**Independent Discrete Choice Problems:**

Decision to which market to sell goods. Which country to import goods.

Melitz (2003): Firms have constant marginal cost. Decision to enter French export market does not intertwine decision to enter Spanish export market. Binary entry decision I(K).

N dimensional Boolean or vector then in total 2\*\*N possible choices. Curse of dimension. How deal with this:

1. Assume no interdependence.
2. Assume N not too large.
3. Use moment inequalities. Profit chosen one should be higher than alternatives. Estimate parameters, but usually get bounds.
4. Put structure on problem and develop solution algorithm. Felix require exhibit complementary among choices. In principle, algorithms will develop bounds in which optimal solution is contained. If upper bound and lower bound is identical then have found solution. 99% is the case. Figure out solution in between bounds. Combination in between if not many can evaluate at each point (lucky case).

Importing:

Imports important for firm performance. In data, firm sourcing multiple inputs from multiple countries. Number of firms and products account for most of cross country variation. Therefore, figuring out extensive margin seems important. Extensive margin of export is better understood than that of imports.

AFT(2014):

Shows meaningful difference among countries. Top 10 US imports (number of firms import from them). Have cases like Mexico, where rank by imports is high, but rank by number of firms low. Implies cost of import could be different from other countries.

Multi-country model of global sourcing:

Importing is to lower variable cost. If get access to inputs from Mexico, have lower variable cost. This effects the return to import from Canada etc. From firm needs to figure out from which country to procure entry cost to get imports from and for what quantity.

AFT (2014) contribution:

* country allowed to differ in 2 dimensions: input providers and cost of sourcing from that country. Closed form solution from intensive margin of sourcing. Extensive sourcing margin.
* Reduced form evidence of interdependency. Increase sourcing from China leads to increased sourcing from other countries (model explains why).
* Environment: J countries, Lj consumers. Standard Dixit Stigliz preference. Talk about manufacturing sector first, but non-manufacturing sectors later to pin down prices. Measure of Nj firms measured by free entry. Market structure is monopolistic structure. Each firm uses unit measure of intermediate inputs. Perfect competitions.

Production technology:

* Assemble bundle of intermediate goods to produce final product. Continuum of intermediate goods. Phi (total factor productivity) and integrate over all intermediate goods and prices. Price from country j(v). Perfect competitive price, price of labor, a(efficiency).
* Productivity: inverse of unit labor cost is bigger than

Firm chooses:

* Set of countries to access intermediate inputs. Source country and price of final good.
* Unit cost is infinite for countries not source country.

Share of intermediate input purchase sources from any country:

Denominator here is firm specific because not every firm has access to every country. Summation is to sum over J sourcing countries because enter cost function of firm. Marginal cost after firm makes optimal choice is 1/phi. Firms with access to more intermediate goods have lower cost.

General profit function:

Cs demand and Frisch distribution for labor production.

Source capability is nondecreasing in J. Benefits from activating more countries is larger when have large corporate productivity (supermodular).

Theory of complements and substitutes from theta:

When activate another country Mexico. Two effects. Substitution effect (source less from US, from fraction of overall sourcing. Out of total purchases, fraction spent in US goes down). Lowered overall cost, which has scale or overall effect. Consumer want to buy more from you based on demand elasticity. If theta is lower than more comparative advantage among productivity across countries. Mexico good at producing is different from that of US. If theta going down more likely to be in the complements case.

Industry equilibrium is measured by fixed point for market potential. Fixed point so that what firm takes as given is consistent across what price you see. Profit before ou enter is 0 will pin down the firms.

When = 1: back to additively separable in terms of choices. Possible to use this framework to study simpler (don’t want to deal with interdependencies). Cancels out substitute and complements.

Sourcing from China is endogenous so use shift share research design, based on ability of data. Chinese export growth to other European countries as measure of productivity level in China. Input output. How much firms in Industry affected by rising inputs from China.

If look at pure manufacturers.

Estimation (Road Map)

1. Vcc