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Sufficient Partial Identification and Aggregation

Choosing models; getting by with less structure

(Lecture 3)

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Lecture 3: Choosing Models, getting by with less Structure: Sufficient Partial Identification and Aggregation (3/3)

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Quantifying the Losses from International Trade Spencer G. Lyon New York University Michael E. Waugh New York University and NBER March 2019

Calculating Equilibrium Prices: Scarf's Algorithm

Scarf (1967,1982) developed a general efficient algorithm to find an approximate fixed point of a continuous function. It is based on a particular way of proving Brower's fixed point theorem, so it is also instructive to understand how it works, in order to also learn how Brower's theorem is established.

Definition 11 *A **simplex** $S \subseteq \mathbb{R}^L$ is defined as the convex hull of L linearly independent points $v_1, v_2, ..., v_L$. That is,*

$$S = \left\{ x \in \mathbb{R}^L : x = \sum_{l=1}^{L} \alpha_i v_i \text{ for some vector } \boldsymbol{\alpha} = (\alpha_1, \alpha_2, ..., \alpha_L) \in \Delta \right\} \quad (27)$$

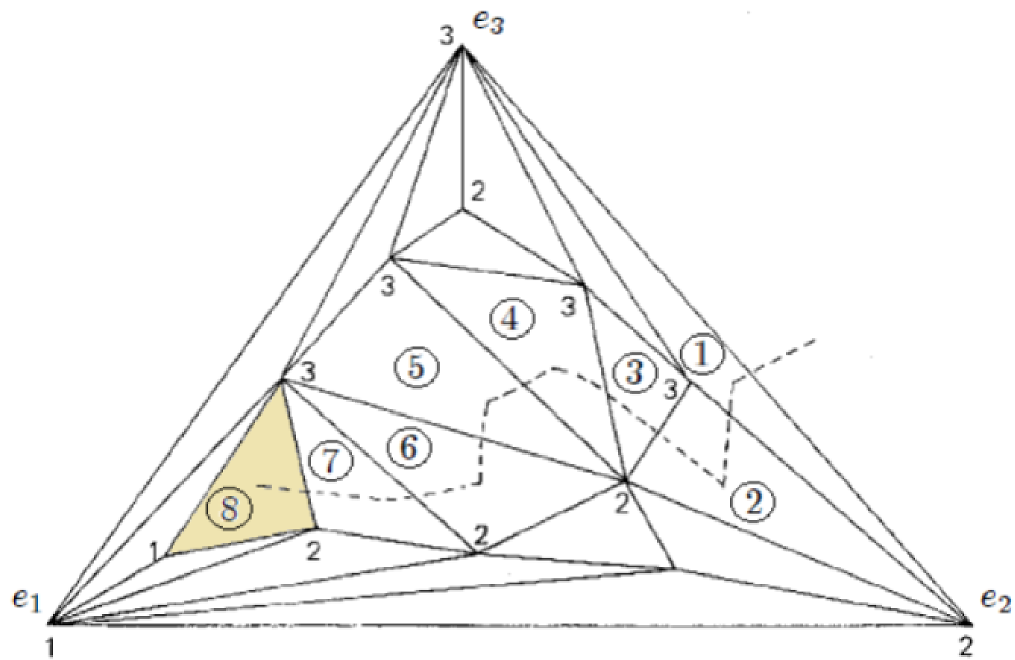

Figure 7: Algorithm for Restricted Simplicial Subdivisions

Start at simplex 1, the triangle made by vertices e_2 and e_3. Note that the other vertex has label 3. For the next step of the algorithm, go to simplex 2, replacing e_3 with a new vertex. Since this repeats the label of the previously existent e_2, replace it and go to simplex 3. We keep on going in this manner until we reach simplex 8, which has all distinct indices, finishing the algorithm.

In the following sections, we will develop some examples of calibration exercises from the literature, in order to illustrate how calibration actually works.

3 Calibration in Applied Microeconomic Models

The earliest example of calibration comes from Shoven and Walley (1972)[1]. In this paper, the authors tried to use a computable general equilibrium model with taxes with Microeconomic data. The purpose of the paper was to get good measures of welfare gains and of how different factors bare taxes, by simulating the equilibria of a model economy (using Scarf's algorithm to calculate them). However, in order to get meaningful figures from the simulations, parameters on preferences and technologies should be set to realistic values. The main idea that they got was that instead of finding equilibrium prices and allocations given parameters, we could use the equilibrium conditions $z(p) = 0$ to get the parameter values that are consistent with the observed data being an equilibrium.

To illustrate how this works, take an example economy with:

- 4 commodities ($L = 4$) such that 2 of them are consumption goods (or final goods), and the remaining 2 are used solely as factors of production (for example, labor and capital are examples of goods which are only used to produce consumption goods which are not consumed by households). Let commodities 1 and 2 be the consumption goods, and labels 3 and 4 the factors of production.

- 2 households. Each household is endowed with both factors of production. Let $\left(x_1^h, x_2^h\right)$ be the consumption vector for each household $h = 1, 2$ and let $\left(\omega_3^h, \omega_4^h\right)$ be the endowment vector of the 2 factors of production for each household. Preferences for each households over consumption bundles is given by a Cobb - Douglas utility function:

$$U^h\left(x_1^h, x_2^h\right) = \left(x_1^h\right)^{\beta_h}\left(x_2^h\right)^{1-\beta_h} \tag{1}$$

  with $\beta_h \in (0,1)$ for $h = 1, 2$.

- 2 firms: $j = 1, 2$. Firm j produces only good j with a CES production function: i.e.

$$y_j^j = \lambda_j \left[\alpha_j \left(y_3^j \right)^{\frac{\sigma_j - 1}{\sigma_j}} + (1 - \alpha_j) \left(y_4^j \right)^{\frac{\sigma_j - 1}{\sigma_j}} \right]^{\frac{\sigma_j}{\sigma_j - 1}} \tag{2}$$

where $\alpha_j \in (0,1), \sigma_j > 0$ and $\lambda_j > 0$ is a scale parameter. y_j^j is the quantity produced of good j by firm j, and $\left(y_3^j, y_4^j \right)$ are the factor demands of firm j in order to be able to produce the consumption good. Note that for $\alpha_j, \sigma_j > 0$ we have that the production function (and hence, the production set) has the **constant returns to scale property.**

Also, the CES production function (2) has nice limit properties. Namely, given $\left(y_3^j, y_4^j \right) \gg 0$:

- As $\sigma_j \to +\infty$ we have that $y_j^j \to \lambda_j \left[\alpha_j y_3^j + (1 - \alpha_j) y_4^j \right]$, a perfect substitutes production function.
- As $\sigma_j \to 1$ we have that $y_j^j \to \lambda_j \left(y_3^j \right)^{\alpha_j} \left(y_4^j \right)^{1 - \alpha_j}$, a Cobb - Douglas production function.
- As $\sigma_j \to 0$ we have that $y_j^j \to \lambda_j \min \left\{ \alpha_j y_3^j, (1 - \alpha_j) y_4^j \right\}$, a Leontief production function.

Example: Mexico 1989

- CGE as a computer representation of Mexico which consists of consumers, producers and government.
- Consumers purchase goods from producers and supply factors of production. They also pay taxes to the government.
- Six producers corresponding to six sectors: primaries, manufactures, services, investment good, government consumption good, import good.
- Use input-output matrix and national accounts.

Input-Output Matrix

- Data: Input-Output matrix for the Mexican economy in 1989

Input-Output Matrix for Mexico

In 10 Trillion 1989 Mexican Pesos

		Expenditures							
		Intermediate Inputs			Final Demands				
Receipts		Primaries	Manufactures	Services	Private Consumption	Investment	Government Consumption	Exports	Total Demand
Intermediate Inputs	Primaries	1	4	0	2	0	0	1	8
	Manufactures	1	8	2	11	8	1	4	35
	Services	1	5	5	21	2	2	2	38
	Imports	0	3	1	1	2	0	1	8
Components of the Value Added	Wages and Salaries	1	4	7			1		13
	Other Factor Payments	4	10	19			0		33
	Indirect Taxes and Tariffs	0	1	4			0		5
Total Production		8	35	38	35	12	4	8	140

Source of basic data: Instituto Nacional de Estadística, Geografía e Informática

Application: Gains from Trade for Mexican Economy of NAFTA

- Level of Aggregation: 27 production sectors, each sector producing a single commodity, 21 traded and 6 non-traded.
- Dimensions: 2 factors of production. One consumer and three regions: Mexico, ROW, North America (NA).
- Production: All productivities combine intermediate inputs in fixed proportions but allow for some degree of substitution between domestic and foreign commodities (Armington aggregator). They also combine labor and capital by means of a Cobb-Douglas production function.
- Foreign Trade: Each sector produces a share for domestic markets and exports the remaining share to NA and ROW. On the import side the small country assumption is adopted, and domestic and foreign commodities are assumed to be imperfect subsititutes.
- Final Demand: There is a single representative consumer which demands goods according to a Cobb-Douglas utility function.

Structure Needed? And At What Level?

The first question on aggregation is the following: **under which conditions can we ensure the existence of a aggregate demand function that depends solely on the total wealth of the population, for all possible wealth profiles** w? More specifically, we ask the question of whether there exist a function $X : \mathbb{R}_+^L \times \mathbb{R}_+ \to \mathbb{R}_+^L$ such that:

$$\text{for all wealth profiles } w \in \mathbb{R}_+^I, \;\; \overline{x}_l\left(p, w\right) = X_l\left(p, \overline{w}\right) = X_l\left(p, \sum_{i=1}^{I} w_i\right) \;\; \text{for all } l \tag{9}$$

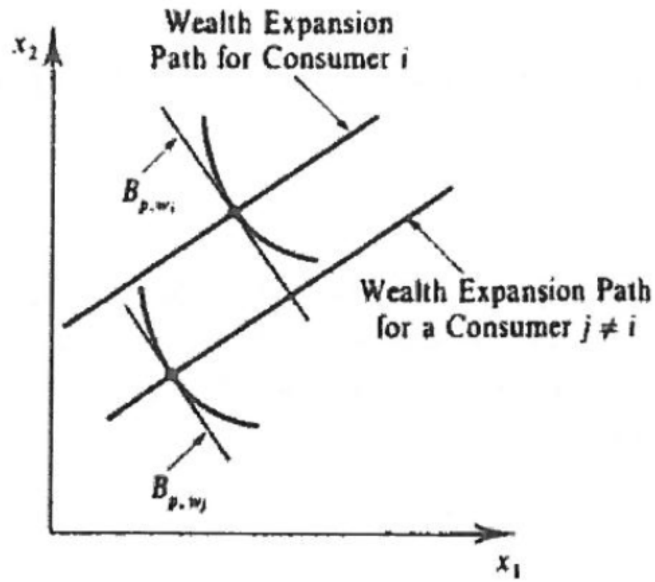

Figure 1: Parallel Linear Expansion Paths (MWG Figure 4.B.1)

Positive Representative Households and Gorman Aggregation

Definition (Positive Representative Household)

Suppose $X_i \subseteq \mathbb{R}_+^L$ and let $\left\{x^i\left(p, w_i\right)\right\}_{i=1}^I$ be the individual demand functions for a given economy, given prices p. We say that a preference $\succsim^*$defined on a consumption set $X^* \subseteq \mathbb{R}_+^L$ (with corresponding utility function u^*) corresponds to a Positive Representative Household iff the aggregate demand function satisfies (9) and moreover, it solves the utility maximization problem

$$\begin{aligned} X\left(p, \overline{w}\right) &= \arg\max_{x \in X^*} u^*\left(x\right) \\ s.t &: \quad px \leq \overline{w} \end{aligned}$$

Definition (Norm. Rep. Household with indirect utility)

Let $\mathbf{w} = (w_1, w_2, ..., w_I) \in \mathbb{R}^I_+$ be an income distribution, $\overline{w} \equiv \sum_{i=1}^I w_i$ and $p \in \mathbb{R}^L_+$ a price vector. Let $\{v_i(p, w_i)\}$ be indirect utility functions for agents $i = 1, 2, ..., I$. We say that a household i^* with indirect utility function $v^*(p, \overline{w})$ is a **Normative Representative Household** iff the following properties hold:

1. Let $(p, \mathbf{w})$ and $(p', \mathbf{w}')$ such that $v_i(p', w_i') \geq v_i(p, w_i)$ and $v_j(p', w_j') > v_j(p, w_j)$ for some j. Then

$$v^*\left(p', \sum_{i=1}^I w_i'\right) > v^*\left(p, \sum_{i=1}^I w_i\right) \Longleftrightarrow v^*(p', \overline{w}') > v^*(p, \overline{w})$$

2. Take $(p, \mathbf{w})$ and let $\overline{w} = \sum_{i=1}^I w_i$. Also, take any $p' \in \mathbb{R}^L_+$ and an aggregate income level $\overline{w}' \geq 0$ such that:

$$v^*(p', \overline{w}') > v^*(p, \overline{w})$$

Then there exists an alternative income distribution $\mathbf{w}' = (w_1', w_2', ..., w_I') \in \mathbb{R}^I_+$ such that $\sum_{i=1}^I w_i' = \overline{w}'$ and

$$v_i(p', w_i') \geq v_i(p, w_i) \text{ and } v_j(p', w_j') > v_j(p, w_j) \text{ for some } j$$

Normative Representative households:

Proposition

Suppose that demand functions are differentiable in w. There is a positive representative household, so if agents have Gorman form preferences, such that

$$v_i(p, w_i) = a_i(p) + b(p) w_i \tag{27}$$

Then an agent with indirect utility function $v^*(p, \overline{w})$ defined as;

$$v^*(p, \overline{w}) = \sum_{i=1}^{I} a_i(p) + b(p) \overline{w} \tag{28}$$

is also a Positive and a Normative representative Household for this economy.

Assessment

- Previous seems rather special for preference
- Cobb-Douglas different across households
  - Does not work
- But, below, using production, get quite strong and general results!

Jones and Neary (1984) "The positive theory of international trade"

https://doi.org/10.1016/S1573-4404(84)01004-2

(1) *Factor-price equalization theorem*. In its global form, this theorem states that, under certain conditions, free trade in final goods alone brings about complete international equalization of factor prices. In its local form, the theorem asserts that, at constant commodity prices, a small change in a country's factor endowments does not affect factor prices.

(2) *Stolper–Samuelson theorem*. An increase in the relative price of one commodity raises the real return of the factor used intensively in producing that commodity and lowers the real return of the other factor.

(3) *Rybczynski theorem*. If commodity prices are held fixed, an increase in the endowment of one factor causes a more than proportionate increase in the output of the commodity which uses that factor relatively intensively and an absolute decline in the output of the other commodity.

(4) *Heckscher–Ohlin theorem*. A country has a production bias towards, and hence tends to export, the commodity which uses intensively the factor with which it is relatively well endowed.

To illustrate these propositions, we turn first to the model's implications for the distribution of income, which are easily seen with the help of the unit cost curves, c_1 and c_2, in Figure 2.1.[24] Each curve shows the combinations of the wage rate w and the rental rate r which imply a unit cost of production equal to the output price of the sector in question. The coordinates of point A are thus the only values of w and r compatible with zero profits in both sectors. Provided such an equilibrium is consistent with the economy's factor endowment, factor prices are thus determined solely by the location of the curves c_1 and c_2, in other words, by technology and commodity prices.

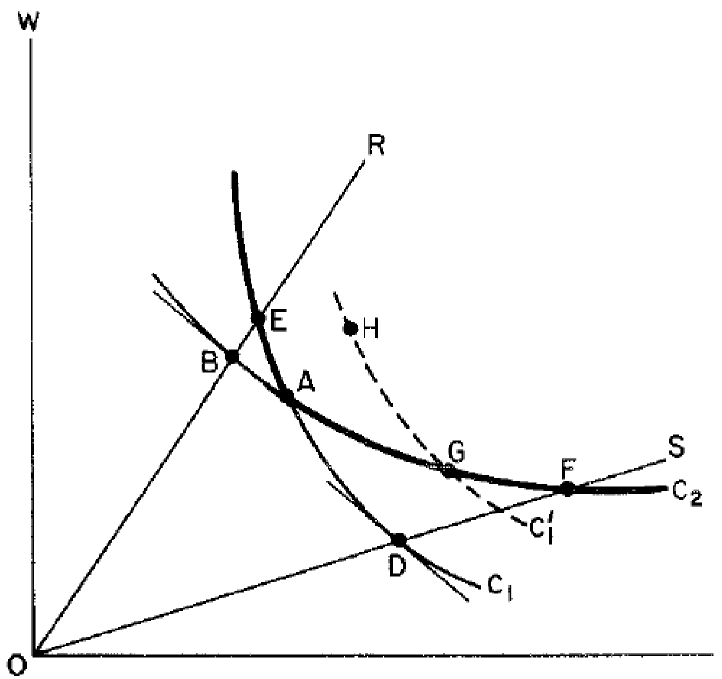

Figure 2.1. Unit cost curves.

While the factor-price equalization theorem asserts that factor prices are independent of endowments, the Stolper–Samuelson theorem is concerned with the nature of their dependence on commodity prices. Specifically, it predicts what Jones (1965) has called a "magnification effect": a given proportional change in commodity prices gives rise to a greater proportional change in factor prices, such that one factor price unambiguously rises and the other falls relative to *both* commodity prices. This may be seen in Figure 2.1: the increase in the price of good 1 shifts c_1 to c_1' and thus lowers the wage rate and raises the rental by a greater proportionate amount than the price increase (since the new equilibrium point G lies to the right of H which is on the same ray from the origin as A and so represents a situation where the relative rental increase just matches the increase in the price of good 1). More formally, the changes in the unit cost and hence in the price of each commodity must be a weighted average of the changes in the two factor prices (where the weights are the distributive shares of the two factors in the sector concerned and a circumflex denotes a proportional change: $\hat{w} \equiv$

dw/w):[26]

$$\theta_{L1}\hat{w} + \theta_{K1}\hat{r} = \hat{p}_1, \tag{2.5}$$

$$\theta_{L2}\hat{w} + \theta_{K2}\hat{r} = \hat{p}_2. \tag{2.6}$$

Since each commodity price change is bounded by the changes in both factor prices, the Stolper–Samuelson theorem follows immediately, with its prediction of unambiguously conflicting changes in real factor rewards following a change in commodity prices.[27]

Corresponding to the magnification effect of the Stolper–Samuelson theorem is a similar relationship between endowment changes and output changes implied by the Rybczynski theorem, the duality between the two theorems reflecting the reciprocity relations discussed earlier. An increase in the capital–labor endowment ratio leaves the wage–rental ratio, and hence factor proportions in each sector, unaffected, provided relative commodity prices do not change and both goods continue to be produced. Equation (2.4) therefore implies that the fraction of the labor force employed in the less capital-intensive sector must fall and the fraction in the other sector must rise by a greater relative amount than the endowment change. With a constant capital–labor ratio in each sector, this in turn implies a similar pattern of output changes, which is the essence of the Rybczynski theorem. To see this more formally, we totally differentiate the two full-employment conditions for this model to obtain:

$$\lambda_{L1}\hat{x}_1 + \lambda_{L2}\hat{x}_2 = \hat{L}, \tag{2.7}$$

$$\lambda_{K1}\hat{x}_1 + \lambda_{K2}\hat{x}_2 = \hat{K}. \tag{2.8}$$

In a manner analogous to (2.5) and (2.6), these equations state that endowment changes are bounded by output changes and so the highly asymmetric response to endowment changes predicted by the Rybczynski theorem must apply.

“Commentary on development, globalization, and trade by Jonathan Dingel: On ‘hat algebra’” (again)

Nowadays, trade economists utter the phrase “exact hat algebra” a lot. What do they mean? Dekle, Eaton, and Kortum (2008) describe a procedure:

Rather than estimating such a model in terms of levels, we specify the model in terms of changes from the current equilibrium. This approach allows us to calibrate the model from existing data on production and trade shares. We thereby finesse having to assemble proxies for bilateral resistance (for example, distance, common language, etc.) or inferring parameters of technology.

Applications in Finance

- Consumer endowed with Z units of the numeraire good (y), with price normalized to 1
- Firms convert y into J other consumption goods, $x = (x_1, ..., x_J)$, with the cost of x_j units of good j being $c_j(x_j)$ units of y.
- Let the total cost of vector x be $c(x) = \sum_{j=1}^{J} c_j(x_j)$.
- The government levies a unit tax t on good 1.
- Let $p = (p_1, ..., p_J)$ be the vector of pre-tax prices for the produced goods.

Application: Harberger's Deadweight loss triangle formula

Derivation, continued

- Suppose quasilinear utility (no income effects)
- Consumer's program:

$$\max_{x,y} u\left(x_1, ..., x_J\right) + y$$
$$s.t. \quad : \quad px + tx_1 + y = Z$$

- Firm's program:

$$\max_{x} p.x - c\left(x\right)$$

- Market clearing

$$x^D\left(p\right) = x^S\left(p\right)$$

Let $p\left(t\right)$ be the market-clearing price when taxes are t.

Application: Harberger's Deadweight loss triangle formula

Effect of taxes

- To measure welfare loss from taxation, suppose government changes tax rate t and returns the tax revenue as a lump-sum to the consumer.
- Welfare is then:

$$\begin{aligned} W(t) &= \left\{ \max_x u(x) + Z - tx_1 - p(t).x \right\} + \left\{ \max_x p(t).x - c(x) \right\} \\ &\quad + t.x_1 \\ &= \left\{ \max_x u(x) + Z - tx_1 - c(x) \right\} + t.x_1 \end{aligned}$$

Note that the term tx_1 appears in the welfare expression becayse the government returns the tax revenue to the consumer).

Application: Harberger's Deadweight loss triangle formula

Two structural approaches to estimating welfare cost of taxes

1. Estimate a J-good supply and demand system and recover (parameterized) utility and cost function parameters, then compute $W(t)$ directly.
2. Fit a demand system to the data and integrate back to obtain expenditure function (Hausman and Newey (1995), then get utility.

Problem: require 2J instruments (J for the demand curve slope, J for the supply curve slope).

Application: Harberger's Deadweight loss triangle formula

An elegant approach proposed by Harberger

Differentiate welfare with respect to taxes and exploit FOCs of firm and workers:

$$\begin{aligned}\frac{dW(t)}{dt} &= \frac{du(x)}{dx}\bullet\frac{dx}{dt} - x_1 - \frac{dc(x)}{dx}\bullet\frac{dx}{dt} + x_1 \\ &= \sum_{i=2}^{J}\left(\frac{du(x)}{dx_i} - \frac{dc(x)}{dx_i}\right)\frac{dx_i}{dt} + \left(\frac{du(x)}{dx_1} - \frac{dc(x)}{dx_1}\right)\frac{dx_1}{dt} \\ &= t\frac{dx_1}{dt}\end{aligned}$$

where we used that at the consumer's optimum:

$$\begin{aligned}\frac{du(x)}{dx_i} &= p_i = \frac{dc(x)}{dx_i} \quad \text{for all } i = 2, ..., J \\ \frac{du(x)}{dx_1} &= p_1 + t = \frac{dc(x)}{dx_1} + t\end{aligned}$$

Application: Harberger's Deadweight loss triangle formula

An elegant approach proposed by Harberger

$$\frac{dW(t)}{dt} = t\frac{dx_1}{dt}$$

- Hence, a sufficient statistic for the welfare effect of taxes is the effect of the tax on demand at equilibrium (no need to estimate the *full* demand curve).
- Key insights are that
  - Behavioral effects can be ignored: since consumers and firms are optimizing, those behavioral effects have a zero first order effect on welfare.
  - Price changes do not enter, since they are a simple redistribution from firms to consumers.

Application: Harberger's Deadweight loss triangle formula

An elegant approach proposed by Harberger

- Limitations of sufficient statistics approach also illustrated with this example:
  - Cannot be used to address large counterfactual changes, since this is a local derivation, relying on FOCs
  - Does not allow for pre-existing distortions
- Example of a great advantage: Can show that same formula can be extended to heterogeneity in agents' demands:
  - Effect of taxes on aggregate demand in equilibrium is still sufficient statistic
  - Intuition: the welfare effects of changes in individual demands are unimportant to a first order since agents were at their optimum
  - A structural model would require modeling and estimating the agents' heterogeneities.

Arkolakis, Costinot, and Rodríguez-Clare (2012) "New Trade Models, Same Old Gains"

Micro-level data have had a profound influence on research in international trade over the last ten years. In many regards, this research agenda has been very successful. New stylized facts have been uncovered and new trade models have been developed to explain these facts. In this paper we investigate to what extent answers to new micro-level questions have affected answers to an old and central question in the field: how large are the welfare gains from trade? A crude summary of our results is: "So far, not much." (*JEL* F11, F12)

The main contribution of our paper is to demonstrate that, independent of their micro-level implications, the welfare predictions of an important class of trade models depend on only two sufficient statistics: (i) the share of expenditure on domestic goods, λ, which is equal to one minus the import penetration ratio; and (ii) an elasticity of imports with respect to variable trade costs, ε, which we refer to as the "trade elasticity."

Melitz and Redding (2014) "Missing gains from trade?"

- https://voxeu.org/article/missing-gains-trade

Recent research has sought to quantify the magnitude of the welfare gains from trade. One of the main findings from this literature is that the gains from trade are relatively modest. This column suggests a channel that the standard approach typically abstracts from. It argues that trade induces changes in domestic productivity through a more efficient organisation of production within the supply chain.

Elasticities: Auclert (2018) "Monetary Policy and the Redistribution Channel"

In this paper, I use consumer theory to refine Tobin's intuitions about aggregation. My analysis clarifies who gains and who loses from monetary policy changes, as well as the effect on aggregate consumption. Monetary expansions tend to increase real incomes, to raise inflation and to lower real interest rates. Not everyone is equally affected by these changes. This generates three distinct sources of redistribution.

First, monetary expansions increase labor and profit earnings. The distribution of these gains is unlikely to be equal: some agents tend to benefit disproportionately, and conversely, some tend to lose in relative terms. This is the *earnings heterogeneity channel* of monetary policy.

Second, unexpected inflation revalues nominal balance sheets, with nominal creditors losing and nominal debtors gaining: this is the *Fisher channel*, which has a long history in the literature since Fisher (1933). This channel has been explored by Doepke and Schneider (2006), who measure the balance sheet exposures of various sectors and groups of households in the United States to different inflation scenarios. Net nominal positions (NNPs) quantify the exposures to unexpected increases in the price level.

Real interest rate falls create a third, more subtle form of redistribution. These falls increase financial asset prices. But it is incorrect to claim that asset holders generally benefit: instead, we have to consider whether their assets have longer durations than their liabilities. Importantly, liabilities include consumption plans, and assets include human capital. Unhedged interest rate exposures (UREs)—the difference between all maturing assets and liabilities at a point in time—are the correct measure of households' balance-sheet exposures to real interest rate changes, just like net nominal positions are for price level changes. For example, agents whose financial wealth is primarily invested in short-term certificates of deposit tend to have positive UREs, while those with large long-term bond investments or adjustable-rate mortgage liabilities tend to have negative UREs. Real interest rate falls redistribute away from the first group towards the second group: this is what I call the *interest rate exposure channel*.

In this paper, I show how these three redistribution channels affect the transmission mechanism of monetary policy to consumption. My main theoretical result decomposes the consumption effect of a transitory change in monetary policy into a contribution from each of these channels, together with an *aggregate income* and a *substitution channel*. Representative-agent models only feature the latter two. My theorem shows that redistribution amplifies these effects, provided that winners from monetary expansions have higher MPCs than losers.

❖ But building the macro RBC model was a bit arbitrary

Beraja (2018) "Counterfactual Equivalence in Macroeconomics"

- How damaging is the Lucas critique?

Economists commonly follow either *structural* or *reduced-form* approaches in order to answer counterfactual questions. The structural approach relies on specifying primitives of a particular model and identifying its parameters. This is a daunting task whenever researchers are uncertain about features of alternative models that are both difficult to distinguish with available data and reasonable a-priori. If counterfactuals differ under these alternative models, their credibility is undermined because they lack robustness. The reduced-form approach requires less commitment to particular model assumptions and has proven very useful to identify consequences of *observed* policy changes that are robust across models. However, the structural approach is the leading paradigm for studying *unobserved*, potential changes in policy rules because structural counterfactuals are not subject to the critique in Lucas (1976).

I call this construction a *Robust Policy Counterfactual* because it allows researchers to obtain quantitative predictions with respect to policy rule changes with minimal a-priori structural assumptions, enhancing credibility of the analysis.

Caliendo, Dvorkin and Parro (2015) “Trade and Labor Market Dynamics: General Equilibrium Analysis of the China Trade Shock”

We develop a dynamic trade model with spatially distinct labor markets facing varying exposure to international trade. The model captures the role of labor mobility frictions, goods mobility frictions, geographic factors, and input-output linkages in determining equilibrium allocations. We show how to solve the equilibrium of the model and take the model to the data without assuming that the economy is at a steady state and without estimating productivities, migration frictions, or trade costs, which can be difficult to identify. We calibrate the model to 22 sectors, 38 countries, and 50 U.S. states. We study how the rise in China's trade for the period 2000 to 2007 impacted U.S. households across more than a thousand U.S. labor markets distinguished by sector and state. We find that the China trade shock resulted in a reduction of about 0.55 million U.S. manufacturing jobs, about 16% of the observed decline in manufacturing employment from 2000 to 2007. The U.S. gains in the aggregate, but due to trade and migration frictions, the welfare and employment effects vary across U.S. labor markets. Estimated transition costs to the new long-run equilibrium are also heterogeneous and reflect the importance of accounting for labor dynamics.

Lyon and Waugh (2019) “Quantifying the Losses from International Trade”

ABSTRACT

Did trade with China harm the US economy in the 2000s? A popular narrative suggests that the rapid rise in Chinese import penetration lead to an expanding trade deficit and negative impacts on wages and employment within narrowly defined labor markets. We provide an alternative interpretation of this evidence by developing a dynamic, standard incomplete market model with Ricardian trade and frictional labor markets and calibrated to match local-labor-market evidence. Despite being consistent with the evidence of Autor et al. (2013), rising trade exposure induces a boom: a increase in GDP and employment, a modest increase in consumption, and an improving trade deficit. Much heterogeneity in the gains from trade underlays the aggregate effects; however, very few actually lose from trade.

Sraer and Thesmar (2019) "A Sufficient Statistics Approach for Aggregating Firm-Level Experiments"

Abstract

We consider a dynamic economy populated by heterogeneous firms subject to generic capital frictions: adjustment costs, taxes, and financing constraints. A random subset of firms in this economy receives an empirical "treatment", which modifies the parameters governing these frictions. An econometrician observes the firm-level response to this treatment and wishes to calculate how long-run macroeconomic outcomes would change if *all* firms in the economy were treated. Our paper proposes a simple methodology to estimate this aggregate counterfactual using firm-level evidence only. Our approach takes general equilibrium effects into account, requires *neither* a structural estimation *nor* a precise knowledge of the exact nature of the experiment and can be implemented using simple moments of the distribution of output-to-capital ratios. We provide a set of sufficient conditions under which these formulas are valid and investigate the robustness of our approach to multiple variations in the aggregation framework.

Lecture 3: Choosing Models, getting by with less Structure: Sufficient Partial Identification and Aggregation (3/3)

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