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# The impact of integration on regional growth and cohesion in Greece

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# Objective

Examination of the adjustment of the Greek economy in the process of EU integration at the regional level during the recent recession period.

Investigation of the growth effects of various types of trade integration.

Contribution to the deeper understanding of the geographically uneven effects of increased integration in a peripheral economy.

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# Research question

Are the processes of development and integration on regional growth dependent on each other?



Do more advanced regions have better chances to benefit from the integration process?  
If true, what is the critical development threshold after which integration has a positive impact?



Are higher levels of integration associated with divergence, while lower levels of integration with convergence?  
If true, what is the critical threshold level of integration after which inequalities increase alongside the level of development?

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# Brief overview of empirical literature

Regional inequality in the EU has increased and divergence patterns tend to prevail in the new millennium (Iammarino et al. 2018; Petrakos and Artelaris 2009).

Most drivers of regional growth tend to favor more advanced, metropolitan, and regions with more competitive production structure (Ciccone 2002; Petrakos et al. 2012) → formation of regional income clubs (Iammarino 2018).

EU integration is accompanied by losses in the less competitive production systems of the South due to pressure of imports from the more advanced production systems of the North (Petrakos et al. 2005b)

Competition among unequal partners may create uneven growth returns across regions → winners and losers (Ezcurra and Rodríguez-Pose 2013; Iammarino et al. 2018; Petrakos et al. 2011)

The footprint of EU integration on less developed regions may be responsible for increasing regional disparities, both at the national and international levels (Bradley et al. 2004; Ezcurra and Rodríguez-Pose 2013; Fotopoulos et al. 2010; Iammarino et al. 2018; Autor et al. 2013; Petrakos et al. 2005a; Rodríguez Pose 2012; Ezcurra and Rodríguez-Pose 2014).

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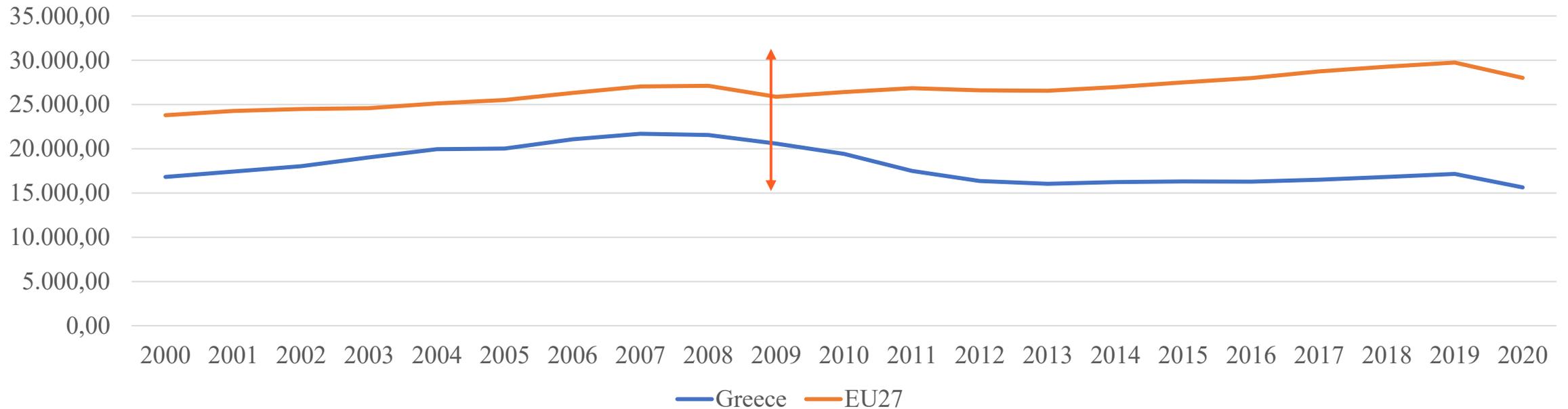
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## The performance of the Greek economy: taking crisis into consideration

*2000-2009: a trend of slow convergence with the EU average*

*2010-2020: a process of divergence that may still be active*

*Figure 1. GDP per capita of Greece and EU (constant prices 2015), 2000-2020*



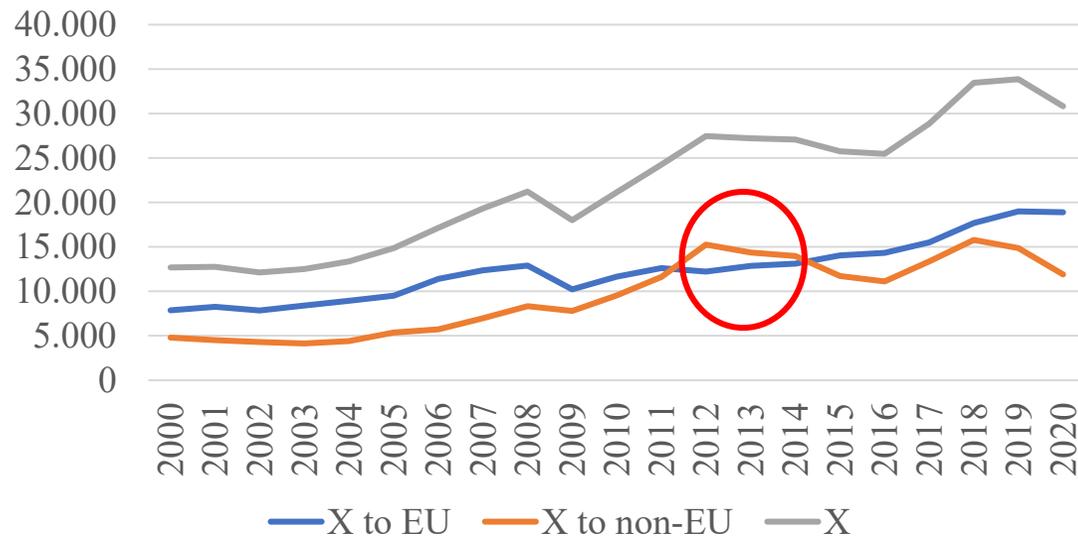
Source: own elaboration using data from the Annual Regional Database of the European Commission's Directorate General for Regional and Urban Policy

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## Examination of trade relations: exports

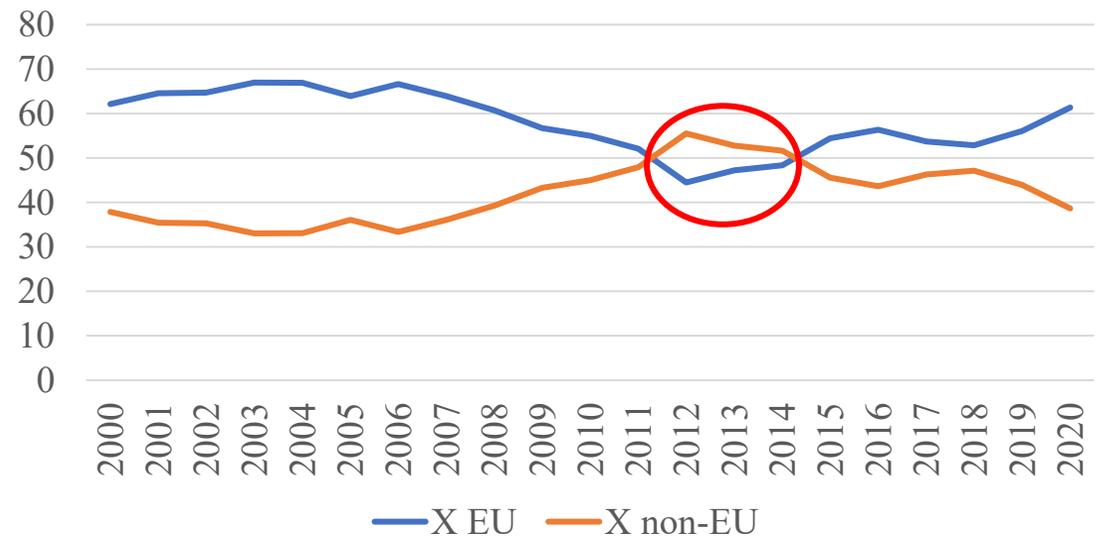
- Non-EU exports exceeded those to EU in the first years of the crisis  
→ shift of the productive system to less demanding markets

Figure 2. Greek exports (million €), 2000-2020



Source: own elaboration using data from EUROSTAT (2023)

Figure 3. Share of exports (over total), 2000-2020

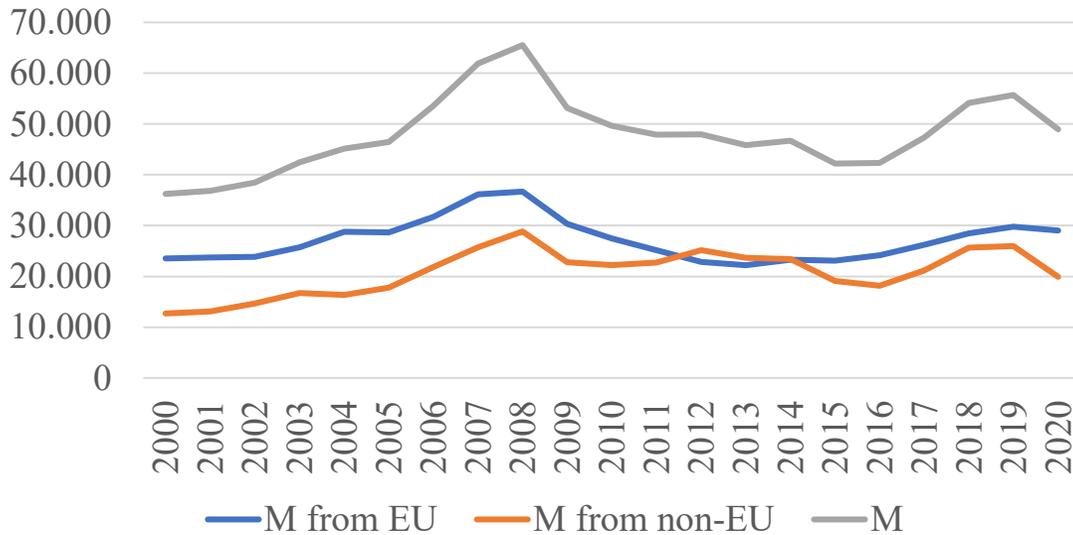


Source: own elaboration using data from EUROSTAT (2023)

## Examination of trade relations: imports

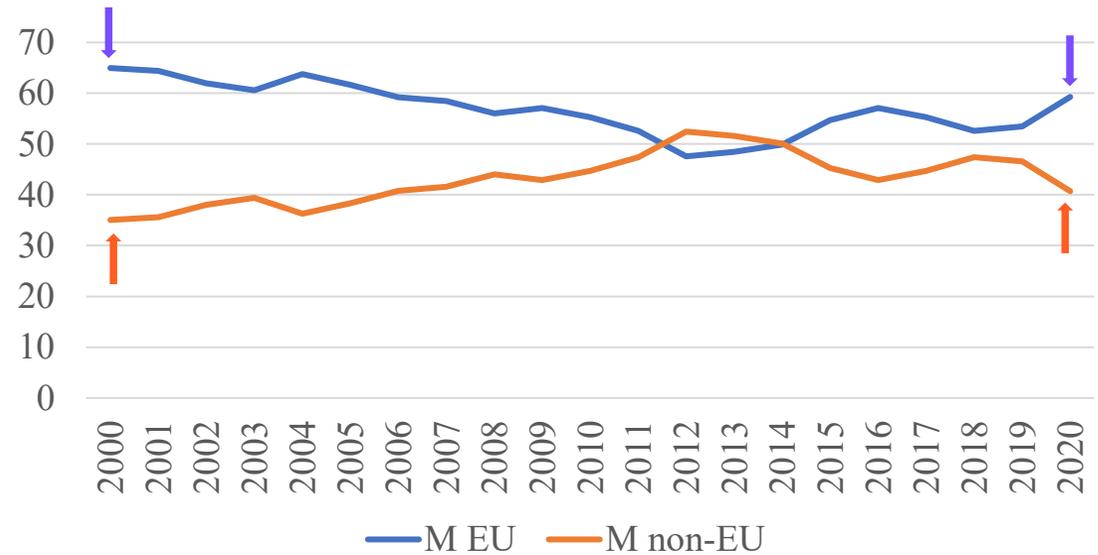
- Imports from EU have declined for several years before regaining an upward trend, but their relative share is lower at the end of the period
- Imports from non-EU were also affected by the crisis, but increased their relative share at the end of the period

Figure 4. Greek imports (million €), 2000-2020



Source: own elaboration using data from EUROSTAT (2023)

Figure 5. Share of imports (over total), 2000-2020

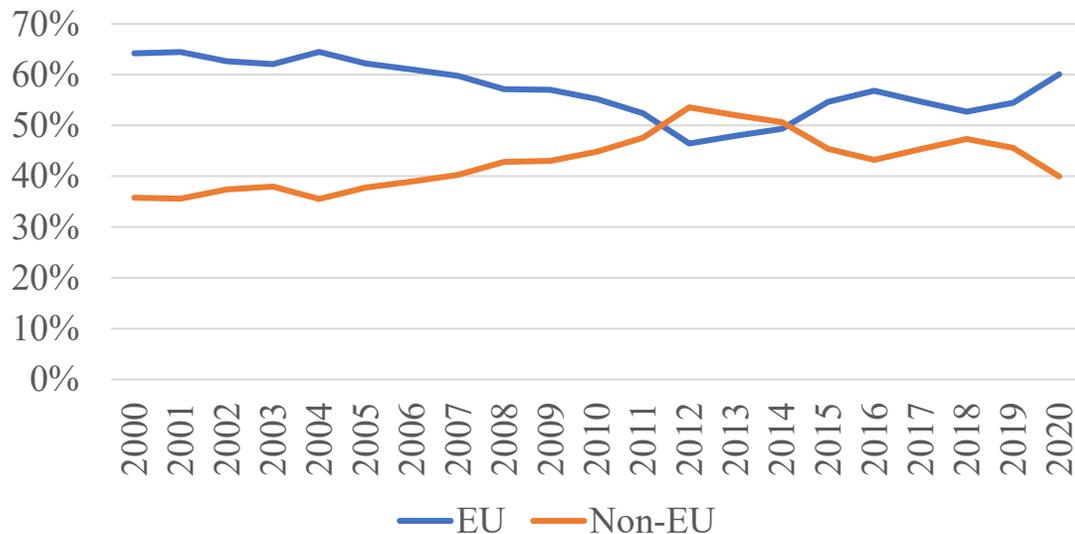


Source: own elaboration using data from EUROSTAT (2023)

## Integration dynamics: two parallel and overlapping processes of integration

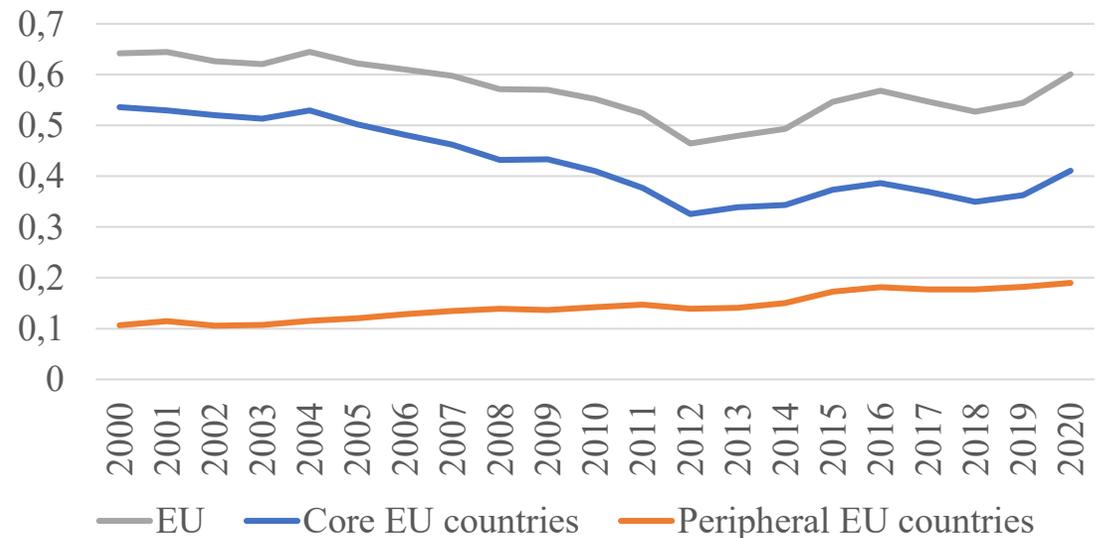
- The crisis has led to a significant reduction of the share of trade with the EU for a period, which may leave a permanent impact on the direction of Greek trade
- The production system of Greece is gradually moving from trade with Core to trade with Peripheral EU countries in an effort to better adapt to competition

Figure 6. EU and non-EU Trade Integration Index, 2000-2020



Source: own elaboration using data from EUROSTAT (2023)

Figure 7. Intra-EU Trade Integration Index, 2000-2020



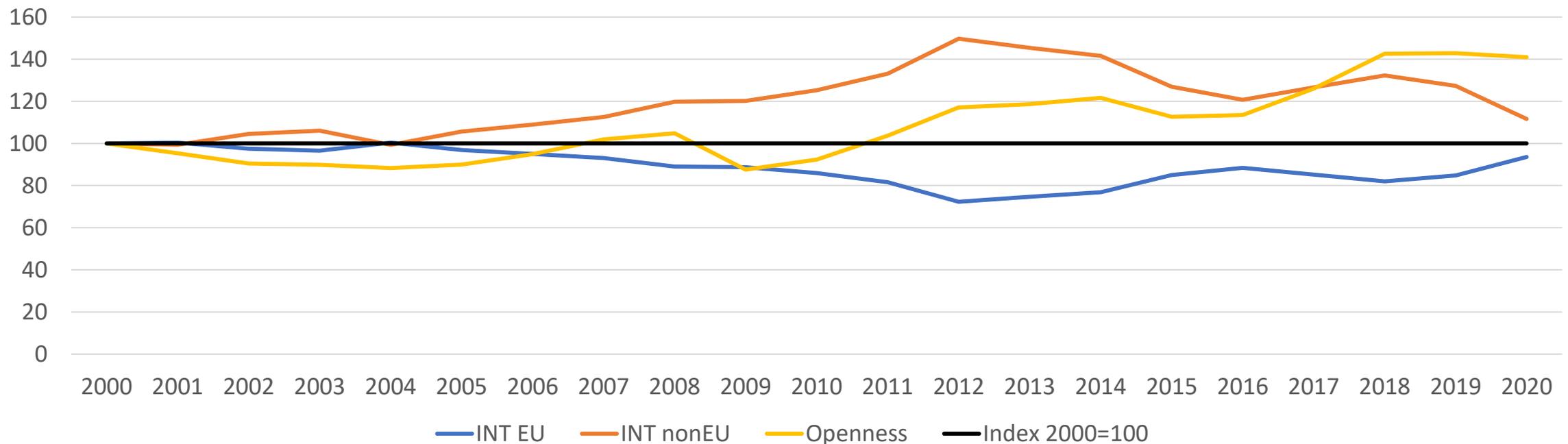
Source: own elaboration using data from EUROSTAT (2023)

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## The processes of globalization and integration

The globalization (openness) process has been stronger than the integration process during the period under examination, even though Greece is an EU member for over 40 years.

*Figure 10. Indices of EU and non-EU integration and openness (2000=100), 2000-2020*



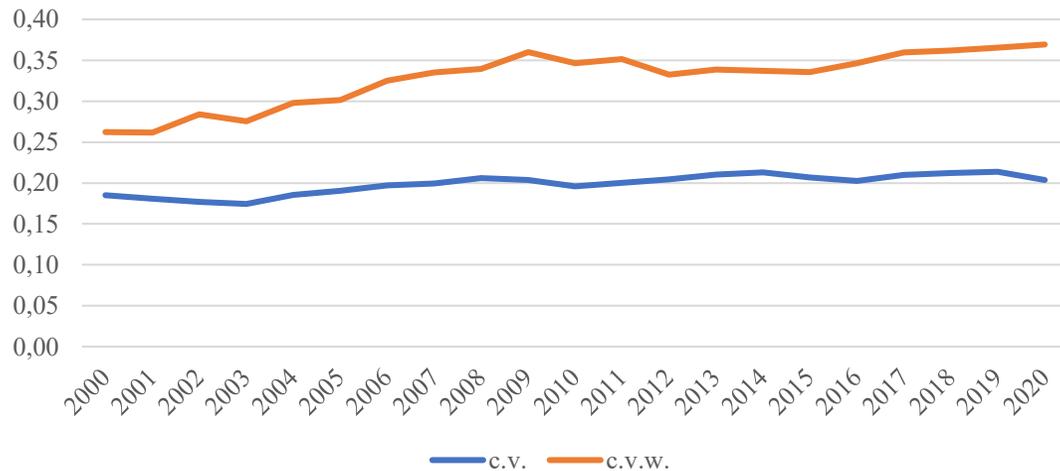
Source: own elaboration using data from EUROSTAT (2023)

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## The spatial pattern of inequality

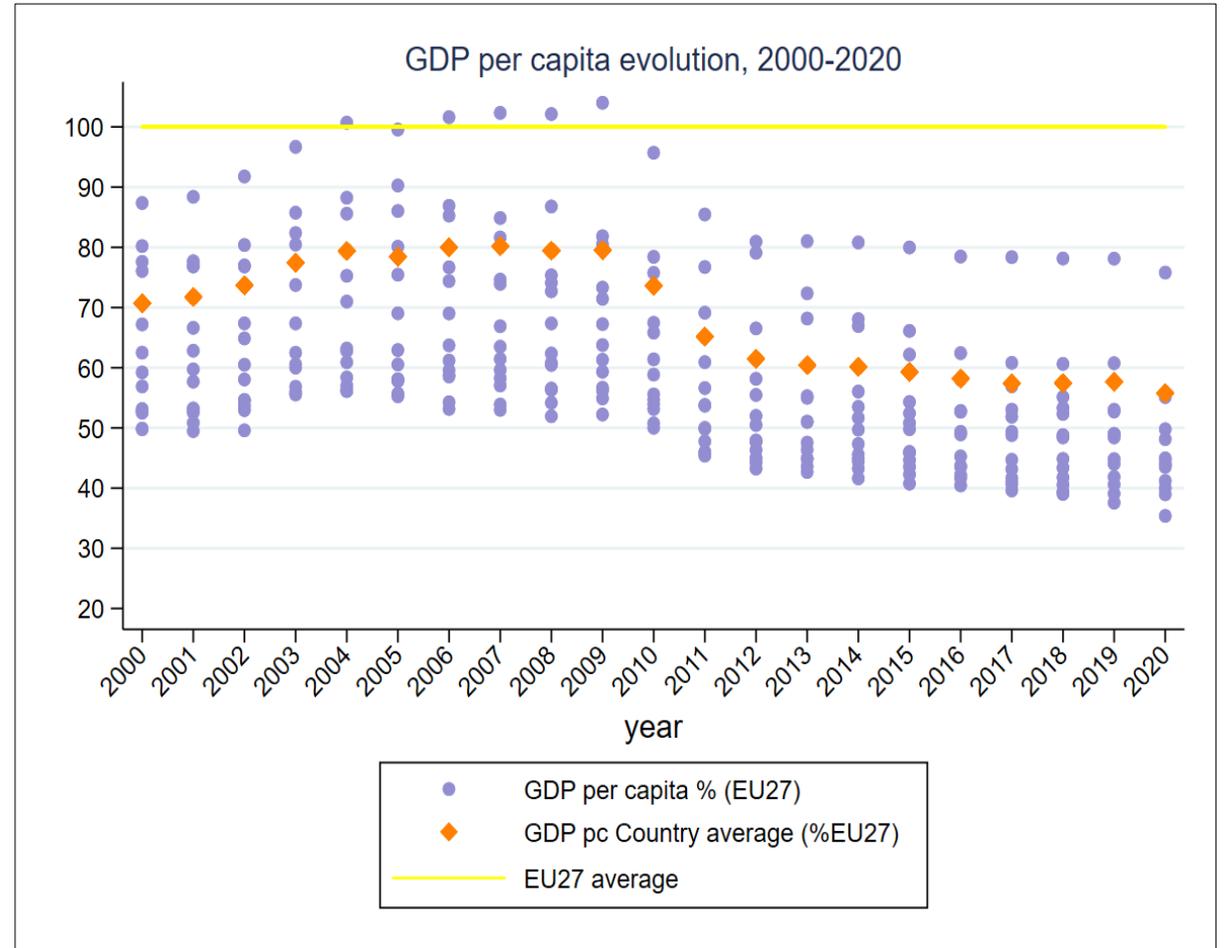
- The impact of the crisis increased the distance of all regions from EU average
- In the years after the crisis the dominant role of Attica is more evident
- Regional inequalities have increased

Figure 12. Evolution of regional inequalities (2000-2020)



Source: own elaboration using data from EUROSTAT

Figure 11. Regional GDP per capita evolution as a share of EU (constant prices 2015), 2000-2020



Source: own elaboration using data from the Annual Regional Database of the European Commission's Directorate General for Regional and Urban Policy

# Data and methodology

13 Greek NUTS II regions

Time Period: 2010 – 2018

Conditional convergence models

Panel fixed effects

# Variables of analysis

Dependent variable	Annual growth of GDP per capita	Change (%) of real GDP per capita	g	ARDECO - EC
Key regressors	Level of development	Real GDP per capita	Y	ARDECO - EC
	EU integration	Ratio of trade with the EU over total trade	INT	ESPON Program "Interregional Relations in Europe"
	Interaction of GDP p.c. with EU integration		Y*INT	
Control variables	High-skilled employment	Ratio of high-skilled employment over total employment	HS	EUROSTAT
	Public investment per capita	Ratio of gross fixed capital formation of the public sector over population	PUB	EUROSTAT
	Population density	Ratio of regional population to the land area	DEN	EUROSTAT
	Annual change of public investment per capita	Change (%) of public investment per capita	$\Delta$ PUB	EUROSTAT
	Annual change of impartiality of government	Change (%) of impartiality, as a dimension of the Quality of Government Index	$\Delta$ IMP	DG-REGIO
	Interaction of GPD p.c. with density		DEN*Y	

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# Econometric models

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$$g_{it} = \beta_0 + \beta_1 Y_{it} + \beta_2 INT_{it} + \beta_3 Y_{it} * INT_{it} + \beta_4 HS_{it} + \beta_5 PUB_{it} + \beta_6 DEN_{it} + \varepsilon_{it}$$

$$g_{it} = \beta_0 + \beta_1 Y_{it} + \beta_2 INT_{it} + \beta_3 Y_{it} * INT_{it} + \beta_4 HS_{it} + \beta_5 \Delta PUB_{it} + \varepsilon_{it}$$

$$g_{it} = \beta_0 + \beta_1 Y_{it} + \beta_2 INT_{it} + \beta_3 Y_{it} * INT_{it} + \beta_4 HS_{it} + \beta_5 \Delta PUB_{it} + \beta_6 \Delta IMP_{it} + \varepsilon_{it}$$

$$g_{it} = \beta_0 + \beta_1 Y_{it} + \beta_2 INT_{it} + \beta_3 HS_{it} + \beta_4 PUB_{it} + \beta_5 DEN_{it} + \beta_6 \Delta PUB_{it} + \beta_7 \Delta IMP_{it} + \beta_8 Y_{it} * DEN_{it} + \varepsilon_{it}$$

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# Preliminary results

## Model (1)

$$\theta_g/\theta_{INT} = -0.3403942 + 0.0000271*Y$$

$$\theta_g/\theta_Y = -0.0000155 + 0.0000271*INT$$

## Model (4)

$$\theta_g/\theta_{DEN} = -0.0007725 - 3.41e-08*Y$$

$$\theta_g/\theta_Y = 9.67e-06 - 3.41e-08*DEN$$

### Independents

GDP per capita (Y)

EU Trade Integration (INT)

Interaction Y\*INT

High skill employment (HS)

Public Investment per capita (PUB)

Population Density (DEN)

Public Investment per capita annual % change ( $\Delta$ PUB)

Impartiality annual % change ( $\Delta$ IMP)

Interaction DEN\*Y

Constant

Thresholds

Y\*

INT\*

DEN\*

R<sup>2</sup>

Obs.

FE

F

Prob > F

### Dependent: annual growth of GDP per capita (g)

	(1)	(2)	(3)	(4)
GDP per capita (Y)	-0.0000155**	-0.000018**	-0.0000187**	9.67e-06*
EU Trade Integration (INT)	-0.3403942***	-0.3150569**	-0.3117515**	0.0476022**
Interaction Y*INT	0.0000271***	0.0000256***	0.0000253***	
High skill employment (HS)	2.076306**	2.312712**	2.219568**	2.332961***
Public Investment per capita (PUB)	0.0706887***			0.0628969***
Population Density (DEN)	-0.0017296***			-0.0007725***
Public Investment per capita annual % change ( $\Delta$ PUB)		0.0373997**	0.0385314**	0.0045792
Impartiality annual % change ( $\Delta$ IMP)			0.0039329***	0.0019549***
Interaction DEN*Y				-3.41e-08***
Constant	0.3343277***	0.1945619*	0.2059918*	-0.0700654
Thresholds				
Y*	12.560,67€	12.306,91€	12.322,19€	-22.653,96
INT*	57,20%	70,31%	73,91%	
DEN*				283,58
R <sup>2</sup>	0.379	0.280	0.299	0.356
Obs.	104	104	104	104
FE	YES	YES	YES	YES
F	313.30	9.77	458.45	906.46
Prob > F	0.0000	0.0007	0.0000	0.0000

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# Main empirical findings

- The impact of integration on regional growth depends on the level of development of Greek regions:
    - driver of growth for the more advanced
    - serious threat for those with weak productive bases
  - The level of regional inequalities is affected by the participation of the country in the EU:
    - regions with more advanced productive base are favored
    - the weaker ones face serious difficulties to compete
  - Regions with a higher share of knowledge/technology intensive firms have a better growth performance
  - Public policy can play a critical role in promoting regional growth and convergence by allocating funds to regions in serious need of investment
  - Improvements in the quality of government have direct effects on the prospects of regions to grow
  - Diseconomies of agglomeration are probably in force – current population imbalances are a permanent source of divergence.
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# Conclusions

The productive system of Greece continues to experience difficulties to compete in the advanced EU market

- Downward trend of the level of integration with the EU
- A gradual but steady shift of trade from the core EU countries to non-core and peripheral EU markets, in search of a more favorable international environment

The effect of integration on regional growth is conditional on the development level of the regions

Spatial irregularities: the prospects of growth of the weaker regions are inversely affected by high levels of integration

Verification of findings of previous studies for the role of public investment and productive structure in regional growth and regional convergence

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Thank you for  
your attention

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