Session 5

Analysis of NTMs

NTMs Data
and descriptive statistics

Outline

- Definition of NTMs
- Data Classification
- Data Categorization
- Data Sources
- Data Limitations
- Descriptive statistics using NTMs data

Definition of NTMs

- *"Non-tariff measures (NTMs) are policy measures, other than ordinary customs tariffs, that can potentially have an economic effect on international trade in goods, changing quantities traded, or prices or both"*

  - Largely uninformative as, ultimately, most economic policies can potentially affect international trade.
    - Some forms of economic policy intervention can be easily categorized as NTMs as their primary purpose is to affect trade (e.g. import quotas, export restraints),
    - large number of government policies that are not directed at international trade for which trade effects are considered externalities (e.g. domestic subsidies, intellectual property laws, environmental standards).

A proper classification of NTMs

- A more practical way to identify a policy measure as an NTM is to rely on a 'proper' classification.

- According to the International classification NTMs are categorized according to their scope and/or design.
  - NTMs are broadly classified as *technical measures* (standards and pre-shipment inspections) and *non-technical measures*. The latter are further divided into hard measures (e.g. price and quantity control measures), threat measures (e.g. anti-dumping and safeguards) and other measures (e.g. trade-related finance and investment measures).

International classification of NTMS (UNCTAD)

Technical Measures	A	SANITARY AND PHYTOSANITARY MEASURES
	B	TECHNICAL BARRIERS TO TRADE
Non Technical Measures	C	PRE-SHIPMENT INSPECTION AND OTHER FORMALITIES
	D	CONTINGENT TRADE PROTECTIVE MEASURES
	E	NON-AUTOMATIC LICENSING AND QUANTITY CONTROL MEASURES
	F	PRICE CONTROL MEASURES, ADDITIONAL TAXES AND CHARGES
	G	FINANCE MEASURES
	H	MEASURES AFFECTING COMPETITION
	I	TRADE-RELATED INVESTMENT MEASURES
	J	DISTRIBUTION RESTRICTIONS
	K	RESTRICTION ON POST-SALES SERVICES
	L	SUBSIDIES
	M	GOVERNMENT PROCUREMENT RESTRICTIONS
	N	INTELLECTUAL PROPERTY
	O	RULES OF ORIGIN
Export Measures	P	EXPORT RELATED MEASURES

Tree/branch structure allows for more details:

A - SPS
A8 Conformity assessments
A85 Traceability
A852 Processing history

E - NA Lic. and Quotas
E2 Quotas
E22 Seasonal quotas
E221 Global allocation

H – Competition Measures
H2 – Compulsory National serv.
H21 – National Insurance

Uses of codes 9 and 0

- Code 9 is used for “non elsewhere specified”
  - Particular measures
    - E.g. A590: Treatment for elimination of pests n.e.s.
    - That is: it is not A51/A52/A53 (Cold/heat, irradiation or fumigation) but something else.

- Code 0 is missing detail
  - E.g. A500
    - Could be any of A5x, but not possible to tell from the text.

- Code 9 and 0:
  - Code A900, B900, C900 (very generic measures, often horizontal

- Depends on data collection: Not always 100% accurate

Categorization:

How to group NTMs for economic analysis?

- International (UNCTAD)
  - Technical, non-technical, export measure
- According to specific WTO agreements
  - SPS / TBT / RoO, etc
- Any better way to categorize NTMs for economic analysis?
  - Where do they affect the economy:
    - Border (at customs, e.g. quarantine, quotas)
    - Behind the border (domestic, e.g. subsidies, distribution)

Categorizing NTMs in regard to Prices

- Impact to different prices - *Ederington and Ruta (2016)*
  - Customs regulations are those which drive a wedge between world and domestic prices (e.g. inspection fees, import and export taxes).
  - Product regulations are related to the characteristics of products (e.g. safety standards in cars or toys or Maximum Residue limits (MRLs) for pesticides). Product regulations drive a wedge between producers' and consumers' prices.
  - Consumers' regulations are primarily consumption taxes (e.g. excise taxes on fuels) but also include regulations which directly affect the final prices paid by consumers without adding anything to the cost of production (e.g. minimum import prices).
  - Process regulations affect producer prices as they regulate methods of production (e.g. labour and environmental standards) when applied to not only domestic but also foreign producers.

Main Data Sources:

- UNCTAD TRAINS
  - Follows UNCTAD classification
  - Accessible free of charge through:
    - UNCTAD TRAINS: http://trains.unctad.org/
    - World Integrated Trade Solution: wits.worldbank.org

- WTO I-TIP
  - Aggregated data, based on WTO notifications
  - https://www.wto.org/english/res_e/statis_e/itip_e.htm

- UN ITC – Market Info (survey summaries) RoO, Quotas. http://www.intracen.org/itc/market-info-tools/non-tariff-measures/

Other sources:

- Some of the data follows International (UNCTAD) classification of NTMs
  - E.g. ASEAN Database

- NATIONAL sources follows their own classification:
  - EU Export Helpdesk
  - US ITC NTM database
  - Concordance tables to UNCTAD may be available

Dimensions of the data

- Product identificaton (generally HS6 digit)
  - Some NTMs affect all products, but most are very specific
  - About 5000 products
- Bilateral information
  - Most NTMs apply to all, but not always so.
- Time information
  - Collected in a given year, but not continuously.
  - Date of implementation
- NTM info
  - NTM CODE: Chapters, 2 and 3 digits
  - Binary variable (existence)

How the UNCTAD data looks like:

reporter	ntmcode	NomenCode	partner	Year_DataCollection	hs6	StartDate
USA	A690	H4	WLD	2014	460290	2010
USA	F650	H4	WLD	2014	160250	2009
USA	B210	H4	WLD	2014	150110	1975
USA	C900	H4	WLD	2014	030483	1996
USA	B600	H4	WLD	2014	620111	1988
USA	P690	H4	WLD	2014	901819	2012
USA	A852	H4	WLD	2014	030719	1995
USA	A900	H4	ARM	2014	100610	2010
USA	A120	H4	SYR	2014	040819	2007
USA	C900	H4	KOR	2014	220850	2011
USA	P120	H4	NPL	2014	392112	1995
USA	A610	H4	SOM	2014	081320	1980
USA	A690	H4	WLD	2014	460290	2010
USA	A120	H4	AUT	2014	070310	1959

Six things to understand in using NTMs data
(1) Comprensiveness

- Although there has been a considerable improvement in the last few years, NTMs data still suffer from omissions (and double counting).
- Because the original information on NTMs is often dispersed among a myriad of sources, some specific measure may be missed even by the most meticulous data collection efforts.
- Similar problems affect NTMs data originating from notifications because notification requirements are not always respected.

Six things to understand in using NTMs data
(2) Lack of Precision

- NTMs data are generally collected and provided to researchers as a binary variable on the presence (or absence) of a specific NTM.
  - more detailed info may be available, but only occasionally.

- As collected, NTMs data do not allow one to appreciate the relative importance of these measures for restricting trade or for adding to trade costs.
  - Equivalence in regulations does not necessarily imply equivalence in stringency (implementation may be different)
  - NTMs data originates from text, and is often qualitative in nature.

For example, differences in the number of NTMs applied across sectors or countries should not be unequivocally interpreted as regulatory stringency as one particular form of NTMs could be much more stringent than five different NTMs combined.

Six things to understand in using NTMs data
(3) Dimensionality

- Information on the presence of very specific types of NTMs is made available on many of the databases on NTMs.
  - On the one hand, such richness of data is valuable for descriptive purposes as it provides information on exactly which measures are in place.
  - On the other hand, such wide dimensionality does not find great use in the econometric assessment of the impact of NTMs.
    - One reason is *multi-stacking* across NTMs which makes it very difficult to isolate the effect of one specific measure from that of another because of collinearity.
    - Another reason: Measurement error is larger the more detail is provided.
    - Multi-stacking and measurement error are the reasons why most econometric assessments aggregate various types of NTMs by very broad categories.

Six things to understand in using NTMs data
(4) Time Dimension

- Although NTMs data often provide information on the date of implementation (or the date of notification), this information may or may not be sufficiently accurate for time series analysis. Some considerations and cautions:

  - WTO Database: Measures that have existed for a long time and have never changed are generally not notified and therefore not accounted for in the data. The reason for this omission is that countries are generally required to notify only new measures or changes to existing measures.

(4) Time dimension (cont.)

- UNCTAD data include information on the date of implementation of the measures. Still, as it is collected, the UNCTAD data are intended to be a snapshot of the existing regulations at the time the data were collected.

  - The data ignore any NTMs which existed in the past but have been revoked before the data were collected.
  - A more general problem is whether the date of implementation should be interpreted as the beginning of the implementation of the specific measure. This may be an incorrect assumption as it is also possible that any measure recorded in the data may be replacing a very similar measure, for which there is no trace in the data.

Six things to understand in using NTMs data
(5) Product Specific requirements

- NTMs data are available at the HS-6 level, covering more than 5000 different products.
  - since products are intrinsically different, differences in the extent of regulations to which each product is subjected to reflect, at least in part, this heterogeneity.
  - For example, sectors such as food products, chemicals or firearms are, by their very nature, likely to be more heavily regulated than raw materials.
  - Likewise, in the case of rules of origin, these vary greatly across products (e.g. rules of origin are more common in final products than in intermediates).
- Without proper aggregation methods, overall indicators may just capture differences in trade composition rather than differences in the use of NTMs or in their stringency.

Six things to understand in using NTMs data
(6) Endogeneity

- A final issue in examining the causal effect of NTMs relates to the effects that NTMs may have on trade flows.
  - As in the case of tariffs and quotas, there is a potential endogeneity bias in estimating the effect of trade policies
  - In particular, political economy arguments suggest that reverse causality is of major concern. For example, governments may be prone to overregulate sectors of importance for domestic producers and consumers, thus imposing NTMs where trade flows are larger. E.g. greater import penetration is likely to lead to increased demand for protection by industry lobbies (Grossman and Helpman, “protection for sale”)

Descriptive statistics

- Some of the most used indices to describe NTMs
  - Frequency index
  - Coverage ratio
  - Prevalence score
  - Regulatory intensity
  - Regulatory distance

Descriptive statistics to answer basic questions:

- Question: How is Agriculture regulated by SPS in two countries? Who regulates more?
  - Percentage of AG products affected by SPS (FI)
  - Percentage of AG imported products affected by SPS (FI)
  - Percentage of trade affected by SPS (CR)
  - Average number of Measures affecting AG products (PS RI)

Frequency index

- **Percentage of products that are affected by NTMs**
  - E.g. % of Agricultural products affected by SPS (Chapter A)
  - Simple formula: $FI_i = \frac{\sum_{k=1}^{hs} NTM_{ik} D_{ik}}{\sum_{k=1}^{hs} D_{ik}} 100$
  - Problem: what is exactly the denominator?
    - Agricultural HS codes, Tariff lines? Imported HS codes?
    - How to integrate the bilateral dimension of NTMs?

Frequency index (cont.)

In general, 2 possible ways of calculating the frequency index:

- Frequency Index: Definition 1:
  - Percentage of AG HS lines affected by SPS.
    - More appropriate for cross country comparison
  - Assumption: every product counts the same

- Frequency Index: Definition 2:
  - Percentage of imported products affected by NTMs
    - Simple average of the Coverage ratio
  - Assumption: imported products only, but what about prohibitive SPS?

Even a simple index requires careful interpretation:

	HS lines AG	Lines with SPSs	Lines Free of NTMs	Imported AG lines	Imported lines with SPSs	Imported lines with no NTMs	**FI 1 (All lines) (2)/(1)**	**FI 2 (Imported) (3)/(1)**
Country A	300	250	50	100	50	50	**83%**	**50%**
Country B	300	150	150	100	100	0	**50%**	**100%**

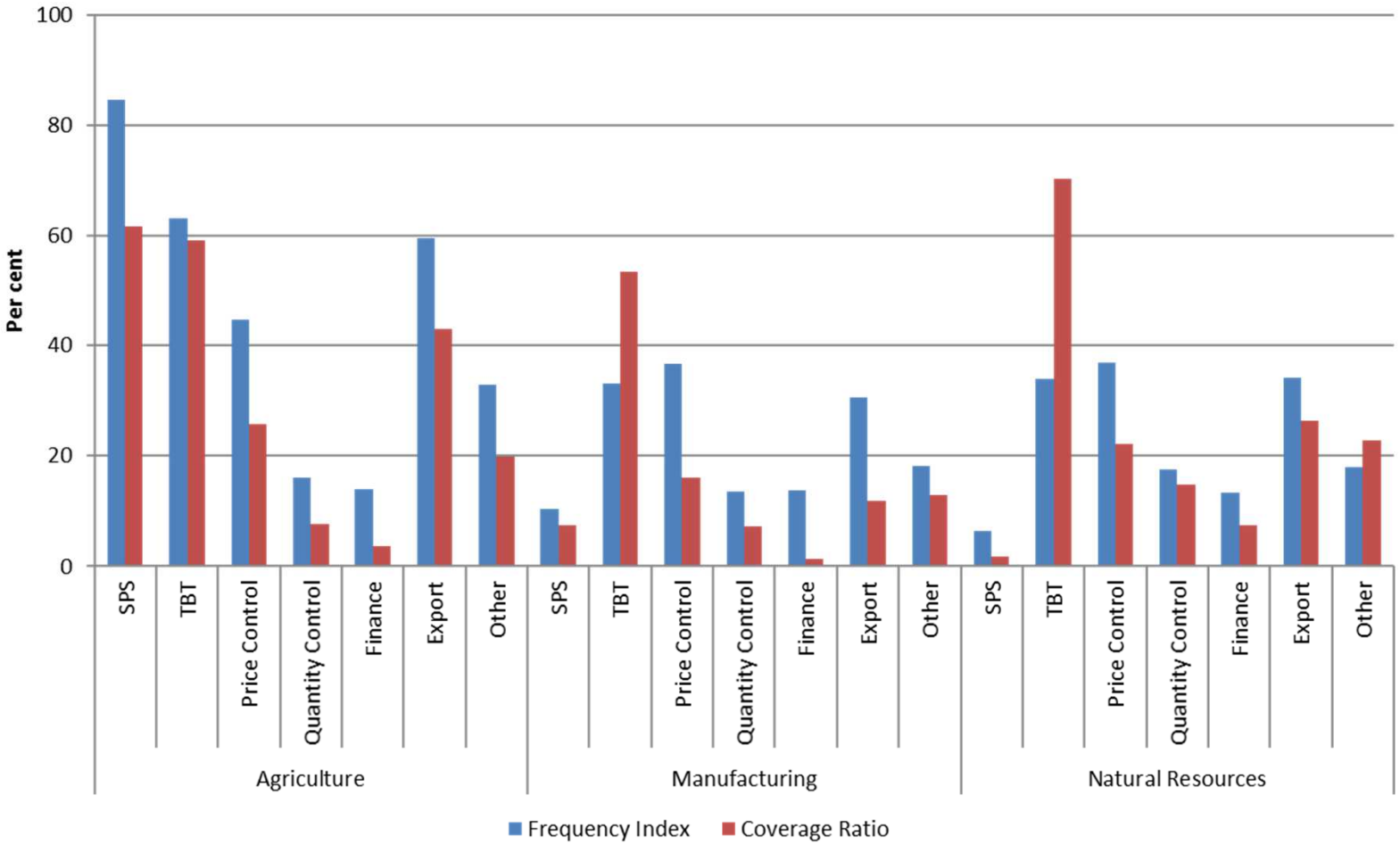
- In practice:
  - Country A regulates everything it deems necessary.
  - Country B regulates only products it could import.
- Which is more meaningful for cross country comparison?

- Also consider: data is bilateral, so what is the denominator in FI 1
  - In practice, FI 1, is only calculated when NTMs are applied to all countries (e.g US embargo on Cuba does not count). So denominator is # of HS lines. Or you can construct a lot of FI at the bilateral level, and see differences.

Coverage Ratio

- Percentage of trade covered by NTMs
  - E.g. % of agricultural imports that need to comply with quarantine requirements in US vs EU.
  - $CR_i = \frac{\sum_{k=1}^{hs} NTM_{ik} X_{ik}}{\sum_{k=1}^{hs} X_{ik}} 100$
  - Less problematic than FI as we are interesed in traded goods.
  - Denominator is total trade

Graphs Frequency and coverage



Prevalence Score

- Average number of NTMs applied to a group of products
  - E.g. How many different types of NTM are applied to Agriculture in US vs EU.
  - $PS_i = \frac{\sum_{k=1}^{hs} \#NTM_{ik} D_{ik}}{\sum_{k=1}^{hs} D_{ik}} 100$
  - In general is a simple average, what is the denominator, imported products or total lines?
  - This index is good only for cross country comparison of the same set of products. Not so good for comparing across products (e.g. apples vs iphones)

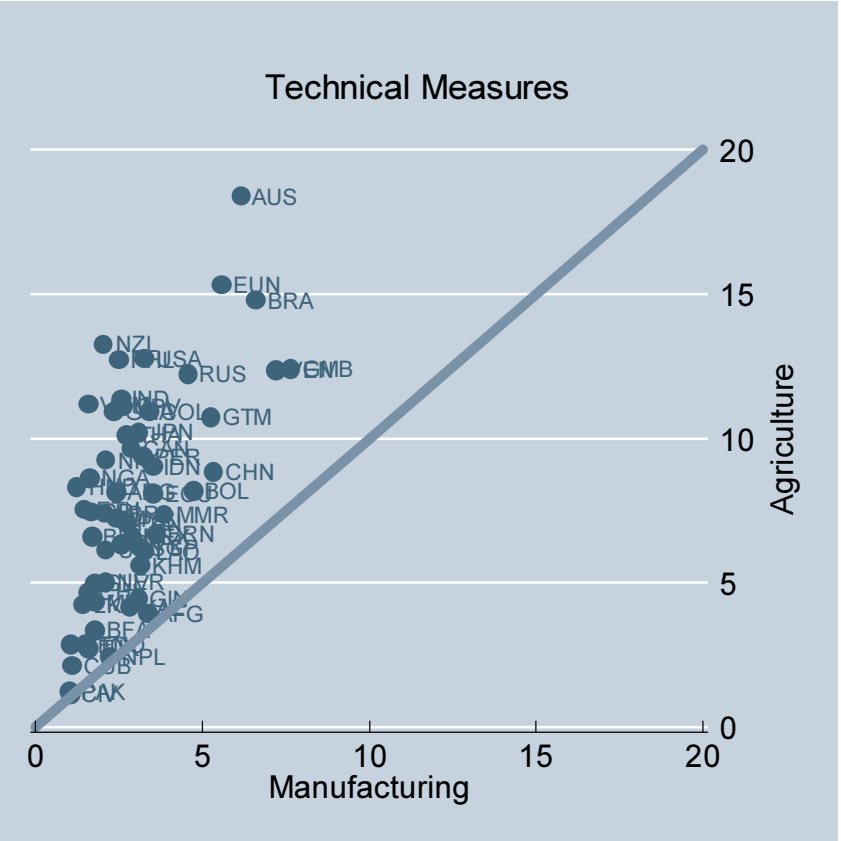
Ex. Agriculture vs Manufacturing

Say: you would like to know whether a country tend to regulate AG relatively more than MFG.

According to the prevalence score (on imported prod) it seems so…

Actually all countries regulate AG more than MFG

Is this information useful in understanding if a country is biasing the regulatory framework vs a specific sector?



Two issues to consider:

- Product characteristics
  - Apples (or AG) may be subject to more types of NTMs than iron ores (or MFG), by their very own nature.

- Endogeneity of NTMs
  - The very presence of NTMs may result in zero trade.
  - trade weighed averages may be biased (more so bilaterally)

- Two procedures to soften these problems:
  - "standardize" the data.
  - use simple averages, but then these two products count the same

    870323 – Cars between 1,500 and 3,000 cc

    870530 – fire trucks

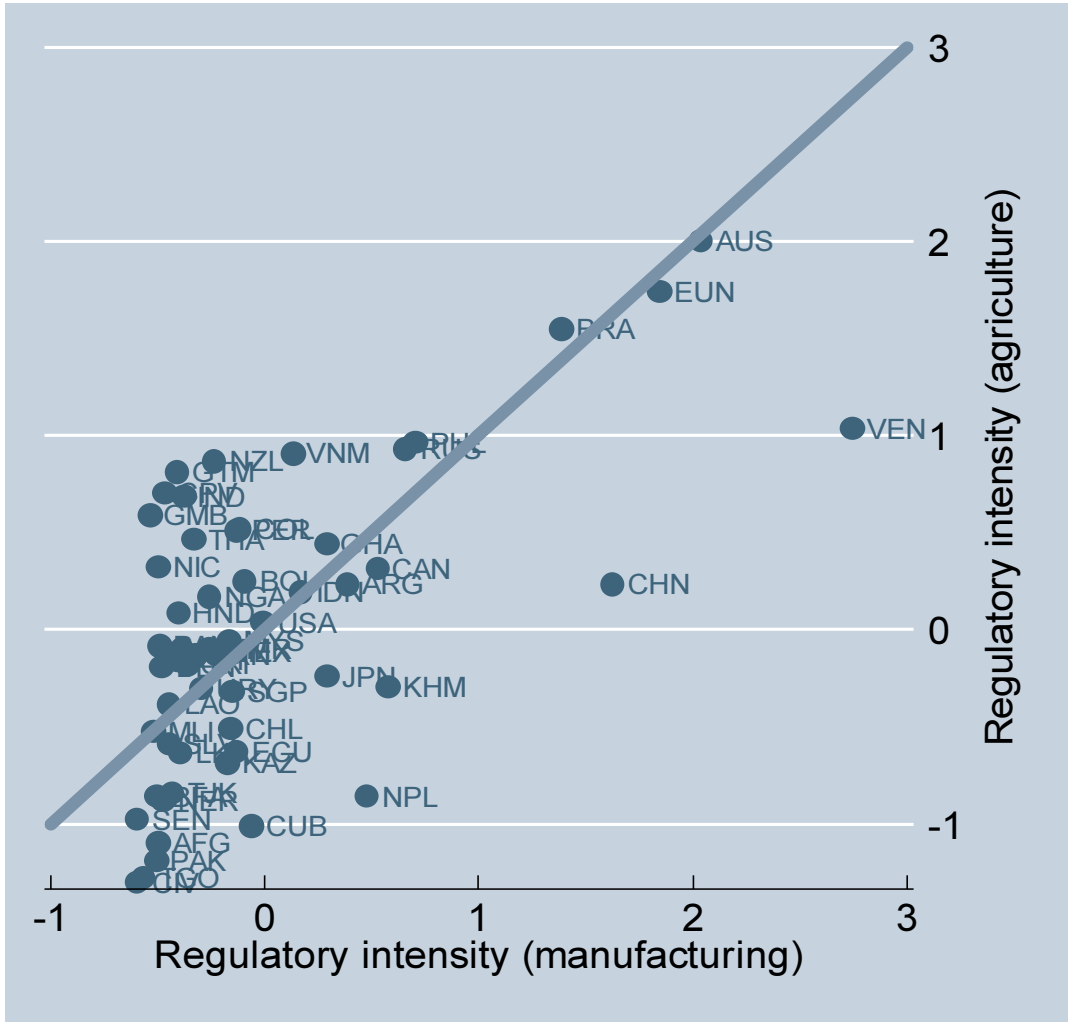
or world trade instead of imports as a weight

Regulatory Intensity

- Similar to prevalence score: tries to capture differences the regulatory framework across countries but in comparison to world averages.
  - $RI_i = \sum_{k=1}^{hs} S_k^w \frac{\#NTM_{ik} - \overline{\#NTM_k}}{sdev\#NTM_k}$; $\#NTM_k = number\ of\ NTMs\ on\ k$

- Can be positive or negative (relatively less regulated)
- where mean and stdev are computed at the product level across countries so as to control for product-specific regulatory differences.
- The standardized variable is then weighed by the share of product k in world trade (S_k^w) so as to reduce the endogeneity problem while still giving more importance to products where trade flows are larger.

Regulatory intensity across products (technical measures)



Makes much more sense than prevalence scores

Agriculture is still more regulated than Mfg (see previous fig). But not in every country once you consider product characteristics

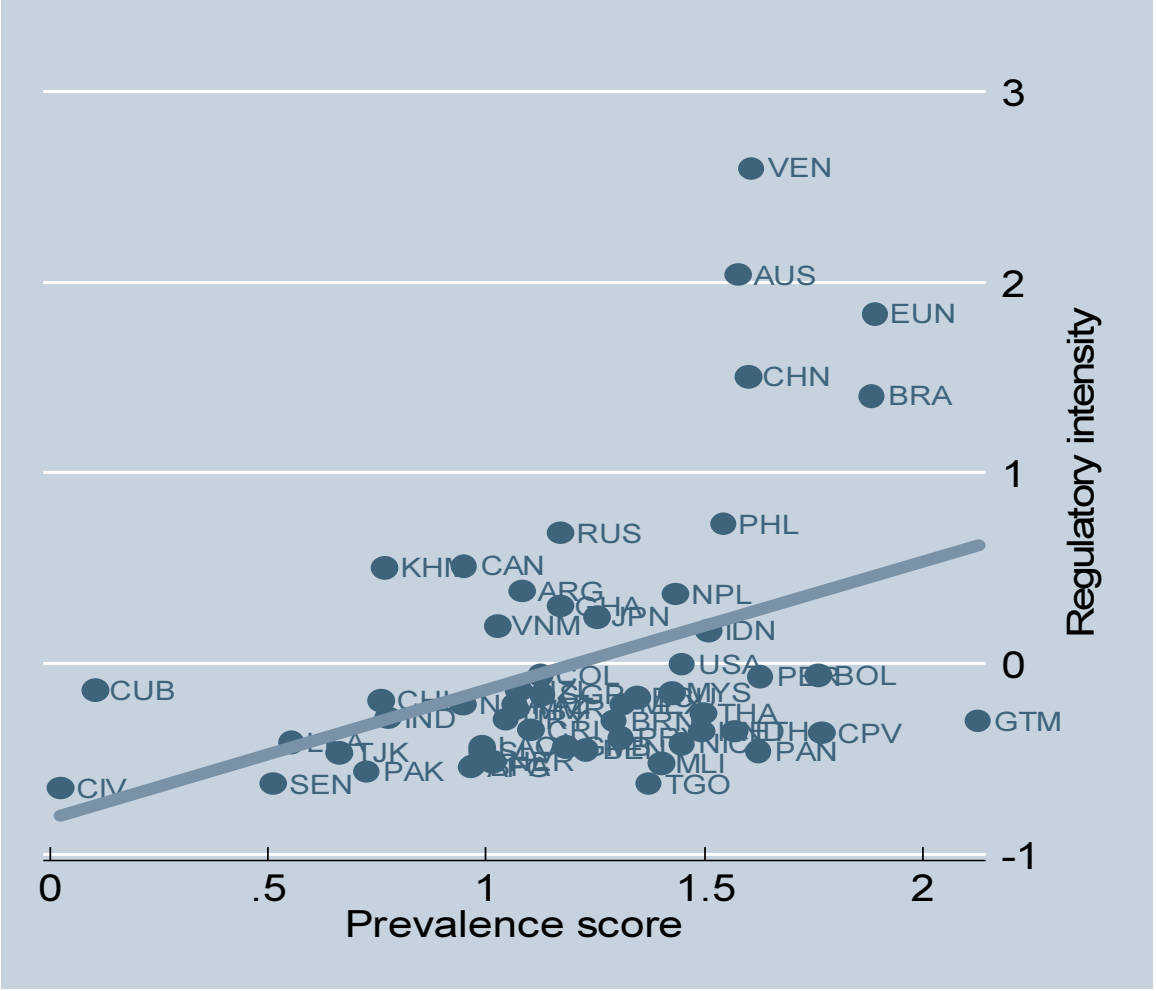
E.g. China regulates imports of Mfg more than Agriculture.

Regulatory intensity and prevalence score across countries (technical measures)

There may be interesting differences even for cross countries comparison.
PS and RI are generally correlated, but not equal.

E.g.
EU has on average more regulations than AUS…

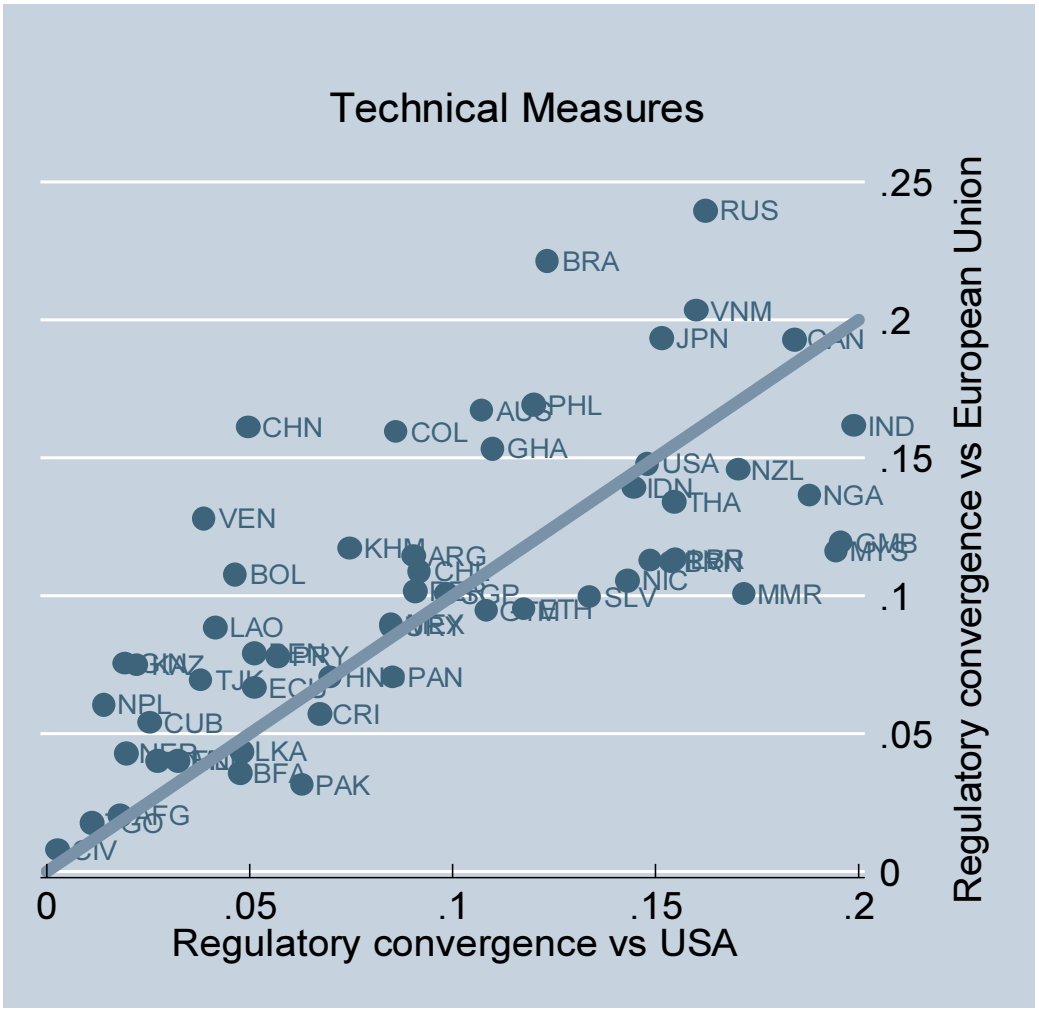
but AUS is relatively more regulated than EU
once you world market size.
(i.e. EUN tend to have more regulations in products that are relatively less traded in world markets



Another information: standard deviation of NTMs across products

- How “disperse” is the regulatory framework?
  - Can be measured by the standard deviation of number of different measures across products
  - Small StDev implies a large number of regulations that are applied all/most products
    - NTMs serving public policy objectives tend to be applied more uniformly
  - Large StDev implies a less uniformity and therefore a more targeted trade policy
    - More targeted policy is often tied to industrial policy, redistribution purposes.

Example: Regulatory distance EU US vs all



Some examples:

Russia is very similar to the EU, and somewhat similar to the US.

MYS is much more similar to US than the EU

Pakistan is not very similar to the US or the EU, but relatively more similar to the US than to the US.

Depends also how much US/EU are similar to each other , 15%

Using zeros or not?

Using all	AB	2 out of 10 identical	20%	
	AC	3 out of 10 identical	30%	
	BC	9 out of 10 identical	90%	This number can become very close to 1
Not using data where both have 0	AB	1 out of 9 identical	11%	
	AC	2 out of 9 identical	22%	
	BC	2 out of 3 identical	66%	

Affects only scale, ranking stays. There are lot of 0-0.
Interpreting is 22 vs 11 “twice as much closer”

Regulatory distance

- Provides an indication on the similarity of regulatory frameworks
  - Country A and B have a regulatory framework that is more similar for apples (AG) or for cars (MFG)?
  - Is the overall regulatory framework of country C more similar to A or B?

- $RD_{ij} = \frac{1}{N} \sum_k \sum_z \left| NTM_{ik}^z - NTM_{jk}^z \right|$

- Measures as the percentage of identical NTMs that are applied in the two countries at the product level.

Indices for continuous NTM variables

Example MRL of pesticides

Dissimilarity of requirements i in origin and destination.

- $DS_{ido}^{HIT} = \frac{|x_{id} - x_{io}|}{\max(x_i) - \min(x_i)}$, aggregate to: $HIT_{do} = \sum_{1=1}^{n} DS_{ido}^{HIT}$
  - Not necessarily in absolute values, as sign can be useful
  - Works also if NTM is a discrete variable, or binary (DS)

Stringency of the measure vs intl standards

- For for substance k, product j and country i
- $S_{ij} = \sum_{k=1}^{K} \frac{\exp\left((MRL_{jk}^{c} - MRL_{ijk})/MRL_{jk}^{c}\right)}{K}$
- exponential transformation in equation expresses convex costs of meeting increasing stringency, but can be linear as well

Some final considerations

- All indices can be calculated
  - For all trade, or only for specific sub-groups of products
  - For all NTMs, or specific NTMs

- Aggregation methods are important, and provide different information
  - Simple averages
  - Weights:
    - Imports
    - world trade