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# The Seasonality of Entrepreneurship

An Exploration according to Industry, Ownership and Geography

# Presentation outline



**01 Rationale**  
Motivation | Research questions | Seasonality in time series

**02 Data and methods**  
Sources of data | Seasonality in time series | Statistical analyses

**03 Estimation results**  
Industry specificity | Ownership specificity | Area specificity

**04 Discussion & conclusion**  
Further research



# Rationale

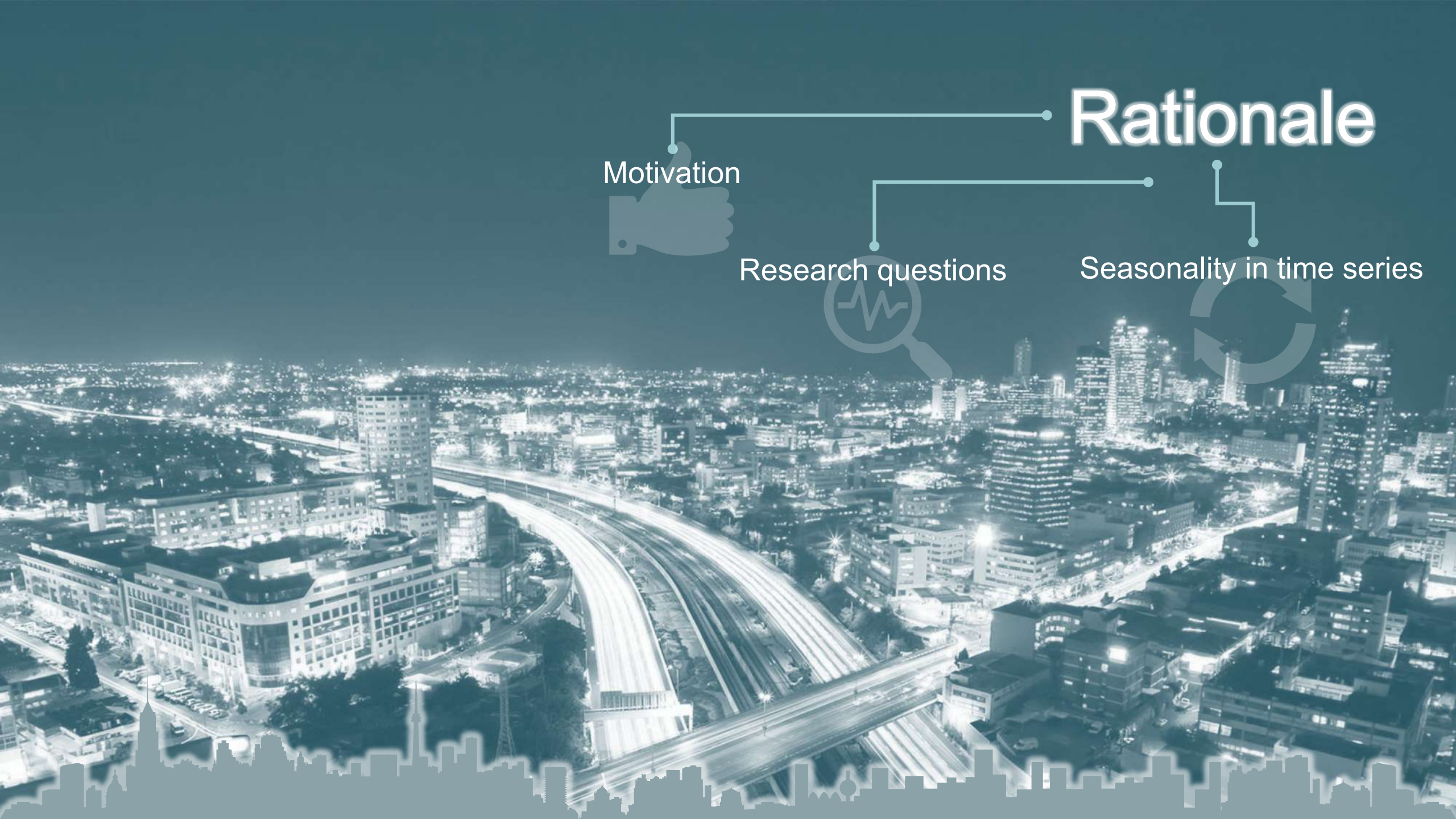
Motivation



Research questions



Seasonality in time series



# Why has nobody so far tested the seasonality of start-ups?



An insignificant topic



No data available



Underexplored economic impact



# Motivation

Entrepreneurship is an antecedent of performance  
(Carree and Thurik, 2003)



## Evidence?

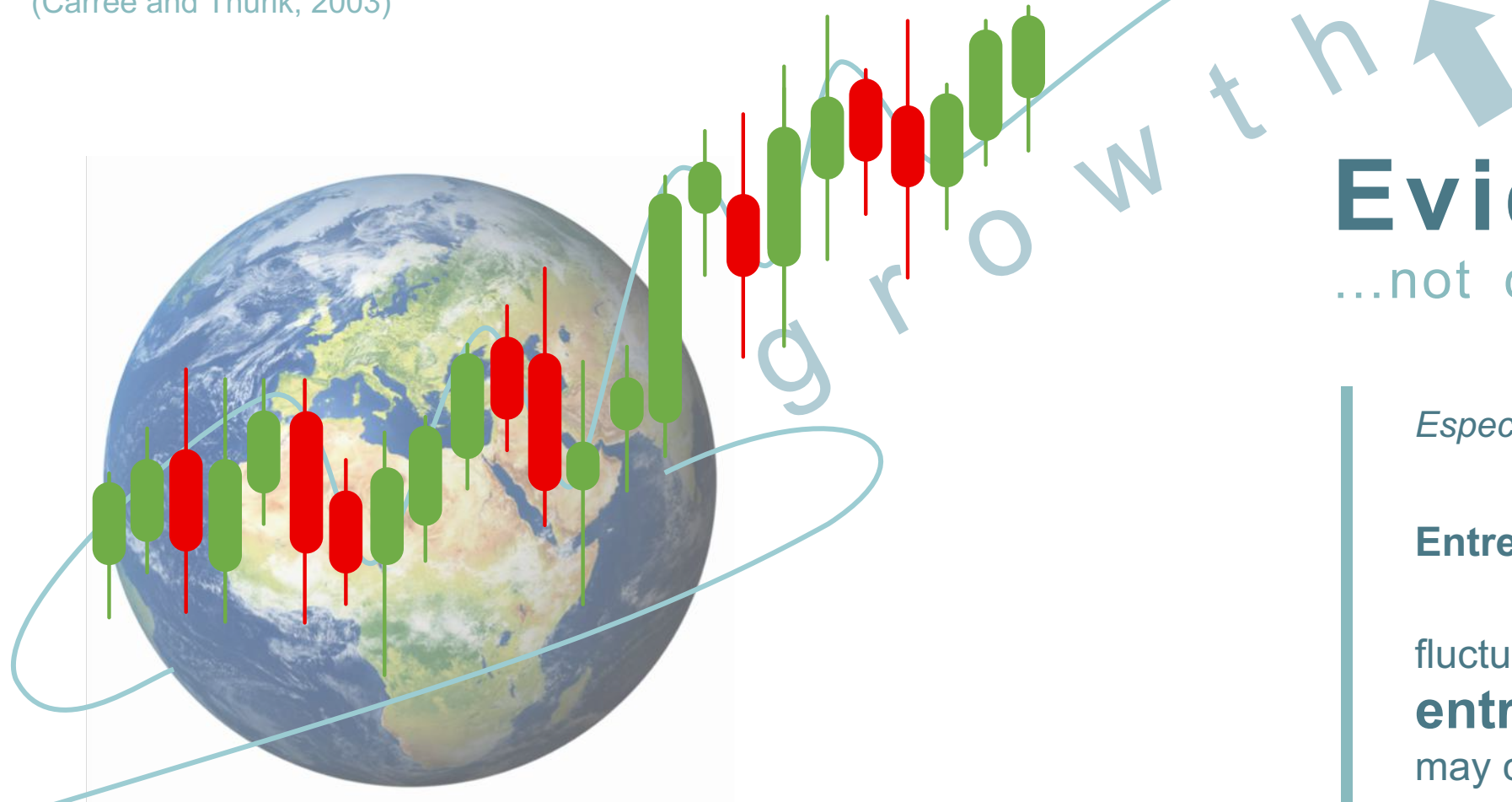
...not convincing  
(Parker, 2018)

*Especially at the macro level...*

**Entrepreneurship varies ...and**

fluctuations in the  
**entrepreneurial rate**  
may count

*why?*





Just like a great resonance in the concert hall...



...seasonality may enhance entrepreneurship...

➡ ...and thus growth

# Novelty of the research

No systematic investigation on seasonality

Our focus



Step 1



Step 2



Step 3



# Research questions

Is seasonality of entrepreneurship noticeable?

Does seasonality vary across industries?



Does seasonality vary across regional context (urban/rural/coastal-touristic)?



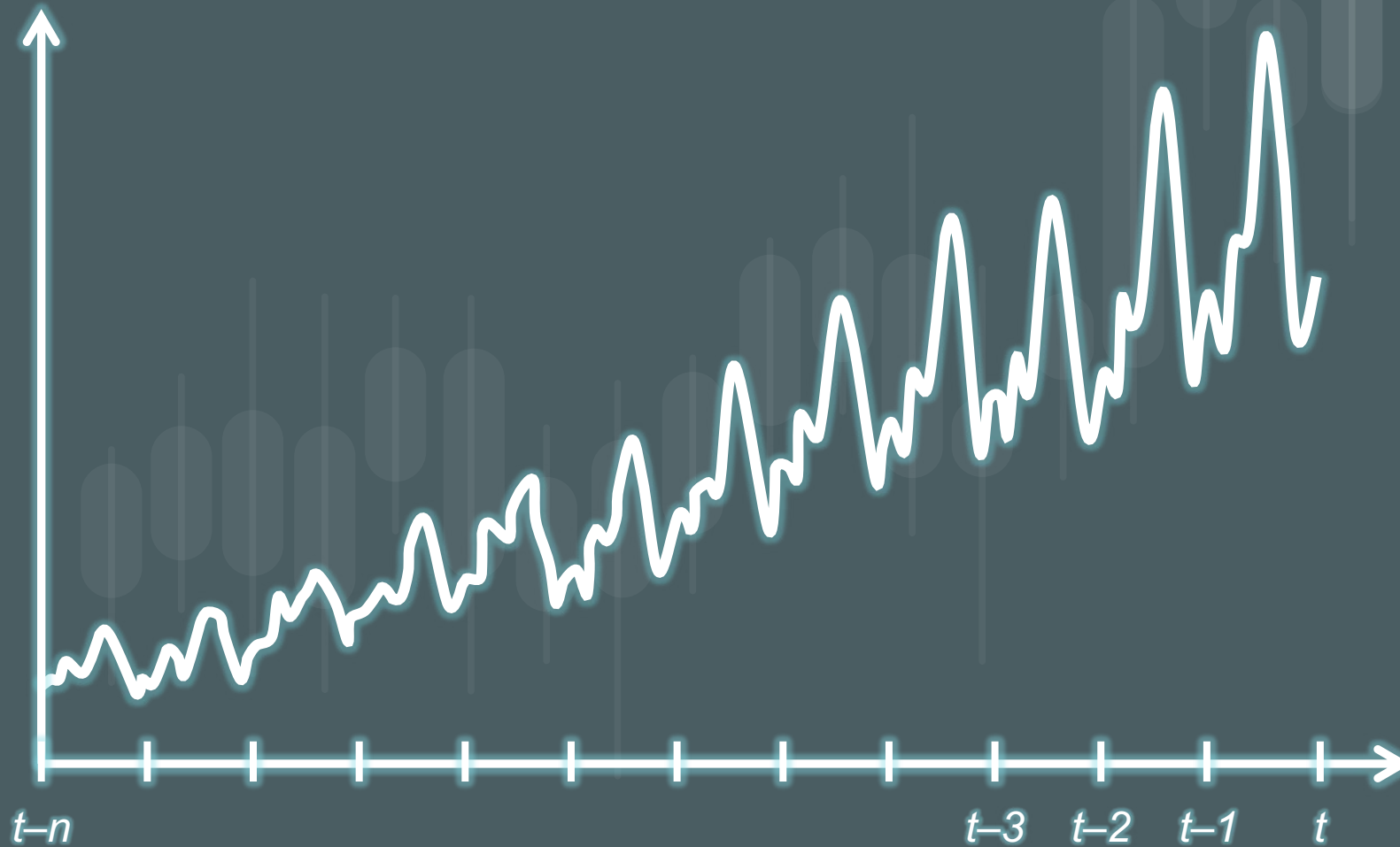
Does seasonality vary across ownership?





Seasonality of economic processes is diverse  
and is observable at several levels

(Hylleberg, 1992)



Yearly

Quarterly

Monthly

Daily

Hourly

# Types of seasonal processes



**Deterministic**  
seasonal process

seasonal process  
deterministic

**Stationary**  
seasonal process

seasonal process  
stationary

**Non-stationary**  
seasonal process

seasonal process  
non-stationary





# Data & Methods

Focus on Croatia | Research process  
| Data sources

# We are focusing on Croatia because...



Source: VectorStock

- Initially a forerunner of transformation
- lost most of its initial advantage because of
  - the wars of the '90s
  - severe deindustrialization
  - general loss of competitiveness
  - the second deepest decline in the EU during the 2008 economic crisis
  - the most prolonged recovery among EU member states
- the most lagging member state of the European Union
  
- But...
- Croatian economy belongs to tourism, which is one of the main economic drivers
- Its cyclical nature may generate seasonal fluctuations across various related sectors



# Research process



# Croatian Financial Agency (FINA) dataset







# Empirical findings

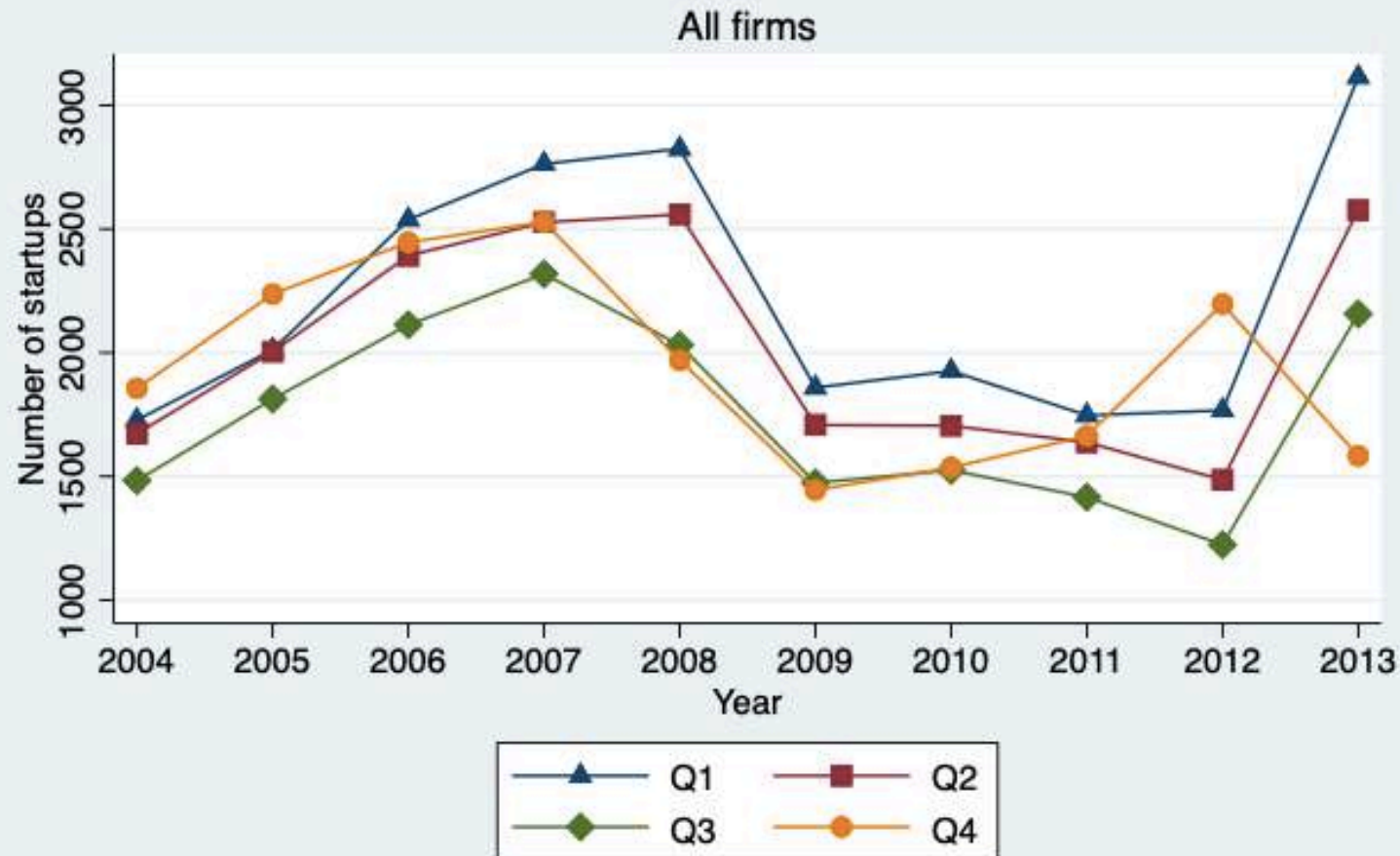
In terms of industries | ownership | location





# Whole Croatian economy

# Seasonality in the whole economy



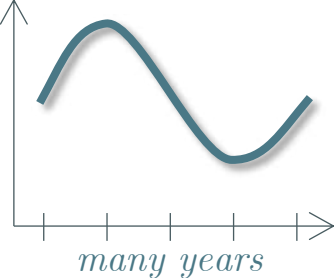
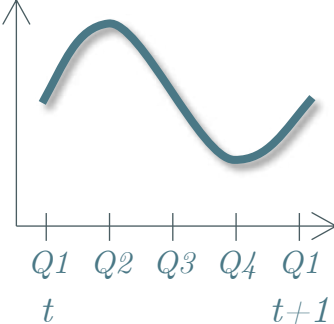
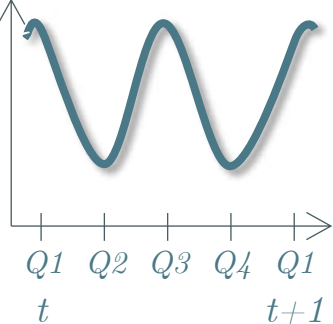












Source: Authors' calculations

Quarter	Coeff.
1st	-167
2nd	<b>-829*</b>
3rd	<b>-611**</b>
4th	<i>reference</i>

Note: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$



# Seasonality in the whole economy

<i>Frequency</i>  <i>Deterministic component</i>	long-run frequency <i>one peak in a few years</i> 	annual frequency <i>one peak in a year</i> 	semi-annual frequency <i>two peaks in a year</i> 
<b>Constant + trend + seasonal dummies</b>			
<b>Constant + trend</b>			
<b>Constant</b>			
<b>No deterministic part</b>			

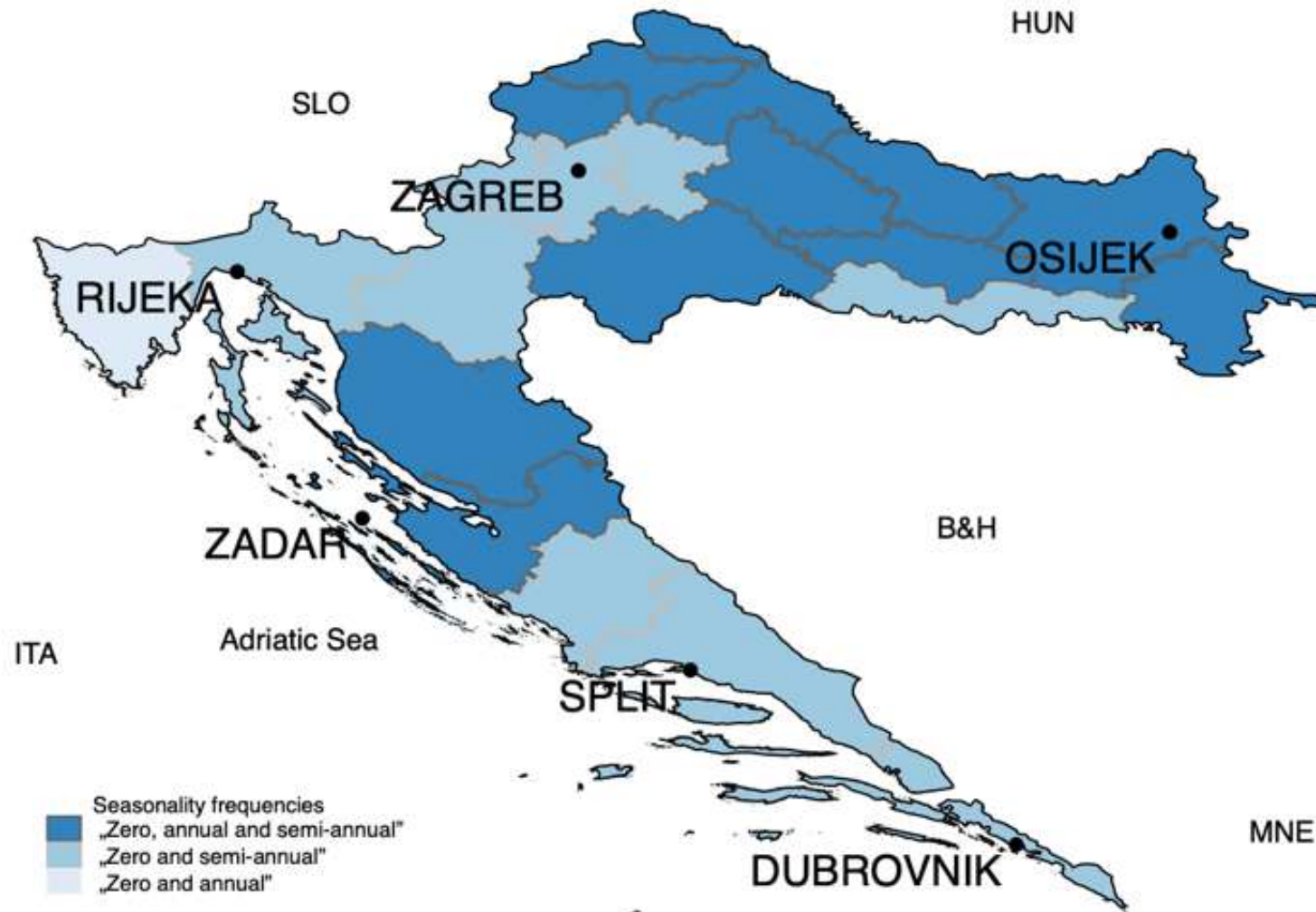


# **Spatial patterns**

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# Spatial patterns of seasonality

(division by NUTS3 regions)



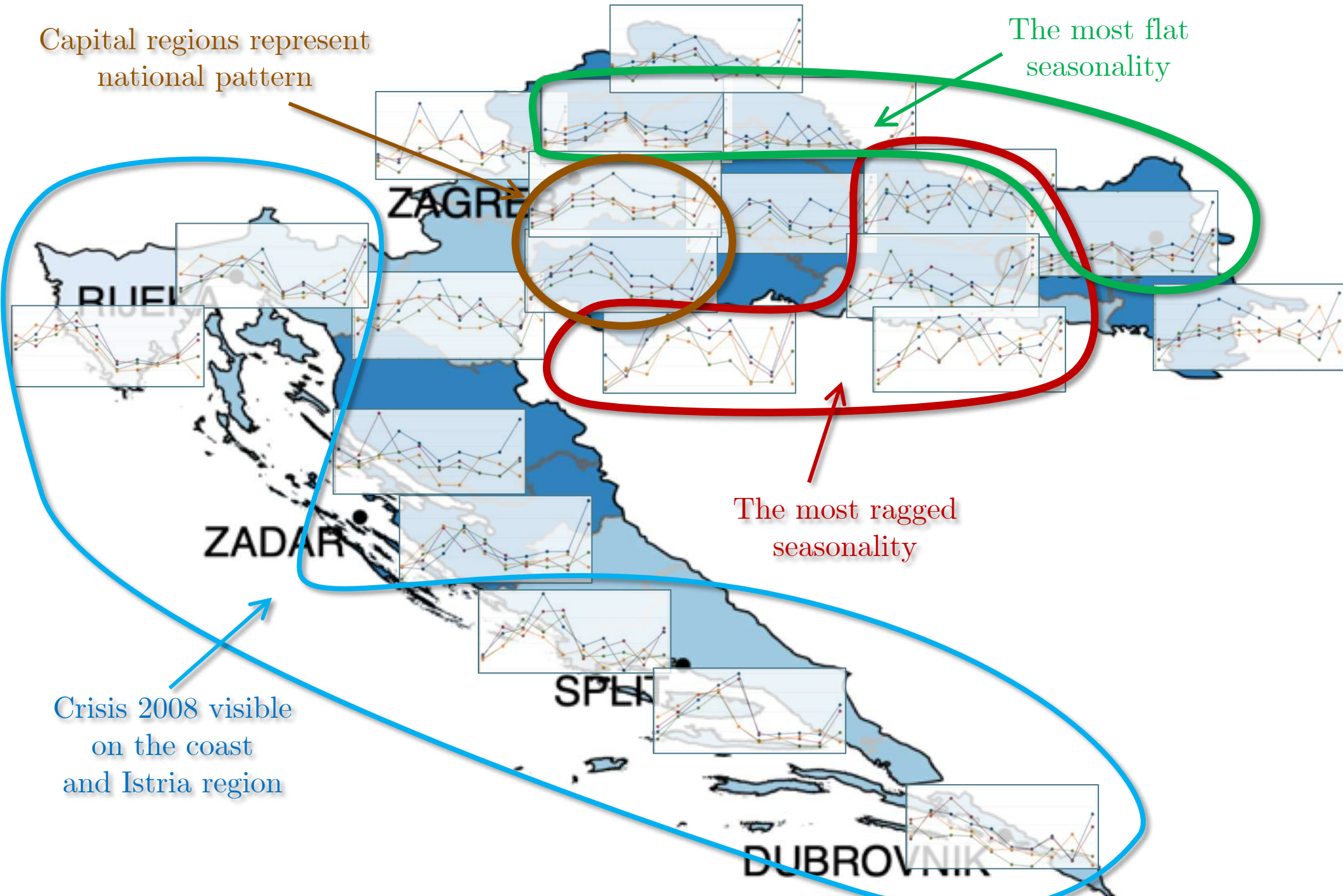
- The most seasonal regions are located in the eastern and central western parts of the country
- Central and southern regions exhibit long-term and biannual (two peaks per year) seasonality
- Istrian region experiences long-term and annual (one peak per year) seasonality

Source: Authors' calculations



Capital regions represent national pattern

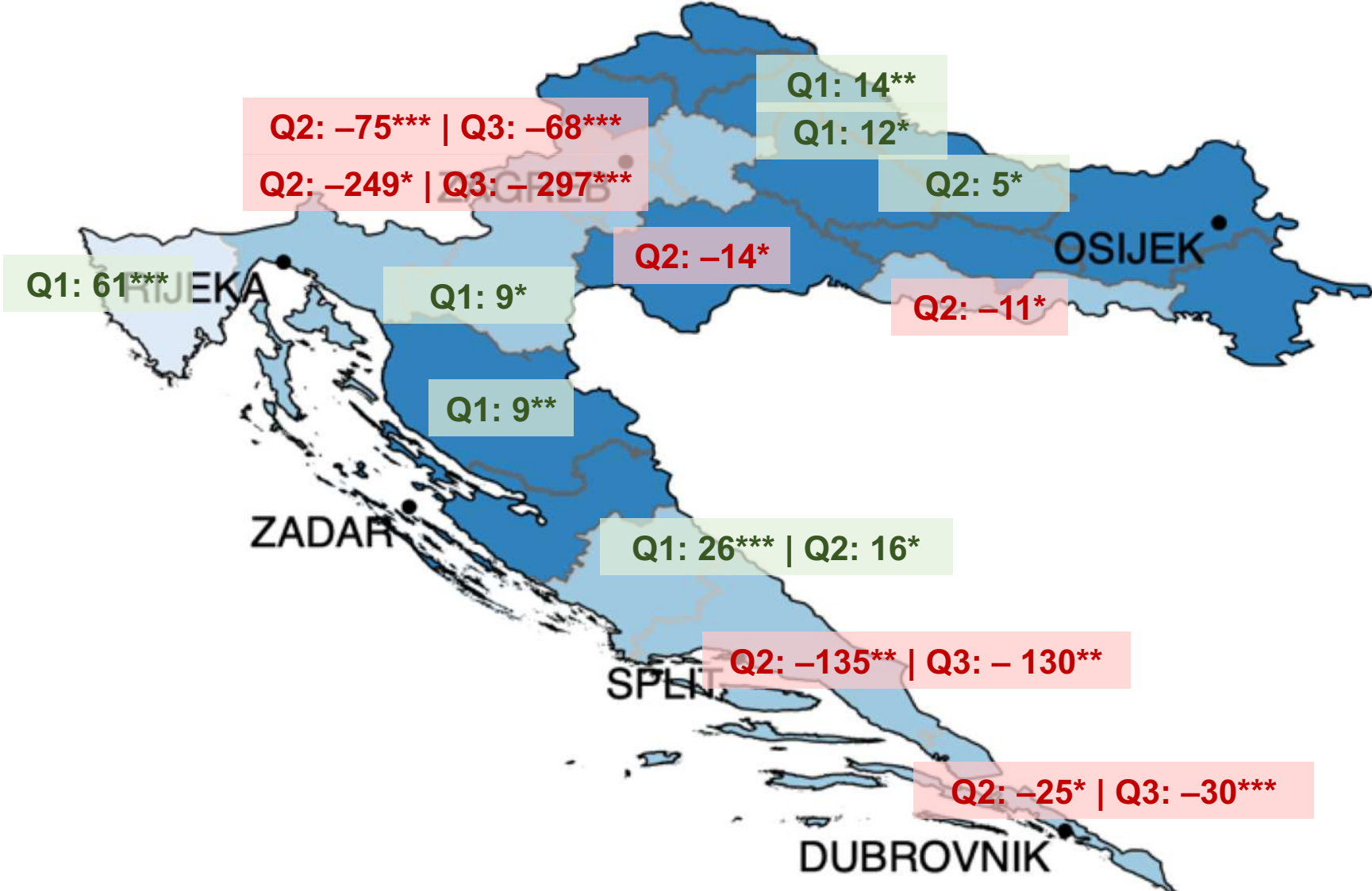
The most flat seasonality



The most ragged seasonality

Crisis 2008 visible on the coast and Istria region

# Significant coefficients in regions

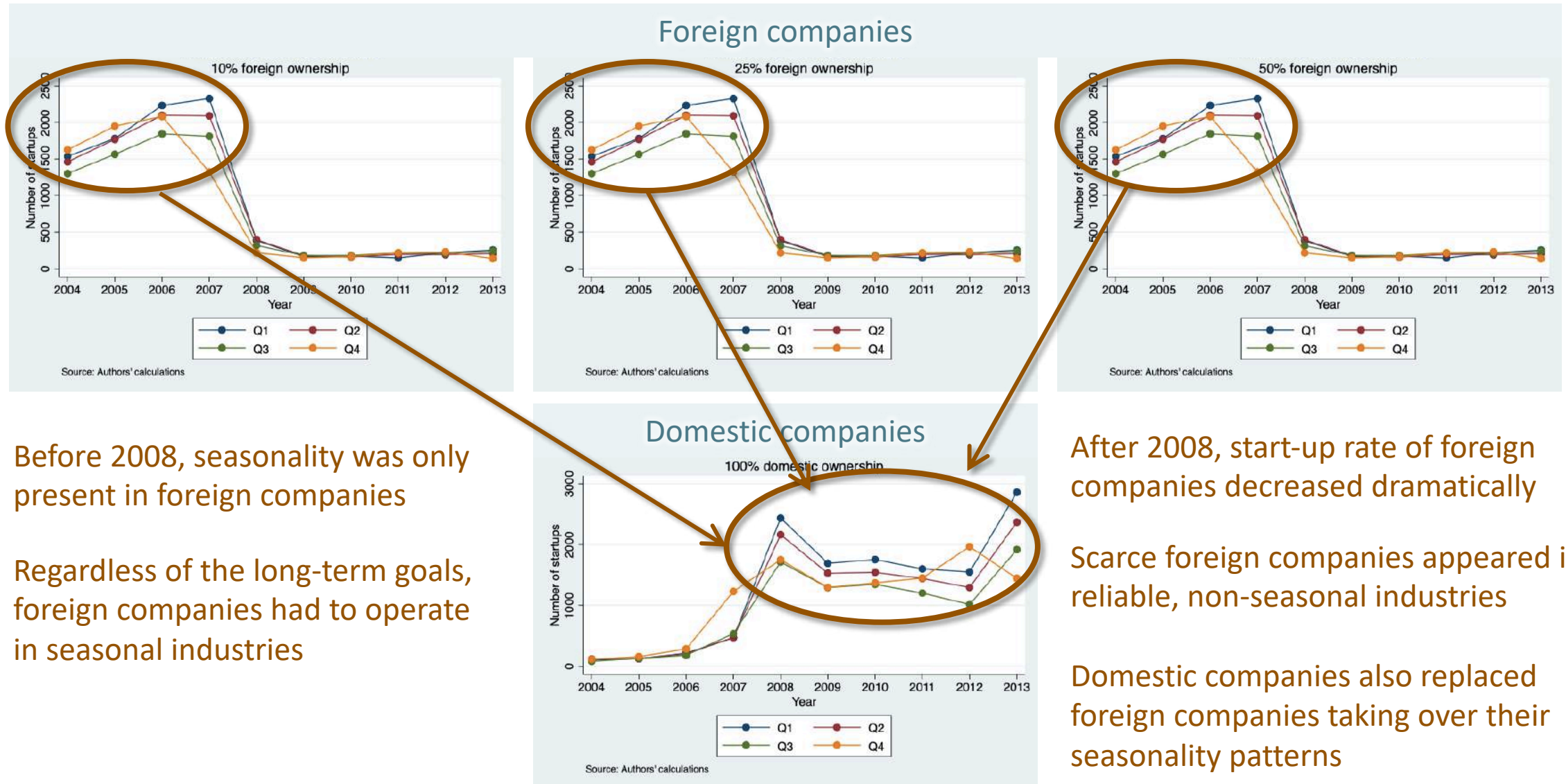




# Ownership patterns



# Domestic companies took over seasonality from foreign companies after the crisis in 2008



Before 2008, seasonality was only present in foreign companies

Regardless of the long-term goals, foreign companies had to operate in seasonal industries

After 2008, start-up rate of foreign companies decreased dramatically

Scarce foreign companies appeared in reliable, non-seasonal industries

Domestic companies also replaced foreign companies taking over their seasonality patterns

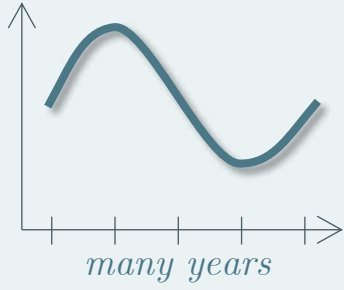
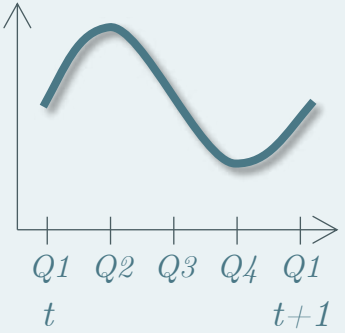
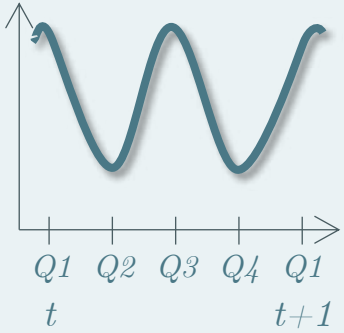
















# Deterministic seasonality in domestic and foreign companies

The **change in seasonality** between *domestic* and *foreign* companies caused **no significant coefficients** of quarters' dummies

Quarter	Domestic	10% foreign	25% foreign	50% foreign
1st	-56	-60	-61	-61
2nd	<b>-667**</b>	16	16	16
3rd	-328	-49	-50	-50
4th	<i>reference</i>	<i>reference</i>	<i>reference</i>	<i>reference</i>

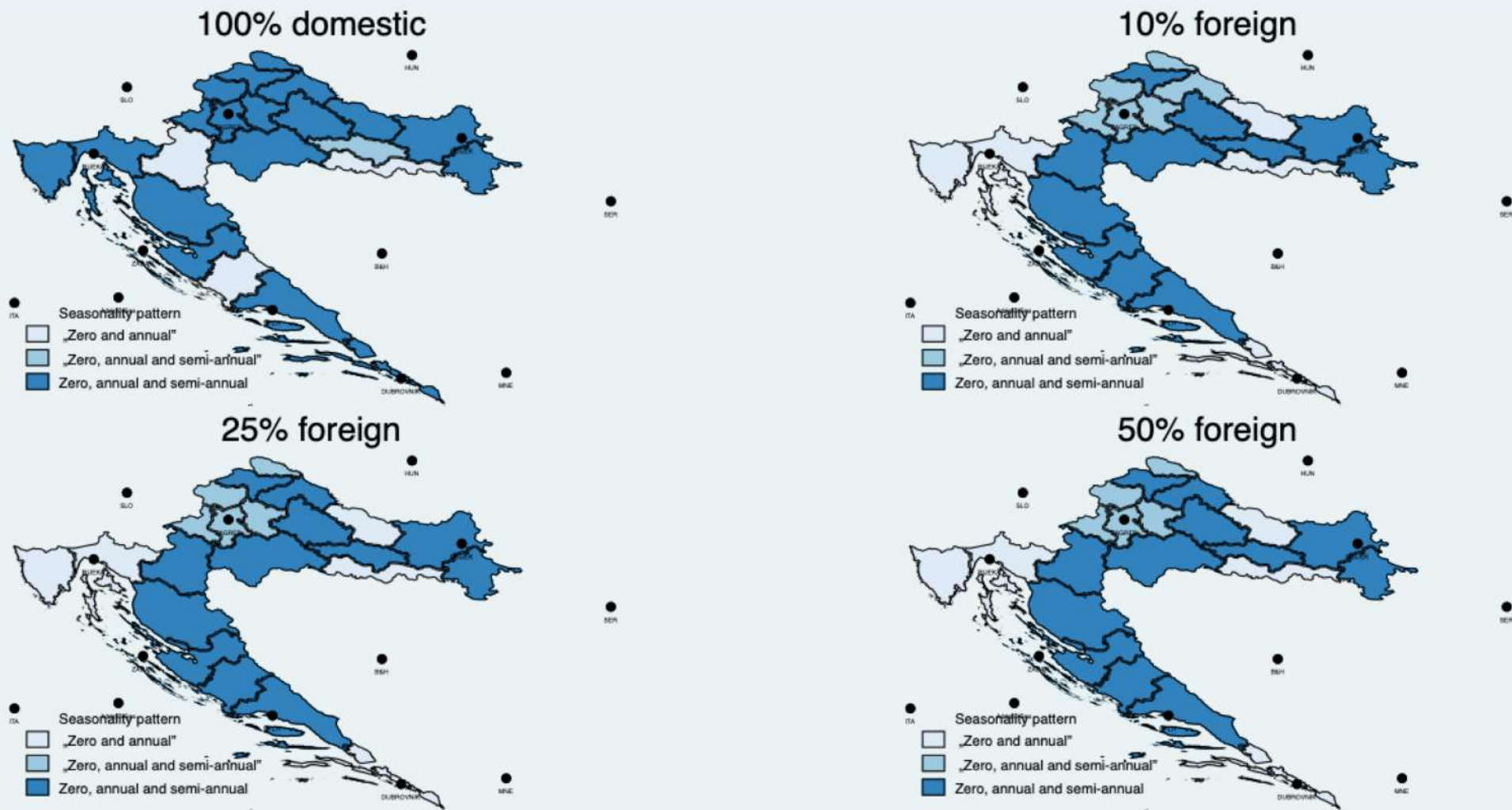
Note: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

# Seasonality patterns in % of ownership

<p><i>Frequency</i></p> <p><i>Ownership</i></p>	<p>long-run frequency <i>one peak in a few years</i></p>  <p><i>many years</i></p>	<p>annual frequency <i>one peak in a year</i></p>  <p><i>Q1 Q2 Q3 Q4 Q1</i></p> <p><i>t t+1</i></p>	<p>semi-annual frequency <i>two peaks in a year</i></p>  <p><i>Q1 Q2 Q3 Q4 Q1</i></p> <p><i>t t+1</i></p>
 <p><b>Domestic 100%</b></p>			
 <p><b>Foreign 10%</b></p>			
 <p><b>Foreign 25%</b></p>			
 <p><b>Foreign 50%</b></p>			



# Geography of seasonality in domestic and foreign companies



Source: Authors calculations

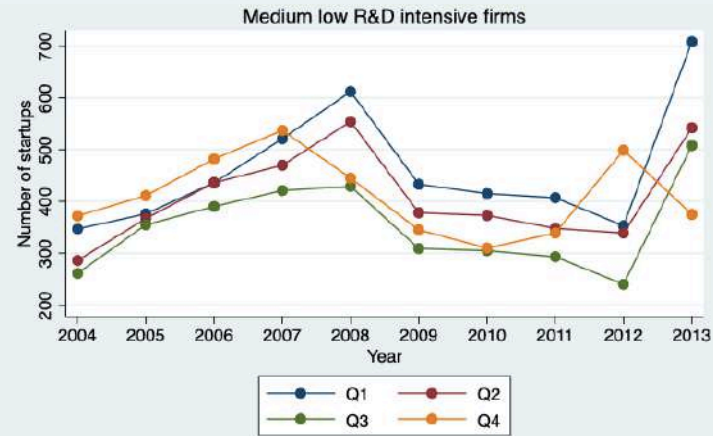
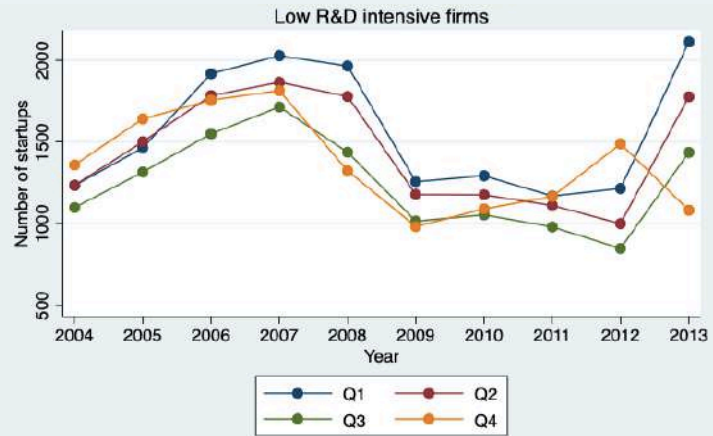


**R&D**

**R&D intensity  
STUDY patterns**

# Deterministic seasonality occurs mainly in low- and medium-low-tech companies

## Low- and medium-low-tech companies

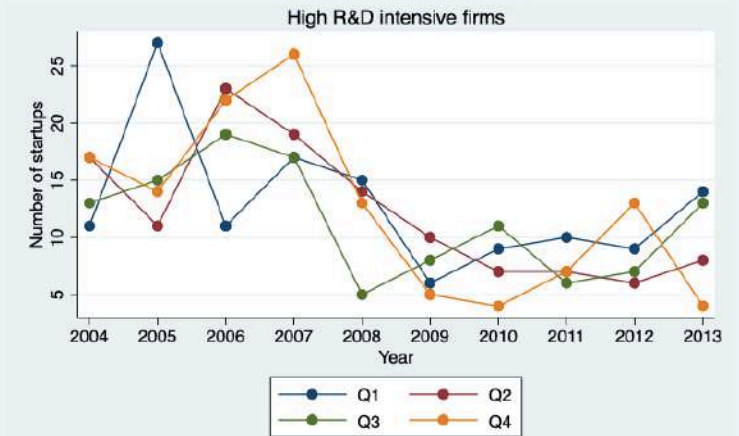
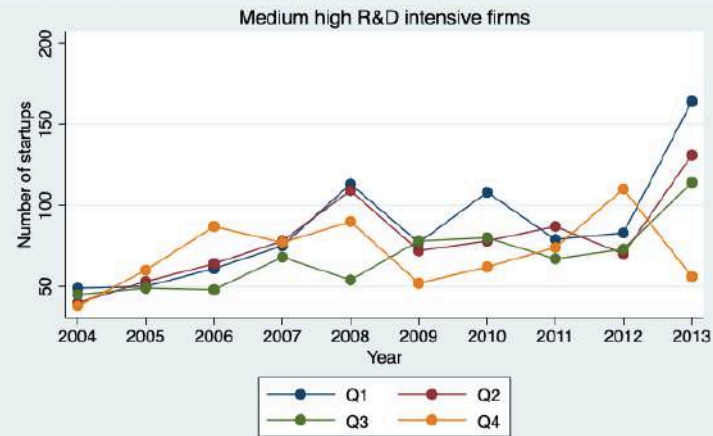
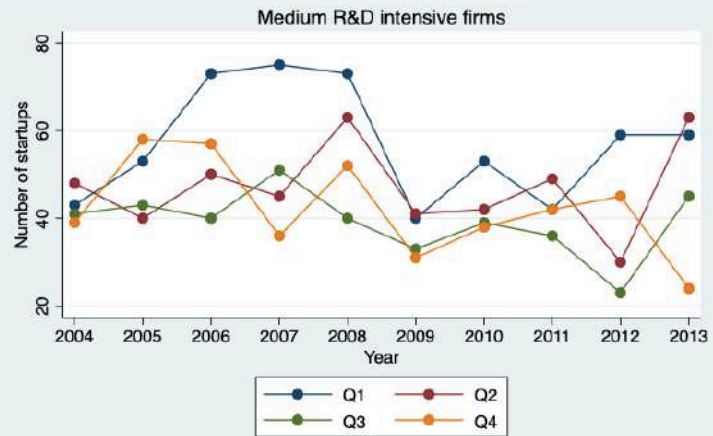


Low-tech companies set an all-country seasonal pattern

Higher technology companies do not exhibit a deterministic seasonality

Medium-high-tech companies show the most flat seasonality and the highest shock resilience

## Medium-, medium-high- and high-tech companies





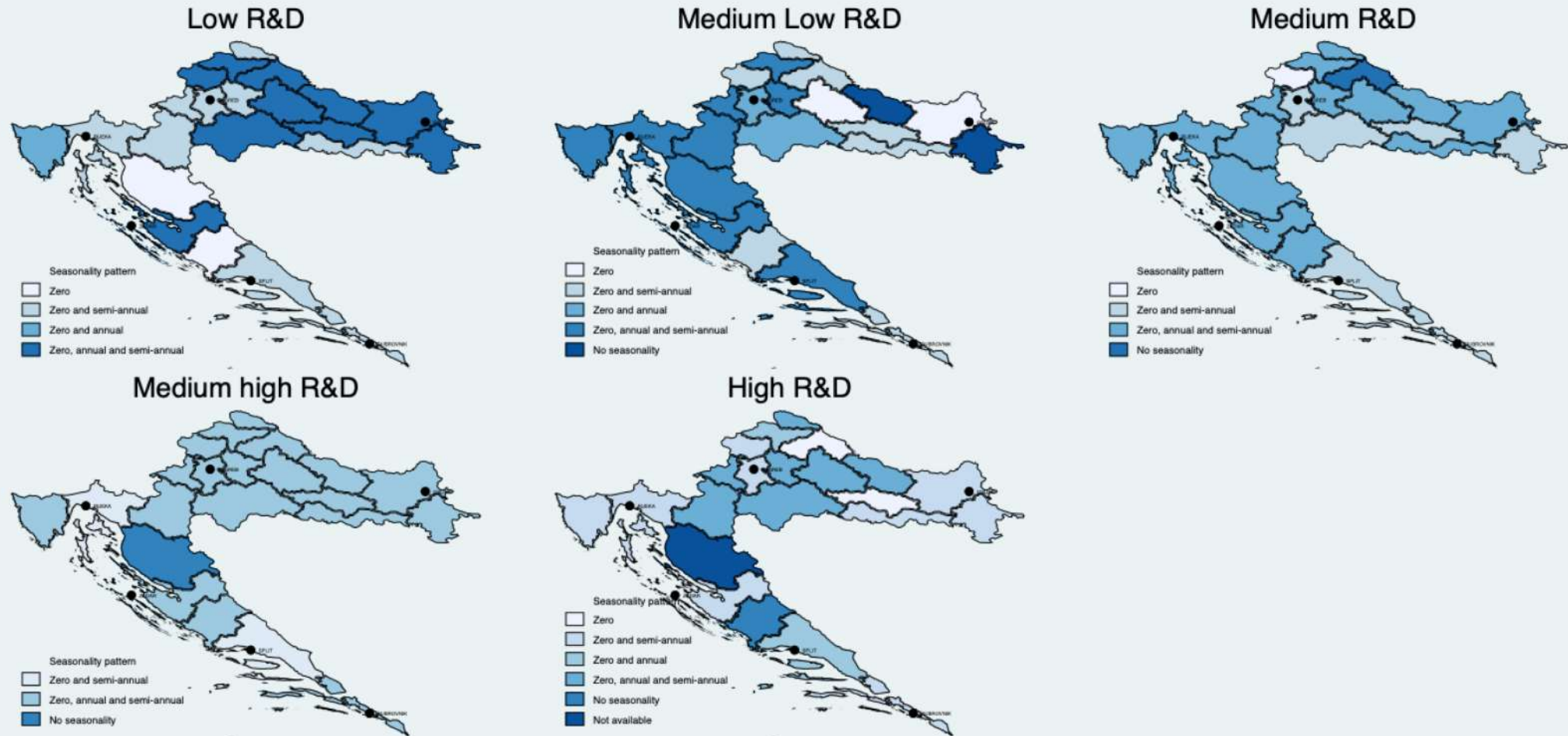
# Deterministic seasonality in different R&D intensive companies

This is confirmed in statistical significance of coefficients of quarters' dummies:

Quarter	Low	Medium-low	Medium	Medium-high	High
1st	-142	-22	16	17	-1
2nd	<b>-516*</b>	-135	-13	-22	-3
3rd	<b>-327*</b>	<b>-197***</b>	-15	<b>-34**</b>	-2
4th	<i>reference</i>	<i>reference</i>	<i>reference</i>	<i>reference</i>	<i>reference</i>

Note: \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1

# Geography of seasonality in companies with different R&D intensity

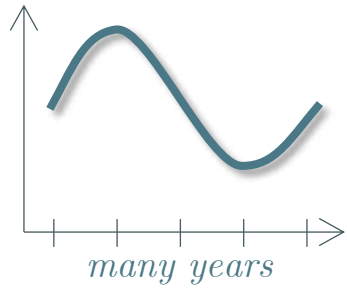
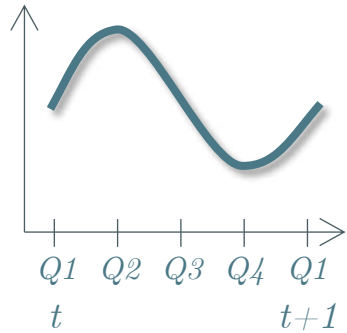
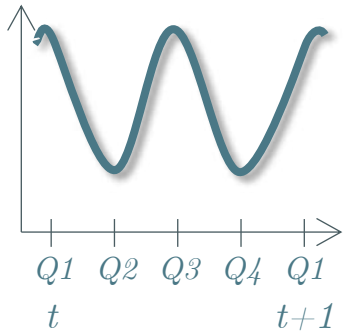






















Source: Authors' calculations

# Seasonality according to knowledge-intensity



Knowledge-intensity

<p>Frequency <i>(constant+trend+seasonal dummies)</i></p>	<p>long-run frequency <i>one peak in a few years</i></p> 	<p>annual frequency <i>one peak in a year</i></p> 	<p>semi-annual frequency <i>two peaks in a year</i></p> 
 <p>High</p>			
 <p>Medium high</p>			
 <p>Medium</p>			
 <p>Medium low</p>			
 <p>Low</p>			



Discussion

**& conclusion**



We explored the seasonality and...

## Short-term seasonality is visible in the start-up activity!

Therefore, it may be a significant contribution to laying the foundations for further research

### Main conclusions:

- Deterministic seasonality is visible in the whole economy (except for the 4<sup>th</sup> quarter)
- Stochastic seasonality is visible at any frequency
- Spatial distribution of seasonality reveals a more stable north and less resilient south
- Interesting takeover of seasonal demand by domestic companies after the crisis in 2008
- Seasonality visible in industries with lower R&D intensity (industries with higher seasonal demand)
- These results underpin the theory of short-term seasonality







**Thank you very much  
for your attention!**

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