



# The impact of economic recessions on the harms of drug use and health responses in Europe: a panel data analysis

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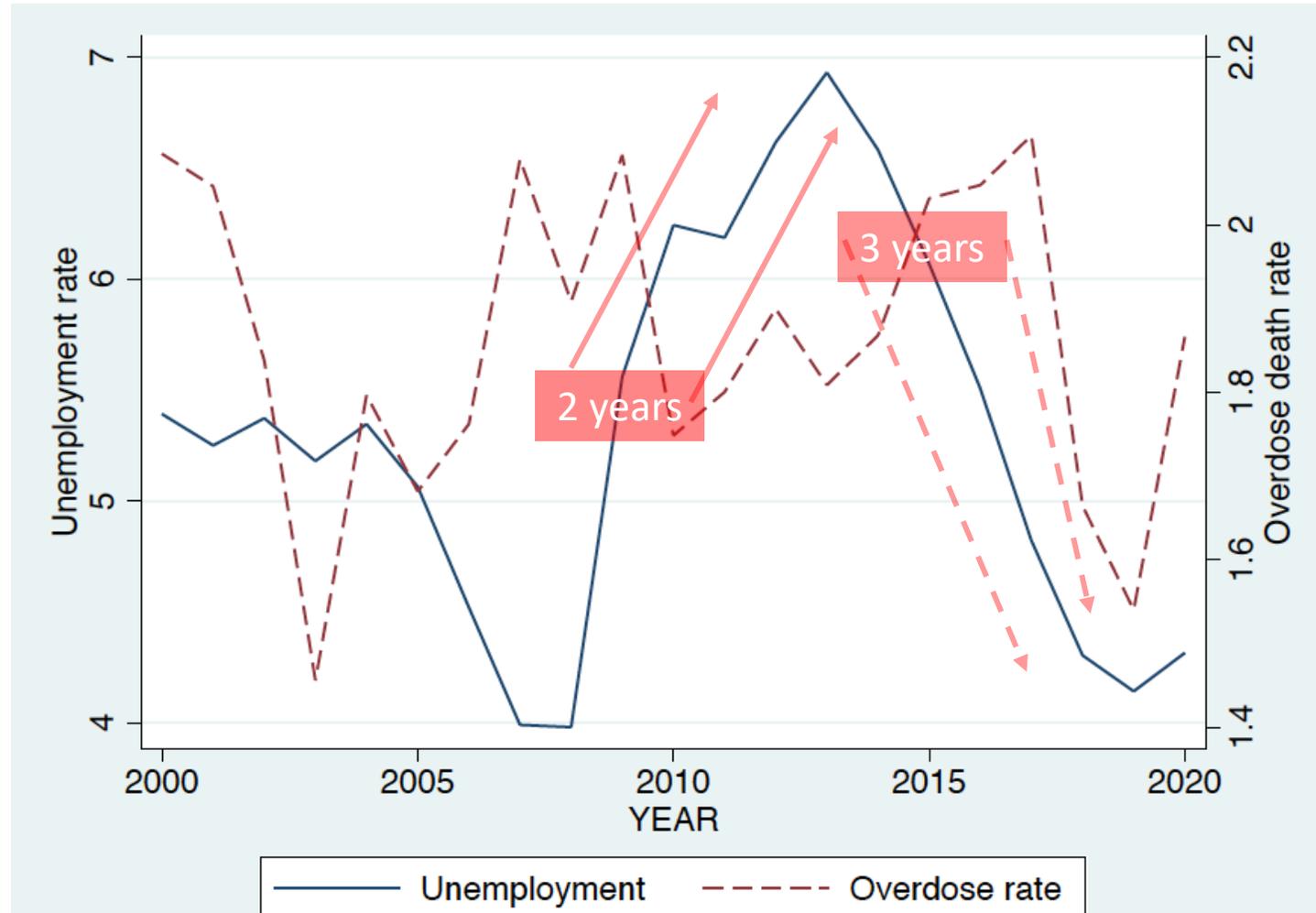
# Motivation

1. **Complex relationship** between economic hardship and health.
2. Decrease of 4.3% in the *Gross Domestic Product* (GDP) in EU countries in 2009 and an economic slowdown in EU countries in 2020, with a 5.9% decrease in the GDP.
3. According to data from the fourth quarter of 2020, almost 4 million jobs were lost in the EU in one year.
4. Results from the literature are **mixed and inconclusived**.

# Motivation

1. Graphically, the evolution of unemployment rate and the overdose deaths seems to be consistent with a **counter-cyclical relationship**.
2. Nevertheless, a **delay** may occur between the economic situation and its subsequent impact on drug consumers' health.

*Annual rate of unemployment and drug overdose deaths (2000-2020)*



# The Relationship

- **Channels** through which economic variables affect drug use: *Income effect, economic-stress effect, opportunity cost effect; supply effect and substitution effect.*
- These **transmission mechanisms** will operate simultaneously, with different intensities, and with potential contradictory impacts.
- Drug-related harm may have a strong persistent **dynamic component over time**.

# Main assumptions

- There are short- and long-term effects of an economic crisis: a **dynamic component** over time of drug use and its related health effects.
- Considering the possibility of a **time lag** is necessary when analysing how macroeconomic variables affect drug harm variables. The adjustment of drug-related harms could be **gradual over time**.
- Drug-related harms will respond non-linearly and asymmetrically to macroeconomic indicators.

# Objectives

1. To assess the impact of economic cycles on illegal drug-related harms in European countries.
2. Two questions:
  1. *Has there been a rise in drug-related harms among European countries during the periods of economic crisis?*
  2. *To what extent do economic risks factors account for this increase?*

# Empirical strategy

- Panel data models.
- **Time lags** that could affect how variables are interrelated in the medium and long term.
- **Thresholds** were allowed to identify **structural breaks** between drug-related harms and the relevant economic variables.
- ***Dummy variables***, reflecting the years of the economic crisis and the possibility of spatial differences at country-level.

# Empirical strategy

## 1) Traditional Panel data model

$$\ln Y_{jt} = \beta_0 + X_{jt}'\alpha_1 + S_{jt}'\alpha_{1S} + \eta_j + \varepsilon_{jt}$$

Drug use harm

Indicator for economic crisis

Vector of social responses

## 2) Allowing for lagged dependent variables (Model 1)

$$\ln Y_{jt} = \beta_0 + \beta_1 \ln Y_{jt-1} + X_{jt}'\alpha_1 + S_{jt}'\alpha_{1S} + \eta_j + \varepsilon_{jt}$$

Lagged variable

## 3) Threshold variable and parameter (Model 2)

$$\ln Y_{jt} = \beta_0 + \beta_1 \ln Y_{jt-1} + X_{jt}'\alpha_1 + S_{jt}'\alpha_{1S} + \eta_j + \varepsilon_{jt} + (\beta_2 \ln Y_{jt-1} + X_{jt}'\alpha_2 + S_{jt}'\alpha_{2S} + \eta_j) 1\{U_{jt} \geq \gamma\}$$

Threshold

# Data

- The **sample** includes 30 countries (27 EU Member States, along with Norway, Turkey and the United Kingdom).
- Two main **data sources**: the EMCDDA and Eurostat.
- Five **types of indicators**: a) data for drug-related harms; b) data for business cycle; c) data for health and social responses; and d) control variables.
- The **period of analysis** was restricted to 2000-2020.

# Data

- Three drug-related **harm variables**: a) “Overdoses deaths”; b) “New HIV notifications”; and c) “people entering treatment”.
- According to previous literature, the “unemployment rate” is used as the main indicator of the economic cycle. This variable emerges as a proxy of household budgets:
  - Capacity to capture disposable income.
  - Capacity to capture subjective aspects (psychological distress and anxiety).

# Data

- Two health and **social response variables**: a) “expenditure in social exclusion and housing”, and b) “opioids substitution therapy”.
- **Additional data** to control heterogeneity were introduced in the estimations (income inequality, health expenditure, age dependency, level of education, life expectancy and healthy life years...)

# Results

1. The relationship between unemployment and drug death rates is **negative**.
2. As the country unemployment rate increases by one percentage point, the drug death rate per 100 thousand inhabitants decreases by a percentage of 2.42. Results remained relevant when the **youth unemployment** rate was considered.
3. Nevertheless, in times of economic weakness, there is a **positive component**. The resulting effect even in the crises years is still **pro-cyclical** (-1.25).
4. A **lag of two years**, between the decline in economic conditions and the effect on health, was detected.

# Results

5. An increase in drug death rates due to the COVID-19 crisis.
6. Income inequality and social responses had no significant effect on the general estimates.
7. When countries were grouped, these variables (in 6) were relevant:
  - a. For Northern European countries, **income inequality** and drug death rates present a positive relationship.
  - b. The variable **expenditure in social exclusion and housing** has been effective at reducing drug death rates in Western Europe.

# Results

## 8. Structural breaks:

1. For unemployment rates lower than the estimated thresholds (unemployment rate of 4.12% or 3.92%), the relationship between death rates and unemployment is **pro-cyclical**.
2. In times of economic weakness, with unemployment rates larger than the estimated thresholds, the relationship becomes **counter-cyclical**.

# Additional results...

1. The effect of economic cycle on “people entering treatment”, is **counter-cyclical**.
2. Strong relationship of "new HIV notifications" with unemployment. The results show a **counter-cyclical** association.

# Conclusion

- **Novelty methodological insights** regarding the study of the relationship between unemployment and drug-related harms.
- A **dynamic panel threshold models** improves the understanding of whether the relationship between unemployment and drug overdose mortality depends on the **intensity of the recession**.
- The existence of possible **persistent effects** of economic crisis on drug-related harms.
- The existence of **structural breaks** in the relationship between drug harms and both the global economic crisis and the COVID-19 pandemic.

# Concluding...

- Identifying critical thresholds in variables of the labour market is a relevant source of information for policy makers.

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Additional material

# Bussiness cycle variable

- A broad indicator reflecting economic activity is the Gross Domestic Product (GDP). However, a decline in the GDP does not necessarily translate into worse living conditions immediately, so this indicator would not have a direct and immediate influence on individual health.

Regressors	MODEL 1. 29 Countries. Period: 2000-2020 <sup>a</sup>										MODEL 2 <sup>b</sup> . 28 Countries <sup>c</sup> . Period: 2005-2014			
	Parameter estimates by estimation method and specification (1)-(5)										Parameter estimates by regime and specification (1)-(2)			
	System-GMM					Difference-GMM					Lower regime	Upper regime	Lower regime	Upper regime
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)	(1)		(2)	
<u>Lnoverdose(-1)</u>	0.7087*** (0.000)	0.7087*** (0.000)	0.6526*** (0.000)	0.6521*** (0.000)	0.7294*** (0.000)	0.5755*** (0.000)	0.5641*** (0.000)	0.5527*** (0.000)	0.5599*** (0.000)	0.5817*** (0.000)	-0.0226 (0.678)	-0.1250*** (0.000)	0.2116** (0.046)	0.1171 (0.297)
<u>Unemp</u>	-0.0242** (0.035)	-0.0348*** (0.004)	-0.0414*** (0.001)	-0.0332** (0.017)	-0.0259** (0.031)	-0.0283** (0.018)	-0.0399*** (0.002)	-0.0448*** (0.001)	-0.0385*** (0.013)	-0.0335*** (0.008)	-0.3623*** (0.001)	0.3071*** (0.009)	-0.5716** (0.011)	0.4849** (0.035)
<u>Unemp(-2)</u>		0.0294** (0.020)	0.0259* (0.073)	0.0255* (0.083)	0.0239 (0.110)		0.0299*** (0.005)	0.0349*** (0.003)	0.0355*** (0.003)	0.0258** (0.040)			-0.2203 (0.398)	0.2862 (0.286)
<u>Unemp0709</u>	0.0117* (0.077)	0.0170** (0.043)	0.0163 (0.126)	0.0164 (0.109)	0.0242*** (0.001)	0.0162** (0.031)	0.0212** (0.016)	0.0233** (0.023)	0.0243*** (0.013)	0.0267*** (0.000)	-0.0325*** (0.001)	0.0705*** (0.000)	0.1068* (0.055)	-0.0829 (0.170)
<u>Dum2020</u>	0.0787 (0.176)	0.1110 (0.117)	0.1081* (0.104)			0.0519 (0.328)	0.0846 (0.176)	0.1216* (0.063)						
<u>Level5s80_s20</u>			0.0916*** (0.006)	0.0920*** (0.004)				0.1249 (0.116)	0.1200 (0.118)					
<u>health_expend0811</u>					-0.0095* (0.073)					-0.0076 (0.155)				
<u>Level1social_exclusionhousing0812</u>				-0.0003* (0.055)					-0.0003** (0.044)					
<u>Level2social_exclusionhousing0812(-2)</u>				-0.0030* (0.073)					-0.0022* (0.096)					
<u>Constant</u>	0.1813*** (0.010)	0.0699 (0.499)	0.0055 (0.967)	-0.0411 (0.777)	0.0651 (0.537)	0.2295** (0.011)	0.1231 (0.226)	-0.0615 (0.751)	-0.1121 (0.591)	0.1227 (0.228)	-0.9959** (0.024)		-1.6130 (0.282)	
<u>Threshold</u>											4.1181*** (0.000)		3.9208*** (0.000)	

0.0117-0.0242= -0.0125

# Limitations

1. High percentage of missing data for the period under analysis.
2. It would have been better to work with a greater disaggregation of data.