14.582 International Trade
— Lecture 12: Markups (Theory) —

Today's Plan

1. Markups, Misallocations, and Trade
2. Krugman (1979)
3. ACDR (2018)

1. Markups, Misallocations, and Trade

Why Markups and Trade?

- Markups $\Rightarrow$ Misallocation
  - Trade liberalization affects markups, and in turn, affects misallocation (+ or -?)
  - Trade liberalization affects allocation, even if markups are fixed, and in turn affects misallocation (+ or -?)
- Markups $\Rightarrow$ Terms-of-trade
  - If a country raises its tariff, and foreigners charge a markup, then markup may change in response to the tariff
  - If there is incomplete pass-through from tariff to markup, rationale for a positive optimal tariff (absent GE effects)

Back to Growth Accounting

- Suppose that we are interested in the welfare impact of a TFP shock
  - Think of trade liberalization as a particular type of TFP shock
  - In a standard trade model, this would be a change in iceberg trade cost
  - But for now, let us just index technology by T
- Consider the representative agent's utility maximization problem:

$$U(T) \equiv \max_{c} \; u(c)$$
$$s.t.: \; p(T) \cdot c \leq R(T)$$

where $R(T) \equiv p(T) \cdot y(T)$ denotes revenues

First Best Benchmark without Distortions

- Firms maximize revenues:

$$R(T) \equiv \max_y p(T) \cdot y$$
$$s.t. : F(y, T) \leq 0$$

- The Envelope Theorem therefore implies:

$$U'(T) = \lambda[-p'(T) \cdot c(T) + R'(T)]$$
$$R'(T) = p'(T) \cdot y(T) - \mu F_T(y, T)$$

  where λ and μ are the associated Lagrange multipliers

- Combining these two expressions:

$$\frac{U'(T)}{\lambda} = p'(T) \cdot [y(T) - c(T)] - \mu F_T(y, T)$$

- First-term = TOT effect; Second term = Solow residual

Comments

1. In a closed economy, market clearing requires $y(T) = c(T)$
   - Thus first term is equal to zero
   - One only needs to know the direct effect of the productivity shock and the initial allocation to compute its welfare impact
2. In an open economy, international trade implies $y(T) \neq c(T)$
   - Thus country now gains if country exports good i ($y_i(T) - c_i(T) > 0$) and its price increases ($p_i'(T) > 0$)
   - But now we need full model to compute price changes and, in turn, welfare impact
3. Of course, the world economy is closed
   - So Solow residulal is all that is needed at the world level
   - See Atkeson and Burstein (2010) and Burstein and Cravino (2015)

Adding Distortions

- Suppose that firms have market power
- In equilibrium, they therefore charge a markup over marginal cost
- It is *as if* we had $\tilde{p}(T) \neq p(T)$ such that firms solve:

$$\begin{aligned} \tilde{R}(T) \equiv & \max_y \tilde{p}(T) \cdot y \\ & s.t. : F(y, T) \leq 0 \end{aligned}$$

- Markup on good i is given by $m_i \equiv p_i / \tilde{p}_i$
- This is no different at if we were taxing good i at rate $t_i = 1 - 1/m_i$
  - Previous approach more general than markups
  - Markups simply act as "wedges" in the Hsieh and Klenow sense
- Note that for firms to take prices as given, we need CRS or DRS

Growth Accounting Revisited

- The Envelope Theorem now implies:

$$\tilde{R}'(T) = \tilde{p}'(T) \cdot y(T) - \mu F_T(y, T)$$

- By definition, we also know that:

$$\tilde{R}'(T) = \tilde{p}'(T) \cdot y(T) + \tilde{p}(T) \cdot y'(T)$$
$$R'(T) = p'(T) \cdot y(T) + p(T) \cdot y'(T)$$

- We therefore obtain:

$$\begin{aligned}\frac{U'(T)}{\lambda} &= [-p'(T) \cdot c(T) + R'(T)] \\ &= p'(T) \cdot [y(T) - c(T)] + p(T) \cdot y'(T) + \tilde{R}'(T) - \tilde{R}'(T) \\ &= p'(T) \cdot [y(T) - c(T)] - \mu F_T(y, T) + [p(T) - \tilde{p}(T)] \cdot y'(T)\end{aligned}$$

- New term = Distortion term (Basu Fernald 2002, Baeqee Farhi 2017)
  - Reallocation ($y'(T)$) now has a first-order effect on welfare
  - > 0 if good i is under-supplied ($p_i > \tilde{p}_i$) and output increases ($y_i' > 0$)

Comments

1. Although $p(T) - \tilde{p}(T)$ appears in the previous expression, it is relative, not absolute prices that matter
   - Firms' supply is homogeneous of degree zero in prices

   $\Rightarrow$ variation of markups across goods matters, not absolute level
   - A uniform tax is not distortionary
   - "Decrease in markups is good" is a partial equilibrium intuition where one good is subject to a markup and the other is not
2. Changes in markups are *not* required for them to affect the consequences of productivity shocks and hence trade liberalization
   - Once there is a wedge, reallocations have first-order effects...
   - even if the wedge is not affected by the shock
3. First-order type result less useful once there are distortions:
   - Formula still provides intuition, but in order to be implemented, we now need $y'(T)$, which requires the full structure of the model...
   - True even in a closed economy where terms of trade can be ignored

2. Krugman (1979)

- Model = Dixit-Stiglitz (1977) with symmetric firms
- c and p/w are simultaneously characterized by

$$\text{(PP):} \qquad \frac{p}{w} = \left[\frac{\sigma(c)}{\sigma(c)-1}\right]\frac{1}{\varphi}$$

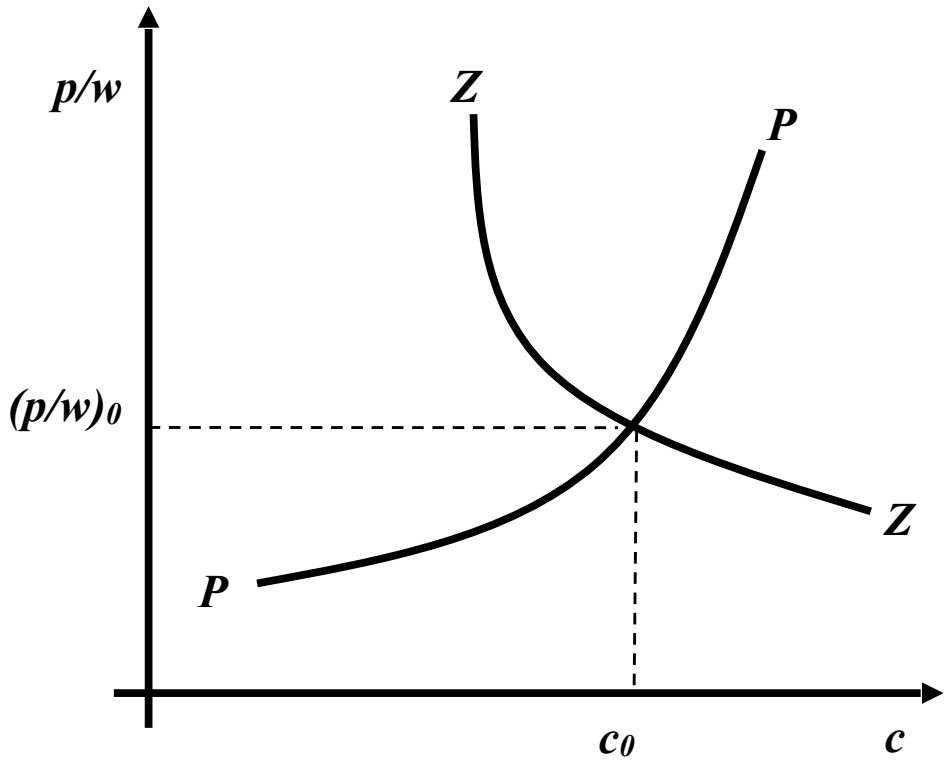
$$\text{(ZP):} \qquad \frac{p}{w} = \frac{f}{q} + \frac{1}{\varphi} = \frac{f}{Lc} + \frac{1}{\varphi}$$

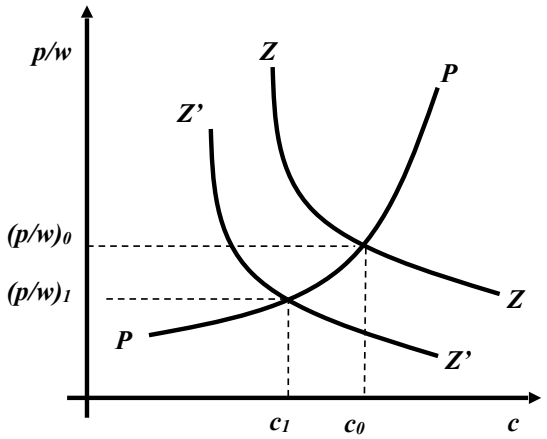
- n can then be computed using market clearing conditions

$$n = \frac{1}{f/L + c/\varphi}$$

Refresher

Graphical Analysis





- Suppose that two identical countries open up to trade
  - This is equivalent to a doubling of country size (which would have no effect in a neoclassical trade model)
- Because of IRS, opening up to trade now leads to:
  - **Increased product variety**: $c_1 < c_0 \Rightarrow \frac{1}{f/2L+c_1/\varphi} > \frac{1}{f/L+c_0/\varphi}$
  - **Pro-competitive/efficiency effects**: $(p/w)_1 < (p/w)_0 \Rightarrow q_1 > q_0$

Comments

- It is common in the literature to present the two previous channels as two new sources of GT absent from neoclassical models
- Two issues with this view:
  - New varieties could appear under perfect competition (Armington)
  - Markups and new varieties are tied together by free entry condition: when markups go down, entry decreases and vice versa
- Note also that markups do not vary across goods in Krugman (1979):
  - There is therefore no misallocation across goods that are produced
  - The only distorted margin here is entry (it is as if goods that are not produced had infinite markups relative to other goods)
  - If entry was fixed, then increasing country size would affect markups, and profits, but not the allocation...
  - From welfare standpoint, key questions = Is entry too low or too high? Does an increase in country size increase or decrease entry?

3. ACDR (2018)

Background

- Arkolakis, Costinot, and Rodriguez-Clare (2012), have shown that for fairly large class of trade models, welfare changes caused by trade shocks only depend on two statistics:

  1. Share of expenditure on domestic goods, λ
  2. Trade elasticity, ε, in gravity equation

- Assume small trade shock so that, $d \ln \lambda < 0$: associated welfare gain is given by

$$d \ln W = -\frac{d \ln \lambda}{\varepsilon}$$

What About the Pro-Competitive Effects of Trade?

- Important qualification of ACR's results:
  - All models considered in ACR feature CES utility functions
  - Thus firm-level markups are constant under monopolistic competition
  - This de facto rules out "pro-competitive" effects of trade
- Recall monopolistic competition with CES leads to efficient allocation:
  - Envelope theorem implies that starting from initial allocation, the effect of productivity shocks are the same as under perfect competition
  - If we relax CES, gains from trade may be very different

ACDR (2018): Overview

- **Goal:** Study the pro-competitive effects of trade, or lack thereof
  - Depart from CES demand and constant markups.
  - Consider demands with variable elasticity and variable markups
- **Focus:** Monopolistic competition models with firm-heterogeneity
- **Experiment:**
  - Consider two classes of models with CES and without
    - Impose restrictions so that all these models have same macro predictions (Pareto distributions of productivity)
    - What are the welfare gains under these two scenarios?

ACDR (2018): Main Results

- Characterize welfare gains in this environment
  - Suppose small trade shock, $d \ln \tau$, raises trade openess, $d \ln \lambda < 0$
  - Welfare effect is given by

$$d \ln W = -(1-\eta) \frac{d \ln \lambda}{\varepsilon}$$

  - $\eta \equiv$ structural parameter depends on
    - Degree of pass-through
    - Magnitude of GE effects

ACDR (2018): Main Results (cont)

- Whether models with variable markups lead to larger or lower gains from trade liberalization depends on sign of η

- **What is the sign of η in theory?**
  - Under common alternatives to CES: $\eta \geq 0$
  - *Intuition:*
    Incomplete pass-through (Trade costs affect TOT)
    GE effects (Trade costs also affect misallocations)
    Direct effect dominates GE effect (Non-homotheticity is key)

- **What is the sign of η in the data?**
  - Direct demand estimation and existing pass-through estimates point to $\eta \geq 0$, but small. Hence the "elusive" pro-competitive effects.

Comments

- Focus of ACDR is on misallocations:
  - Distribution of markups is fixed (because of Pareto)
  - ... and does not vary across origin countries (because of Pareto)
  - Misallocations is across varieties from the same origin country
  - Entry is fixed too (because of Pareto)
- In general,if distribution of markups is fixed, reallocations require sector-specific productivity shocks
  - In ACDR, though, trade costs do not vary across firms/varieties
- This explains the role of non-homothetic preferences in ACDR:
  - With homotheticity = back to first best results and ACR formula
  - Without homotheticity = if trade costs go down and country gets richer, consumers change shares of expenditure on different varieties
  - This is good if reallocation leads to expansion of high-markup varieties
  - But under common alternative to CES, marginal varieties tend to have lower markups and richer consumers tend to buy more varieties...