How does multinational production affect the measurement of competitiveness?

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Outline

Motivation

- In a world with **multinational companies**, the geographical **location** of production does not coincide with the **ownership** of production...
- ... **growing disconnect** between domestic (geography-based) indicators and national (ownership-based) indicators
- This raises issues for several measures of **competitiveness**, based on the location of production, e.g.:
  - Gross exports
  - Value added in exports
  - 'GVC income'
- **Question:** How does multinational production affect the measurement of competitiveness (i.e. production capabilities in tradables)?

Our contribution

- Assemble a unique **bilateral** dataset on **foreign affiliates** in the manufacturing sector of 44 countries
  - Value added and factor incomes broken down according to **location** of activity and **ultimate owner** country
- Compute **ownership-based** measures of production capabilities
  - Value added by **nationality of firms**
  - Value added by **nationality of factors** involved in production
- Evaluate **exports and FDI** using a **common metric** based on value added
  - Value added in exports versus value added of foreign affiliates

Related literature

- Ownership-based approach (applications to the U.S. and Japan)
  - Baldwin and Kimura 1998, Kimura and Baldwin 1998, Lipsey et al. 1998
  - This paper: much **larger set of countries**
- FDI and multinational production
  - Fukui and Lakatos 2012, Ramondo 2014, Ramondo et al. 2013, Alviarez 2014
  - This paper: **more detailed** dataset with a **longer** time span
- Global value chains (GVC)
  - Johnson and Noguera 2012, Johnson 2014, Koopman, Wang and Wei 2014
  - This paper: **value-added approach** to the analysis of exports and production by foreign affiliates

Dataset on multinational production

- We **build** an innovative **bilateral dataset** on multinational production for 44 countries and a RoW aggregate
  - 44 countries account for more than 90% of world manufacturing value added
  - Years: 2004-2011
  - Manufacturing sector as a whole
- For each **country pair** we report the following variables:
  - Turnover
  - Employment
  - Value added
  - Labor compensation (Wages and social benefits)
  - Capital compensation (Gross operating surplus)
- Examples
  - Value added by German-owned affiliates in Hungary
  - Capital compensation of U.S.-owned affiliates in Brazil

Sources

- Inward and outward foreign affiliates statistics (FATS)
  - OECD, Eurostat and national sources
  - Data on majority-owned firms only (50% rule), by ultimate controlling country
- BvD Orbis: worldwide firm-level data
- Estimation methods
- FATS data account for about 80% of sales of foreign affiliates worldwide (>90% in large advanced economies) but only 60% of value added

Foreign affiliates (manufacturing; 2011)

Global activity of foreign affiliates (USD billion)

	Foreign affiliates	% of world manufacturing
Sales	9337	21.2
Employment	26758	6.7
Value added	2052	18.0
Labor compensation	1012	18.3
Capital compensation	1040	17.7

Ownership-based measures of production capabilities

- Define *location* with first subscript and *ownership* with second subscript
- Value added by **location** ("domestic")

$$VA_i^{location} = VA_{i,i} + \sum_{j \neq i} VA_{i,j} \tag{1}$$

- Value added by **nationality of firms**

$$VA_i^{firms} = VA_{i,i} + \sum_{j \neq i} VA_{j,i} \tag{2}$$

- Value added by **nationality of factors**

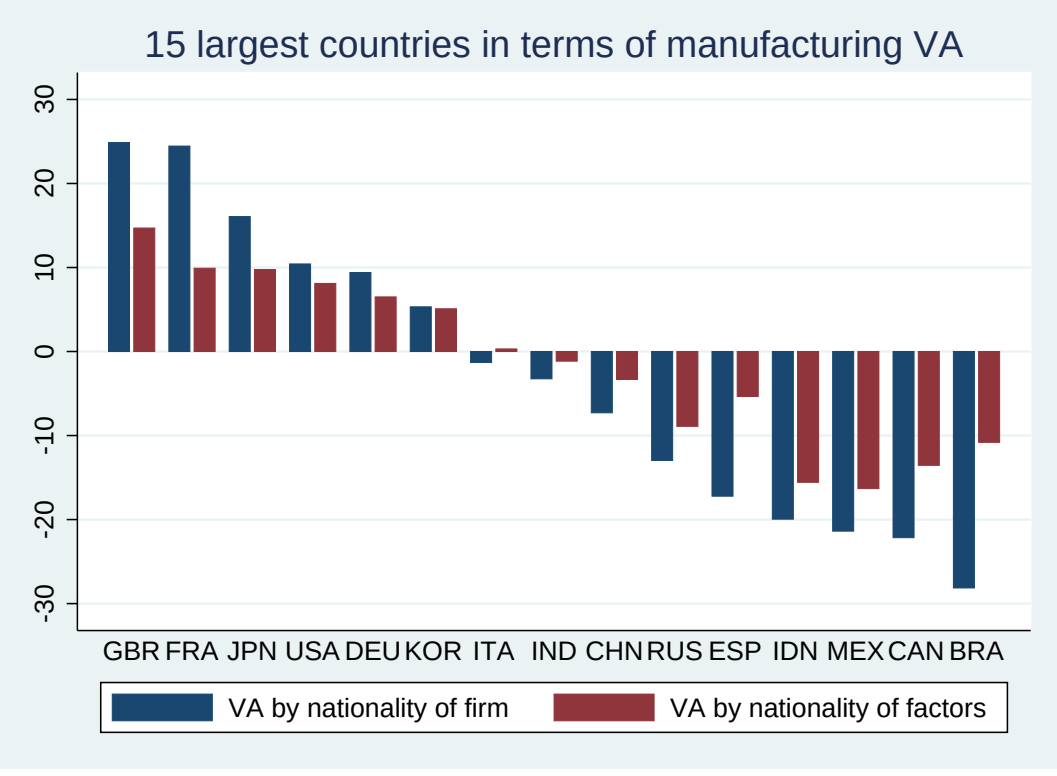
$$VA_i^{factors} = VA_{i,i} + \sum_{j \neq i} LAB_{i,j} + \sum_{j \neq i} CAP_{j,i} \tag{3}$$

How to interpret ownership-based measures?

- VA by nationality of firms
  - Measures the global capabilities of domestically-owned firms (combining capital, management, proprietary technology with labor at home or abroad)
- VA by nationality of factors
  - Measures the global value added generated by national factors (labor at home, capital at home or abroad)
- These indicators capture important aspects of the competitiveness of a country's firms or factors of production...
- ... which could be used to supplement competitiveness indicators based on the location of the activity (Lipsey et al. 1998)

Ownership-based and location-based VA

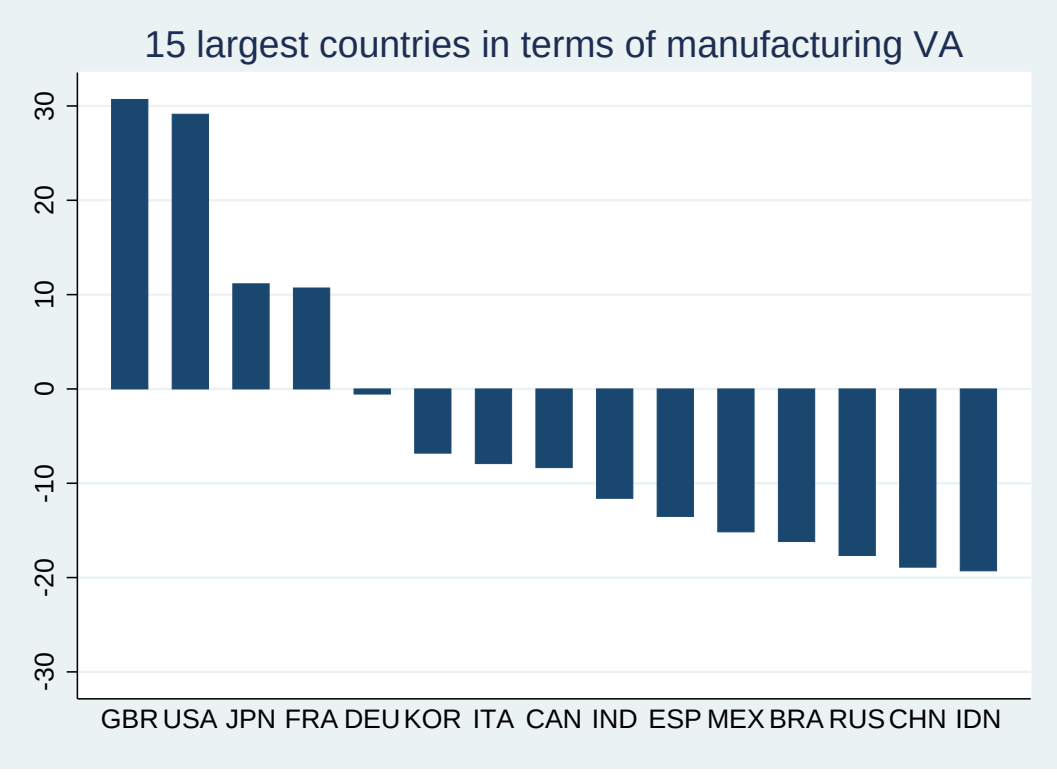
How does value added by nationality of firms (or factors) differ from value added by location of activity?



- VA by nationality of firms is 25% larger for France and UK...
- ...15% larger for Japan, 10% larger for Germany and US
- ... and 15-30% smaller for large emerging countries

Exports and FDI in value-added terms

What happens to world market shares on VA in exports if we include the VA of foreign affiliates?



- 30% increase for UK and US, 10% increase for France and Japan
- no change for Germany, 7% decrease for Italy
- up to 20% decrease for large emerging countries

Concluding remarks

- Foreign affiliates matter
  - Almost 20% of world manufacturing VA
- Ownership-based indicators differ from location-based indicators
  - VA by nationality of firms larger than domestic VA only in large advanced economies (esp. France and U.K + Japan, U.S. and Germany)
  - Considering foreign affiliates also matters for assessing countries' recent performance on international markets
- "Ownership as well as geography matters for economic behavior" (Baldwin and Kimura 1998)
- Improvement of official statistics on foreign affiliates (esp. for value added and trade) is needed for further progress

Thank you for your attention

Availability of FATS data

Share of activity of foreign affiliates for which FATS data is available

Year	Sales	Empl	VA	LAB	CAP
2004	78	55	59	60	55
2005	78	55	58	58	54
2006	75	56	61	62	56
2007	77	60	63	63	58
2008	75	58	62	63	60
2009	79	63	59	65	53
2010	77	60	59	62	54
2011	79	62	59	62	55

Availability of FATS data

By controlling country

Ctrl	%World	Sales	Empl	VA	LAB	CAP
USA	26.3	90	63	89	91	88
JPN	10.6	98	99	27	34	20
DEU	10.2	90	80	56	62	50
GBR	8.8	83	41	58	58	58
FRA	6.5	88	82	50	95	62
NLD	6.3	78	77	64	76	54
CHE	4.6	77	62	79	79	79
ITA	2.6	92	93	58	34	33
KOR	2.5	5	2	3	0	0
SWE	2.2	96	93	53	42	30

By location country

Loc	%World	Sales	Empl	VA	LAB	CAP
USA	16.1	95	87	95	78	74
CHN	10.2	58	57	14	24	22
DEU	8.3	95	94	93	93	93
GBR	4.7	93	90	90	85	95
CAN	4.3	93	85	70	63	84
BRA	4.1	80	82	31	33	46
FRA	4.0	95	95	95	96	95
ESP	2.7	91	95	83	86	78
BEL	2.7	80	89	37	42	51
ITA	2.6	82	91	80	74	88

Asymmetries in FATS data

Comparison with total sales reported by the controlling country

Ctrl	Sales (our estim.)	Sales (outward FATS)	Ratio
USA	2452	2611	0.94
JPN	987	1108	0.89
DEU	958	879	1.09
GBR	824	641	1.29
FRA	616	802	0.77
ITA	243	278	0.87
SWE	195	248	0.79
CAN	132	169	0.78
LUX	128	88	1.44
FIN	122	130	0.94
BEL	110	30	3.70
AUT	97	83	1.16
IRL	79	27	2.94
ESP	63	62	1.02
POL	22	18	1.18

- Examples of large asymmetries between inward and (mirror) outward data
  - Belgian-owned affiliates in US, Germany and France
  - Irish-owned affiliates in US
  - Luxembourg-owned affiliates in Germany
  - UK-owned affiliates in US and Germany
  - Swedish-owned affiliates in US
  - US-owned and Japanese-owned affiliates in Hong Kong

Robustness analysis (2011)

Ratio between VA by nationality of firms and VA by location of activity

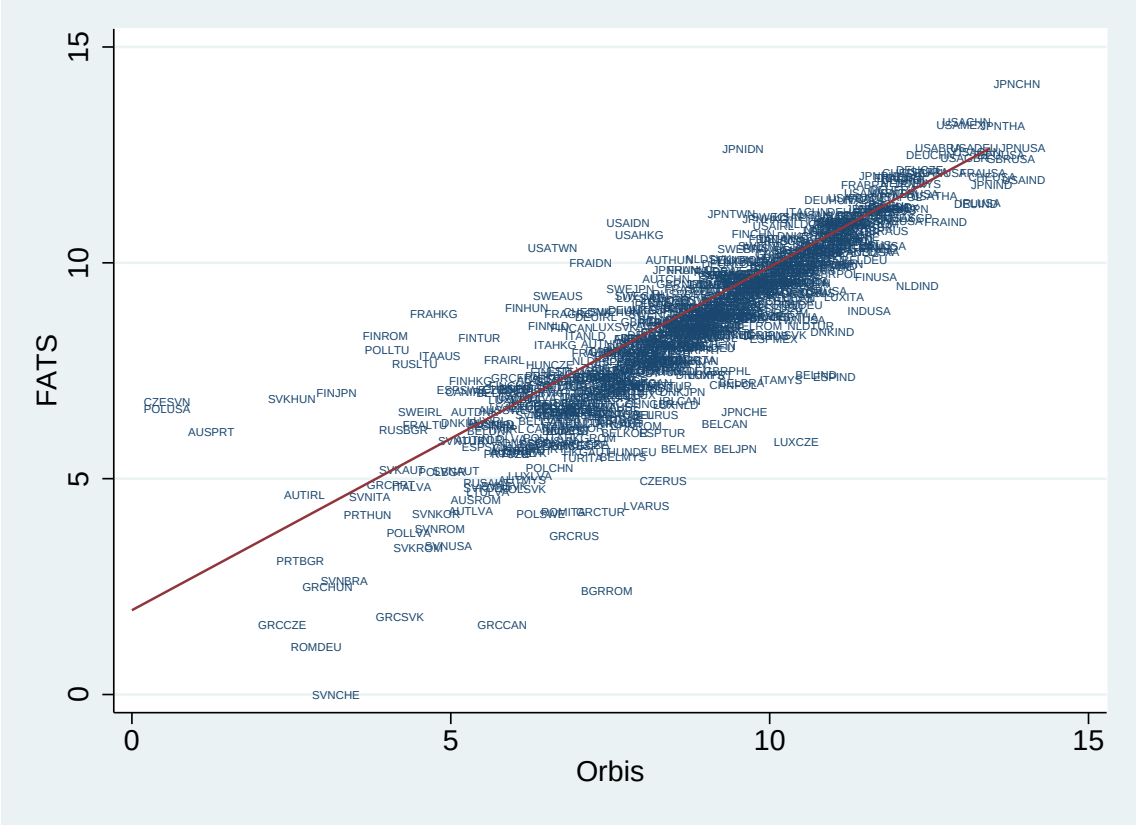
Country	Baseline	Robustness
CHN	0.93	0.93
USA	1.10	1.13
JPN	1.16	1.14
DEU	1.09	1.10
ITA	0.99	0.96
BRA	0.72	0.72
KOR	1.05	1.06
CAN	0.78	0.78
RUS	0.87	0.87
IND	0.97	0.97
GBR	1.25	1.26
FRA	1.26	1.28
MEX	0.79	0.79
IDN	0.80	0.80
ESP	0.83	0.82

- Robustness estimates do not impose consistency with total activity reported by inward country
- This has a relatively minor impact on the ratio between VA by nationality of firms and VA by location

Importance of service activities in manufacturing groups

- How much do non-manufacturing activities matter for sales and profits of manufacturing groups?
- Evidence from selected large multinationals:
  - **Apple Inc.**: 10% of sales in 'iTunes, Software and Services'
  - **FCA Group**: 1% of sales in 'Other activities' (group services & media)
  - **Philips Group**: 4% of sales in 'Innovation, group & services' (group services + IP services)
  - **Toyota Motor Corporation**: 10% of sales and 28% of operating income in 'Financial services & other activities'
  - **Volkswagen Group**: 10% of sales and 13% of operating income in 'Financial services'
  - Notes: 2014 data. Inter-company transactions included except for Apple

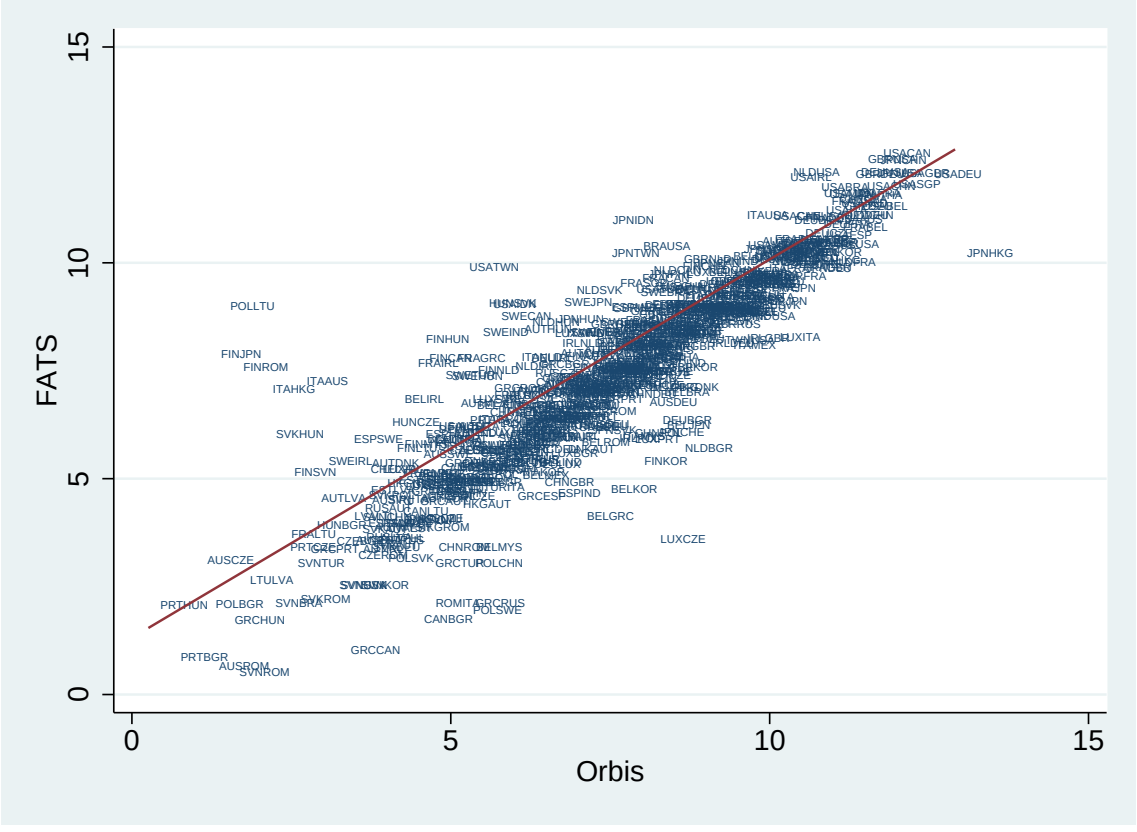
Correlation between FATS and ORBIS: Log employment



Slope of the fitted line = 0.80 (s.e. = 0.03)

R-squared = 0.73

Correlation between FATS and ORBIS: Log sales



Slope of the fitted line = 0.81 (s.e. = 0.04)

R-squared = 0.75

'Tax havens' and profits of MNEs

Share of FDI income in 'tax havens' (2008-2012)

Country	% in 'tax havens'
USA	51.0
BEL	49.0
ITA	42.5
GBR	40.3
DEU	34.4
ESP	24.0
SWE	23.9
FRA	23.5
AUT	15.8

Source: Eurostat and Zucman (2014). Balance of payments data, total economy. Tax havens: Ireland, Luxembourg, Netherlands, Switzerland, Offshore countries.

BoP data on FDI

BoP data underestimate FDI in the manufacturing sector (esp. on the outward side), due to the recording of the immediate counterpart (often holding companies)

Share of manufacturing in FDI stocks (BoP data, 2012)

Country	Outward FDI	Inward FDI
Germany	16.5	10.2
Spain	22.2	31.1
France	5.4	7.0
Italy	24.2	29.9
United Kingdom	18.7	20.9

Source: Eurostat.

Value-added approach to exports vs FDI

- Define Y_i as value added to serve foreign markets, either via exports or foreign affiliates

$$Y_i = VAX_i + VAFA_i \tag{4}$$

VAX_i = value added in exports (GDP in exports) $VAFA_i$ = value added of foreign affiliates

- Fully comparable and non-duplicative metric (Baldwin and Kimura 1998)
- Implicit assumptions (which reflect data issues)
  - Value added of foreign affiliates entirely serves foreign markets
  - An ownership-based measure would exclude exports of foreign-owned companies (second term below)

$$Y_i = VAX_{i,i} + \sum_{j \neq i} VAX_{i,j} + VAFA_i \tag{5}$$

World market shares on exports and FDI

- World market share in terms of VAX_i

$$SHVAX_i = \frac{VAX_i}{\sum_i VAX_i} \tag{6}$$

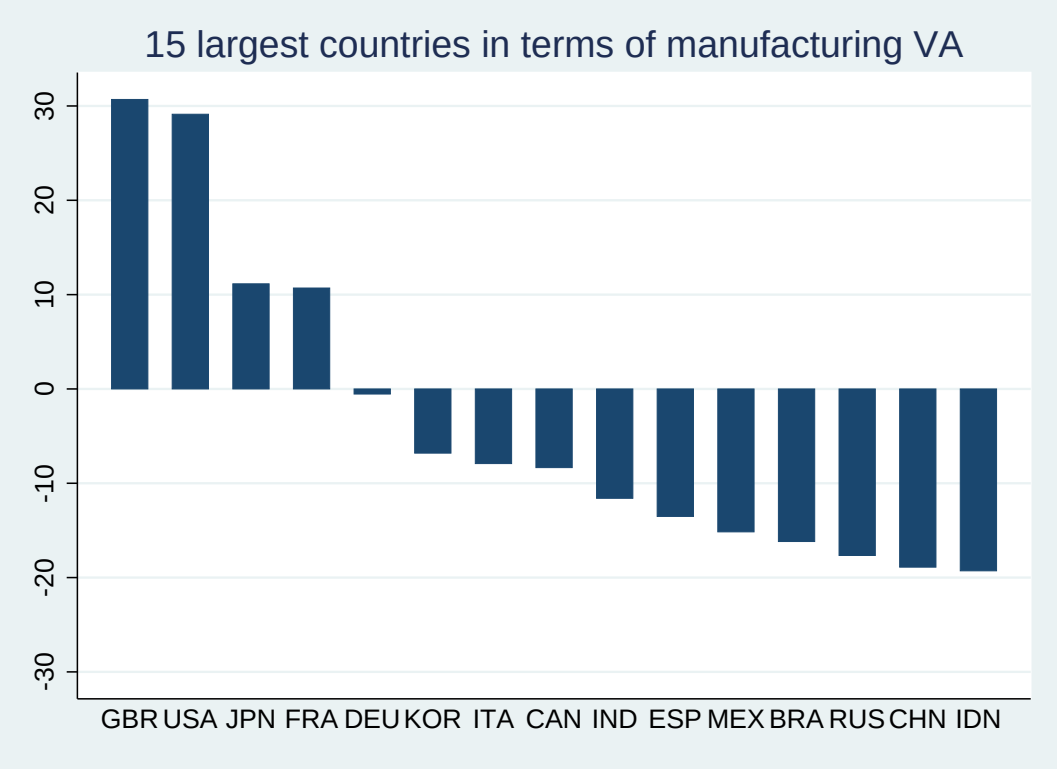
- World market share in terms of Y_i $(VAX_i + VAFA_i)$

$$SHY_i = \frac{(VAX_i + VAFA_i)}{\sum_i (VAX_i + VAFA_i)} \tag{7}$$

- Manufacturing sector only for both VAX_i and $VAFA_i$

Comparing world market shares (2011)

What happens to world market shares on VA in exports if we include the VA of foreign affiliates?



- 30% increase for UK and US, 10% increase for France and Japan
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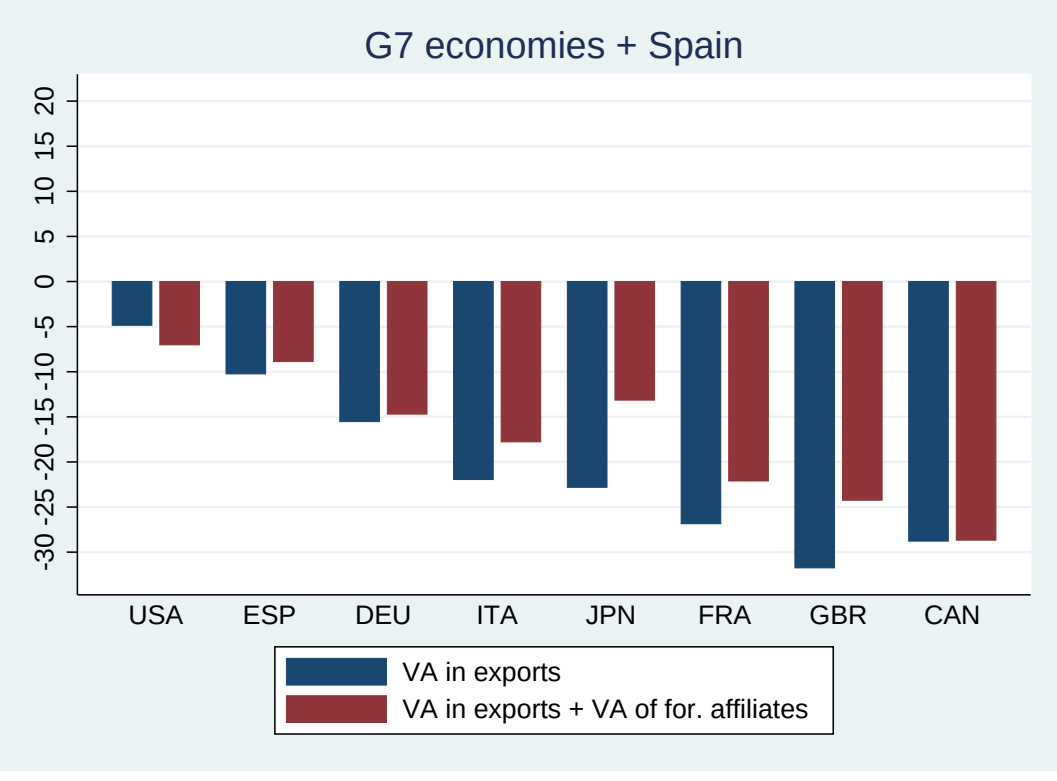
Comparing changes in world market shares (2004-2011)

What happens to changes in world market shares on VA in exports if we include the VA of foreign affiliates?



- Japan's loss of market share becomes only 13% (from 23%)
- Similar pattern for France, Italy (Chrysler effect) and UK