Background Motivation

- Market integration (or Liberalization)
- Introduction of foreign entrants and their products
- Intensive competition
- Lower markup of a product
- Product range adjustment

Demand & Supply

- Marshallian demand and Dixit-Stiglitz price indexes
  - Heterogeneous sector:
    - Hot firm: \[ w = \frac{\partial V}{\partial q_f} \text{ and } P = \frac{\partial V}{\partial q_f} \]
    - Cold firm: \[ w = \frac{\partial V}{\partial q_f} \text{ and } P = \frac{\partial V}{\partial q_f} \]
- Supply side:
  - Heterogeneous sector: CES technology with a unit of labor \( \beta = 1 \); A Numerate and \( \alpha = 1 \) as \( \beta = 1 \)
- Homogeneous sector: Heterogeneity in productivity \( \alpha \)
  - Assumptions:
    - Symmetric tech. across products: No product index \( \sigma = 1 \)
    - Fixed cost for expanding a unit range of product \( K_f \)
  - Hot-firm profit function
    - Hot-firm's optimal choices
      - Price: \( P_f = \frac{\partial V}{\partial q_f} \) where \( q_f = \sigma (1-\sigma) S_f \)
      - Product Range: \( N_f \) = \( \frac{\partial V}{\partial q_f} \)

Zero-Cutoff Profit (ZCP) Condition

- Fixed cost \( (K_f) \): Among \( M_f \) entrants in an economy, only productive \( M_f < M_f \) firm survive and produce
- Sorting productivities in a descending order, \( q_1 > q_2 > \ldots > q_{M_f} \)
- the market can be summarized like
  \[ \prod_1 \geq 0 \text{ and } S_f > 0 \text{ for } f = 1, \ldots, M_f \]
  \[ \prod_1 = 0 \text{ and } S_f = 0 \text{ for } f = M_f + 1, \ldots, M_T \]
  - ZCP condition gives the elements of the threshold (marginal) firm
    - Threshold productivity \( \mu_{\text{ZCP}} = \frac{1}{\sum_{f=1}^{M_f} q_f} \)
    - Market share of a marginal firm \( \prod_{\text{ZCP}} = \frac{1}{\sum_{f=1}^{M_f} q_f} \)

The Moment of Market Integration (Short-run)

- Bilateral Trade between symmetric economies
  - Liberalized market size: \( P^L \) = \( 1 \)
  - No random productivity assignment
  - All entrants in the liberalized market maintain their own productivity assigned in autarky
  - No new entrant
  - Survivors in autarky become the only entrants of the integrated market

Short-run Equilibrium

- At moment of the market integration from trade liberalization
  - \( M_T = 2M_f \) firms surviving in autarky of symmetric economies \( J \)
  - Fixed-firm productivity—market size of the integrated market
    - Product prices of the integrated market, \( P^\ast \) = \( 2 \)

The Bertrand-Nash equilibrium of trade liberalization in the short-run consists of

- A set of information about the ZCP condition in the heterogeneous sector: \( \{\mathcal{S}_0, W, \mathcal{Z}_0\} \)
- A vector of the optimality set by the \( M_0 \) surviving firms in the integrated market, including the price of a variety, the range of varieties, and the firm-level market share: \( \{P_f, S_f, \mu_f\} \) and
- A sectoral price index within the integrated economy: \( P^\ast \)

Which solves both utility and profit maximization simultaneously.

Quantitative Analysis - Introduction

- Discrete and heterogeneous firms: Unavailability to employ the Law of Large Numbers (LLN)
  - No analytical closed-form solution
  - Non-stationary short-run equilibrium
  - Even in the simple scenario using symmetric economies, it is not able to get a closed-form of firm-level optimality.
- Quantitative analysis: Numerically exploring how individual firm adjust their optimality in the short-run of market liberalization
  - How?
    1. Benchmark replication of the market integration in the previous literature—New productivity assignment at the beginning of market integration
    2. Counterfactual quantitative analysis with the novel concepts of the market integration

Quantitative Analysis Process

- Followed the mechanism and relevant parameters in Feenstra and Ma (2008)
  - The conventional general procedure to find equilibrium in the granular firms with multiple products framework
- Mechanism:
  - Finding the marginal firm satisfying the ZCP condition
    - The lowest and unique number of \( \mu_{\text{ZCP}} \) in the productivity set to satisfy
      \[ \sum_{f=1}^{M_f} \mu_{\text{ZCP}} = 1 \]
    - Productivity set and relevant parameters
      - \( J = 6 \) and \( \alpha = 5 \)
      - Fixed sectoral shares due to the CES demand \( \sigma = 0.5 \text{ and } \sigma = 0.5 \text{ in the integrated market} \)
- Survivors in Equilibrium (with new concept)
  - Unlike the previous literature, we can find that the ZCP condition is updated, resulting in firm-level changes in markup and product range.

Survivors in Equilibrium (with new concept)

- No proportional to the market size — Larger market size \( (R_f) \) \( \Rightarrow \) \( N_f \)
- Smaller market share \( S_f \) \( \Rightarrow \) \( M_f \)
  - Two opposite effects on profit: \( \mu_{\text{ZCP}} \) = No proportional to the market size—Resource are concentrated on the most productive firms (Firm 1s)

Model Structure

- Employed the general framework in Feenstra and Ma (2008)
- Integration between symmetric markets
  - Set of firm-level productivity: Identical across regions
  - Zero iceberg trade (transportation) cost, and zero fixed cost for exporting goods
  - Fixed wage \( w = 1 \): Consistent with symmetricity
- Low market integration: Focus on transition vs. focusing on equilibrium
- Fixed productivity at the moment of market integration vs. New random assignment
- We can figure out how the supersets adjust their markups and product ranges at the moment of market liberalization.

Contribution

- This work gives an idea about tractable firm-level optimality for heterogeneous discrete firms producing multiple products
- Discrete (Granular) firms vs. Continuous firms (Zero-measured)
- Focusing on transition vs. Focusing on equilibrium
- Fixed productivity at the moment of market integration vs. Random normal assignment

This Paper

- Objective
  - Numerical exploration of market integration impact on an individual firm’s decision on \( 1) \) markup of a product and \( 2) \) product range in the short-run
  - Capturing “head-to-head competition” making the integrated market pro-competitive
    - Competition among the highest production firms from each economy
- Overview
  - Introduction
  - Main Framework: Nested CES demand + Monopolistic Competition
  - Defining the concept of market integration in the short-run
  - Diction productivity (no countrymen)
- Research Questions
  - 2nd Part: Quantitative analysis with the newly defined short-run environment of market integration
    - Implementing pro-competitive integrated market

Research Question

- How do discrete firms differentiate in productivity (+heterogeneous) response to the market integration between symmetric economies (+international trade) when they maintain own productivity assigned in autarky (+short-run)?

Numerical Results

- Market shares
  - \( \{P_f, S_f, \mu_f\} \)
  - Higher productive firms get larger market shares.

- Price and Markup
  - \( P_f = \frac{\partial V}{\partial q_f} \text{ and } \mu_f = \frac{\partial V}{\partial q_f} \)
  - Higher productive firms set a higher markup and a lower price.
  - Only \( S_f \) affects markup of a product.

- Lower \( S_f \) led by head-to-head competition: \( P_f \) and \( \mu_f \)

Thank You

Comments are always welcome.