Margins of Trade: Evidence from Czech Firm-Level Data

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Introduction

- Recent research in international trade: firm‘ characteristics important for decisions to export, some role of credit constraints
- Margins of trade (with firms‘ heterogeneity) important for understanding the adjustment of current account imbalances (Pappada 2008, 2011; Galstyan and Lane 2008; ongoing CompNet project)
  - More exports of a given variety (intensive margin) puts downward pressure on export prices
- Following Bricongne et al. (2012), we decompose the export dynamics into extensive and intensive margins using the universe of Czech firm-level international trade data (Extrastat, Intrastat) in 2007-2011
  - Extensive margin: entry/exit by firm, country, HS6 product; the remaining part is intensive margin
  - Novel to the literature: non-residents and products by use (capital, intermediate, consumption goods)

Methodology

Calculate mid-point growth rates defined as export flows by a firm i to a given destination (country) c of product group k at t (see Davis and Haltiwanger, 1992; Bricongne et al., 2012):

$$g_{ickt} = \frac{x_{ickt} - x_{ick(t-1)}}{\frac{1}{2}\left(x_{ickt} + x_{ick(t-1)}\right)}. \qquad (1)$$

For the purpose of aggregation, we define a weight to each elementary trade flow in (1) as the relative share of the flow in total exports of the whole population of exporting firms:

$$s_{ickt} = \frac{x_{ickt} + x_{ick(t-1)}}{\left(\sum_c \sum_i \sum_k x_{ickt} + \sum_c \sum_i \sum_k x_{ick(t-1)}\right)}. \qquad (2)$$

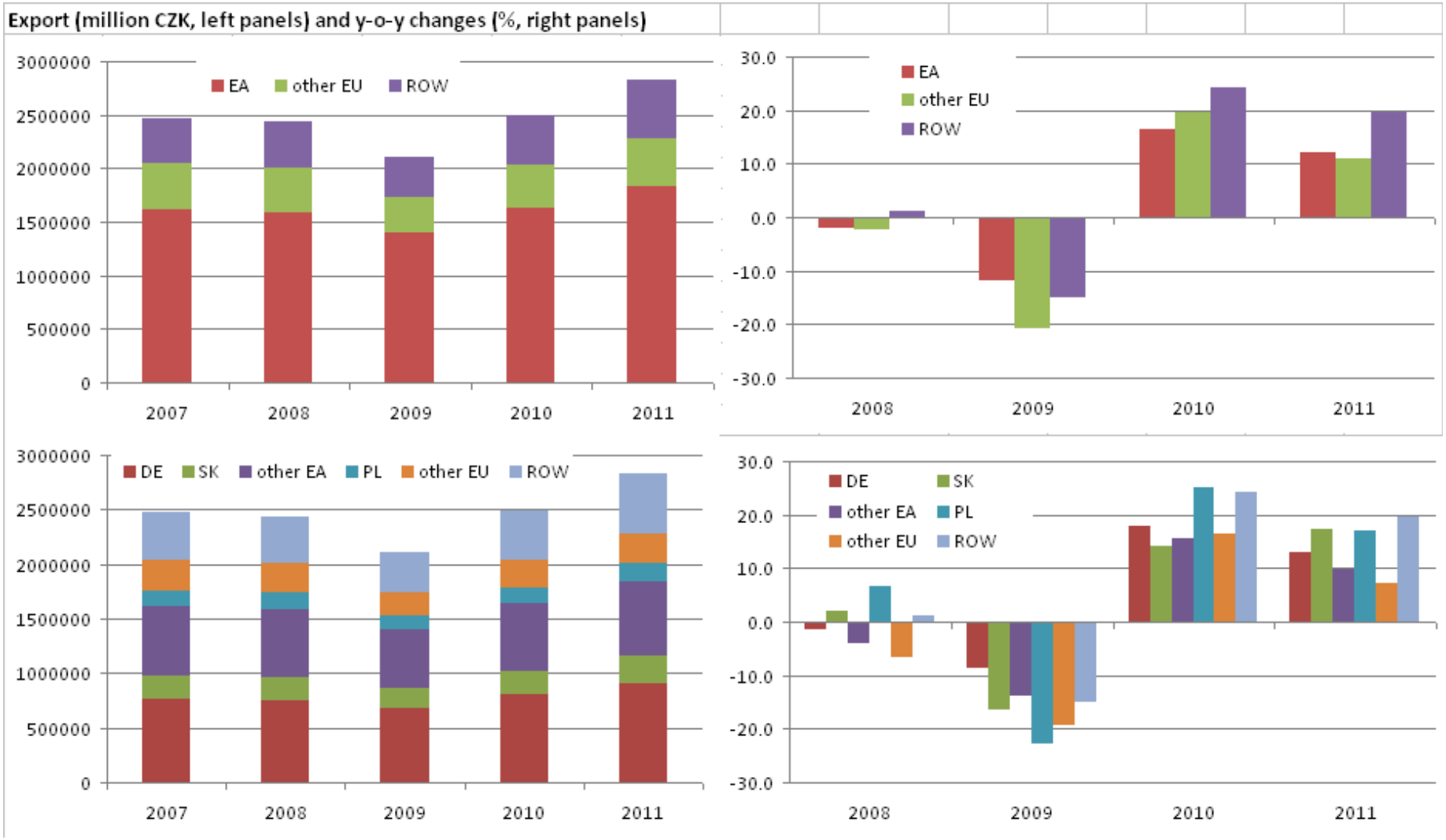
The growth rate of the total value of exports is then given as a weighted sum of elementary flows:

$$G_t = \sum_c \sum_i \sum_k s_{ickt} g_{ickt}. \qquad (3)$$

Data

- Extrastat and Intrastat quarterly data in 2005-2011, products at CN8
- Instrastat: threshold increased from 4 mil. CZK in 2008 to 8 mil. CZK in 2009; exporting groups introduced in 2009
- Focus on HS6 since 2007 (major changes to HS6 in 2007, previous years will be added in the next part)
  - HS4 as a robustness check
- Use yearly information to construct mid-point growth rates
  - Extensive margin: no occurrence in a given year
- Define non-residents (CZSO approach) and products by use (using BEC classification)

Stylised facts I



Stylised facts II

Table 1: Summary statistics

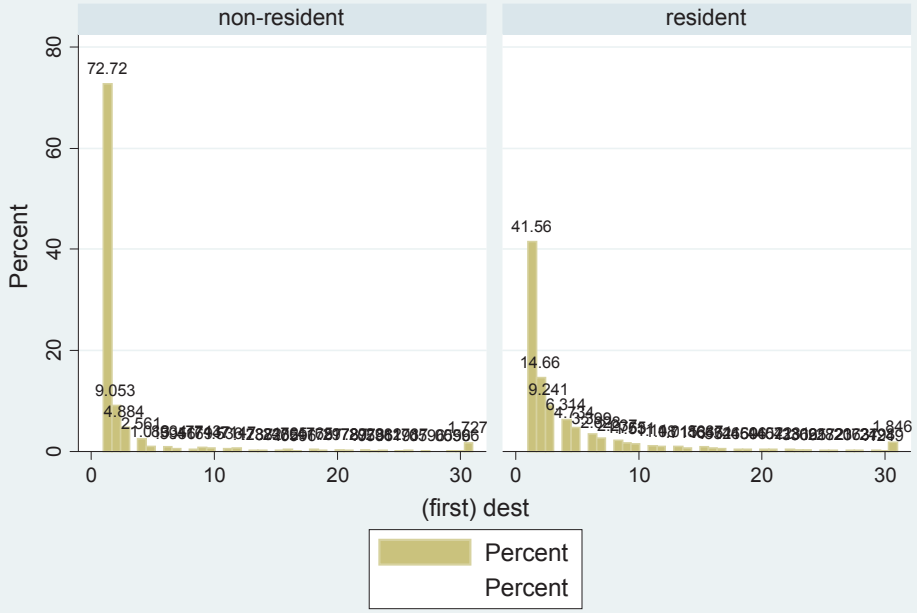
	Residents					Non-residents				
	2007	**2008**	**2009**	**2010**	**2011**	**2007**	**2008**	**2009**	**2010**	**2011**
Firm level										
Number of products										
Mean	11.7	11.9	12.4	12.8	12.9	5.9	6.2	6.7	7.2	7.3
Median	4	4	4	4	4	1	1	1	1	1
Std. dev.	23.8	24.7	25.6	27.1	28.5	21.8	22.3	21.9	23.5	27.2
Number of destinations										
Mean	4.9	5.1	5.2	5.5	5.6	3.1	3.4	3.6	3.4	3.3
Median	2	2	2	2	2	1	1	1	1	1
Std. dev.	7.7	7.8	8.1	8.6	8.9	7.4	7.9	7.6	6.5	6.5
Export (million CZK)										
Mean	111.8	110.0	98.4	123.3	133.4	246.0	253.0	200.4	275.3	261.5
Median	7.2	7.3	6.7	8.7	9.1	1.5	1.4	1.6	1.6	1.5
Std. dev.	1464.5	1361.4	1244.2	1619.3	1795.3	2406.6	2400.4	1922.7	2634	3101
Aggregate level										
Number of firms	18 418	18 211	17 228	15 734	16 261	1 679	1 727	2 043	1 995	2 502
- % of total						*8.4*	*8.7*	*10.6*	*11.3*	*13.3*
Number of products	4 722	4 735	4 727	4 731	4 733	2 324	2 449	2 424	2 534	2 725
- % of total						*33.0*	*34.1*	*33.9*	*34.9*	*36.5*
Number of destinations	213	208	207	209	211	157	168	163	171	175
- % of total						*42.4*	*44.7*	*44.1*	*45.0*	*45.3*
Export (million CZK)	2 058 992	2 003 110	1 698 758	1 946 193	2 175 645	412 994	436 953	409 324	549 270	654 211
- % of total						*16.7*	*17.9*	*19.4*	*22.0*	*23.1*

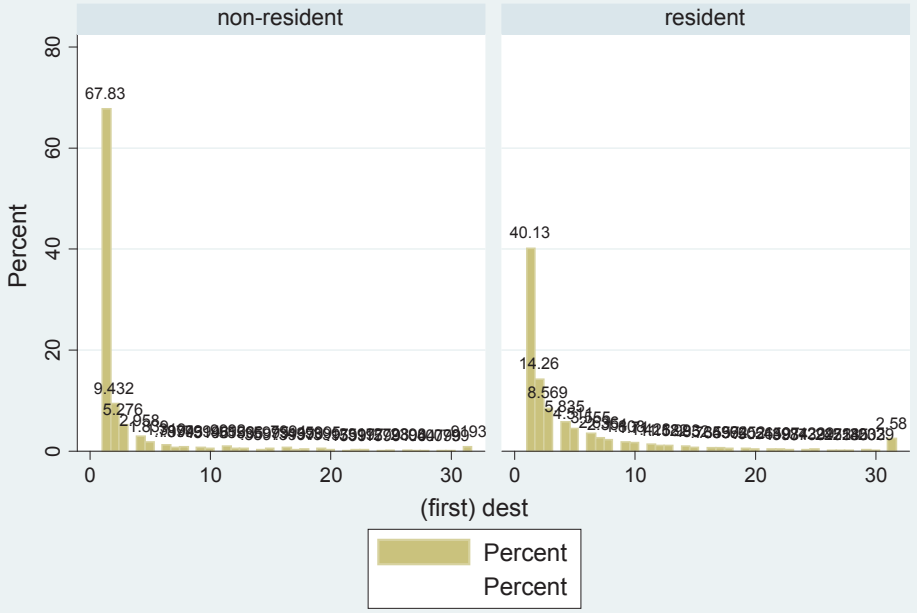
Stylised facts III

- Increasing number of products and destinations
- Export concentrated among few firms
- Increasing role of non-resident firms (in 2007: 13 % of all firms, accounting for 23 % of total export)
- Non-residents: fewer products and destinations; larger amount of export
- Next slides illustrate export concentration by the number of products and destinations
  - Many firms export one product to one destination, but in terms of export share, firms are multi-product and multi-destination
  - The product mix of multi-product firms is diversified in terms of HS2 sectors

Stylised facts IV

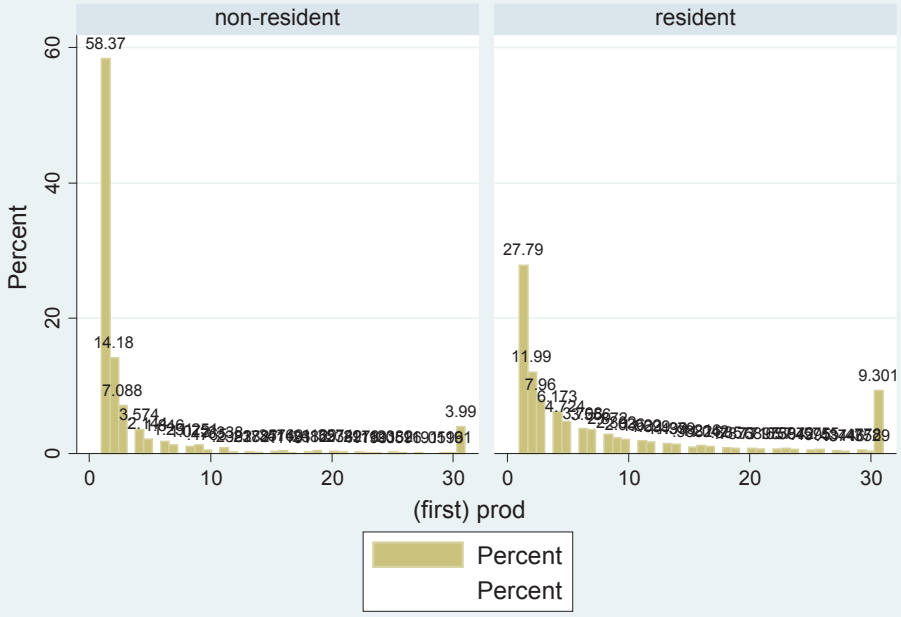
Distributions of exporters by the number of destinations (left: 2007, right: 2011)

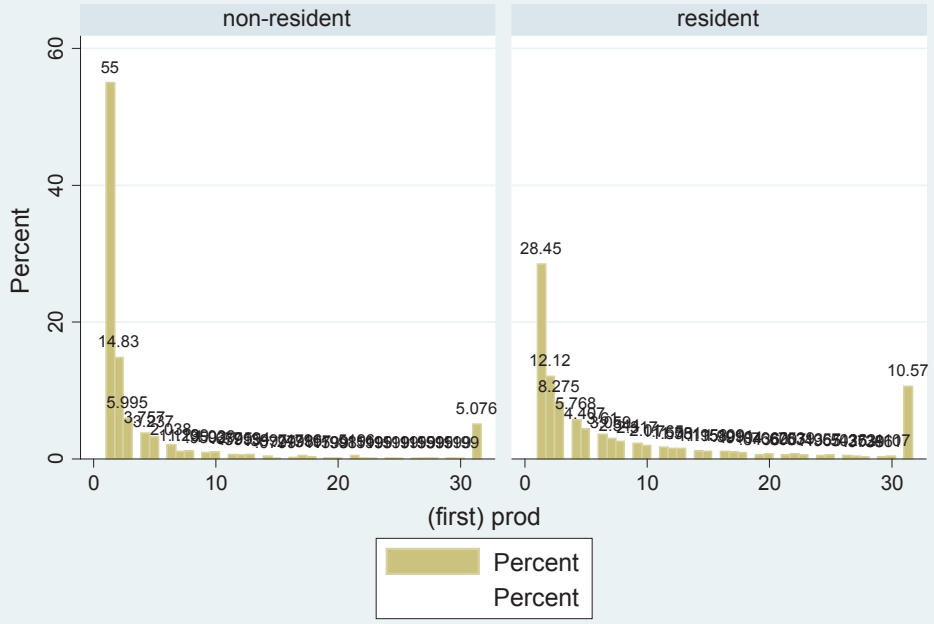




Stylised facts V

Distributions of exporters by the number of products (left: 2007, right: 2011)





Stylised facts VI

Joint distributions over the number of products and destination (average 2007-2011) (percentage of firms)

Destinations	Products						
	1	2	3	4-10	11-30	31+	Total
Residents							
1	21.5	5.9	2.9	6.3	2.6	1.0	40.2
2	2.9	3.2	1.8	4.2	2.0	0.8	14.8
3	1.2	1.1	1.1	3.1	1.7	0.7	8.9
4-10	1.6	1.6	1.7	8.0	6.4	3.2	22.6
11-30	0.3	0.4	0.5	2.9	4.1	3.2	11.2
31+	0.0	0.0	0.0	0.3	0.8	1.0	2.2
Total	27.5	12.2	8.1	24.8	17.5	9.9	100.0
Non-residents							
1	48.1	8.5	3.1	5.8	1.7	0.9	68.1
2	3.9	2.7	1.1	1.5	0.5	0.3	9.9
3	1.7	1.5	0.8	1.3	0.3	0.1	5.7
4-10	1.5	1.4	0.9	2.5	1.1	0.7	8.3
11-30	0.6	0.4	0.4	1.7	1.7	1.9	6.6
31+	0.0	0.0	0.1	0.1	0.5	0.7	1.4
Total	55.8	14.5	6.4	12.8	5.8	4.6	100.0

Stylised facts VII

Joint distributions over the number of products and destination (average 2007-2011) (percentage of exports)

Destinations	Products						
	1	2	3	4-10	11-30	31+	Total
Residents							
1	1.2	0.6	0.4	1.3	0.9	0.6	5.0
2	0.8	0.4	0.3	1.1	0.8	0.5	3.9
3	0.5	0.2	0.2	1.0	0.8	0.5	3.3
4-10	1.1	0.8	0.9	5.0	5.5	4.0	17.4
11-30	0.2	0.7	0.8	5.0	12.7	16.2	35.7
31+	0.0	0.7	0.6	1.5	5.3	26.6	34.7
Total	3.8	3.5	3.3	14.8	26.0	48.6	100.0
Non-residents							
1	1.7	0.4	0.1	0.4	0.3	1.9	4.8
2	0.3	0.3	0.3	0.3	0.2	0.4	1.7
3	0.2	0.2	0.1	0.2	0.1	0.3	1.0
4-10	0.7	0.6	0.5	1.7	1.4	2.1	6.9
11-30	0.6	0.9	0.6	4.6	8.5	43.8	58.9
31+	0.3	0.1	0.6	1.1	5.2	19.4	26.6
Total	3.7	2.4	2.2	8.2	15.6	67.9	100.0

Stylised facts VIII

Distribution of firms according to sectors (HS2) and products (HS6) (average 2007-2011, percentage of firms)

Sectors (HS2)	Products (HS6) 1	2	3	4-10	11-30	31+
Residents						
1	100.0	49.9	27.9	9.7	0.7	0.0
2		50.1	44.3	21.1	3.1	0.2
3			27.8	25.4	5.3	0.2
4				21.1	8.5	0.6
5+				22.7	82.4	98.9
Non-residents						
1	100.0	55.7	31.9	16.0	1.2	0.0
2		44.3	44.0	25.0	7.1	0.2
3			24.2	25.4	6.2	0.2
4				19.6	13.9	0.4
5+				14.1	71.6	99.1

Results I

Margins of trade

	HS6				HS4			
	2008	2009	2010	2011	2008	2009	2010	2011
Net Intensive	-2.9	-14.3	16.7	11.1	-2.9	-14.7	16.9	11.8
Intensive Positive	18.9	14.4	32.7	27.2	17.3	13.6	31.7	26.2
Intensive Negative	-21.8	-28.7	-16.0	-16.1	-20.3	-28.3	-14.7	-14.5
Net Extensive	1.6	0.7	1.7	2.3	1.7	1.1	1.4	1.6
Net Firm	0.4	4.0	0.2	1.8	0.4	4.0	0.2	1.8
Firm Entry	2.1	5.5	3.9	3.7	2.1	5.5	3.9	3.7
Firm Exit	-1.7	-1.5	-3.8	-1.9	-1.7	-1.5	-3.8	-1.9
Net Country	1.1	-2.3	0.6	-0.5	1.1	-2.3	0.6	-0.5
Country Entry	2.9	2.7	4.6	1.9	2.9	2.7	4.6	1.9
Country Exit	-1.8	-5.0	-3.9	-2.4	-1.8	-5.0	-3.9	-2.4
Net Product	0.1	-1.0	0.9	0.9	0.1	-0.6	0.6	0.3
Product Entry	3.2	3.1	4.1	3.8	2.2	2.1	3.0	2.3
Product Exit	-3.1	-4.1	-3.3	-2.8	-2.1	-2.7	-2.4	-2.0
Total (y-o-y in %)	-1.3	-13.6	18.4	13.4	-1.3	-13.6	18.4	13.4
GDP in EA (y-o-y in %)*	1.7	-4.7	2.9	2.7	1.7	-4.7	2.9	2.7
CZK/EUR (y-o-y in %)	-10.2	6.0	-4.4	-2.8	-10.2	6.0	-4.4	-2.8
CZK/USD (y-o-y in %)	-16.1	11.9	0.3	-7.4	-16.1	11.9	0.3	-7.4

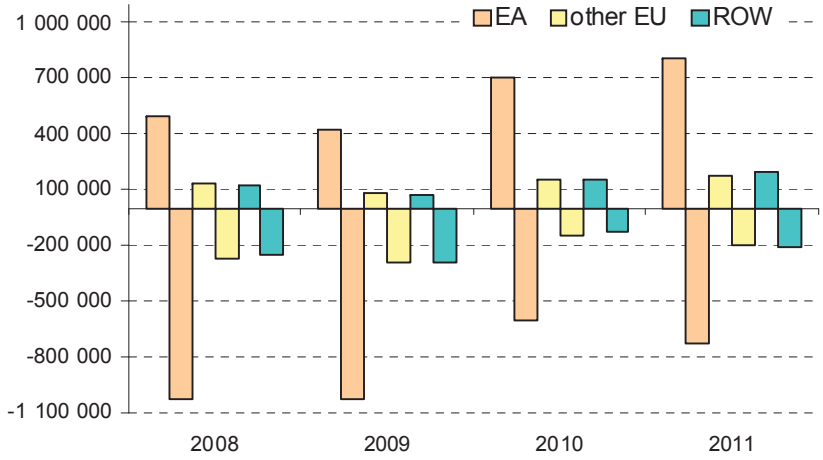
Note: * GDP growth in effective euro-area (weighted by export share).
Total = net intensive + net extensive
Net extensive = net firm + net country + net product

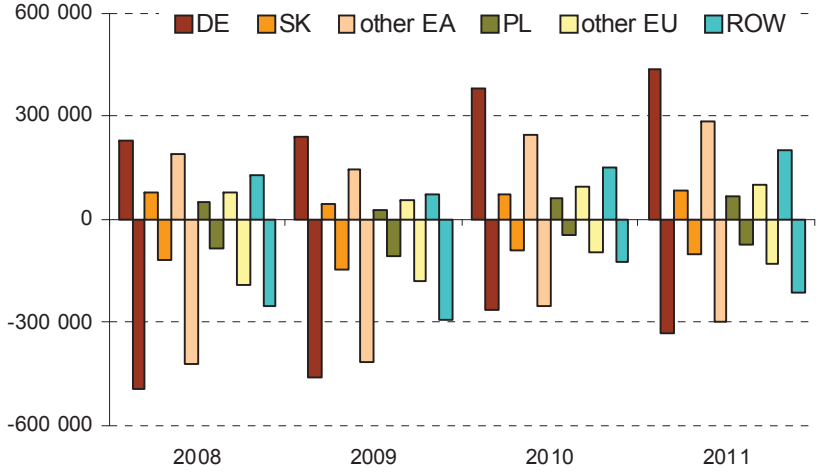
Results II

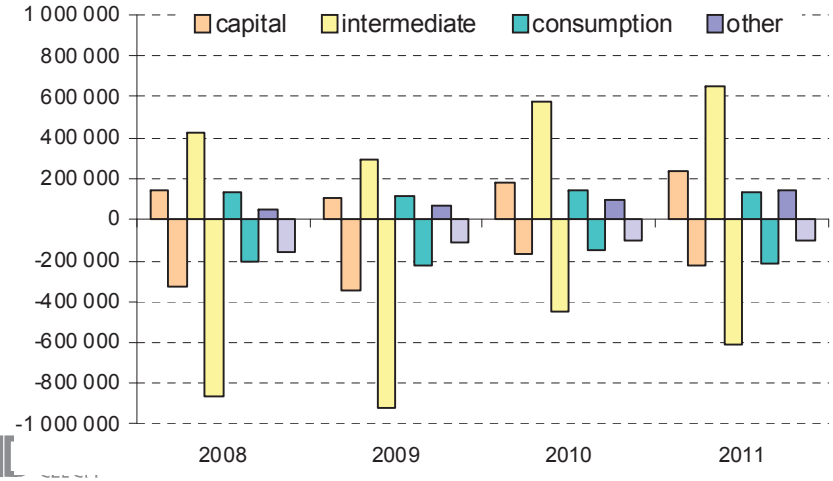
- Intensive margin prevails: Decline 2009, also in 2008
- Country: Exit higher in 2009, also in 2010; entry higher in 2010 (some firms returned?)
- Firm: Entry is positive throughout the period (implications for long-term growth)
  - Higher entry in 2009: Did they survive / export before?
    - 43% still exported in 2010, 36% in 2011; 10% in 2007: New exporters, many of them survived
  - Exit still low in 2009, somewhat higher in 2010
    - Part of this due to methodological changes? Not really: the opposite direction; firm entry into ROW also important (see next slides)
- Firms react first through intensive margin, adjustment through extensive margin follows (sunk costs)

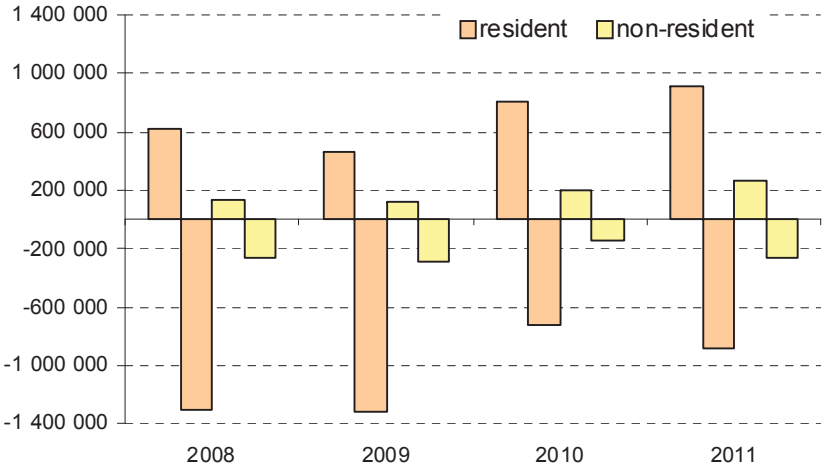
Results III

Intensive margin (positive values: int. positive; negative values: int. negative; million CZK)



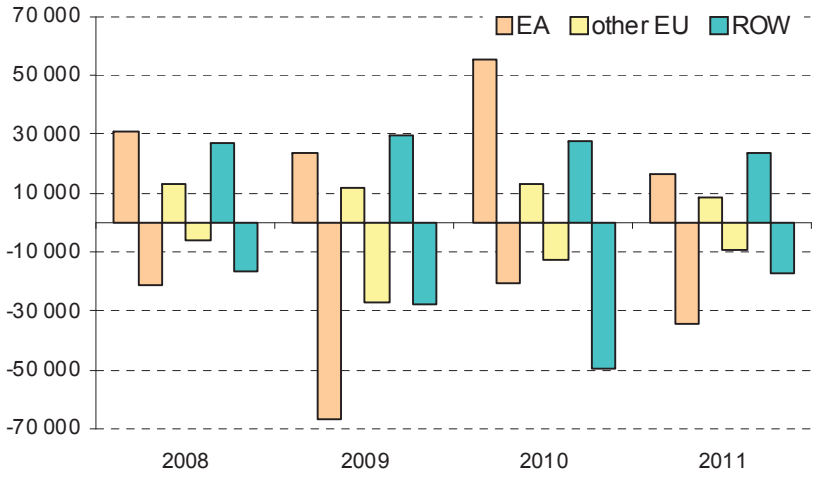


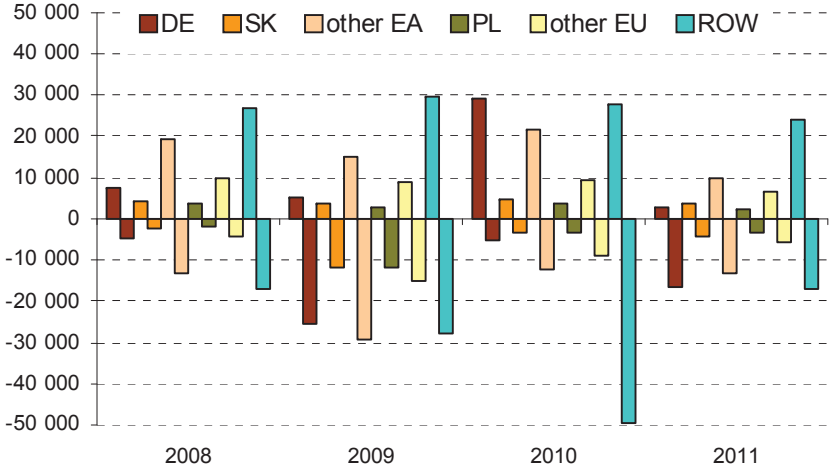


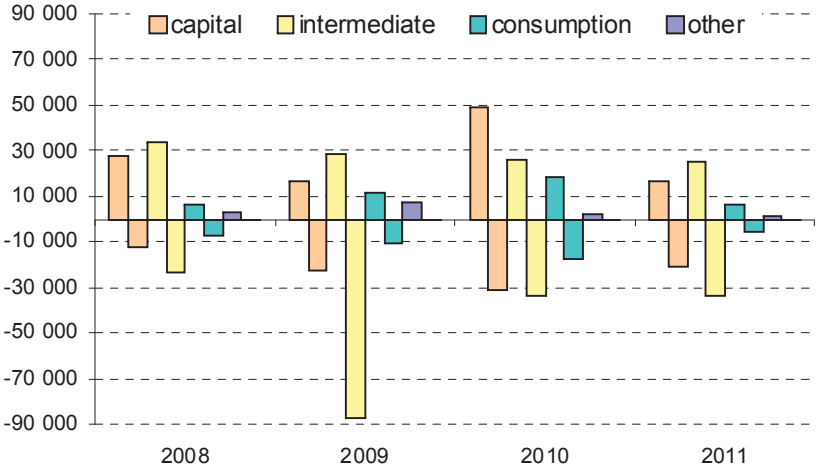


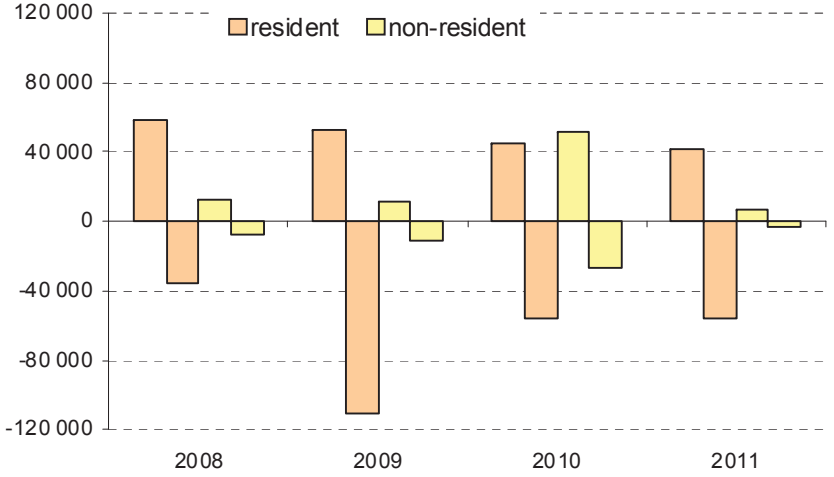
Results IV

Country entry/exit (positive values: country entry; negative values: country exit; million CZK)



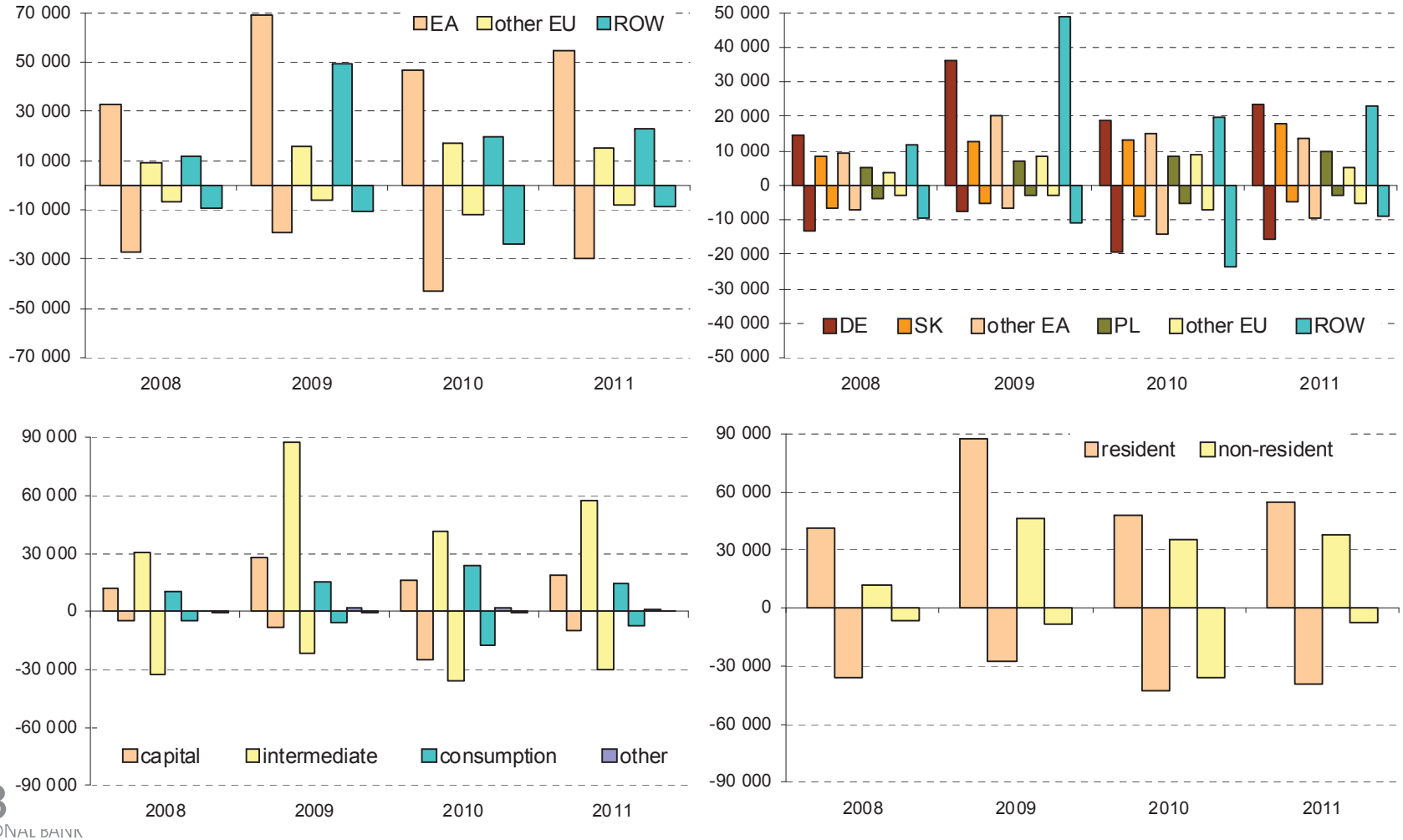






Results V

Firm entry/exit (positive values: firm entry; negative values: firm exit; million CZK)



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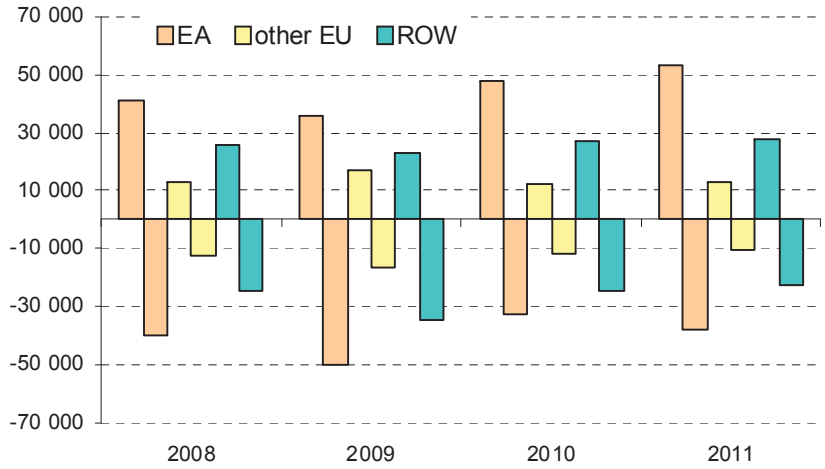
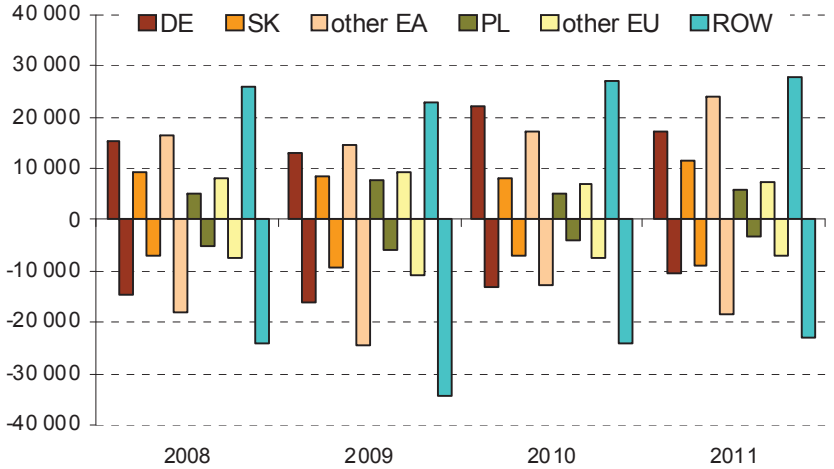
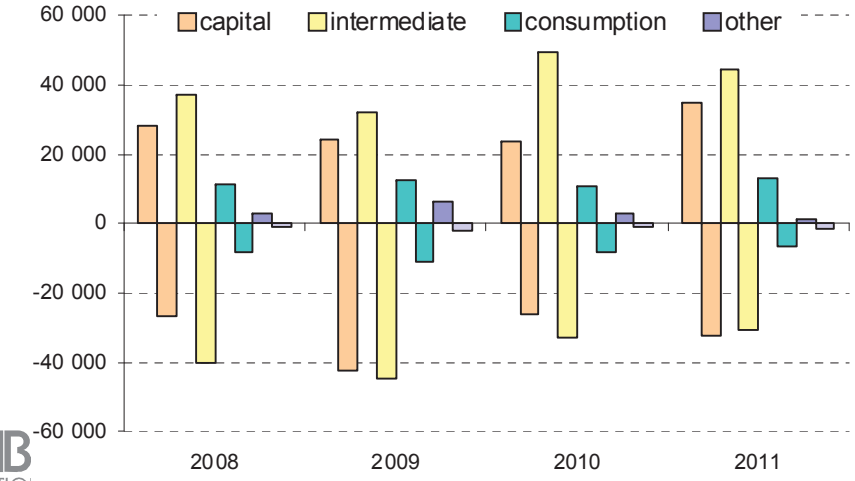
Results VI

Product entry/exit (positive values: product entry; negative values: product exit; million CZK)







Results VII

- We decompose values of entry/exit
  - Drop in intensive margin in 2008-2009: EA, intermediate goods, residents
  - Country exit in 2009: adjustment in EA, intermediate goods and residents
    - In 2010 a higher entry in EA (some firms returned back?); a higher exit in ROW (replaced by new exporters?)
  - Firm extensive margin in 2009: a higher entry in EA and ROW, intermediate goods
- While the adjustment went primarily through the intensive margin and exit/entry by country, some firms were still able to enter foreign markets even in times of demand drop (replacement of existing exporters?; some role of weaker exchange rate?)

Next steps

- Include 2005-2006 data (account for HS6 changes in 2007)
- 2012 data will be available in September 2013
- Extensions:
  - Product and country switching
  - Dynamics of new exporters (Eaton et al. 2012, Amador and Opromolla 2013; search and learning in international trade models)

- Thank you for your attention