



CROATIAN NATIONAL BANK

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# The Effects of Crisis and EU Accession on Croatian Merchandise Trade : A Gravity Model Study

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Standard disclaimer: The opinions expressed in this paper are those of the authors and do not necessarily represent the official views of the Croatian National Bank.

# Motivation

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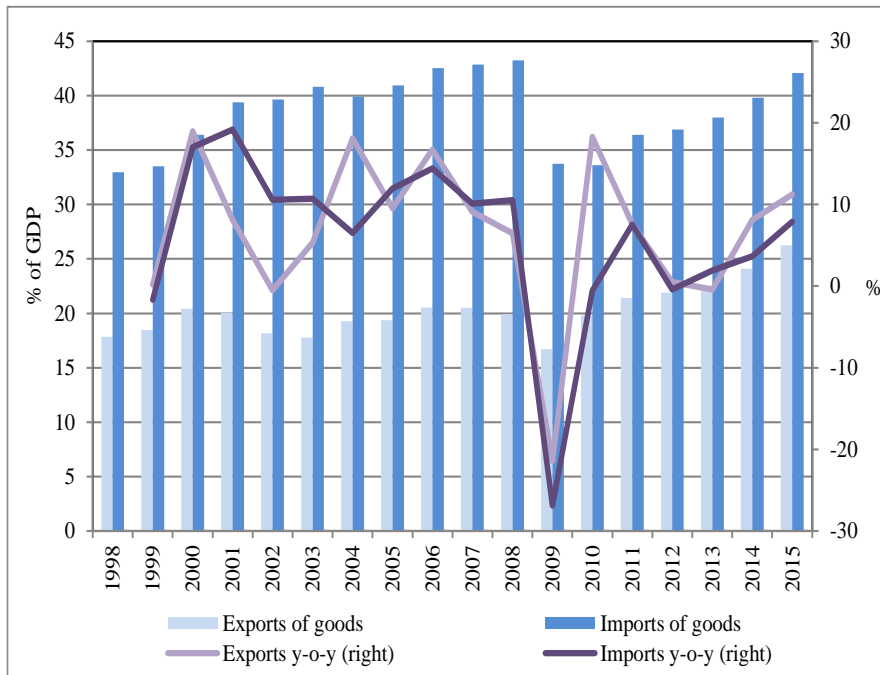
- ❑ in the post-war period exports has never been sufficient to cover imports, however, some changes occurred...
  - ❑ since the outbreak of the crisis – declining trend in the trade deficit
  - ❑ since the EU accession - changes in the trade structure
- ❑ to better understand this changes – gravity model of trade
- ❑ Main questions:
  - ❑ did economic and financial crisis affect Croatian export and import determinants in the same way?
  - ❑ do FTAs intensify Croatian trade?
  - ❑ has the membership in CEFTA and then in the EU brought benefits to Croatian exports?
  - ❑ in which markets there is still room for export improvement?

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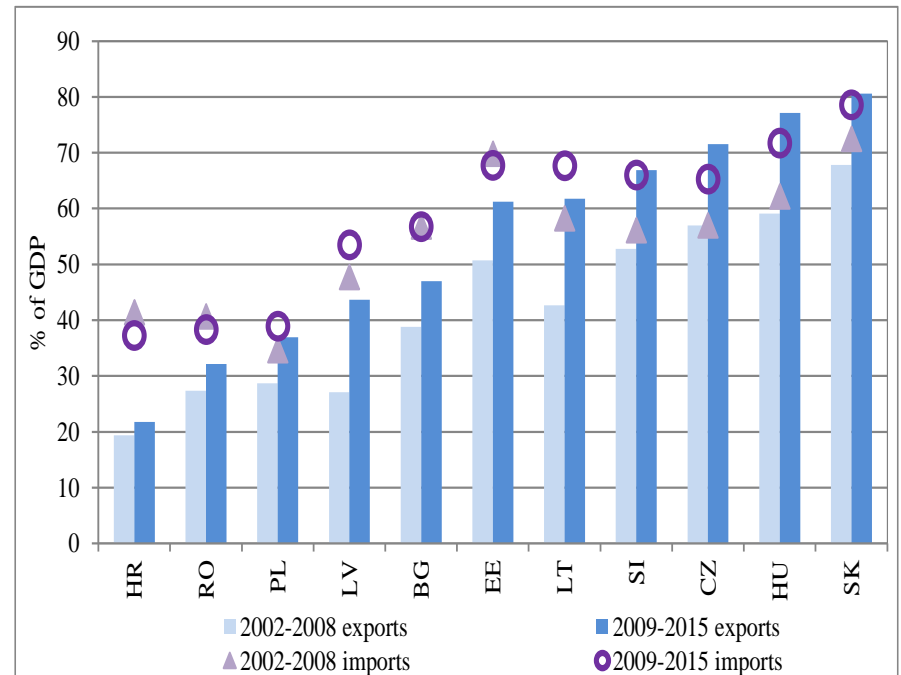
# Merchandise trade in Croatia

# Trade characteristics

Crisis aftermath marked by strong decrease in domestic demand and imports, rather than in exports



Croatian exports still relatively small in relation to CEE countries



Source: CBS

Note: Data for Czech Republic is available until 2014.  
Sources: Eurostat; CBS

# Geographical structure

High dominance of EU countries both on the export and import side

	EXPORT		IMPORT	
	pre-crisis	post-crisis	pre-crisis	post-crisis
	1998-2008	2009-2015	1998-2008	2009-2015
EU 27	65.2	61.4	70.0	69.3
EU-15	49.9	42.7	53.9	48.3
EU-12	15.3	18.8	16.1	21.0
EFTA	1.4	1.8	2.0	1.9
CEFTA	18.1	19.7	3.4	5.6
Other	14.7	17.1	24.6	23.2

Note: Expressed as % of total.

Source: CBS

- ❑ Changes in the structure after EU accession:
  - ❑ exports – notably higher share of EU & lower share of third countries
  - ❑ imports – same but can be due to the methodology changes

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# **Methodology and data description**

# Basic model

- based on Newton's law of universal gravitation
- Newton's equation applied in the international economy - larger countries mutually trade more and distant countries less (higher transportation costs)

$$X_{ij} = G \frac{GDP_i^{\beta_1} GDP_j^{\beta_2}}{D_{ij}^{\beta_3}}$$

$X_{ij}$  - bilateral trade between countries  $i$  and  $j$

$GDP_i$  &  $GDP_j$  - gross domestic product of countries  $i$  and  $j$

$D_{ij}$  - distance between countries  $i$  and  $j$

$G$  - constant

# Model specification (1)

- single country gravity model – Croatia and its main trading partners
- basic model expanded with historical links, trade agreements and membership in economic unions

- Static model: (expected sign)

$$\ln X_{it} = \alpha_i + \overset{+}{\beta_1} \ln Y_{it} + \overset{-}{\beta_2} \ln D_i + \overset{+}{\beta_3} FTA_{it} + \overset{+}{\beta_4} SAA_{it} + \overset{-}{\beta_5} EU_{it} + \overset{+}{\beta_6} CEFTA_{it} + \overset{+}{\beta_7} ex\_Yu_i + \theta_t + \varepsilon_i$$

- Dynamic model (captures the "history effect"): (expected sign)

$$\ln X_{it} = \alpha_i + \overset{+}{\beta_1} \ln X_{it-1} + \overset{+}{\beta_2} \ln Y_{it} + \overset{-}{\beta_3} \ln D_i + \overset{+}{\beta_4} FTA_{it} + \overset{+}{\beta_5} SAA_{it} + \overset{+}{\beta_6} EU_{it} + \overset{+}{\beta_7} CEFTA_{it} + \overset{+}{\beta_8} ex\_Yu_i + \theta_t + \varepsilon_i$$



## Model specification (2)

- four models: Pooled OLS, Fixed Effects, Random Effects, System GMM
- estimated parameters from the system GMM model are used to measure Croatian export and import potential:

$$Pottrade_i = \frac{Efftrade_i}{Fittrade_i} \quad SPT_i = \frac{Pottrade_i - 1}{Pottrade_i + 1}$$

*Efftrade<sub>i</sub>* - actual value of Croatian exports/imports to/from country *i*

*Fittrade<sub>i</sub>* - potential value of exports/imports to/from country *i* estimated by gravity equation

- + indicate a higher actual trade than potential, - indicate the opposite

# Data description

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- ❑ panel data analysis
- ❑ Dataset:
  - ❑ spans from 1998 to 2015 (annual data)
  - ❑ 85 Croatian major trading partners
  - ❑ together account for more than 95% of total Croatian merchandise trade
  - ❑ models were also tested with different versions of variables that capture the effect of free trade agreements

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# Results overview

# Exports

- ❑ Static model:
  - ❑ income coefficient in range 0.5 - 0.7%, distance negative
  - ❑ if trading partner was part of SFRY – raises exports by five times
  - ❑ other variables not statistically significant
- ❑ Dynamic model:
  - ❑ exports from the previous period affects current export value
  - ❑ the higher the income between Croatia and its trading partner - the more intensified Croatian export, distance has a strong negative sign
  - ❑ export is three times higher to countries of the former Yugoslavia
  - ❑ EU variable is significant (after joining the EU Croatian exports to member countries rose by more than 50%)
  - ❑ statistical significance for other variables (SAA, FTA and CEFTA) wasn't confirmed

# Imports

## ❑ Static model:

- ❑ income coefficient in range 1.0 – 1.4%, distance negative (transportation costs effect more Croatian exports than imports)
- ❑ FTAs on trade are statistically significant (except CEFTA)
- ❑ after EU accession imports from other member countries increased by approximately 150%
- ❑ if trading partner was part of SFRY – raises imports by six times

## ❑ Dynamic model:

- ❑ imports from the previous period affects current import value
- ❑ income and distance are statistically sign. and have expected signs
- ❑ positive impact of former SFRY on imports again confirmed
- ❑ EU variable is stat. significant (after joining the EU Croatian imports from member countries rose by more than 60%)
- ❑ statistical sign. for other variables wasn't confirmed

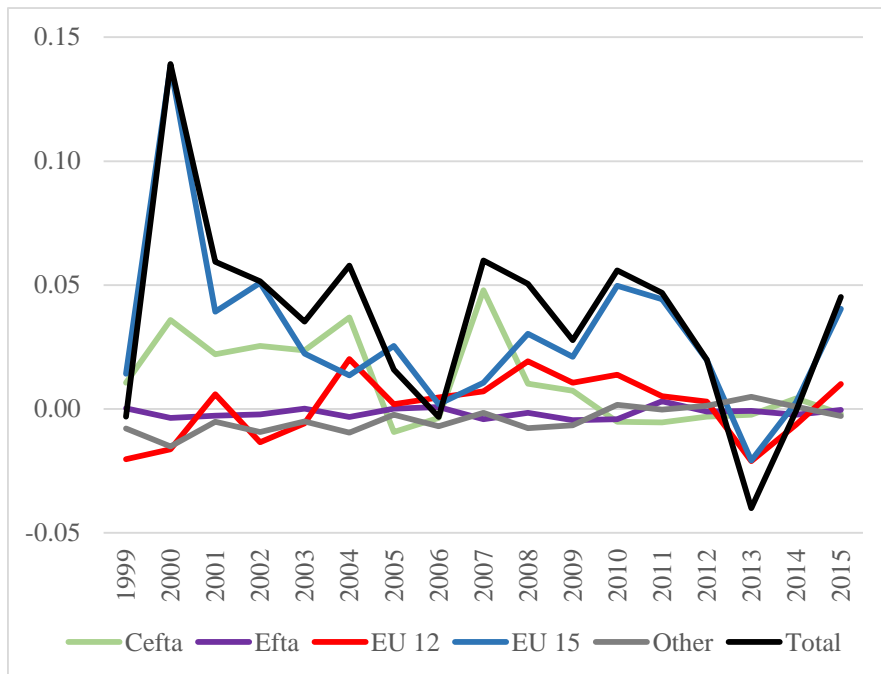
# Robustness check

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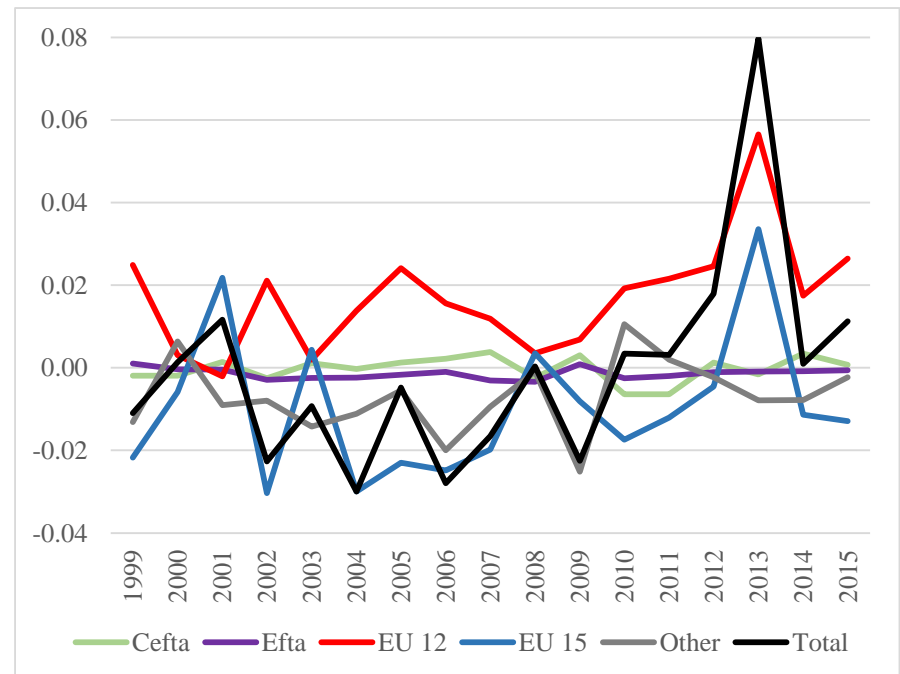
- ❑ the main sample was divided into two sub periods: the period before and after the outbreak of the global financial crisis
- ❑ the main results obtained in the evaluation for the whole period were largely retained (confirmed statistical significance and sign of the estimated parameters)
- ❑ somewhat larger changes between estimated coefficients in the pre- and post-crisis period in the import equation

# Croatian export and import potential

Total export potential index primarily reflects changes in the trade with the EU and CEFTA



Dynamics of the import potential index largely follow dynamics of EU and third countries indices



Notes: Liechtenstein is excluded from EFTA due to the unavailability of the data. Total is the sum of individual indices for country groups, which were weighted by their share in total exports / imports for a given year.

Source: author's calculations.

# Conclusions – summing up (1)

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- ❑ exports and, even more, imports intensify with the higher level of income of Croatia and its trading partner
- ❑ greater distance from the trading partner weakens the exports more than imports
- ❑ past trade value is positively correlated with the present one

Do FTAs intensify Croatian trade? Has the membership in CEFTA and then in the EU brought benefits to Croatian exports?

- ❑ positive effect of the EU accession is confirmed in both equations
- ❑ other FTAs are not stat. significant for exports and imports, while the former Yugoslav republics have significant and positive impact on Croatian trade



## Conclusions – summing up (2)

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Did economic and financial crisis affect Croatian export and import determinants in the same way?

- ❑ somewhat larger changes between estimated coefficients in the pre- and post-crisis period in the import equation

In which markets there is still room for export improvement?

- ❑ export potential index with EU-12 started to improve in the last two years, but there's still unfulfilled potential to Slovenia
- ❑ shift in the index value from negative to positive with most of EU-15 countries after Croatia joined the EU
- ❑ regarding CEFTA market, Bosnia and Herzegovina is the only country where Croatian exports was in the whole period above its potential

# Comparison of results with the literature

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- ❑ results are largely in line with the findings of similar studies:
  - ❑ a strong partiality towards trade with former Yugoslav republics like in Šošić and Vujčić(2005)
  - ❑ Croatian membership in CEFTA is not statistically significant for Croatian trade in this paper, in line with the results of Begović(2011)
  - ❑ Malešević(2003) also didn't find evidence that Croatian trade with CEFTA countries is stronger than trade with other countries in the sample (not fully comparable)
  - ❑ parameters of distance and income in line with results of Buturac and Gržinić(2009) and Malešević(2003)

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**Thank you for your attention!**