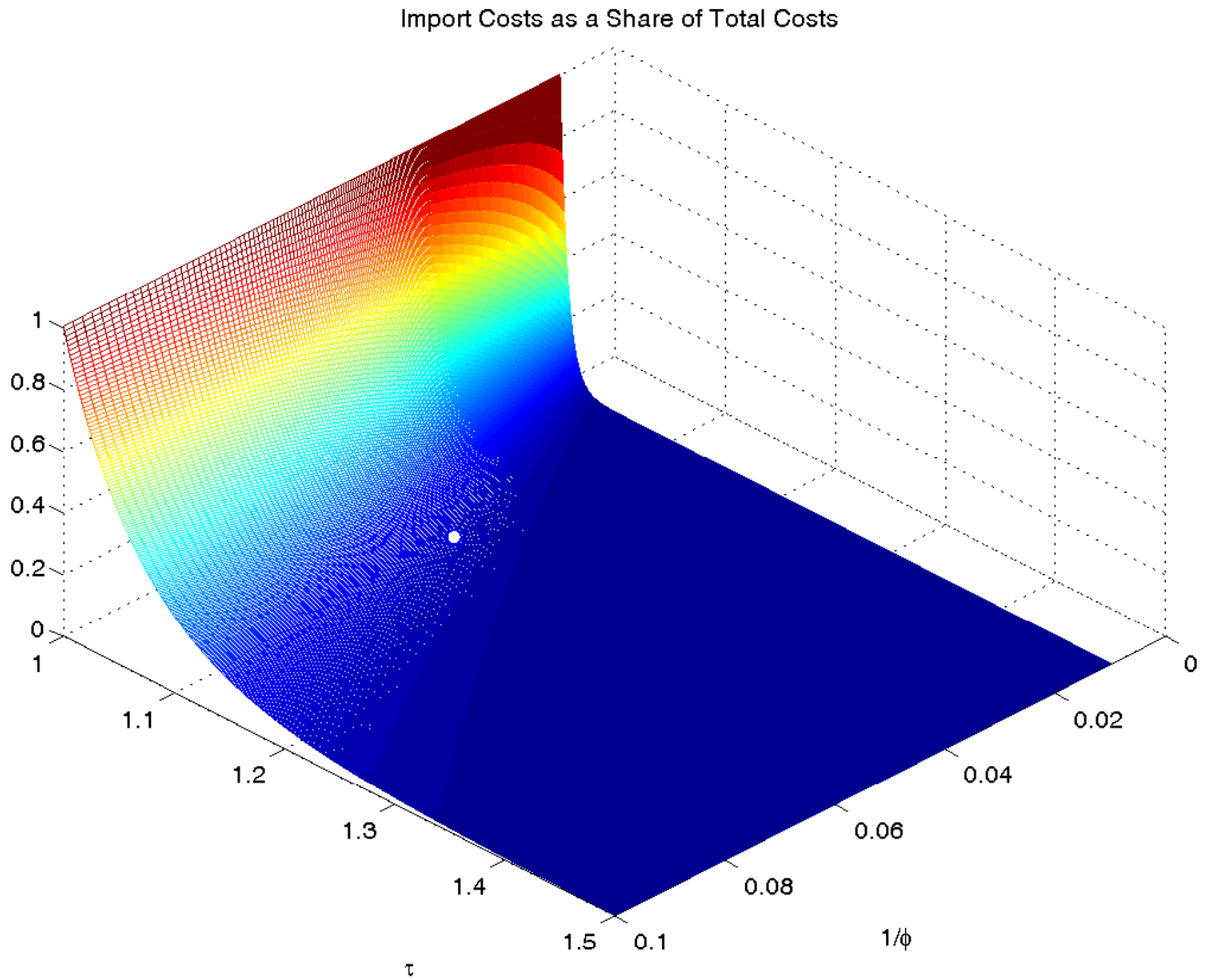
Import Cost Shares (contd.)



Affiliate Sales

Affiliate sales:

$$
\begin{aligned}
R^i_{jk} &= \left(\frac{\sigma}{(\sigma-1)}\right)^{1-\sigma} B^i_k (C^i_{jk})^{1-\sigma} \\
C^i_{jk} &= \exp\left[\frac{\lambda}{\phi_i}\left(1-(\tau^i_{jk})^{-\phi_i/\lambda}\right)\right].
\end{aligned}
$$

Compute elasticities with respect to trade costs and knowledge-intensity for calibrated values of τ, ϕ, λ and for $\sigma = 2$.

Affiliate Sales (contd.)

- Affiliate sales are decreasing in trade costs.

  Elasticity from calibrated parameters:

$$\frac{\partial \log R}{\partial \log \tau} = (1-\sigma)\tau^{-\phi/\lambda} = -0.06$$

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- The rate of decrease is higher in more knowledge-intensive industries.

  Elasticity from calibrated parameters:

$$\frac{\partial^2 \log R}{\partial \log(\tau)\partial(1/\phi)} = \frac{(1-\sigma)\phi^2}{\lambda}\tau^{-\phi/\lambda}\log(\tau) = -3.21$$

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Matching the elasticity of sales with respect to trade costs requires $\sigma \approx 60$, and overstates the effect of knowledge intensity.

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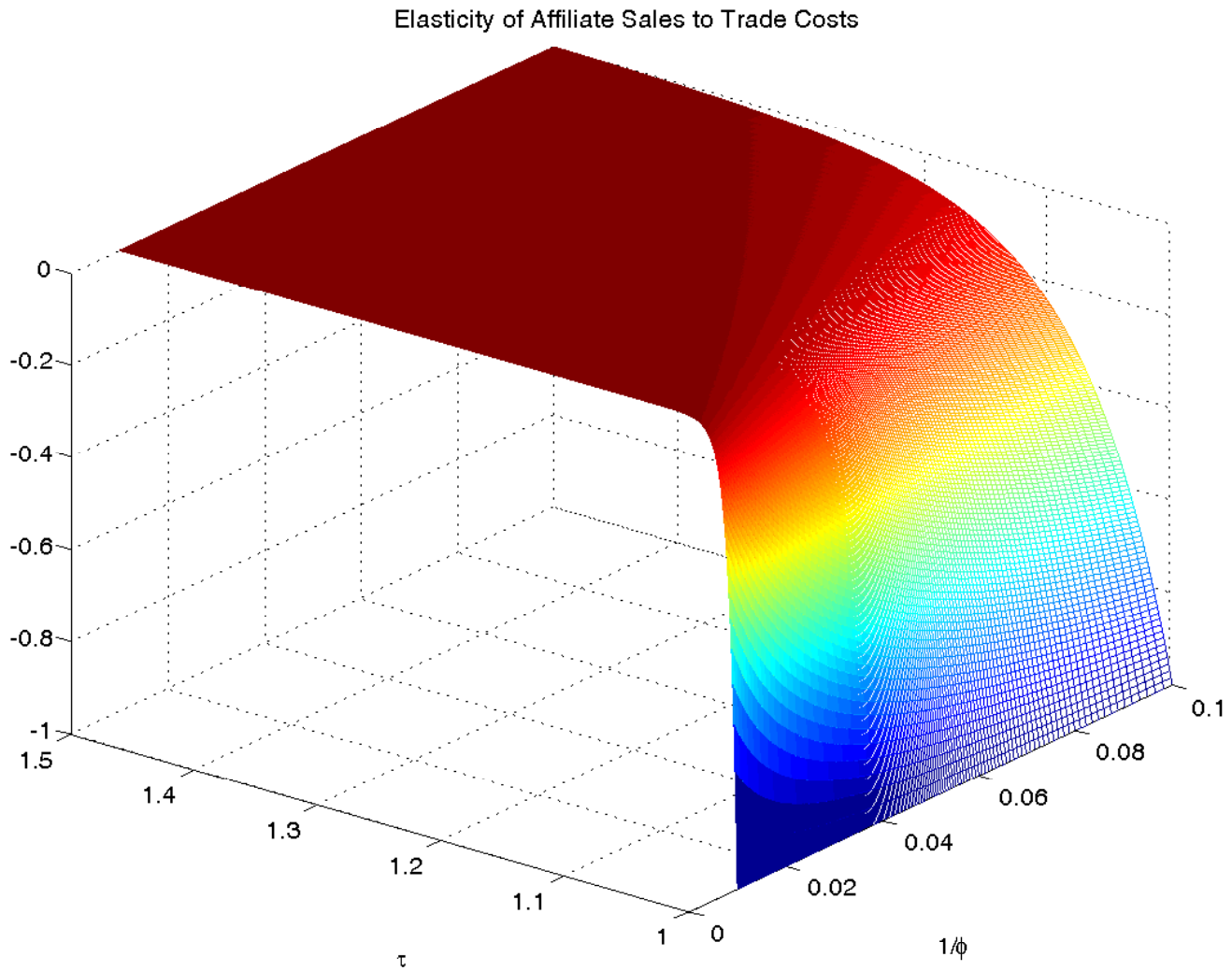

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- Average τ in the data is LOW (mean 1.104, st.dev 0.105) – consistent with most of the affiliates located in neighboring countries (Canada, Mexico)
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- **Why does this matter?**

  Quantitative fit is crucial if we are interested in understanding the **welfare consequences of international technology transfer**.

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Conclusions

- Elegant model that sheds light on the interaction of trade costs and technology transfer in determining the sourcing strategy of affiliates of MNCs.
- Careful reduced-form analysis of the main mechanisms of the model.
- Potential for quantitative fit of the model: welfare consequences of international technology transfer within multinational corporations.
- I look forward to more work in this agenda!