

***ON LINKING COUNTRY MODELS THROUGH BILATERAL
INTERNATIONAL TRADE FLOWS.
Data and modelling equations***

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Links between economies in multi-country models act through different channels:

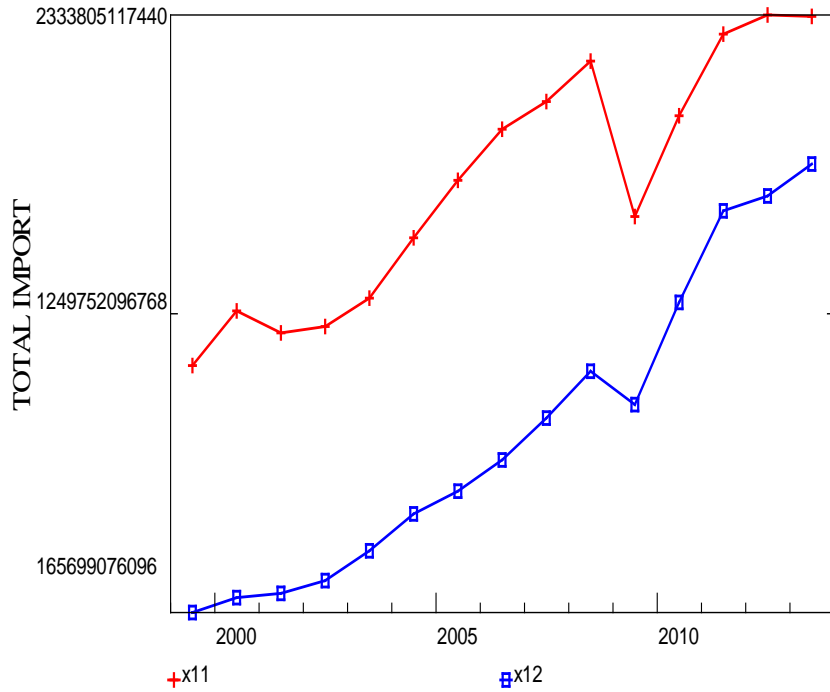
- trade
- financial variables (e.g., interest rates)
- prices
- production factors

In the past, trade links have been usually underestimated by economic literature while paying more attention to production factors and prices (see Whitley ,1992)

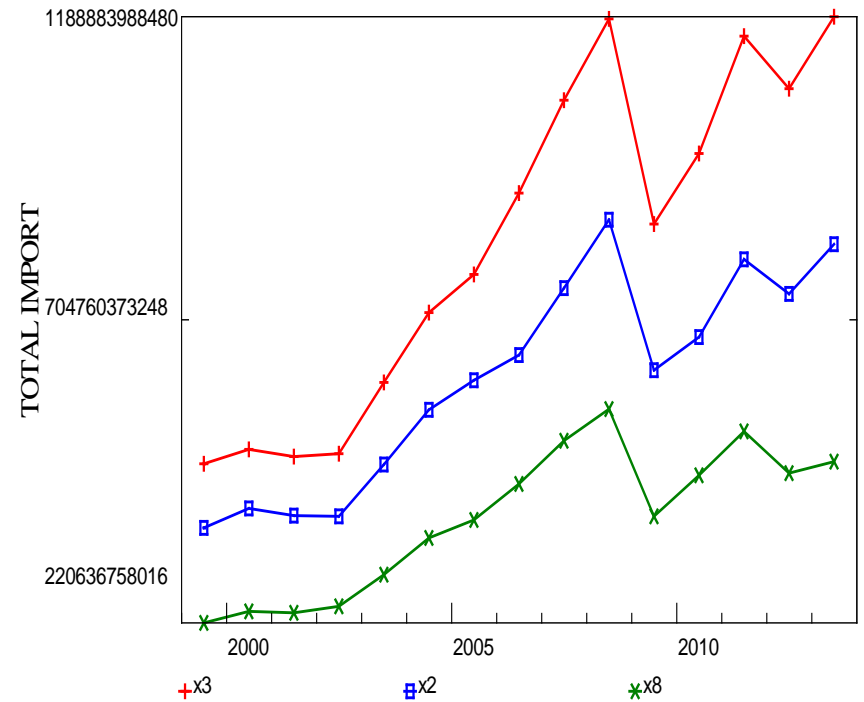
... we decided to study international trade flows and to maintain / develop the BTM

WHY DID TRADE CAPTURE OUR ATTENTION?

"Total Imports"
"US (red) and China (blue)"



"Total Imports"
"GER (red), FRA (blue), and ITA (green)"



WHY DID TRADE CAPTURE OUR ATTENTION?

Table 1. Rates of contraction from peak to trough, 2008-2009

	Goods exports (cumulative change)	No. months (peak to trough)	Trough month	Industrial production (cumulative change)	No. Months
World	-25%	8	2009M05	-13%	11
Industrialised	-24%	8	2009M05	-17%	12
US	-23%	7	2009M05	-14%	14
EU27	-22%	7	2009M05	-14%	12
Japan	-22%	8	2009M06	-36%	12
Emerging	-28%	3	2009M01	-9%	7
China	-26%	3	2009M01	-2%	5
Korea	-25%	3	2009M01	-22%	6
Taiwan	-38%	2	2008M12	-36%	5
Brazil	-34%	11	2009M11	-20%	5
Mexico	-26%	9	2009M07	-14%	8

Source: Baldwin (2009)

OUTLINE OF THE PRESENTATION

- i) A selection of criteria for a taxonomy of applied trade models
- ii) The INFORUM international system of models
- iii) The new dataset with some preliminary descriptive results
- iv) Future steps and some problems about data availability and specification of equations
- v) A message to the INFORUM group

1) CLASSIFICATION CRITERIA FOR APPLIED MODELS

In this work we focus on international trade data and models. Some distinguished features:

- (a) the level of trade flows aggregation
- (b) the theoretical approach
- (c) the integration between country models.
- (d) the geographical coverage.

1) CLASSIFICATION CRITERIA FOR APPLIED MODELS

A taxonomy of selected applied models

	Aggregation	Theory	Linkage	Geography
Project LINK	Macro	Traditional structural econometric model	multi-lateral	100 Countries
MULTIMOD	Macro	Augmented w/ Rational Expectations and Supply side features	multi-lateral	21 countries + ROW
INTERLINK	Macro	Augmented w/ Rational Expectations and Supply side features	multi-lateral	OECD countries + 3 groups (ROW)
GTAP	Multi-sector	CGE (representative agent's maxim.; Armington Assumption)	bi-lateral	Database with 129 Regions
G-CUBE	Multi-sector	DSGE	bi-lateral	Database with 129 Regions
MSG2	Multi-sector	DSGE	bi-lateral	Database with 129 Regions
GINFORS	Multi-sector/Macro	E3 - Multisectoral Econometric model	bi-lateral	OECD Countries + other major trading partners
E3ME	Multi-sector	E3 - Multisectoral Econometric model	multi-lateral	21 world regions
FIDELIO	Multi-sector	Hybrid	bi-lateral	EU Countries

II) THE INFORUM INTERNATIONAL SYSTEM OF MODELS

Main features of Bilateral Trade Model

	Type-I model 1975 -1995	Type-II model 1995 -present
i) The linking system of national models through BTM	Multi-lateral flows; links trough World Prices	Bi-lateral flows
ii) a detailed disaggregation of commodity classification	120 sectors; 9 countries + 1 group	120 sectors; 13 countries + 3 groups
iii) econometric estimation of import shares	Relative prices	Relative prices + relative capital stocks

II) THE INFORUM INTERNATIONAL SYSTEM OF MODELS

Type-I model

- a solar system ... draws ... and radiates
- based upon OECD data
- prices used in the trade module were domestic prices
- the heart of the trade module is a squared trade share matrix M with as many rows as countries in the system, obtained using imports for each country. Its generic element is computed as:

$$S_{i,j,t} = M_{i,j,t} / M_{.,j,t}$$

II) THE INFORUM INTERNATIONAL SYSTEM OF MODELS

Type-I model

The basic equation to predict the evolution of M matrix is

$$S_{i,j,t} = S_{i,j,0} \cdot P_{i,j,t}^{b_{i,j}}$$

- $P_{i,j,t}$ is the relative price of the origin country i in market j ; the relative price is a ratio between the domestic price in i (adjusted with the exchange rate), $P_{e,i,t}$, and the world price as seen from the country j of destination of the flows, $P_{w,j,t}$.
- Domestic prices are weighted average of the present price and the four years-before price.
- The system of weights varies among different commodities.

II) THE INFORUM INTERNATIONAL SYSTEM OF MODELS

Type-II model

- In the 1990s, a significant change in the approach: Bilateral Trade Model (BTM)
- based upon Statistics Canada data
- prices used are domestic prices (tariffs)
- the share equation has been improved

$$S_{i,j,t} = \beta_{i,j,0} \cdot \left(\frac{P_{e,i,t}}{P_{w,j,t}} \right)^{\beta_{i,j,1}} \cdot \left(\frac{K_{e,i,t}}{K_{w,j,t}} \right)^{\beta_{i,j,2}} \cdot e^{\beta_{i,j,3} \cdot T_t}$$

Main features:

- Data to describe international trade are collected by few international organizations

EU - COMEXT (1995-2013) and UN - COMTRADE (1999-2013) for their high commodity disaggregation and also for country coverage



- The most common classifications used to describe international trade are the "Harmonized System" (HS) and the "Standard for International Trade Classification" (SITC)

We decided to use a highly disaggregated level of data but we collapse into two-digits SITC classification because it's easier to control

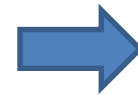


III) THE NEW DATASET

- Two points of view: the perspective of the country of origin of the flows, considering data on exports; alternatively, the point of view of the country of destination, considering data on imports.

We decided to use imports flows

- A new list of Countries has been adopted.



- Most of the included countries do not exhibit missing observations (1999 -2013). However, we do observe cases in which data either start later than 1999 or end before 2013. Moreover, some countries do display discontinuous series.

The UN Comtrade database includes the first 90 importers (according to 2012 data this is more than 90% of the total value of imports).

III) THE NEW DATASET

- Comext database displays a mixed version of the SITC classification. We employ a bridge table to transform the SITC Rev 3 codes into the SITC Rev 4 ones (using up to 5 digit classifications)

Most of the included countries switch from SITC Rev3 to SITC Rev4 in 2007. It is not always the case. Moreover, there are examples of countries presenting only a SITC Rev3 version of the database (e.g., Botswana).

- All flows are in current prices. Currency used is USDollar. Flows of EU-Comext dataset are converted from Euro to USDollar with the official exchange rates published by Eurostat.

New features:

- Trade on Services is included in the dataset: the share of services in world trade reached 21% in 2009

EU - COMEXT and UN - COMTRADE as data sources (years 2000-2012)

- The same classification in both sources



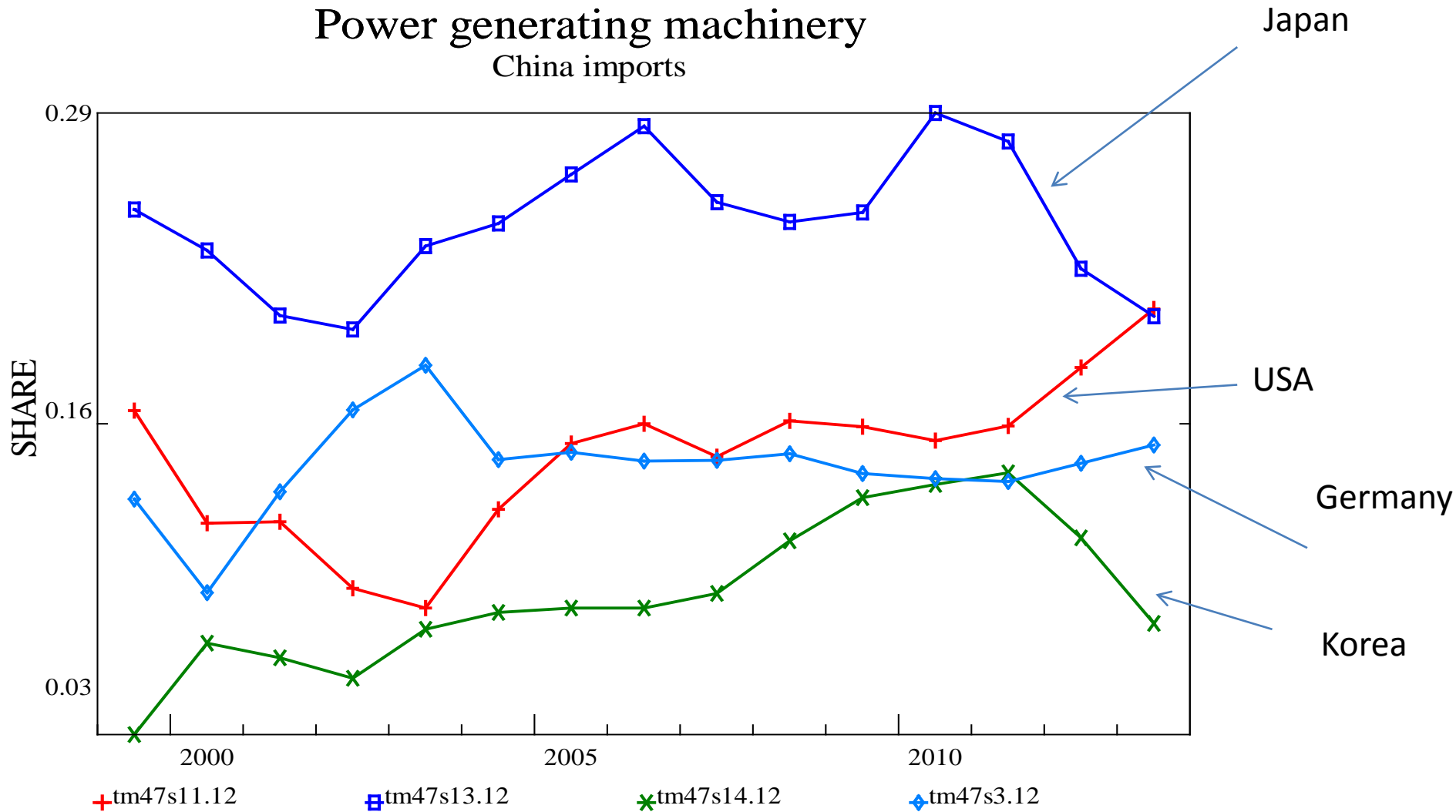
- The same perspective (country of destination) was used.

Import flows were considered

IV) SOME PRELIMINARY DESCRIPTIVE RESULTS

Machinery in China

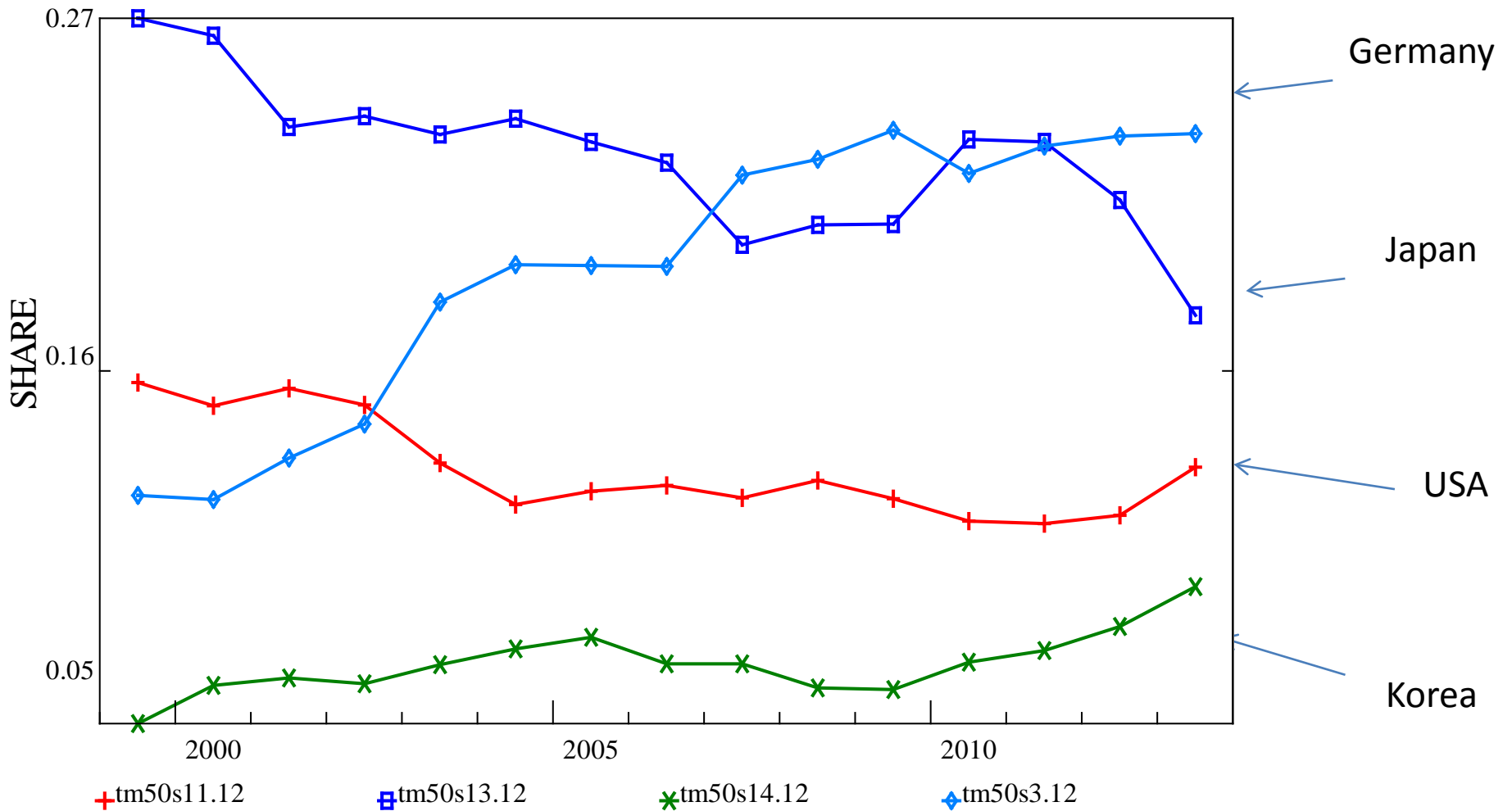
Power generating machinery
China imports



IV) SOME PRELIMINARY DESCRIPTIVE RESULTS

Machinery in China

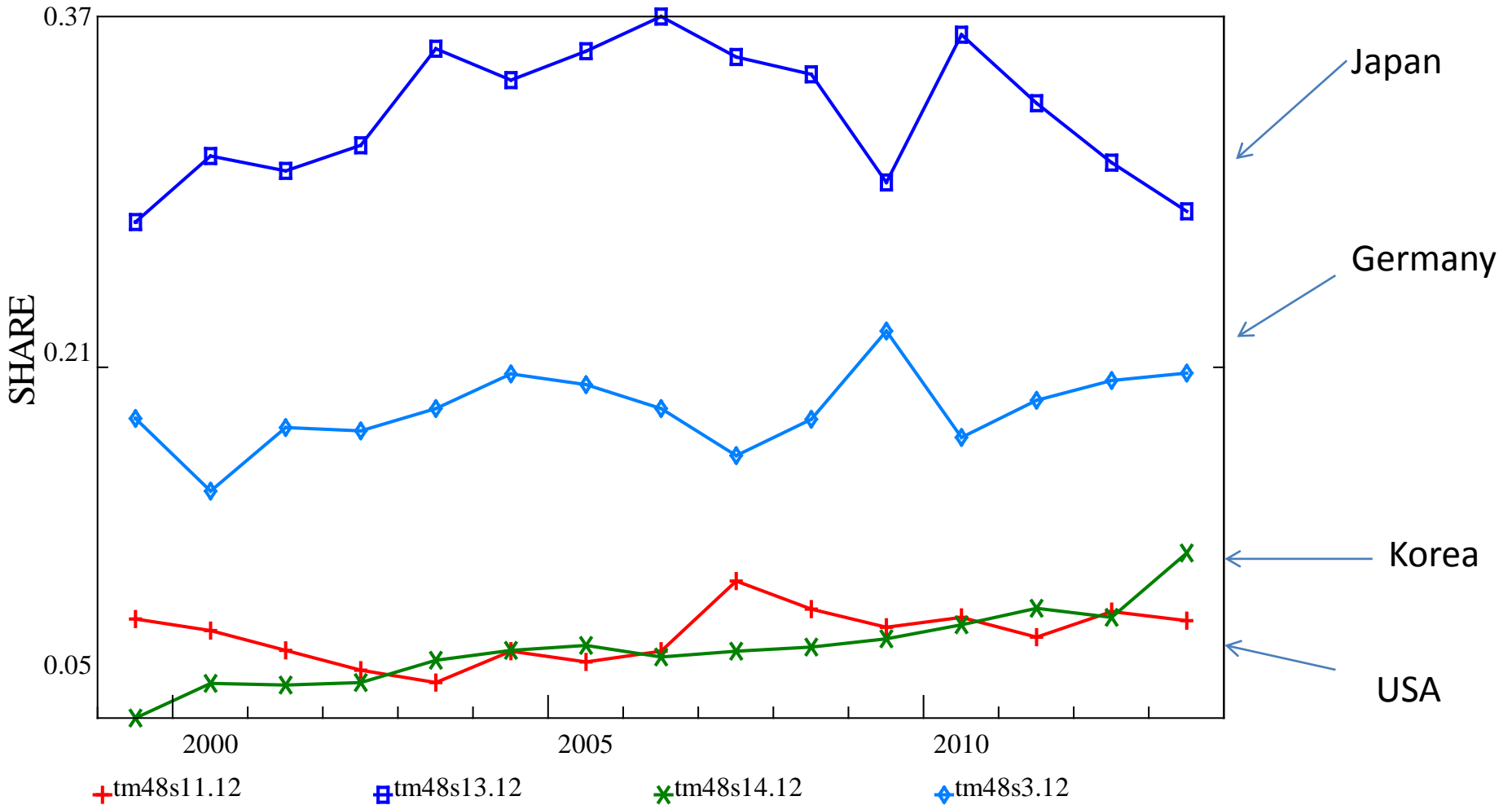
General machinery
China imports



IV) SOME PRELIMINARY DESCRIPTIVE RESULTS

Machinery in China

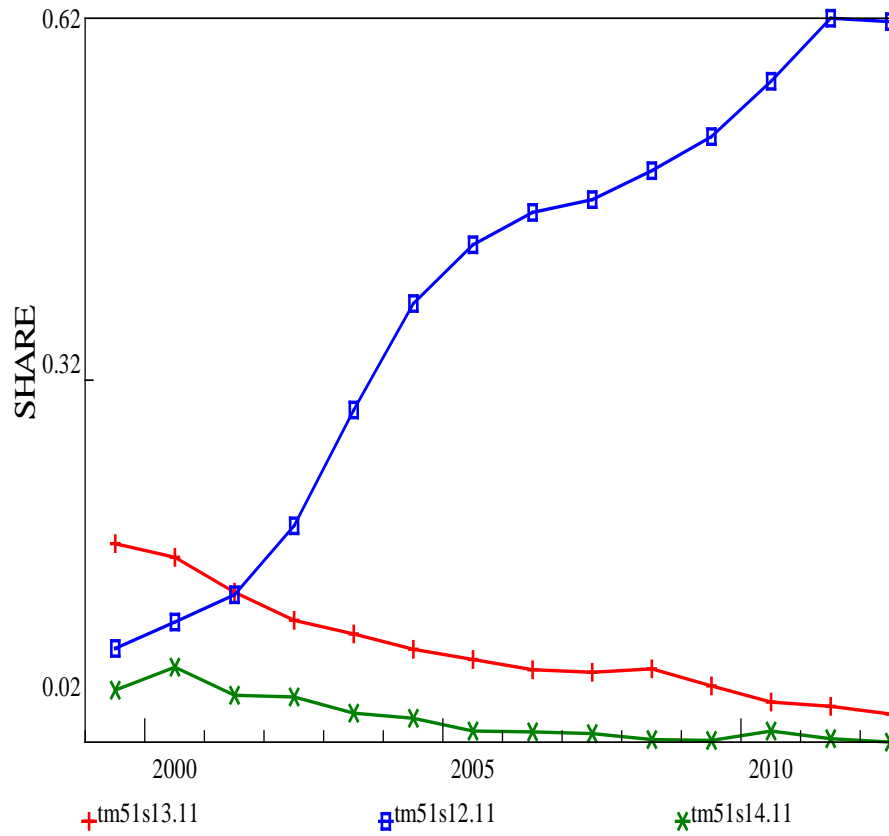
Specialized machinery
China imports



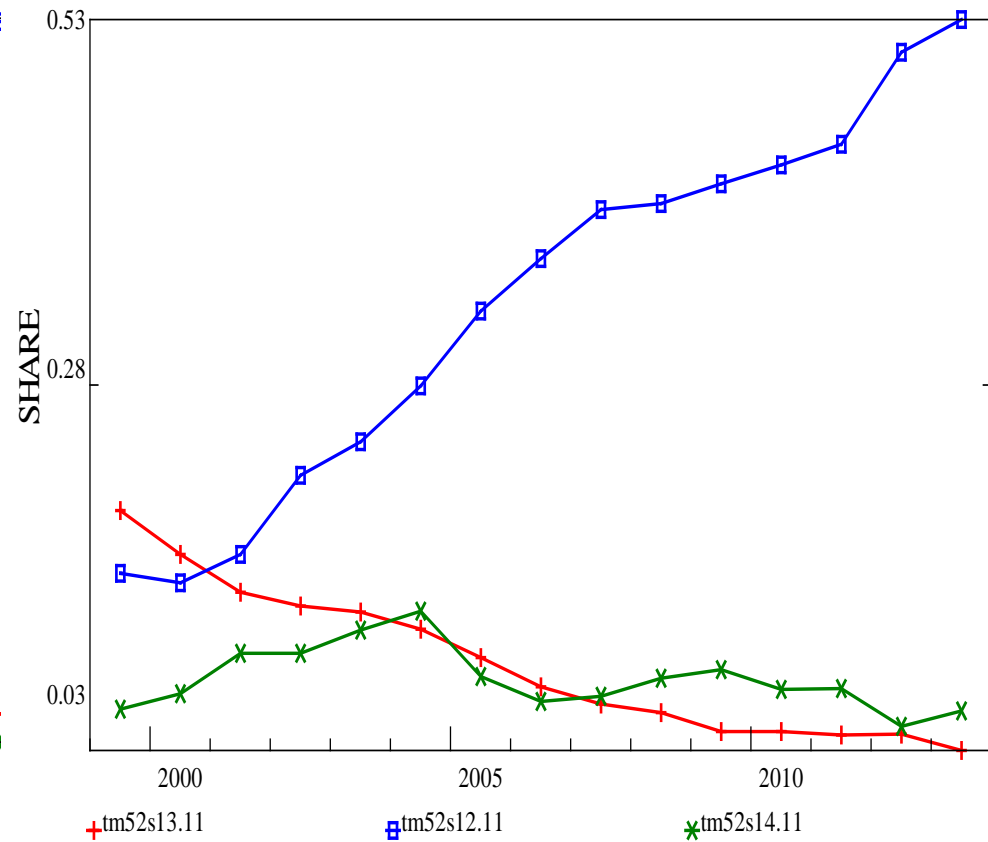
IV) SOME PRELIMINARY DESCRIPTIVE RESULTS

Technology in US

office machinery
in US from JAP, CHINA, and KOR



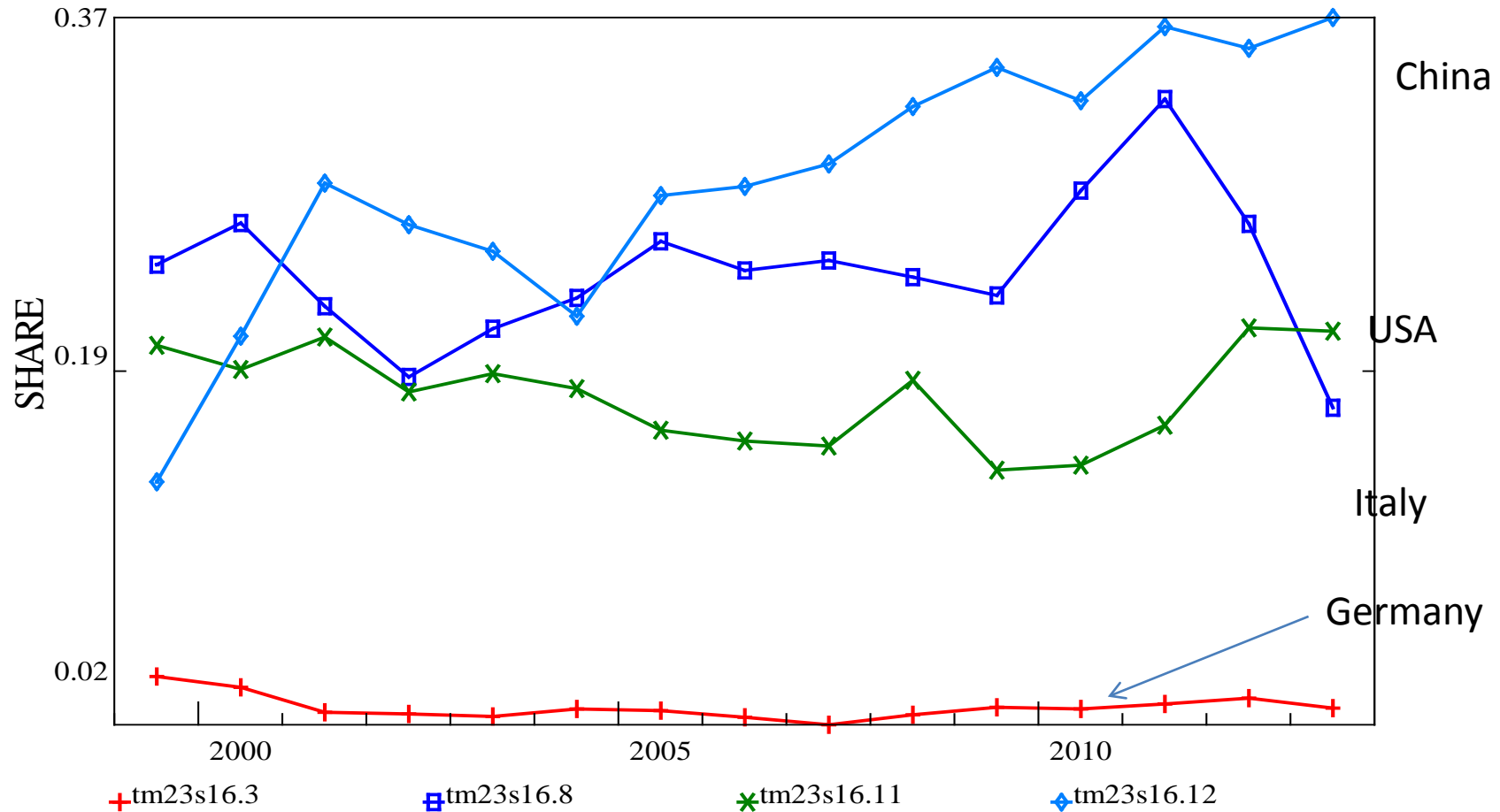
telecommunications
in US from JAP, CHINA, and KOR



IV) SOME PRELIMINARY DESCRIPTIVE RESULTS

OIL from different Areas of the World

Crude Oil. and refined products
from Middle-east producers

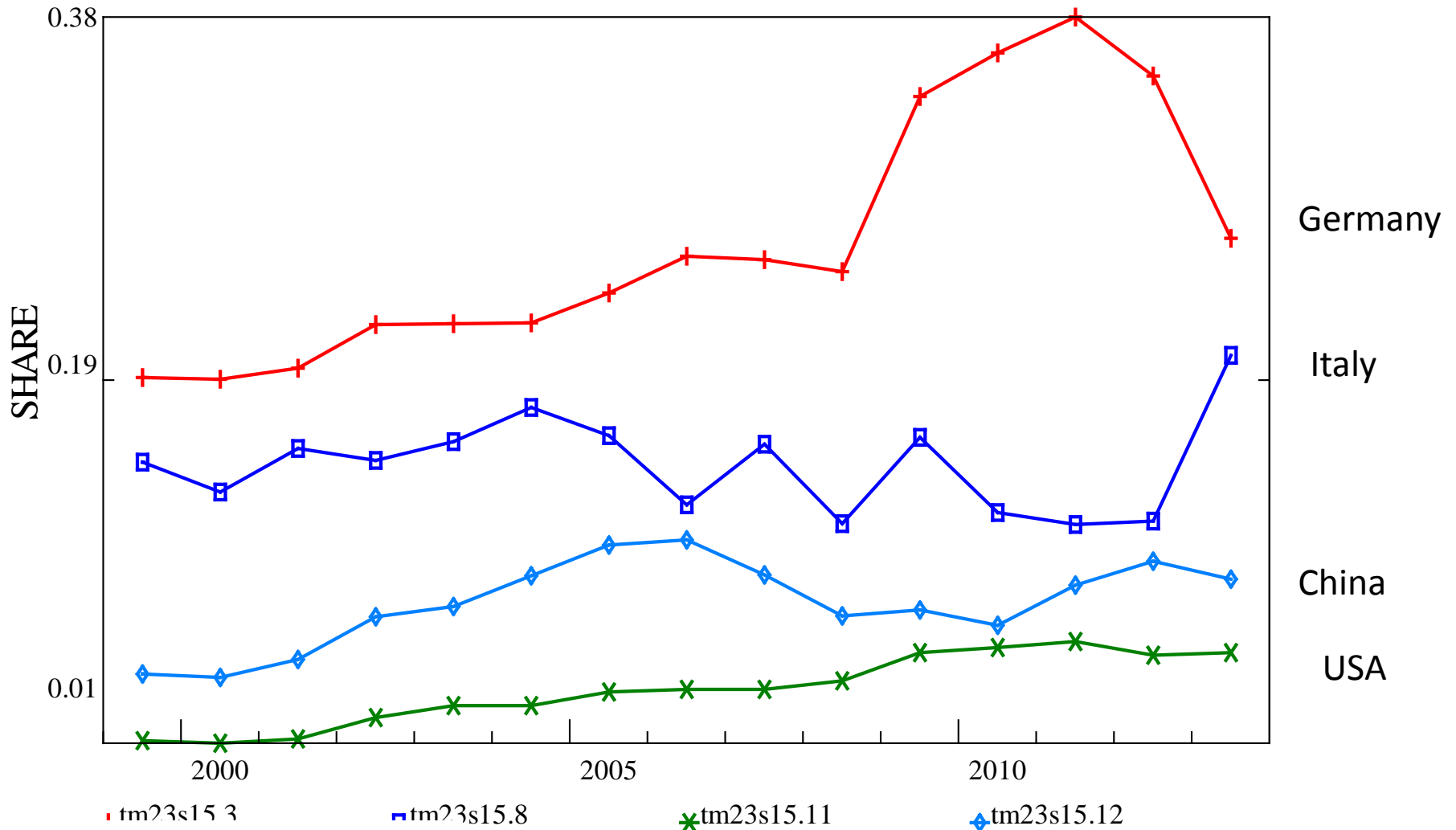


IV) SOME PRELIMINARY DESCRIPTIVE RESULTS

OIL from different Areas of the World

Crude Oil, and refined products

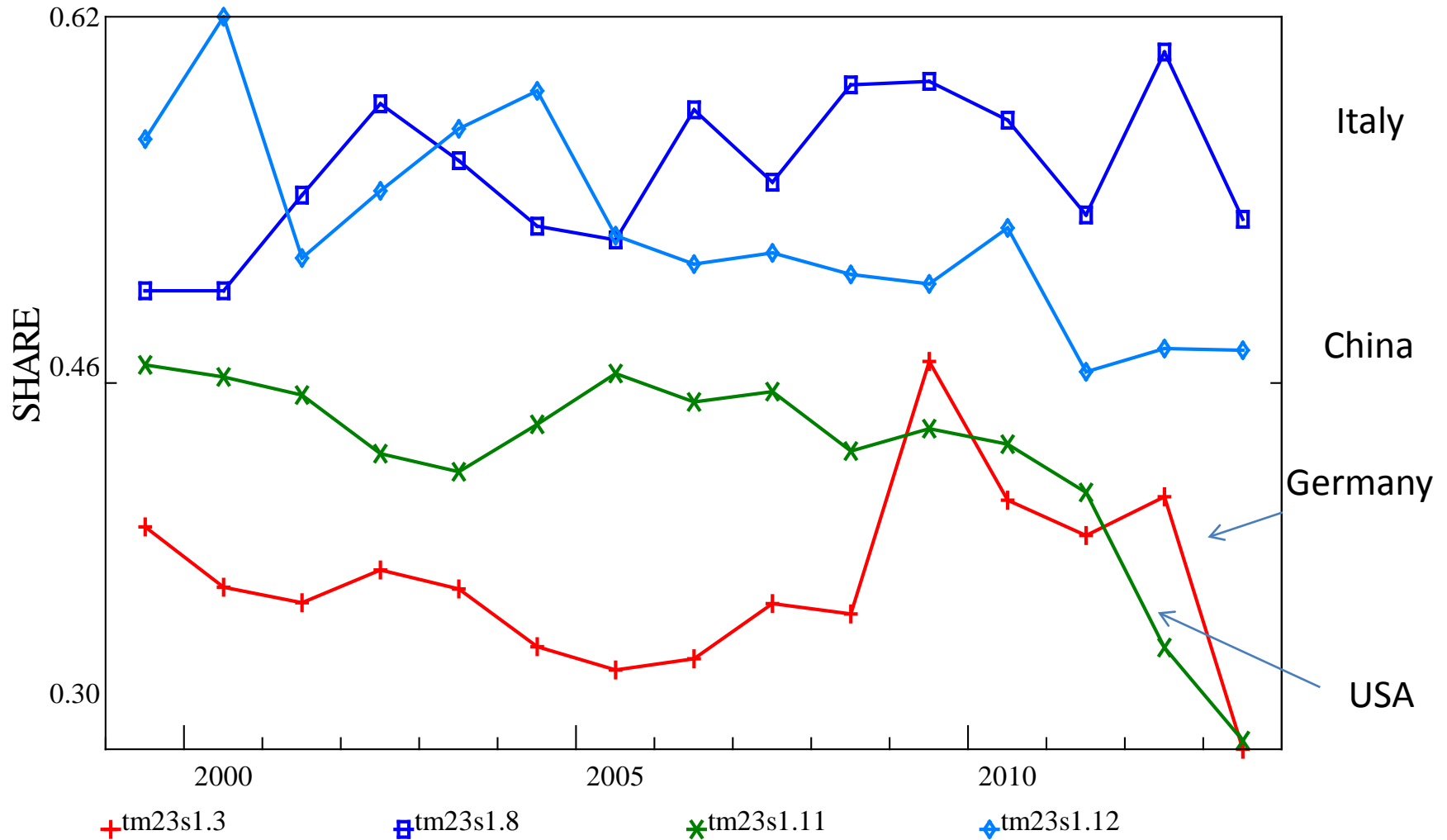
from Russia



IV) SOME PRELIMINARY DESCRIPTIVE RESULTS

OIL from different Areas of the World

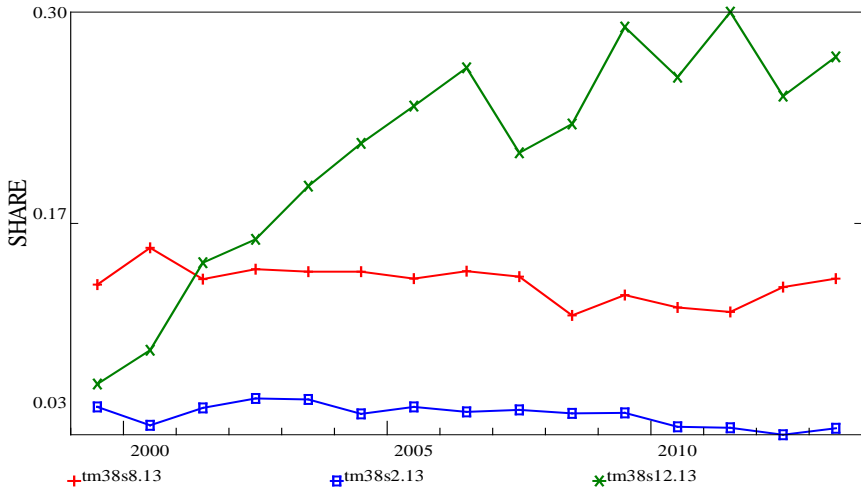
Crude Oil, and refined products
from Rest of the World



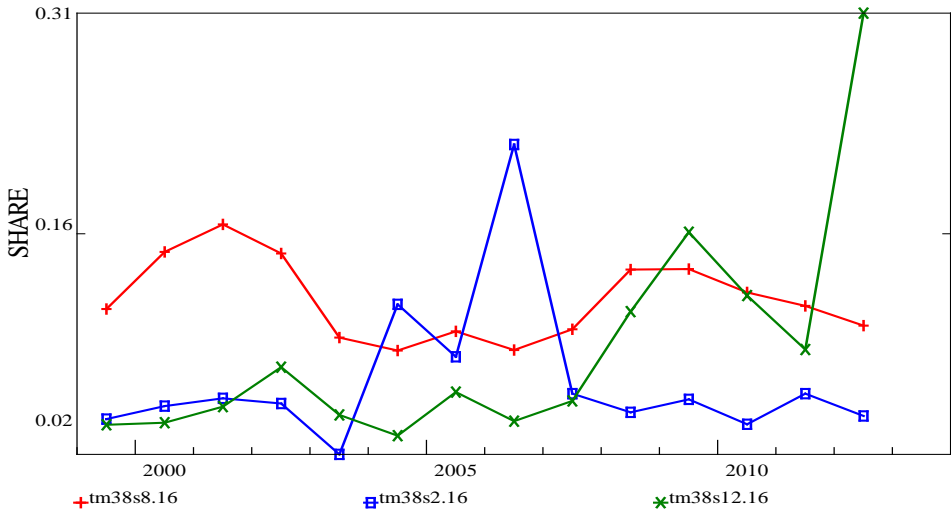
IV) SOME PRELIMINARY DESCRIPTIVE RESULTS

Fashion industry

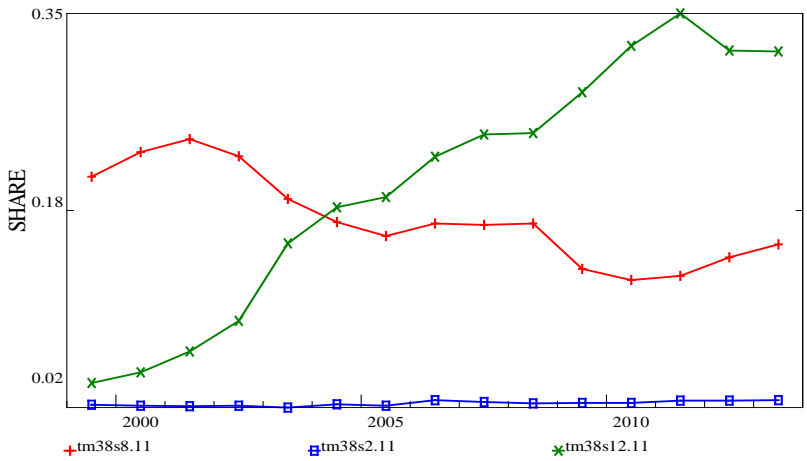
13 "Japan"
Leather products



16 "Oil Producers"
Leather products



11 "United States of America"
Leather products

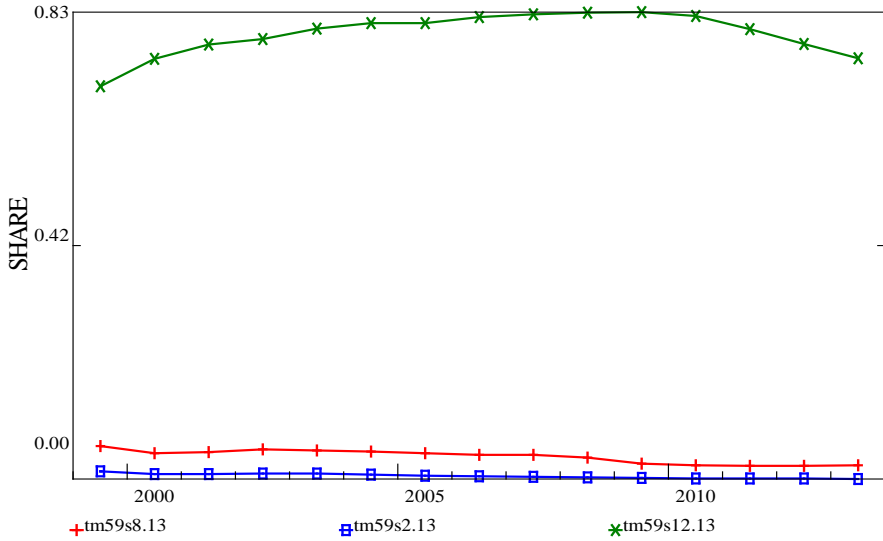


Green – China
Red – Italy
Blue - France

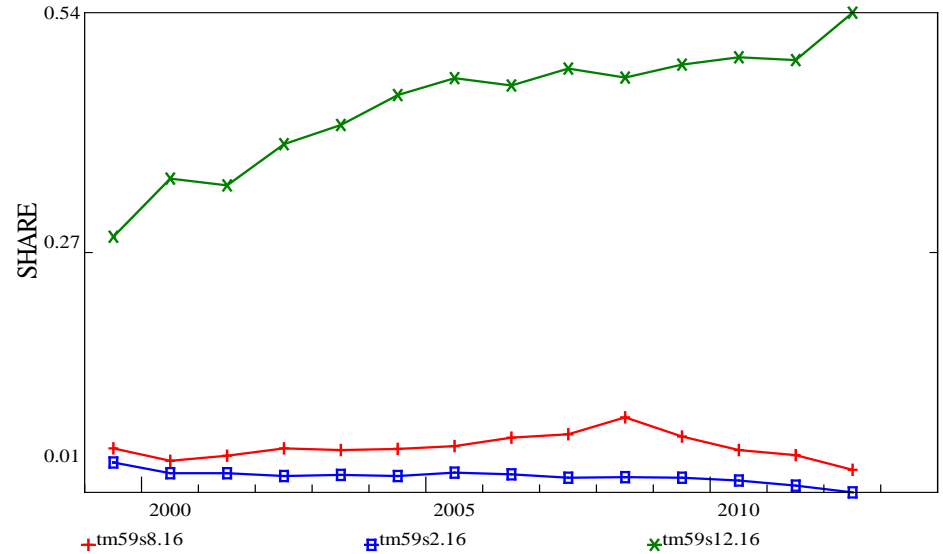
IV) SOME PRELIMINARY DESCRIPTIVE RESULTS

Fashion industry

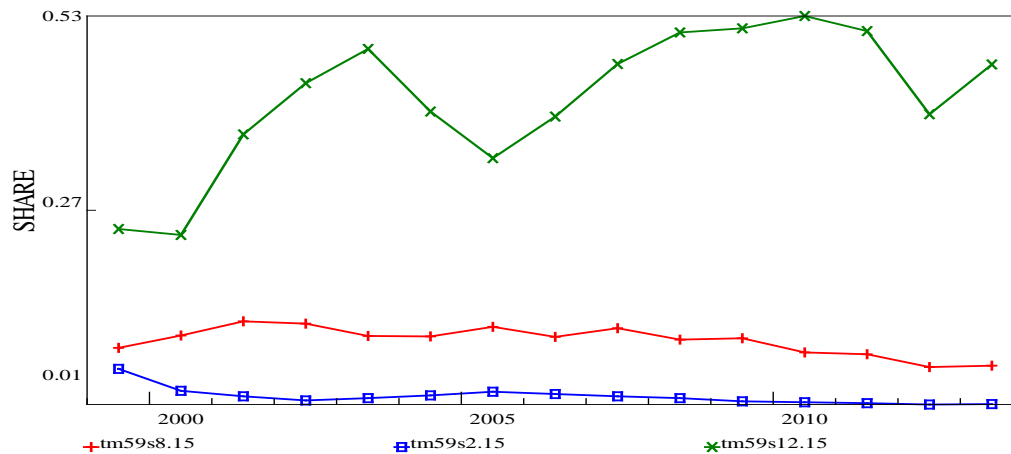
13 "Japan"
Clothes and clothing accessories



16 "Oil Producers"
Clothes and clothing accessories



15 "Russia"
Clothes and clothing accessories



Green – China
Red – Italy
Blue - France

IV) A MESSAGE TO ALL INFORUM MEMBERS



... ask not what BTM can do for you; ask what you can do for BTM ...

IV) A MESSAGE TO ALL INFORUM MEMBERS

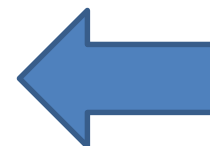
- ✓ Time series of investment by investing sectors (or capital stock by owner sectors)
- ✓ Time series of exports prices by sectors (or domestic production prices by sectors)
- ✓ Time series of exports and imports (total) from National Accounts
- ✓ an updated INFORUM-type model (complete and running)



I WANT YOU!

Service Code	Description
200	Total EBOPS Services
205	1 Transportation
206	1.1 Sea transport
207	1.1.1 Passenger
208	1.1.2 Freight
209	1.1.3 Other
210	1.2 Air transport
211	1.2.1 Passenger
212	1.2.2 Freight
213	1.2.3 Other
214	1.3 Other transport
215	1.3.1 Passenger
216	1.3.2 Freight
217	1.3.3 Other
236	2 Travel
237	2.1 Business travel
240	2.2 Personal travel
245	3 Communications services
249	4 Construction services
253	5 Insurance services
260	6 Financial services
262	7 Computer and information services
266	8 Royalties and license fees
268	9 Other business services
287	10 Personal, cultural, and recreational services
291	11 Government services, n.i.e.

We could sum all Transport services excluding passenger Transport which could be summed up to Travel services to estimate Tourism related services



1 00 - Live animals	34 56 - Fertilizers (other than those of group 272) ☐
2 01 - Meat	35 57 - Plastics in primary forms
3 02 - Dairy products	36 58 - Plastics in non-primary forms
4 03 - Fish	37 59 - Chemical materials and products, n.e.s.
5 04 - Cereals	38 61 - Leather, leather manufactures, n.e.s., and dressed furskins
6 05 - Vegetables and fruit	39 62 - Rubber manufactures, n.e.s.
7 06 - Sugars, and honey	40 63 - Cork and wood manufactures
8 07 - Coffee, tea, cocoa, spices	41 64 - Paper☐
9 08 - Feeding stuff for animals	42 65 - Textile yarn, fabrics
10 09 - Miscellaneous edible products	43 66 - Non-metallic mineral manufactures, n.e.s.
11 11 - Beverages	44 67 - Iron and steel
12 12 - Tobacco	45 68 - Non-ferrous metals
13 21 - Hides, skins and furskins, raw	46 69 - Manufactures of metals, n.e.s.
14 22 - Oil-seeds and oleaginous fruits	47 71 - Power-generating machinery and equipment
15 23 - Crude rubber	48 72 - Machinery specialized
16 24 - Cork and wood	49 73 - Metalworking machinery
17 25 - Pulp and waste paper	50 74 - General industrial machinery and equipment, n.e.s.,
18 26 - Textile fibres (other than wool)	51 75 - Office machines
19 27 - Crude fertilizers, and minerals (excluding coal, petroleum)	52 76 - Telecommunications
20 28 - Metalliferous ores and metal scrap	53 77 - Electrical machinery
21 29 - Crude animal and vegetable materials, n.e.s.	54 78 - Road vehicles
22 32 - Coal, coke and briquettes	55 79 - Other transport equipment
23 33 - Petroleum, and related materials	56 81 - Prefabricated buildings; sanitary, plumbing, heating and lighting
24 34 - Gas	57 82 - Furniture
25 35 - Electric current	58 83 - Travel goods, handbags and similar containers
26 41 - Animal oils and fats	59 84 - Articles of apparel and clothing accessories
27 42 - Fixed vegetable fats and oils	60 85 - Footwear
28 43 - Animal or vegetable fats and oils, waxes	61 87 - Professional, scientific and controlling instruments
29 51 - Organic chemicals	62 88 - Photographic apparatus
30 52 - Inorganic chemicals	63 89 - Miscellaneous manufactured articles, n.e.s.
31 53 - Dyeing, tanning and colouring materials	64 93 - Special transactions
32 54 - Medicinal and pharmaceutical products	65 96 - Coin (other than gold coin), not being legal tender
33 55 - Essential oils and resinoids and perfume materials; toilet, p	66 97 - Gold, non-monetary (excluding gold ores and concentrates)



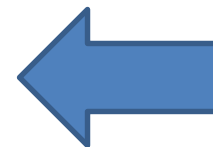
	EU	Other Countries
EU	data from COMEXT - imports - exports	data from COMEXT - exports
Other Countries	Data from Comext - imports	no data from COMEXT



Ordered Country list

- #1 Rest of the World,
- #2 France,
- #3 Germany,
- #4 United Kingdom,
- #5 Spain,
- #6 Austria,
- #7 Belgium,
- #8 Italy,
- #9 Canada,
- #10 Mexico,
- #11 US,
- #12 China,
- #13 Japan,
- #14 Korea,
- #15 Russia,
- #16 Middle-East Oil producers,
- #17 Rest of the Eurozone,
- #18 Rest of the EU28

* Overseas territories are considered as part of the Main Country (UK, France, China, ...) and so imports/exports flows are considered interregional transactions and not included in this dataset.



8 "Italy" "Gas"

