Trade Wars and Trade Disputes: the Role of Equity and Political Support

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Are the US and China in a trade war?

- Last summer, two distinguished scholars at the Peterson Institute were asked if the US and China were in a trade war.
  - Mary Lovely said “yes”;
  - Chad Bown said “not yet”.
  - Both offered sensible accounts based on careful readings of the politics and economics, but they were very much inside, expert perspectives.
  - Since then there have been attempts to evaluate the consequences of these policies, including whether one or the other country is “winning”.

Are the US and China in a trade war?

- There is a large technical literature on trade wars, with roots in the earliest years of modern economic theory.
  - Neither Chad nor Mary felt any need to refer to that literature, nor the paper by Ossa (2014, AER)
  - The computational literature certainly is rooted in that theory.
  - Does that literature really help understand the current, or any other, trade war; or are these just stupid trade disputes—global STDs?

Broader research project

- We started with a literature survey
  - Classic, modern and contemporary optimal tariff papers
  - Empirical applications and recent estimations… but very wide optimal tariff estimates!
- Why different results?
  - Part of a broader CGE/SG model comparison on model features (expanding TTIP survey) and how they explain different results
- This paper: what are we optimizing and how can that inform actual policy?

Presentation

- Economic Literature
- Auditing optimal tariff theory
- Inequality concerns in trade policy
- Numerical setting and trade war simulations
- Results for Nash tariffs changing objective functions
- Stupid trade disputes
- Conclusions

Overview

- We argue that:
  - The theory of rational trade wars provides little help in understanding trade relations between US and China, which are as close to a real trade war as we've seen for quite some time.
    - We take it as axiomatic that trade economists should have something to say about this sort of thing *as trade economists*.
    - However, we find that we can only provide very conditional and limited advice
    - In particular, the objective function to be optimized is hard to define and fully-informed rational players are required
  - Main numerical result: Nash equilibria change significantly with different objective functions been optimized

Overview (II)

- We argue that the current situation is, from the perspective of the theory of rational trade wars an example of what might be called a *stupid trade dispute*.
  - Should we have something to say about this sort of thing?
  - We argue that we can say things, but they are not the things suggested by the theory of rational trade wars
- Quantitative trade policy analysis should be based on case-by-case scenarios not on optimal tariff theory

I. Definition, literature and auditing current theory

What is a trade war, why do we care?

- Sovereign nations get in many trade disputes that are relatively small scale.
  - These are often sectoral in nature and handled through the dispute settlement mechanisms at the WTO and a variety of PTAs.
    - These are not trade wars (think of them as “trade skirmishes”).
    - The fact that these are handled via such mechanisms is actually reproductive of the liberal trading system of which they are a part.
  - We will not consider these trade wars, and the theory of rational trade wars is not obviously about them anyway.

What is a trade war, why do we care?

- By “trade war”, we will mean: a breakdown in cooperative trading relations between countries, or coalitions of countries.
  - This will involve substantially increased protection across a range of products.
  - Trade may be part of more generally hostile relations, making it important to be clear about the relationship between commercial and geo-strategic objectives in the objective function of the decision-maker.
- As to why we care, until two years ago, or so, we would have said: we don’t… but things have changed.

The Economic Literature on Trade Wars

- The theory of trade wars is one end of a more general theory of *interactive trade theory*.
  - The idea is that the policy of one country has an effect on the policy choices of its trading partners.
  - This will usually mean that the countries in question are "large", in the usual sense that their policies affect the prices at which they trade, and thus the welfare of their trading partners.
- Interactive trade theory has evolved in three loosely construed periods that we call:
  - The Mercantilist era
  - The Classical era
  - The Modern era
  - The Contemporary era.

The Economic Literature on Trade Wars

- Mercantilism
  - Core Propositions of Mercantilist Theory
    - Wealth is an absolutely essential means to power, whether for security or for aggression;
    - Power is essential or valuable as a means to the acquisition or retention of wealth;
    - Wealth and power are each proper ultimate ends of national policy; and
    - There is a long-run harmony between these ends.
  - Note that "wealth" refers primarily to the state, it is thus not in any way equivalent to "welfare" as we now understand it.
  - Because power is considered in relative terms, pursuit of power is essentially zero-sum in nature.
  - This also applied to commercial relations between nations (Viner 1948, pg. 9).

The Economic Literature on Trade Wars

- Note that there is nothing irrational about mercantilist policy.
  - As the large (post-Classical) literature on mercantilism suggests, this was a policy appropriate to an age of state building (Heckscher, Viner, *et al.*).
- What does the objective function of a mercantilist state look like.
  - Note that the terms-of-trade will only be (a probably quite secondary) consideration—as will the trade volume
  - Instead, following Viner, trade surpluses, revenue and the effect of policy on the relative power of the state, will be key.

The Economic Literature on Trade Wars

- The Classical era
  - Early classical economists (Smith in particular) were more concerned with arguing for broadly liberal trading relations, consistent with a general emphasis on liberal economic policies domestically.
    - In this, with regard to trade, early Classics were particularly concerned to deny the core arguments of the Mercantilists.
    - In particular, they were fundamentally concerned with the wealth of the nation (e.g. Smith) not the wealth of the state.
  - Torrens and Mill, in particular, recognized that an appropriately chosen tariff could raise national income but were primarily interested in arguing that to use the tariff for such a purpose was immoral.
  - The exception was when a tariff could be used to induce a trading partner to reduce its tariff.

The Economic Literature on Trade Wars

- What we call the "modern" era of interactive trade theory emerges with Bickerdike's and Edgeworth's analysis of an optimal tariff.
  - The tools and results of this era are continuous through, say, the 1970s.
  - In particular, Kaldor, Scitovsky and, especially, Johnson inaugurate the systematic study of trade wars.
  - It will be relevant, shortly, that this is the period that sees the development of the "new welfare economics", which was to play a major role in this era of interactive trade theory.

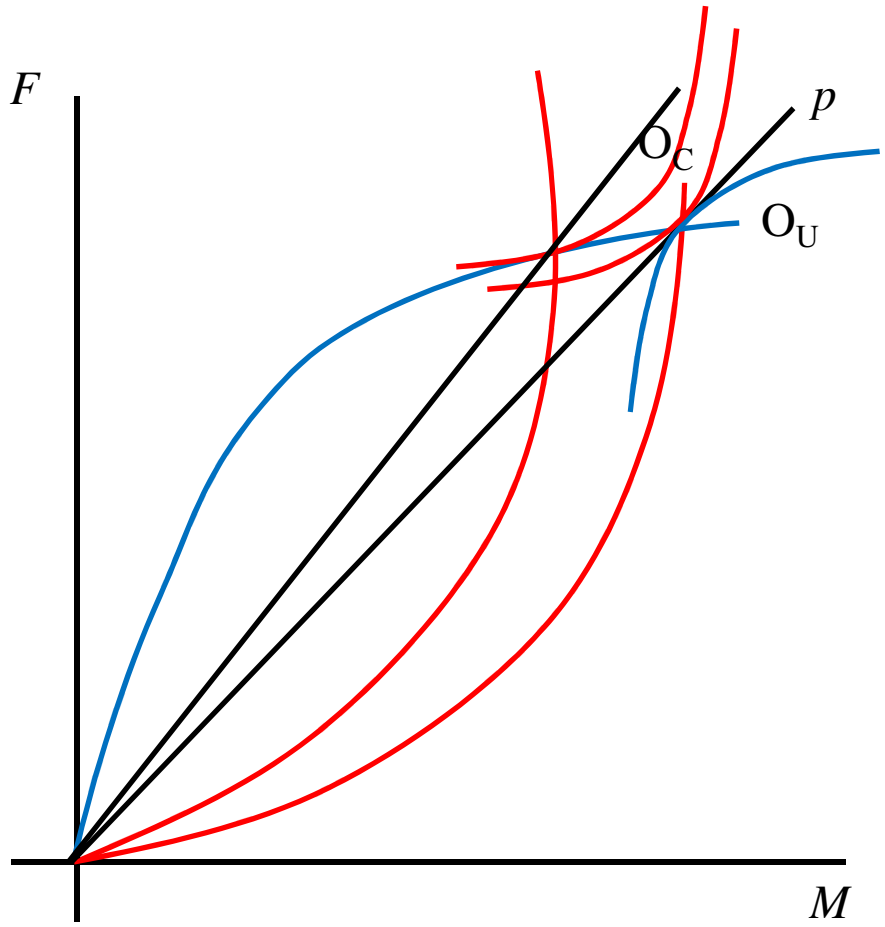
The Economic Literature on Trade Wars

- What we call the "contemporary" period begins with the boom in game theoretic research in the 1980s.
  - Trade theorists were major importers of these tools.
  - To use these tools, with governments as active agents, required a more thoroughgoing focus on either:
    - Underlying economies with unambiguous aggregation up to a representative agent; or
    - The existence of a Samuelsonian social welfare function.
  - In addition, this period saw a replacement of the concerns of the new welfare economics with a concern for empirical application.

Optimal Tariff Theory: Modern Era

- The 2-good × 2-country model, with a well-behaved representative agent underlying demand and welfare claims, is ideal for illustrating the logic of the optimal tariff and easily yields a formula for the optimal tariff in terms of a single elasticity.
  - In the days when offer curves were a standard part of trade theoretic pedagogy, the illustration of an optimal tariff was easy.

Optimal Tariff Theory: Modern Era



Using offer curves, it is easy to show that the optimal tariff takes a form that is familiar from the theory of monopoly as: $t = 1/\varepsilon_X^*$, where ε_X^* is the elasticity of foreign export supply.

Optimal Tariff Theory: Modern Era

This seems straightforward, but it is worthwhile to note Murray Kemp's comment:

"Much attention has been lavished on this formula. But it provides scant guidance in the search for an optimal τ since it involves two, not one, unknowns. The value of ε^* depends on the position of the foreign demand curve at which it is evaluated; the point on the foreign demand curve depends on the import demand by the tariff-imposing country; that in turn depends on the internal distribution of income; but, finally, the post tariff distribution of income depends on the arbitrary pattern of lump-sum taxes and subsidies. There is, then, not a single optimal τ but an infinity."

The Modern Theory of Trade Wars

- The issue of retaliation has been part of the trade policy literature from the start.
  - From Mill (1844, pp. 28-29) forward, analysis of terms-of-trade gains from trade taxes are usually accompanied by a warning that such taxes are likely to attract retaliation which, in turn, will reduce the gains (possibly resulting in overall losses, Gorman, 1958).
  - Much of the early work on trade wars considers a "tit-for-tat" process potentially ending in autarky, certainly reducing global welfare and probably reducing the welfare of each participant individually

The Modern Theory of Trade Wars

- This literature begins with Scitovsky (1942) and reaches its most sophisticated form in Johnson (1953-4).
  - Johnson considers a trade war as a process in which each country imposes an optimal tariff assuming that the other is passive and the countries alternate in tit-for-tat fashion until they reach a point where neither country can gain from a change in its tariff when its turn to retaliate comes.
  - Walras calls this process *tâtonnement* ("groping" or "trial and error") or, in a more game theoretic way, rational tit-for-tat.
  - Johnson shows that, contra Scitovsky, one country *may* win a tariff war (i.e. one country's welfare in the post-war equilibrium may be higher than welfare under free trade).

Contemporary Theory of Trade War

- One of the defining attributes of the contemporary theory of trade wars is its explicit use of modern game theoretic tools in the analysis.
  - For contemporary research, the Nash equilibrium defines the trade war and, especially given the globally low tariffs characterizing our time (i.e. the time of contemporary trade policy research), dynamic analysis, when it is used, is used to explain how countries move away from trade wars, not how they move toward them.
  - We use this broader (in tariff space) process: a non-cooperative Nash equilibrium defined by the intersection of the optimal tariff response curves
    -

Contemporary Theory of Trade War

- If we are willing to assume a representative agent and sufficient economic structure that reaction functions are well-behaved:
  - There is a unique equilibrium illustrated in policy space;
  - That is easily seen to be representable as a prisoners' dilemma.
    - In the general case, trade war is the *unique Nash equilibrium*;
    - In both cases, it is inefficient relative to free trade.

Contemporary Theory of Trade Peace

- We have already noted that modern theory of trade wars saw trade war as a process and what we now call Nash equilibrium as its endpoint, where contemporary theory sees the Nash equilibrium as the trade war.
  - Perhaps not surprisingly, given the historically low levels of trade protection (even with the Trump tariffs), the great majority of modern game theoretic research on trade wars is about how cooperation can be sustained—i.e. *trade peace*.
  - Some of this work follows the game theoretic literature on folk theorems more-or-less directly, while a very large literature seeks to incorporate the role of institutions (especially the WTO) in sustaining cooperation.

Contemporary Theory of Trade Peace

- Easiest way to get trade peace: assume that something like the GATT/WTO is a binding contract.
  - Theory of Cooperative Nash Equilibrium
    - The work goes into characterizing the efficient set of outcomes; and
    - A rule for picking out an allocation from that set among the contracting parties/members (e.g. the Nash product).
  - There is a sizable theoretical literature that does this (e.g. Mayer 1981, Riezman 1982, Harrison & Rutstrom 1991).
- Other strategies/explanations are possible:
  - Trigger strategies (Aumann, Friedman, Abreu)
  - "Non-rational" players (Kreps, Milgrom, Roberts & Wilson, 1982)

Some Empirics of Trade Wars

- History of Trade Wars
  - Given the definition in the introduction, it is probably not surprising that trade wars (in the sense we have defined them here) are extremely rare in the post-WWII era.
    - In fact, looking at Table 1 in Bac and Raff (1997) there are none.
    - They are mostly narrow conflicts (e.g. “chicken war”, “steel war”, “turkey war”, etc.) or conflict over administrative issues (e.g. US v. Taiwan over tariff calculation).
    - The last trade war in the 20th century was that triggered by the Hawley-Smoot tariff.

Some Empirics of Trade Wars

- Empirics & Numerical Modeling of Trade Wars
  - There are two sorts of empirical research on trade wars
    - Attempts to evaluate the effects of trade wars.
      - Note that there is no normative content to this work.
      - While not central to our concerns here, it is notable that this work is of considerable practical value.
      - In fact, there have been a number of recent applications of these methods to current trade disputes (US-China, US-ROW, Brexit).
      - We'll come back to this point, but this is the sort of thing economists, *qua* economists, do well.
    - Attempts to calculate optimal and Nash optimal tariffs
    - We will focus on work that seeks to identity optimal tariffs (and tariff structures) and Nash optimal tariffs (and tariff structures).

Some Empirics of Trade Wars

- Calculating Nash optimal tariffs
  - These have been calculated under a very wide variety of specifications
    - *Dimensionality of the models*: number of regions, production sectors and factors.
    - *Underlying theoretical trade model employed*: Heckscher-Ohlin-Samuelson, Armington (1969), Krugman (1980), Eaton and Kortum (2002), or Melitz (2003).
    - *Numerical general equilibrium model used*: Heckscher-Ohlin-Samuelson, computational general equilibrium (CGE) and/or other numerical general equilibrium models (e.g. structural gravity, new quantitative trade models).

Some Empirics of Trade Wars

- *Specific features of the models*: market structure, production and consumption technologies, intermediate linkages and factor mobility.
- *Macroeconomic closures* for: the trade balance, government balance, and investment-savings decisions.
- *Time dimensions*: static or dynamic models with or without changes in factor endowments/accumulation.
- *Context of the numerical simulations*: countries/regions and time period analyzed.
- *Specific trade elasticities employed*: if calibrated, estimated and/or the assumed values used.
- *Underlying economic data used*: GTAP, WIOD or constructed by the authors.

Some Empirics of Trade Wars

- Conditional on the model characteristics and parameter values employed--in particular trade elasticity values--the Nash optimal tariff ranges from around 5 percent up to more than 100 percent.

- Accordingly, the estimated “welfare” effects also vary broadly.

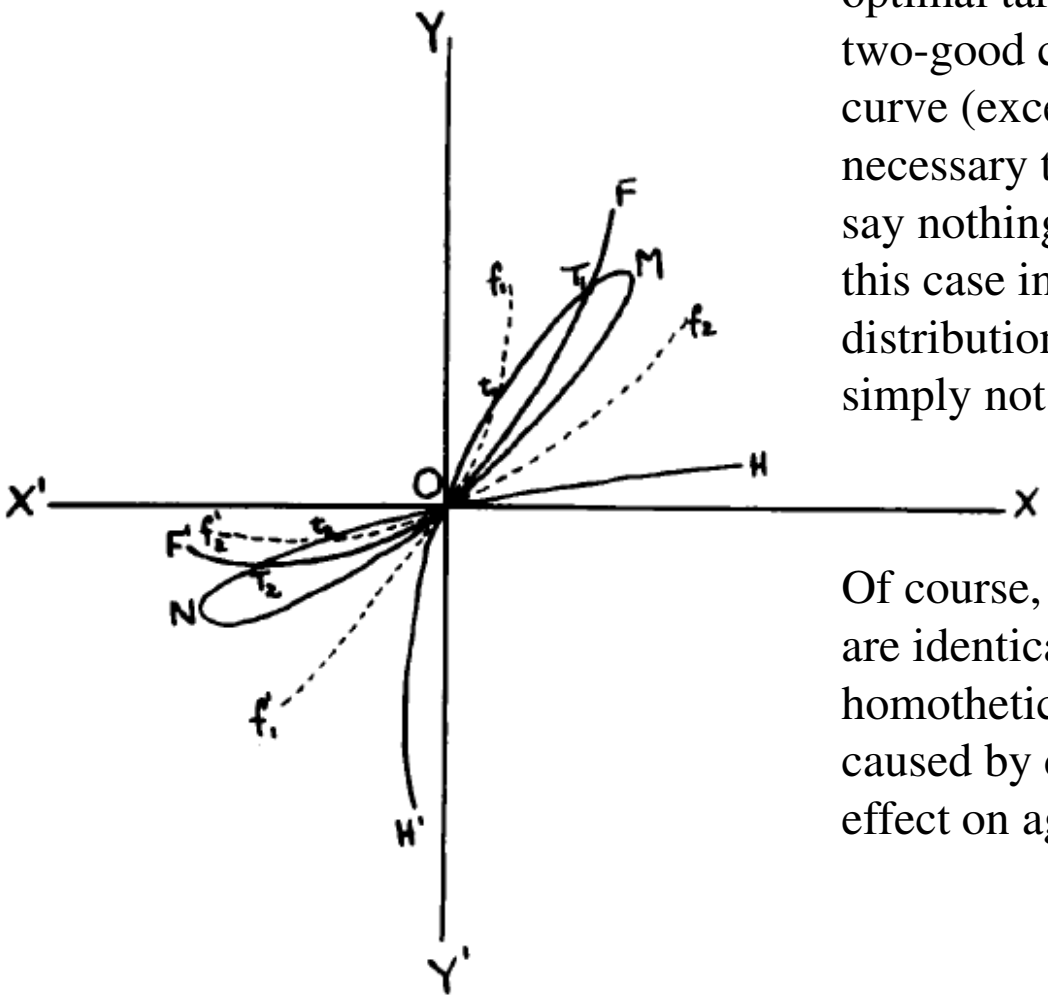
Auditing Rational Trade War Theory

- Three main issues: all of which renders the notion that any actually existing tariff structure reflects the actions of a unified, rational agent exceptionally unlikely

- 1. Social welfare: how to aggregate individual utilities?
  - All of this proceeds under a maintained assumption of a Samuelsonian planner with a well-behaved social welfare function.
  - Perhaps the most striking difference between modern and contemporary interactive tariff theory is the fundamental concern in the former for agent heterogeneity and income distribution.

Auditing Rational Trade War Theory

- 2. The role of taste heterogeneity
  - Since Johnson (1959): it undermines the straightforward application of optimal tariff theory has been a theme at least classic analysis.
    - Johnson uses a standard Heckscher-Ohlin-Samuelson model with taste heterogeneity among single-factor-owning households.
    - Stolper-Samuelson effects thus not only redistribute income among households but change aggregate demand.
    - Johnson shows that even though these household preferences are individually well-behaved, the effect on the offer curve is striking.
    - If you haven't seen the picture, it's a classic!



These results speak to the positive aspect of optimal tariff theory, telling us that, even in the two-good case, the information about the offer curve (excess demand correspondence) necessary to determine the optimal tariff (to say nothing of an optimal tariff schedule), in this case information about tastes and income distribution under alternative tariff policies, is simply not available.

Of course, as long as household preferences are identical and Gorman polar form (e.g. homothetic or quasi-linear), redistribution caused by changes in tariff policy has no effect on aggregate demand.

Auditing Rational Trade War Theory

- 3. What are the policy makers actually optimizing?
  - The problems with the normative part of optimal tariff theory induced by taste heterogeneity and income distribution are probably more serious than the positive problems noted in the preceding paragraph.
  - After all, the "optimal" in "optimal tariff theory" refers to normative analysis.
    - Specifically, without an objective function there can be no optimum.
    - Even with Gorman polar form preferences, heterogeneity in household factor-ownership will mean that any change in tariff policy will produce income distribution effects that undermine any hope of applying the logic of Pareto optimality to evaluation of those policies.

Auditing Rational Trade War Theory

- Dealing with this will require something like a Bergson-Samuelson social welfare function.
  - The key result is that
    - if household utilities are concave; the social welfare function is quasi-concave in household utilities; and redistribution of income is carried out consistent with that social welfare function;
    - then aggregate demand will be representable as if a representative agent is maximizing a utility function that is quasiconcave in aggregate consumption of commodities.
  - This social welfare function does represent the welfare of whoever determines the normative content of that function, but this is a long way from the normative content of the Pareto rule and still further from the simple representative agent.
  - Note first that, as much of the modern research on the optimal tariff suggested, the optimal tariff structure is going to vary with the income distribution, and second, that redistribution must actually be carried out to underwrite the representative agent.

Auditing Rational Trade War Theory

- Consider the Grossman-Helpman (GH) lobbying model that defines contemporary PE research on trade.
  - The GH economy is characterized by: identical quasi-linear preferences over $n + 1$ goods; n of which are produced from intersectorally mobile labor and a sector specific factor; and one good, which serves as the *numeraire*, that is a freely traded Ricardian good (that is, it is produced with only labor).
  - This structure eliminates most general equilibrium interactions in the interest of tractability, and the identical quasi-linear preferences mean that aggregate demand can be characterized as deriving from a representative agent.
  - GH are never very clear about exactly what either of contributions or average welfare relate to in the actual politics of trade policy, but at least "contributions" are analytically clear in the context of the model.
  - This cannot really be said of the "average welfare" term

Auditing Rational Trade War Theory

- Taken together, the issues discussed in this section suggest that, while the now standard models clarify and highlight key empirical relations for the analysis of large country tariff policy, it is also clear that they cannot be seen as a general analysis of such policy.

- This *theoretically* underpins our main message: without income distribution considerations and/or political economy concerns, Nash tariffs are extremely hard to determine
  - How are we to make adjustment for the dramatically counterfactual assumptions necessary to derive our results.
  - In that paper, we argue that more attention to alternative model structures can help with this.

Auditing Rational Trade War Theory

- Politics
  - The issues deriving from heterogeneity carry over to the analysis of politics.
  - As we noted above, the assumptions necessary to illustrate the interaction of domestic politics with a broad commitment to social welfare, in both Grossman/Helpman and Bagwell/ Staiger, are even more severe here.
  - As in the previous point, all players need to know the objective functions of all players (or at least the distribution across types of players).
  - Reality check: what do we think is the objective function of
    - The Trump administration;
    - The May administration.

Auditing Rational Trade War Theory

- Evaluation of Rational Trade War Theory
  - In its relatively simple form (i.e. 2-country × 2-good) we learn some useful lessons.
    - Trade policies of major trading countries are fundamentally interdependent. Ignoring this will lead to bad policy.
    - In particular, retaliation can undo the gains from a single-country optimal tariff.
      - This is a useful warning; and
      - This is a useful application of the theory of economic policy.
    - It is possible to "win" a trade war, but this requires both
      - Relatively special underlying economic conditions; and
      - Application of very carefully calculated optimal tariff structure.

Auditing Rational Trade War Theory

- As a guide to the prosecution of a trade war this literature is almost completely without value.
  - The objective functions in use in the models bear essentially no relationship to the objective functions of policy makers (whether or not they incorporate "political economy forces").
    - This is particularly important: "optimal" policy requires a clear objective function.
    - The substitution of a clear but practically irrelevant objective function to generate results makes those results practically irrelevant.

II. Simulating Nash tariffs with different objective functions

Main elements of the paper

- We focus on numerical analysis of a US vs. rest of the world (RoW) trade war.
- Our emphasis is on some of the assumptions made in the contemporary literature regarding policy objectives.
- We examine the implications of broadening our set of policy objective functions,
  - Move away from a single representative agent (i.e. including inequality effects)
  - Asymmetric political weights
  - We find significantly different Nash tariff values
- Analyze STDs: do not assume rationality of one of the players

Main elements of the paper (II)

- We use a structurally estimated Eaton-Kortum quantitative general equilibrium model (similar to Caliendo & Parro, 2015) but with more labour detail (5 occupational-based types)
- We incorporate trade policy effects on US household inequality
- We introduce a comprehensive computational method for identification of the Nash equilibrium set of tariffs that identifies the optimal reaction functions of each country

Income inequality matters

- Much attention in the early (modern) literature, but largely forgotten with standard "representative agent" Samuelsonian welfare function (implicit redistribution!)
- We include household heterogeneity regarding factor ownership, such that factor and income distribution matters for social welfare (Francois and Rojas-Romagosa, 2011).
- Note: we still need to assume homothetic preferences although with diminishing marginal utility in composite consumption (Atkinson, 1970)
- We work with Sen-type social welfare (Sen, 1974, 1976):

$$SW = Y(1-I)$$

  - with I= Gini coefficient (but other indexes can be used) and Y is mean income (or mean welfare)

US factor ownership and inequality

- Top down approach (cf. Bourguignon and Bussolo, 2013): Macro model on top and factor prices transmit to household income by source
- Usually done with micro-level household survey data, but we use a parsimonious approach by income quintile:
  - share of total households (aggregated by quintiles) in different occupations (US Census Bureau, 2015).
  - Aggregate to GTAP 5-labour types to get labor ownership matrix
  - Capital ownership matrix is indirectly obtain with by using the GTAP total factor income,
  - Government net transfers is difference between total quintile net and gross income values (CBO, 2014)
- No equivalent data for RoW

Inequality changes for the US

- With quintile income we obtain the initial Gini coefficient for the US
- Tariff changes in the macro model are then mapped to inequality (Gini) changes in the US and these in turn provide changes in Sen-type social welfare
- We also use capital rents as an input when using a capital-lobbying political support objective function
- This is a stylized inequality analysis, but we have data on seven income sources that allows us to move beyond a purely representative-agent analysis

Quantitative GE model

- We use a trade GE quantitative model where we structurally estimate trade elasticities in line with "new" quantitative trade (NQT) literature (Costinot & Rodriguez-Clare, 2013) and assume CD functions otherwise (Caliendo & Parro, 2015)
- Underlying data are adjusted to set the trade balance at zero
- Trade is modelled according to the model of comparative advantage by Eaton and Kortum (2002)
- Our model is very similar to (Caliendo & Parro, 2015), but:
  - We have more agents (private, public)
  - Larger set of taxes (domestic, endowments, output)
  - Five labor types and capital (instead of only one factor)

Gravity estimations of trade elasticities

- We calibrate the baseline of our model to actual data from 2014 using the GTAP database version 10
- We use the gravity equation derived from the Eaton-Kortum model:

$$v_{ijk} = \left(\frac{(1+t_{ijk})\tau_{ijk}c_{ik}}{P_{jk}}\right)^{-\theta_k} = exp\{-\theta_k \ln(1+t_{ijk}) + \beta' x_{ijk} + \mu_{ik} + \lambda_{jk} + \varepsilon_{ijk}\} \qquad (1)$$

- Trade elasticity is the tariff coefficient and iceberg trade costs are partially proxied by depth of PTA (DESTA)
- We use a two-stage estimation methodology to account for the endogeneity of PTAs (Egger et al. 2011 and 2015)

Dimensionality

- Dimensionality problem: the main practical constraint in the literature has been to deal with multiple sectors in complex (enough) models:
  - With N countries, S sectors and T possible tariff levels, then S T^N simulations are required
  - It can easily become unfeasible (running into the millions) if this set is not constrained
  - Importantly all numerical applications use a single-sector (or one-sector at a time)
- We have complex model but need to assume a flat (overall) tariff level

Experiment design and grid search

- There are several methods (grid searches) that can be used to find the Nash equilibrium.
- Most common: use a convergence grid search
  - starts with current (factual) tariffs, computes the optimal tariff for the first country, then imposes this tariff on the second country to compute the optimal tariff for the second country, and so forth, until a convergence criterion is satisfied
  - No need for full tariff space
  - Used by Perroni and Whalley (2000), Ossa (2011, 2014) and Bouët and Laborde (2018)
  - Not an issue in well-behaved GE models but can be with imperfect competition & economies of scale (main selling point of trade geography literature)

Comprehensive grid search

- We are first to use a comprehensive tariff space to generate optimal reaction curves
- Use GE model to obtain welfare impact of different tariff combinations (three-dimensional space)
- 17 tariff levels (0 to 80%, in 5pp intervals): 289 sims
- Discrete reaction curve in the two-dimensional tariff-space with larger welfare (or other objective function)
- Use polynomial regressions to smooth them and obtain a continuous reaction curve
- Intersection of reaction curves provides the non-cooperative Nash tariffs

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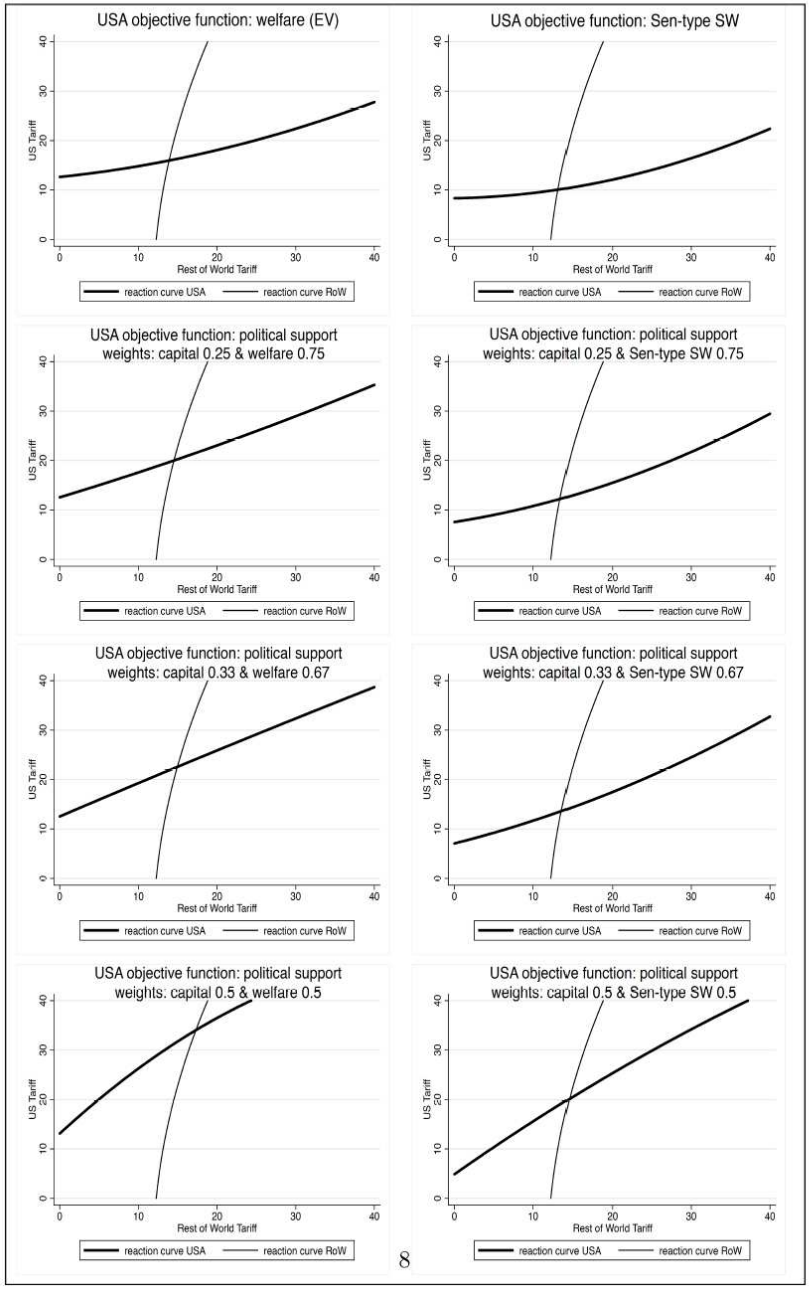
Three different objective functions

- Standard welfare (EV), which is usually is close to real GDP per capita
- Sen-type SW: Obj = w (1-G)
- Political support function with capital lobbying
  - Obj = *a** K_rents + (1-*a*) * SW
  - We use three *a* values: 0.25, 0.33 and 0.5

Figure 1 Reaction curves and non-cooperative Nash equilibria, RoW always optimises welfare (EV) while the USA optimises different objective functions



Inequality changes

Figure 2 Gini coefficient level by USA tariff at different RoW tariff leve

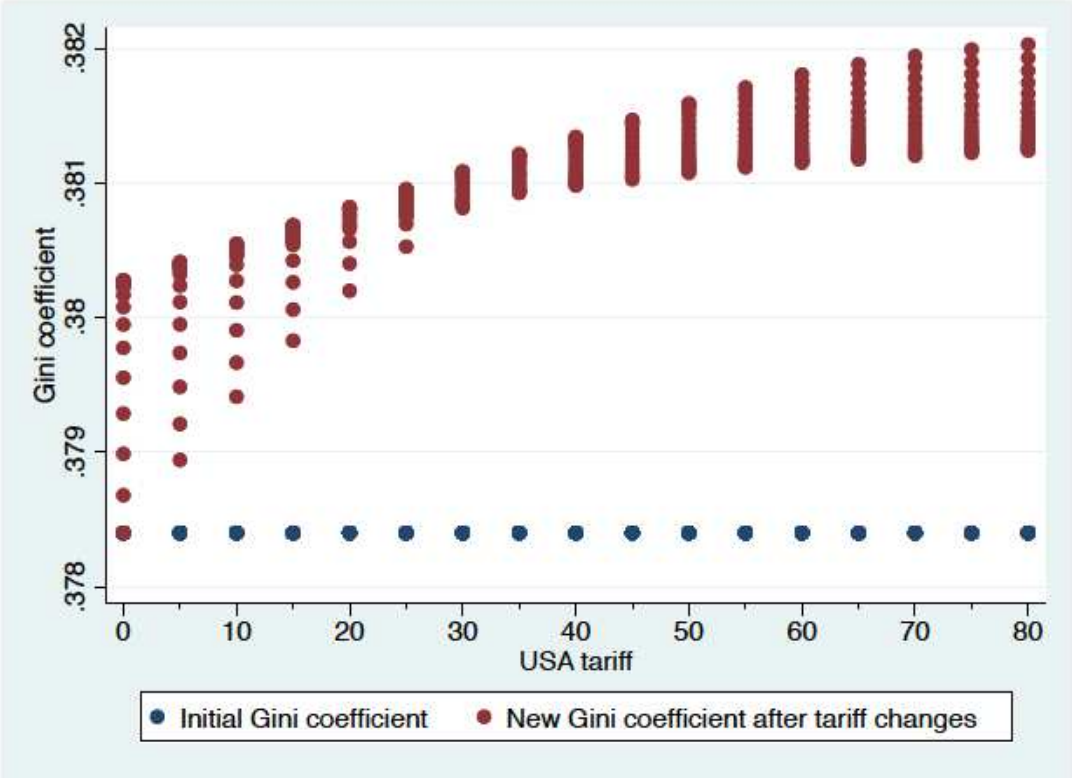


Figure 4 Real factor price changes by USA tariff at different RoW tariff levels, percentage changes with respect to free trade baseline

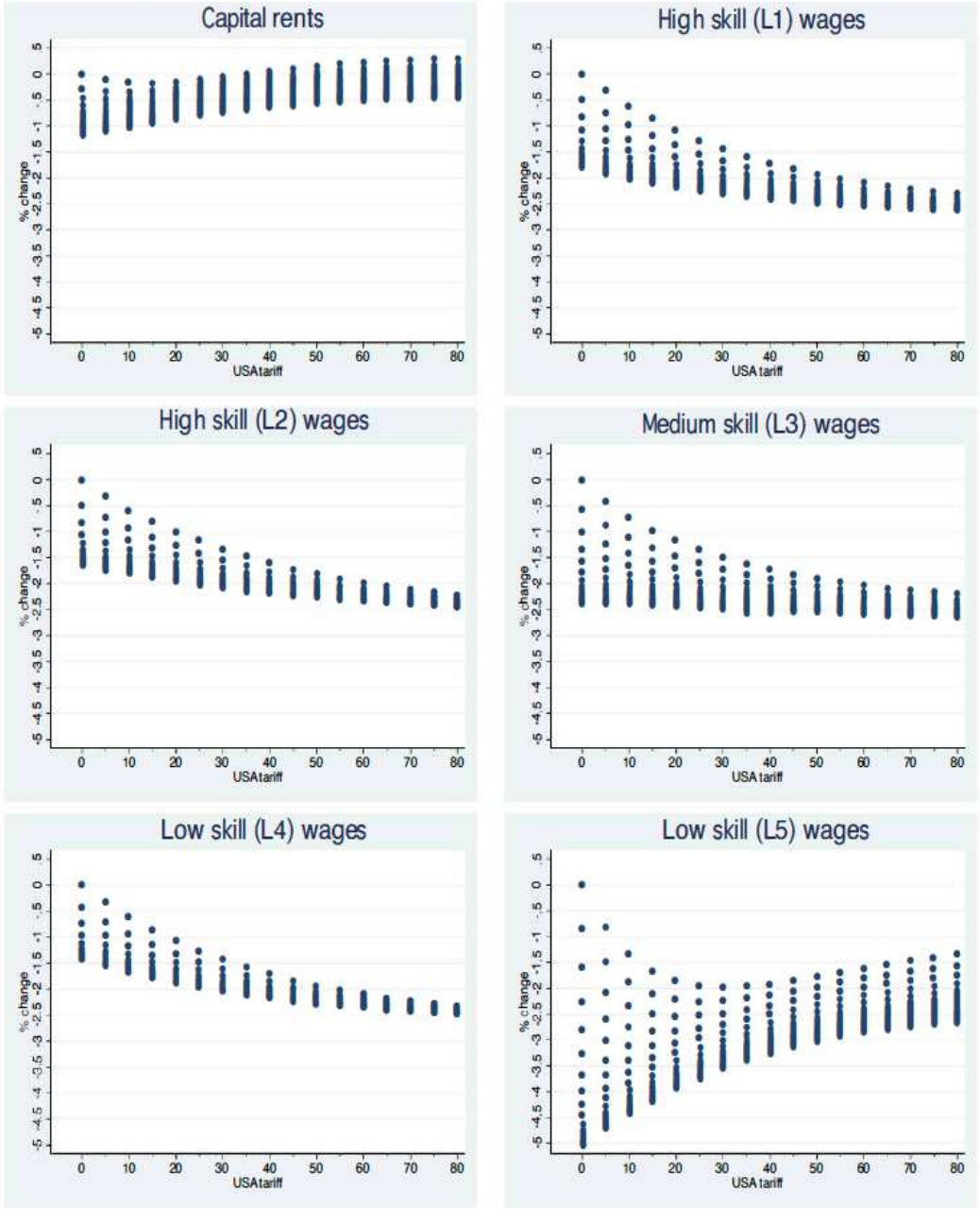


Table 2 Nash non-cooperative tariffs when the USA optimises different objective functions

Objetive function:	**USA**	**RoW**
Welfare (EV)	15.96	13.90
Sen-type social welfare	10.07	13.14
Political support function with welfare		
weights: capital 0.25 & welfare 0.75	20.01	14.52
weights: capital 0.33 & welfare 0.67	22.56	14.95
weights: capital 0.50 & welfare 0.50	34.03	17.31
Political support function with Sen-type (SW)		
weights: capital 0.25 & SW 0.75	12.22	13.40
weights: capital 0.33 & SW 0.67	13.60	13.57
weights: capital 0.50 & SW 0.50	20.10	14.53

Source: Own numerical simulations using GTAP-10 database. Notes: We assume that RoW only optimises welfare (EV). Welfare is the per capita utility (equivalent variation) from consumption.

Table 3 Macroeconomic results for Nash non-cooperative trade war when USA optimises different objective functions, relative changes with respect to free trade baseline

Objective function:	welfare (EV)		Political support weights: 0.25 capital 0.75 welfare (EV)		Political support weights: 0.33 capital 0.67 welfare (EV)		Political support weights: 0.5 capital 0.5 welfare (EV)	
	USA	RoW	USA	RoW	USA	RoW	USA	RoW
Uniform tariff	15.96%	13.90%	20.01%	14.52%	22.56%	14.95%	34.03%	17.31%
Welfare (US$ million)	-105,439	-104,278	-111,724	-131,301	-116,927	-146,022	-146,354	-197,048
Welfare (% change)	-0.72%	-0.24%	-0.77%	-0.30%	-0.80%	-0.33%	-1.00%	-0.45%
Exports	-63.59%	-5.54%	-67.09%	-5.97%	-68.95%	-6.21%	-74.92%	-6.99%
Terms-of-trade	-0.95%	0.10%	-0.37%	0.04%	-0.07%	0.01%	0.77%	-0.08%
Gini coefficient	0.54%	--	0.60%	--	0.63%	--	0.74%	--
Objective function:	Sen-type SW		Political support weights: 0.25 capital 0.75 Sen-type SW		Political support weights: 0.33 capital 0.67 Sen-type SW		Political support weights: 0.5 capital 0.5 Sen-type SW	
	USA	RoW	USA	RoW	USA	RoW	USA	RoW
Uniform tariff	10.07%	13.14%	12.22%	13.40%	13.60%	13.57%	20.10%	14.53%
Welfare (US$ million)	-103,884	-55,432	-103,250	-74,685	-103,630	-86,199	-111,913	-131,777
Welfare (% change)	-0.71%	-0.13%	-0.71%	-0.17%	-0.71%	-0.20%	-0.77%	-0.30%
Exports	-56.92%	-4.75%	-59.61%	-5.07%	-61.17%	-5.25%	-67.16%	-5.98%
Terms-of-trade	-2.00%	0.22%	-1.59%	0.17%	-1.34%	0.14%	-0.36%	0.04%
Gini coefficient	0.43%	--	0.48%	--	0.50%	--	0.60%	--

Source: Own numerical simulations using GTAP-10 database. Notes: Rest of the World (RoW) optimises welfare (EV). Welfare is the per capita utility (equivalent variation) from consumption.

III. Stupid Trade Disputes: theory and simulations

On Stupid Trade Disputes

- Our auditing of the assumption structure of interactive trade theory suggests that this is certainly a large part of the problem.
  - But trade theory is still useful: it alerts us to what we believe are key causal mechanisms and allows us to audit the logic underlying those beliefs.
  - However, when we come to the current (possible) trade war between the US and China, and the US relationship to the world trading system generally, we leave the realm of rational trade wars and enter the realm of stupid trade disputes (STDs).

On Stupid Trade Disputes

- In what sense does interactive trade theory help us understand the trade policies of the Trump or May administrations.
  - That is, sufficiently well trained economists/game theorists will surely be able to rationalize the policy of either (or, even, both) administrations. However,
  - The *ex ante* plausibility of these accounts would be in doubt.
    - From day to day it is hard for seasoned analysts to say what is going on in US and UK trade policy.
    - This suggests to me that this theory is not much use in understanding the current trade policy of these major actors.

On Stupid Trade Disputes

- Suppose, however, that we are willing to believe that some version of interactive trade theory does a reasonable job of capturing some fundamental aspect of the trade policies of the core trading nations prior to Trump and May (and possibly others in the future).
  - For some reason, one of these, let's say Trump, decides to pursue policies that are inconsistent with the norms embodied in what was a previously valid model of rational trade policy.
  - Note that simple rational trade dispute theory helps us argue that this might be the case.
  - In its place, Trump decides to pursue *stupid trade disputes*.

On Stupid Trade Disputes

- Two types of stupid trade disputes—defined relative to rational trade disputes
  - *Weakly stupid trade disputes*: (At least some) political decision makers are completely rational, they are just not rational in the way required by the theory of rational trade wars.
    - For example: suppose that Donald Trump is a mercantilist of the classic sort.
      - He rejects liberal trading relations as based on a fundamentally flawed model of relations between nations.
      - He believes that current account balance is a measure of winning and losing in the struggle over trade.
      - He believes that trading relations, like power relations generally, are zero-sum in nature.

On Stupid Trade Disputes

- There is nothing irrational about this (though it is certainly reasonable to disagree with this evaluation).
  - However, this does lead to *stupid* trade disputes.
  - That is, the behavior of national decision makers will be determined by factors that are not a part of rational trade war theory.
  - In particular, what is the point of a trigger strategy here?
- Because the US is rational in this scenario, we can apply game theoretic reasoning.
  - It should be noted that economists will have no particular advantage here.
  - Rather, political scientists that study geopolitical conflict will be the obvious experts.

On Stupid Trade Disputes

- Suppose that the real goal of Trump administration trade policy is to establish political dominance, on China in particular, but essentially on all countries.
  - The key here is simply rejection of any rule-based system in favor of a power-based system.
  - How should we evaluate this?
    - Are the products, and exceptions, in the tariffs actually implied consistent with this? Probably not.
    - However, if so, there is certainly no relationship between such policy and the current literature on interdependent trade theory.
  - Along the same lines, it is interesting to ask about Chinese policy.
    - In many ways China's response to Trump is fully consistent with received theory.

On Stupid Trade Disputes

- *Strongly stupid trade disputes*: (At least some) political decision makers are not rational in the way required by any standard game theoretic model.
  - In this case, suppose that Donald Trump is not capable of the sort of means-ends calculations that are definitive of rationality (or at least unwilling to do so—maybe just lazy).
    - In the case of Brexit, we imagine that it is never clear who is making decisions, so rationality cannot be attributed to the British government.
  - Instead, decisions are made, in the moment, based on prejudices, non-well-founded rules of thumb, etc.

On Stupid Trade Disputes

- What is the right response of still rational decision-makers.
  - Simplifying, what if Trump is just arbitrarily imposing a flat (can also be sector-specific 25% tariff):

Table 4 Macroeconomic results for stupid trade disputes for different retaliation scenarios, percentage changes with respect to free trade baseline

Scenario:	No RoW retaliation		Retaliation RoW tit-for-tat		Optimal retaliation using welfare (EV)		Extreme retaliation (trade embargo)	
	USA	RoW	USA	RoW	USA	RoW	USA	RoW
Uniform tariff	25.0%	0.0%	25.0%	25.0%	25.0%	15.4%	inf	inf
Welfare (US$ million)	29,610	-191,054	-166,175	-164,512	-123,187	-158,972	-676,422	-826,576
Welfare relative change	0.20%	-0.43%	-1.14%	-0.37%	-0.85%	-0.36%	-4.56%	-1.87%
Exports	-55.41%	-5.84%	-74.83%	-6.46%	-70.58%	-6.41%	-100.00%	-6.35%
Terms-of-trade	5.33%	-0.55%	-1.88%	0.17%	0.15%	-0.02%	--	2.06%
Gini coefficient	0.56%	--	0.67%	--	0.66%	--	-0.26%	--

Source: Own numerical simulations using GTAP-10 database. Notes: Optimal retaliation based on optimization of welfare (EV) for RoW.

Conclusions

- Core of optimal tariff theory relies on rationality and a well-defined objective function
- Both assumptions are debatable
- We show that using different objective functions affects Nash tariffs
- Thus optimal tariff theory provides little practical political guidance
- Best response to STDs is optimal tariff (by definition) but otherwise tit-for-tat, but these could escalate to trade embargos…
- Trade policy analysis can provide case by case evaluations (e.g. Brexit), but little value to analyze a trade war

Broader concerns: WTO and beyond

- How should we think about the evolution of the system?
  - If Trump is just an anomaly, perhaps we can just wait it out and hope for the best.
    - We are also in for bigger trouble if smart, non-lazy nationalist politicians have learned how to work Republican voters.
  - But what if STDs spread according to some process of contagion or imitation?
  - If we believe that the liberal system serves the global interest, at least weakly, better than any other system on offer, how do we respond to the existential threat posed by anti-globalists like Trump?

Broader concerns: WTO and beyond

- This is really a key moment: the real payoff of a liberal system is that it permits the emergence of new powers without war.
  - Unless we want to consider the recovery of Europe and the rise of Japan (at least the first of which took place in the context of the hottest years of the cold war), there has never been a test of a genuinely liberal system.
  - There never was a genuinely liberal international system until after the Second World War.
- Where are we supposed to look for guidance on this question?