

# The European Commission's science and knowledge service

Joint Research Centre

## The resilience of EU Member States to the financial and economic crisis.

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*EC-JRC: Finance and Economy Unit*

***The Impacts and Methodology of Indicators and  
Scoreboards***

*23 March 2018, JRC Ispra*

# Outline

- **Motivation**
- **JRC Conceptual framework on resilience**
- **Test case on the recent financial & economic crisis**
  - **Main questions & policy objectives**
  - **Measurement of resilience**
    - System variables
    - Construction of resilience indicators
    - Resilience outcomes
  - **Identification of resilience characteristics**
- **Future plans**

➤ **Increasing attention to resilience & sustainability**

- **Policy measures (e.g. Financial stability, MIP)**
- **Policy declarations**
  - Harnessing globalization (EC, 2017)
  - Rome declaration (2017)
  - G20 principles (2017)
  - IMF macroeconomic perspective on resilience (2016)
- **Academic interest**
  - Trade-offs between growth and stability/crisis risk (Popov & Smets, 2011)
  - Study of recessions and resilience drivers (ECB 2016, OECD 2014/2016)

➤ **“Going beyond GDP” perspective**

- **Increasing consideration for inequality & societal well-being**
- **Holistic & disaggregated approach to policy making**  
(Stiglitz, Sen & Fitoussi report, 2009)
- **Resilience itself is considered as a broad concept**  
(“Strategic approach to resilience”, EC 2017)



# Objective of the project

- Foster the **monitoring** of resilience of the EU
  - By using the **JRC framework**
  - And developing appropriate **indicators to cover the full system**
- Promote the incorporation of **resilience thinking** into policies
  - Broaden the policy focus **from prevention to anticipation, preparation, and resolution**
  - Move the focus **beyond stability**, putting **adaptation and transformation** into a central place
  - Go **beyond aggregate policies**, look at citizens, communities, too
  - Go **beyond single policy areas** – hence the creation of Resil.net
- Make the resilience **measurement framework** operational

JRC developed a **conceptual framework** for resilience

in consultation **with Research Network on the Measurement of Resilience**



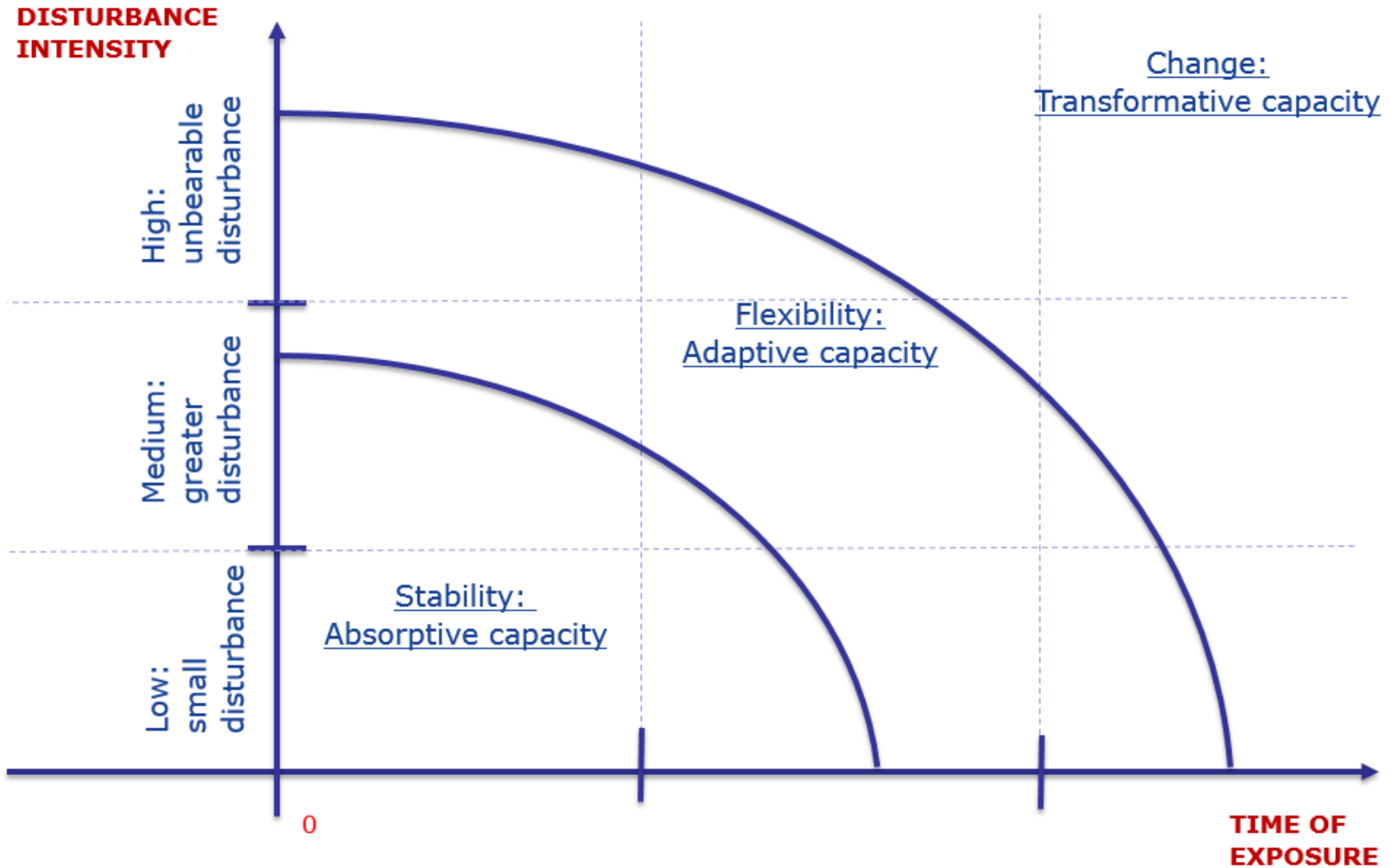
# ***What is resilience?***



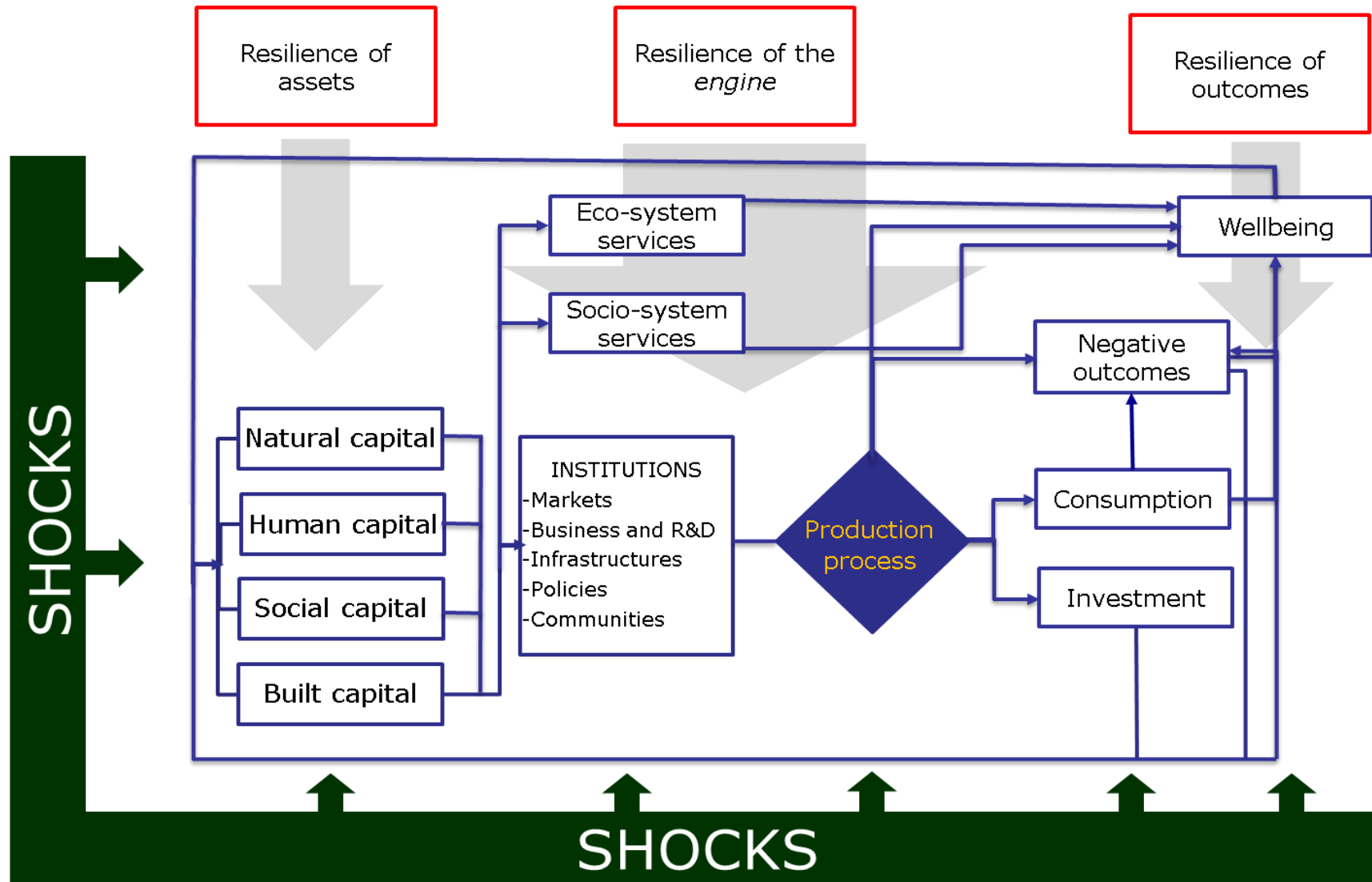
*Resilience is the ability of a system/society to **face shocks and persistent structural changes** in such a way that **it does not lose its ability to deliver societal wellbeing in a sustainable way***

*(i.e., **deliver current societal well-being, without compromising that of future generations**).*

# Time and resilience capacities



# The system view



Extending Costanza et al. (1997)



# Measurement strategy: a three-step-approach towards a dashboard



**System variables**



**Indicators of resilience**



**Resilience characteristics**

# **Pilot of the strategy: resilience to the 2008-2012 financial and economic crisis**



- Which countries showed more (less) resilience during and after the crisis?
- Which are the country characteristics associated with resilient behaviour?

# Measurement strategy: a three-step-approach towards a dashboard



**System variables**

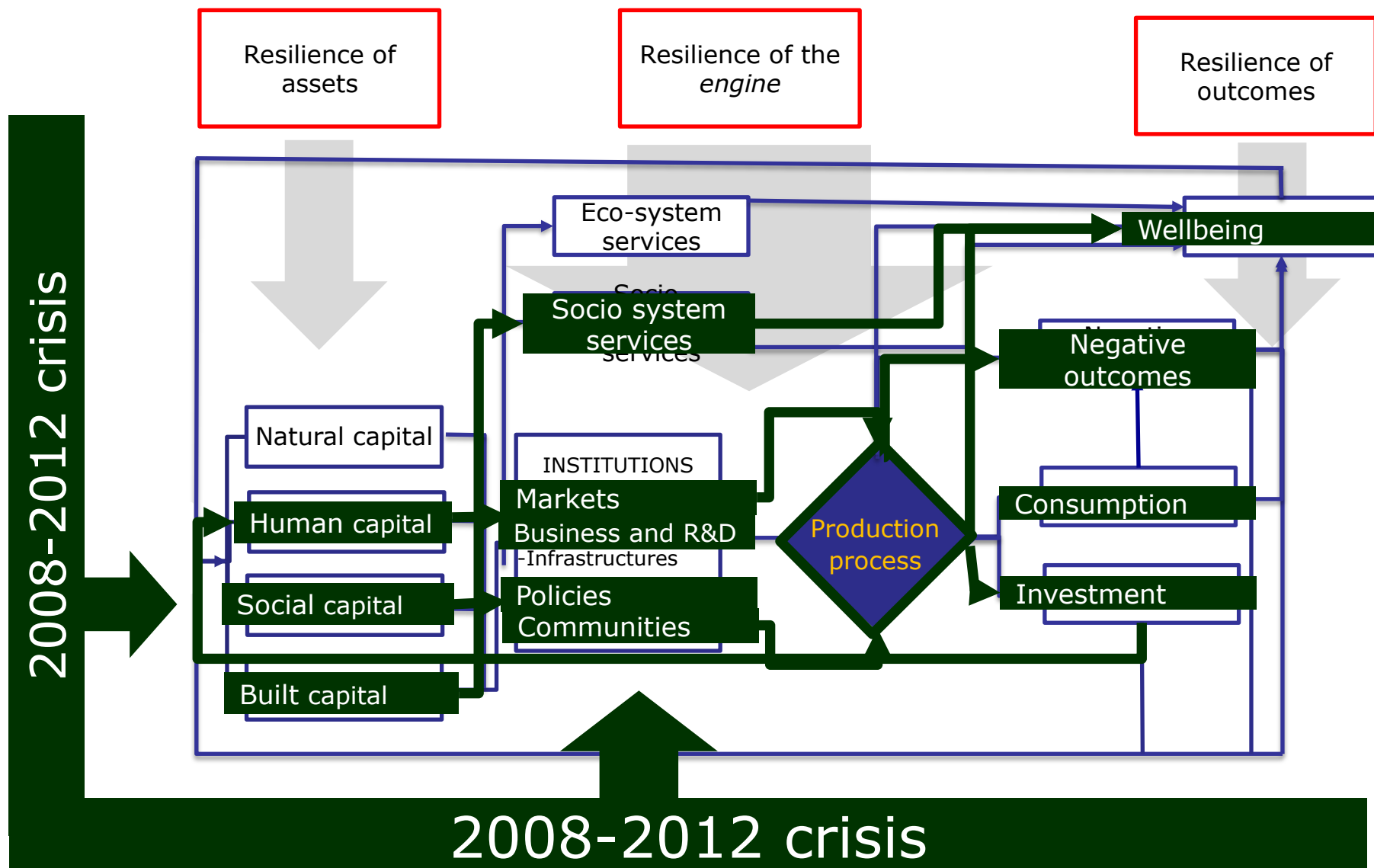


**Indicators of resilience**



**Resilience characteristics**

# Step 1: system variables



# Selecting the system variables

- Drawing on various socio-economic indicator sets
  - European Pillar of Social Rights
  - Macroeconomic Imbalance Procedure
  - Sustainable Development indicators
  - Europe 2020 strategy
  - Quality of Life indicators
  - ...
- Selection criteria
  - Spanning our system in a balanced way
  - Exhibiting a substantial variation during the crisis
  - Covering individual and societal wellbeing “beyond GDP”
  - Sufficient coverage in time and across countries
- A final list of 34 variables

# 34 system variables

	ASSETS	ENGINE	OUTCOMES
<b>CORE</b>	Investment	Government deficit Government debt Household loans House prices Inflation Labour productivity Corporate loans Private debt Stock prices	Employment rate GDP Unemployment rate
<b>SYSTEM</b>	Exp. on education Exp. on health	Exp. on labour market programs Expenditure on R&D	HH. consumption Household income
	Fairness Trust in people	Trust in EP Trust in legal system Social activity	Life satisfaction Happiness Health
	Stock of dwellings*	Share of temporary work Wages	Income inequality NEET** Social exclusion

\* Accommodation units

\*\* Youth not in Education, Employment or Training

# Measurement strategy: a three-step-approach towards a dashboard



**System variables**



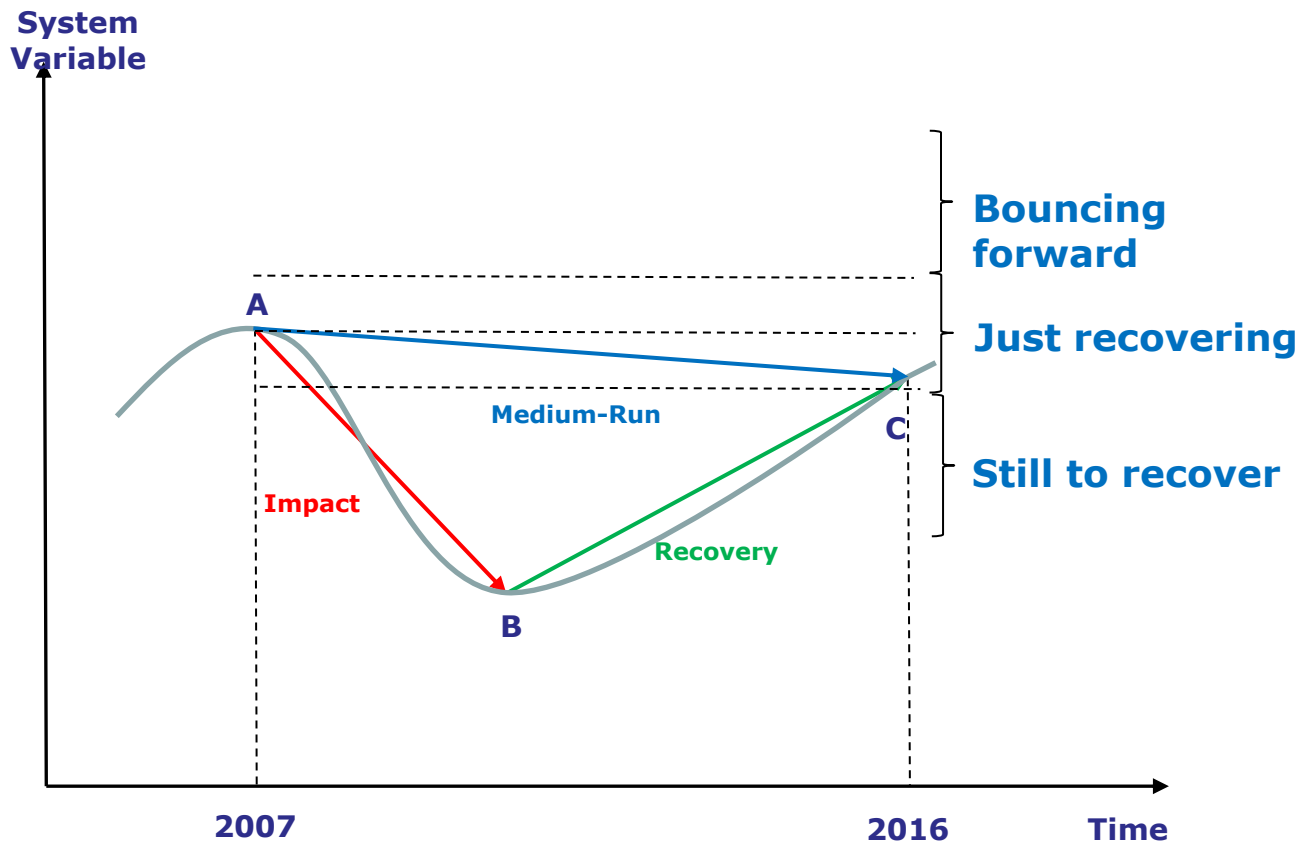
**Indicators of resilience**



**Resilience characteristics**

# Step 2: Metrics and indicators of resilience

## 2.1. Metrics for individual system variables



**Impact**  
Absorption

**Recovery**  
Absorption/  
Adaptation

**Medium-Run**  
Adaptation

**Bounce-Forward**  
Adaptation/  
Transformation

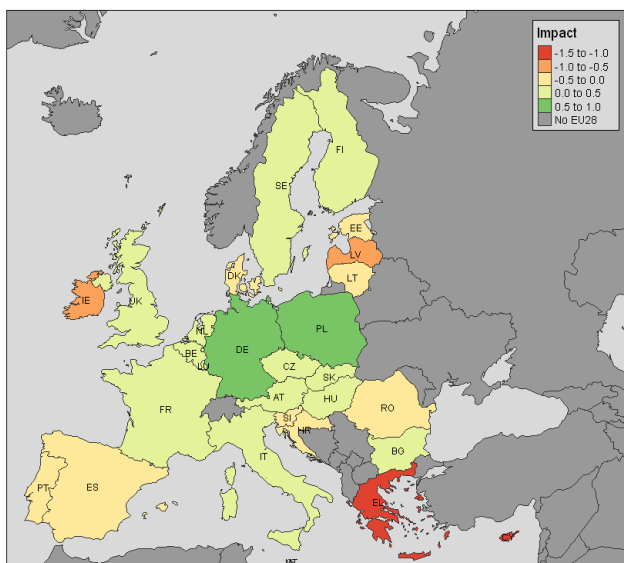


## 2.2: Constructing the resilience (composite) indicators from metrics: Impact

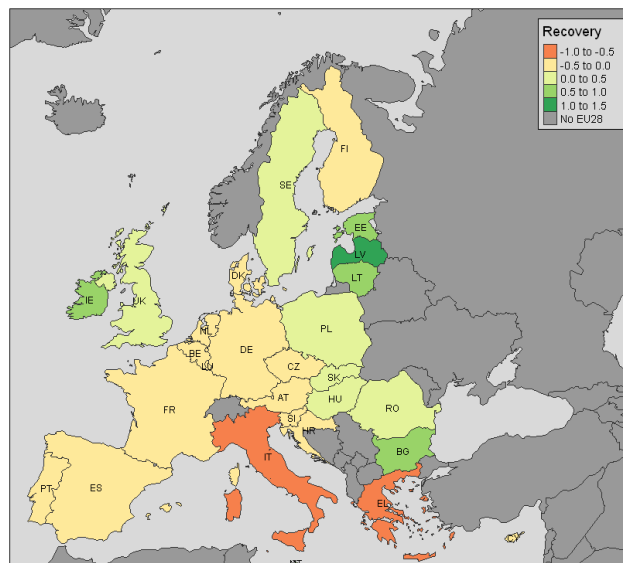
Country	ASSET						ENGINE														OUTCOME										Avg. score					
	Dwellings	Exp. Education	Exp. Health	Fairness	Trust People	Investment	Social Activity	Gov. Deficit	Gov. Debt	HH Loans	House Prices	Trust EP	Trust Legal	Inflation	Active LM	Passive LM	Labour Prod.	Corp. Loans	Private Debt	Exp. R&D	Stock Prices	Temporary Work	Wages	Employment	GDP	Happiness	Health	HH Consumption	Inequality	NEET		Social Exclusion	HH Income	Satisfaction	Unemployment	
PL	0.2	0.8	0.3	0.0	0.0	1.4	0.0	0.4	0.9	0.5	0.0	0.0	0.3	0.2	1.0	-2.1	1.1	1.4	-0.1	1.0	0.4	0.4	0.8	1.4	1.4	0.8	0.1	1.4	1.7	0.7	1.5	1.0	0.8	0.9	0.61	
DE	0.7	0.5	0.1	0.7	-0.2	0.9	1.0	0.5	0.7	1.6	1.2	0.6	0.0	0.5	-1.0	-1.4	0.1	0.7	0.9	0.7	0.7	0.6	0.5	1.2	0.3	1.1	1.5	0.7	0.7	1.4	0.5	0.8	0.8	1.2	0.61	
BE	1.0	0.6	0.3	-0.4	0.1	1.0	0.2	0.3	0.6	1.0	1.3	0.5	0.2	0.0	0.8	0.5	0.5	-0.1	-1.1	0.6	0.3	0.5	0.5	0.8	0.7	-0.1	0.0	0.8	0.6	0.8	0.5	0.7	0.1	0.9	0.45	
AT	0.7	0.6	0.3	0.3	0.1	0.9	-2.0	0.6	0.5	1.2	1.2	0.6	-0.1	0.7	0.6	0.2	0.6	0.8	0.6	0.6	0.1	0.3	0.4	1.1	0.6	1.1	-0.7	0.7	-0.3	1.0	-0.5	0.2	0.8	0.9	0.44	
BG		0.8	0.8	-0.2	-0.2	0.3	-0.6	0.2	0.9	0.1	-0.3	0.3	0.4	-1.5	-2.2	0.1	1.2	1.0	0.5	1.0	-0.9	0.5	1.3	-0.3	1.2	1.1	0.4	0.5	1.0	0.4	3.4	1.3	0.8	-0.1	0.41	
LU	0.9	0.8	0.1			1.1		0.5	0.7	-0.5	1.2			0.7	0.6	0.6	-1.7	0.5	2.7	-1.5	0.2	-0.5	0.0	0.8	0.2	0.9	-0.8	0.7	-0.5	1.1	-0.3		0.6	0.6	0.35	
SK	1.1	0.3	0.3	-0.1	0.3	0.5	0.7	0.3	0.4	0.8	0.4	-1.7	-1.0	0.0	0.4	1.5	0.7	0.1	0.1	0.6	0.2	-1.4	1.2	0.4	0.9	-1.4	2.0	1.1	-0.1	0.7	0.7	1.3	-1.4	0.5	0.30	
FR	0.7	0.2	0.0	0.4	0.2	0.9	0.4	0.5	0.0	0.8	0.9	0.1	0.2	0.6	0.5	0.2	0.4	0.7	-0.1	0.4	0.6	0.3	0.1	0.8	0.5	-0.6	-0.8	0.7	-0.9	0.6	0.4	0.6	-0.9	0.6	0.30	
SE	0.3	0.3	0.2	-0.1	-1.3	0.7	1.3	0.5	1.2	1.1	1.1	1.5	1.3	0.6	-0.2	-1.8	-0.4	0.6	-0.4	0.1	0.7	0.8	-0.7	0.5	0.1	0.3	0.5	0.7	-0.9	0.6	-0.3	0.4	0.2	0.6	0.29	
FI	0.4	0.6	0.1	0.9	1.1	0.5	0.0	-0.1	0.1	0.9	1.1	0.0	-0.6	0.4	0.6	0.0	-1.0	-0.1	-0.2	-1.6	0.3	0.9	0.3	0.5	-0.1	0.7	-0.7	0.5	0.9	0.0	0.4	0.7	0.5	0.6	0.25	
NL	0.0	0.6	0.2	1.0	0.6	0.5	1.0	0.3	0.3	0.0	0.1	-0.1	0.1	0.6	0.1	-0.5	0.1	0.0	0.4	0.0	0.4	-0.2	-0.3	0.4	0.6	0.0	0.0	0.3	1.2	0.6	0.3	-0.3	-0.5	0.5	0.25	
HU	-0.3	-2.8	-1.2	0.2	1.1	0.4	-0.6	1.2	0.8	-0.2	-0.5	0.9	1.6	3.1	0.8	-0.5	0.7	0.0	0.1	0.5	0.4	-1.0	0.7	0.4	0.1	0.9	2.5	-0.7	-0.7	-0.1	-0.9	-0.2	0.8	0.4	0.23	
MT	0.6	0.2	-0.8			0.4		1.0	1.1	1.0	1.0			0.7	-0.9	0.0	0.1	-0.8	0.1	-0.2	0.7	-0.2	-0.3	1.1	1.0	-0.6	-1.5	0.6	0.0	1.6	-0.6		-0.3	1.0	0.21	
CZ	0.3	0.6	0.4	-1.7	-1.6	0.8	-1.1	0.5	0.7	0.5	1.0	1.2	0.7	-0.8	0.6	0.4	0.1	-0.8	0.3	0.0	0.4	0.0	0.2	0.6	0.6	-1.5	-0.2	0.9	1.2	0.5	0.6	0.7	-0.2	0.7	0.19	
UK	-0.8	0.1	0.2	-0.2	0.2	0.3	-0.4	0.0	-0.6	0.0	0.3	0.6	0.5	0.1	0.8	0.2	0.1	-0.9	0.4	0.1	0.9	0.6	-1.4	0.6	0.2	0.7	-1.8	0.2	0.5	0.5	0.0	-0.6	0.8	0.6	0.09	
IT	0.8	-1.8	-0.2			-0.1		0.6	0.0	0.7	0.1			0.2	-0.2	0.4	0.0	0.1	0.3	0.3	0.1	0.2	0.2	0.3	-0.3	0.2	0.3	-0.2	0.3	-0.9	-0.5	-0.7	0.8	-0.1	0.03	
PT	-0.9	-1.4	-1.1	-0.4	0.5	-0.5	2.2	-0.1	-1.3	-0.6	0.5	-0.6	-0.4	-0.1	0.3	0.0	1.0	0.8	0.0	0.6	0.0	0.1	-1.0	-0.7	-0.1	1.1	0.3	-0.4	1.8	0.3	-0.1	-0.2	0.8	-0.3	0.00	
RO		-2.6	2.6			-0.1		0.1	0.3	-0.4	-2.1			-0.5	-2.4	-1.8	1.8	0.6	0.3	-1.7	-0.3	0.8	1.0	0.8	0.9	-1.2	0.4	0.2	0.9	-0.4	1.2	0.0	0.2	0.9	-0.01	
DK	-0.3	-0.1	0.4	0.5	0.1	0.4	0.1	-0.2	0.6	-0.6	-0.1	0.6	0.8	0.5	0.2	-1.1	0.1	-4.1	0.0	0.9	0.5	-1.1	0.8	0.1	0.2	0.3	-0.9	0.3	-1.5	0.5	0.1	0.7	0.0	0.4	-0.03	
SI	0.6	0.2	0.0	-0.7	-0.6	-0.6	0.7	-1.3	-1.2	0.4	-0.2	-1.1	-1.1	0.5	-0.6	-0.5	-1.3	0.3	0.2	1.5	-0.6	0.9	-0.4	-0.2	0.0	-0.3	0.5	0.4	-0.2	0.3	-0.3	-0.3	-0.9	0.1	-0.16	
HR		-0.5	0.2	2.6	1.5	0.0	-1.5	0.4	-0.7	0.2	-0.3	0.6	0.5	-0.5	-1.4	0.7	-1.3	0.0	0.0	-1.0	-0.1	-3.2	-0.6	-0.6	-0.6	0.5		-0.9	-0.2	-1.1		0.6	0.9	-0.3	-0.20	
ES		0.2	0.4	-0.4	0.6	-0.6	-0.1	-0.9	-1.4	-0.9	-1.0	-0.1	-0.2	0.4	-0.3	0.9	1.0	0.1	0.6	-0.3	0.5	1.7	0.1	-1.6	-0.2	-0.2	1.1	-0.8	-1.6	-1.0	-1.0	-0.6	-1.2	-2.2	-0.28	
EE	-0.2	0.1	0.7	0.1	0.4	-1.2	-1.0	0.4	1.1	-0.2	-1.5	0.7	0.6	-1.1	-0.9	2.0	-0.3	-1.0	-0.2	0.6	0.0	-0.2	1.6	-1.4	-1.9	-0.5	-0.2	-2.0	-0.9	-0.7	-0.5	0.1	-1.1	-1.2	-0.29	
LT	-0.4	1.4	0.6			-0.8		-0.1	0.3	-0.6	-0.9			-2.1	0.7	0.8	0.2	0.0	0.6	-0.9	0.0	1.2	-0.3	-1.0	-0.8	0.1	-1.3	-1.4	-1.8	-0.9	-0.8	-0.3	0.8	-1.4	-0.32	
IE	-2.2	0.7	0.7	-1.1	-0.7	-0.6	-1.2	-4.3	-2.7	-1.9	-1.7	-0.6	0.5		-0.3	0.9	1.3	0.2	-0.1	-2.9	0.8	-0.1	-0.1	0.8	-1.4	-0.2	0.5	-0.3	0.0	0.9	-1.7	-1.3	0.4	0.2	-0.8	-0.54
LV	-3.1	-0.2	-1.4			-1.6		-0.2	-0.3	-1.8	-1.5			-2.1	-1.2	0.5	-2.0	-0.1	-0.3	-2.9	0.3	-0.5	-0.6	-1.6	-2.1	-0.1	0.6	-2.2	-0.6	-0.8	-0.8	-1.1	0.8	-1.4	-0.97	
CY	0.5	0.1	-0.7	-2.3	-3.0	-1.8	0.8	-0.8	-0.9	-2.7	0.0	-2.5	-3.2	-0.7	1.8	-1.0	0.3	0.7	-2.6	0.2	-4.4	-1.7	-2.7	-1.3	0.0	-0.8	-0.4	0.2	-1.3	-2.2	-0.4	-2.2	-1.4	-1.2	-1.10	
EL	-0.7	-0.4	-3.4	1.0	0.7	-2.9	0.1	-0.2	-1.9	-0.5	-1.2	-1.5	-1.2	0.0	0.6	0.3	-2.4	-0.2	-0.2	-0.4	-1.5	0.3	-2.2	-2.0	-3.1	-3.2	-0.5	-2.4	0.0	-1.9	-1.5	-3.0	-3.2	-2.4	-1.21	

# Visualizing the three main resilience indicators

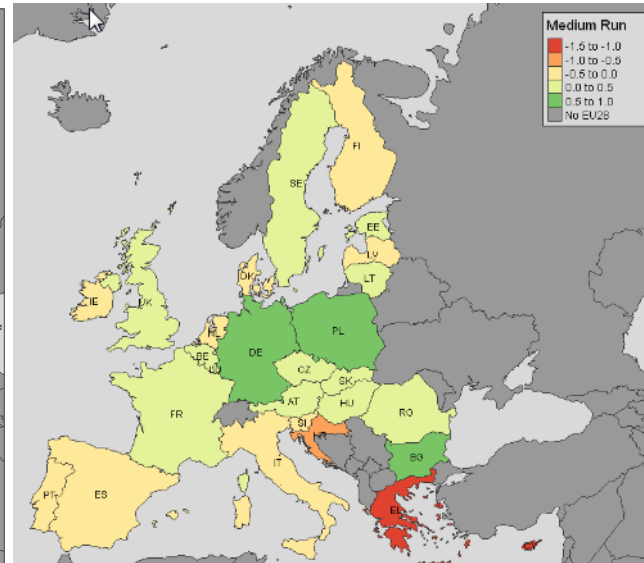
Good absorption does not necessarily imply good adaptation and vice-versa



**IMPACT**

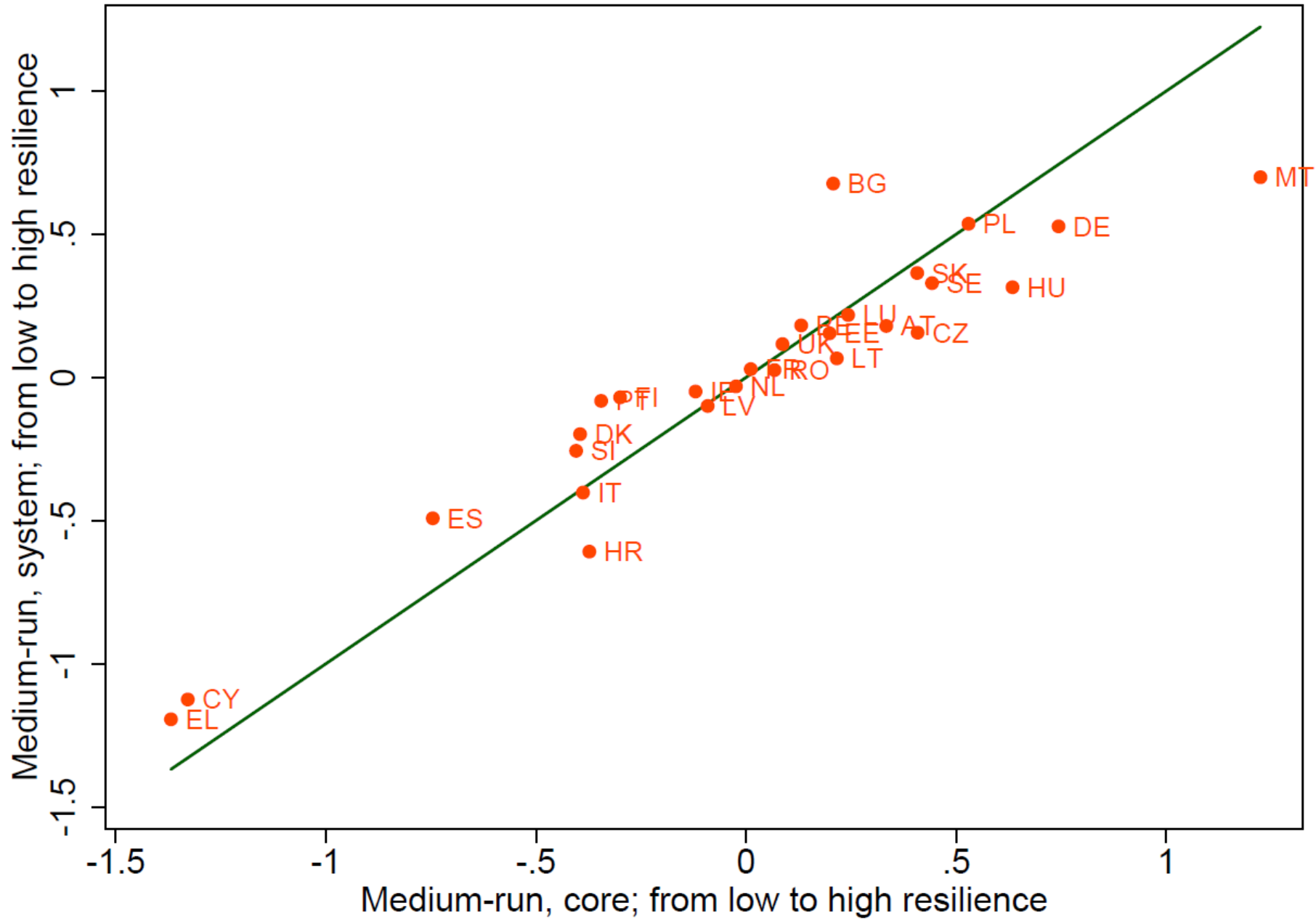


**RECOVERY**

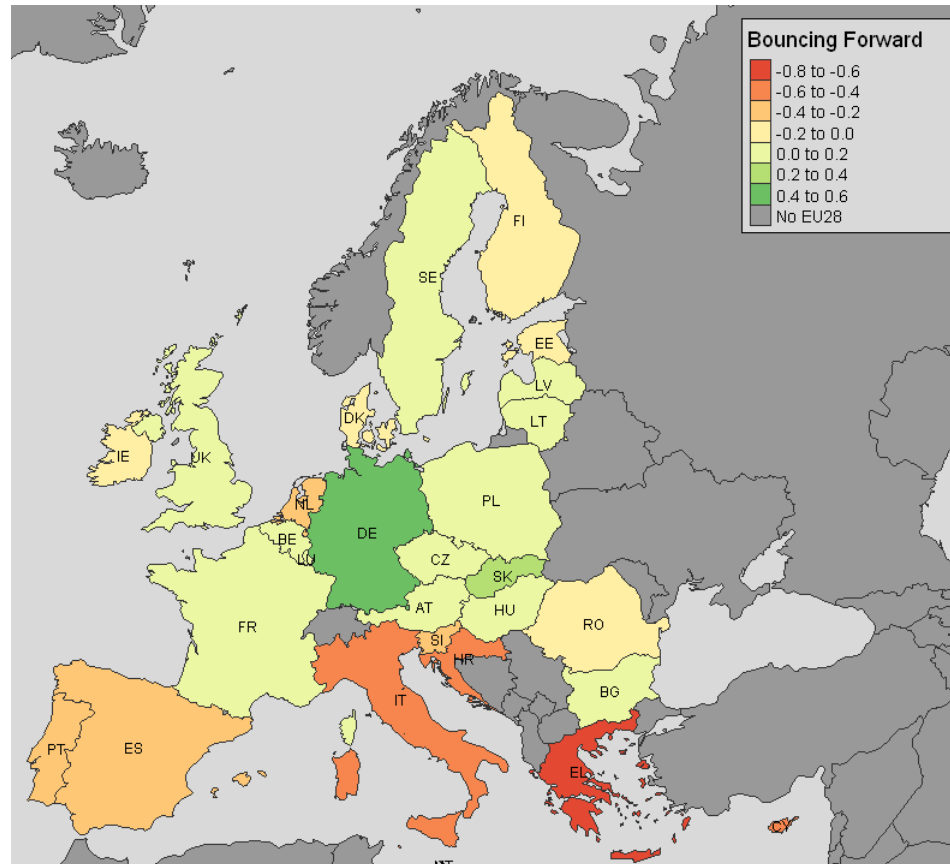


**MEDIUM RUN**

## Core versus system: the system view matters



**Some countries managed to bounce forward and improve their situation compared to the pre-crisis period, but not all.**



**BOUNCING FORWARD**

# Measurement strategy: a three-step-approach towards a dashboard



**System variables**



**Indicators of resilience**



**Resilience characteristics**

# Step 3: Characteristics of resilience

**Resilience characteristics** are features of countries that influence their resilience.

They cover broad aspects of the society, institutions and policies.

Pre-determined, multi-year averages, that can be monitored continuously, even in the absence of a shock.

Broad aggregation	Example of variables
Government expenses	<ul style="list-style-type: none"><li>- Social expenditure</li><li>- Expenditure on education</li><li>- R&amp;D expenditure</li><li>- Exp. on labour market programmes</li></ul>
Education	<ul style="list-style-type: none"><li>- PISA results</li><li>- Population with tertiary education</li></ul>
Quality of Government	<ul style="list-style-type: none"><li>- Ease of doing business</li><li>- Government effectiveness</li><li>- Political stability</li><li>- Regulatory quality</li><li>- Rule of law</li><li>- Trade openness</li><li>- Voice and accountability</li></ul>
Digital development	<ul style="list-style-type: none"><li>- Connectivity</li><li>- Digital skills</li><li>- Integration of digital technology</li></ul>
Health status	<ul style="list-style-type: none"><li>- Chronic illness</li><li>- Fertility rate</li></ul>
Innovation and R&D	<ul style="list-style-type: none"><li>- Eco-innovation index</li></ul>
Economic performance	<ul style="list-style-type: none"><li>- GDP growth</li><li>- Investment share</li><li>- Government indebtedness</li></ul>
Gender equality	<ul style="list-style-type: none"><li>- Gender equality index</li></ul>
Labour market	<ul style="list-style-type: none"><li>- Employment rate</li><li>- Unemployment rate</li><li>- Share of routine</li></ul>
Social cohesion	<ul style="list-style-type: none"><li>- Trust towards institutions</li><li>- Trust towards your neighbour</li><li>- Perception of fairness</li><li>- Poverty</li></ul>

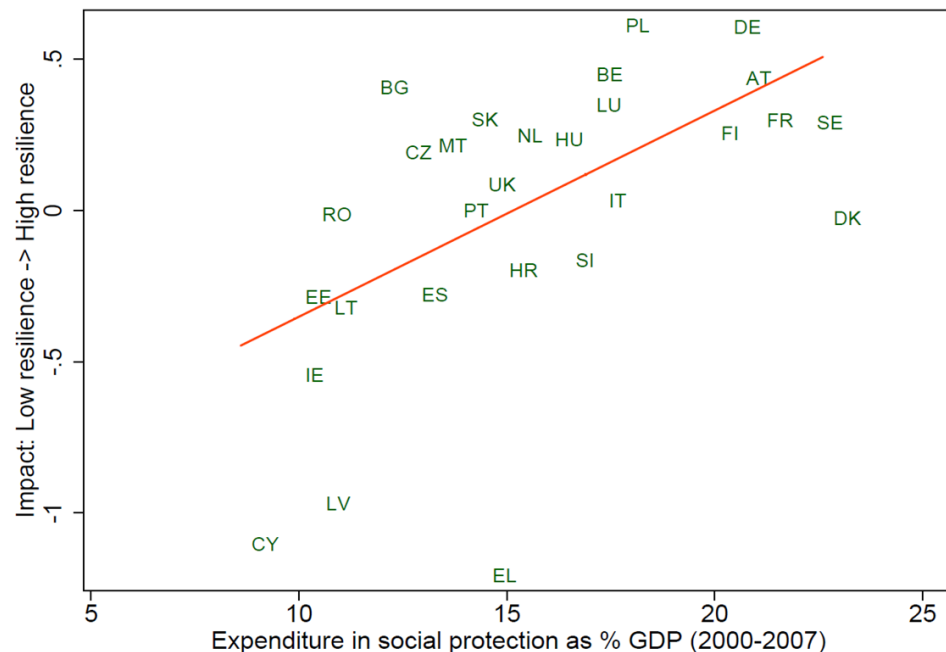
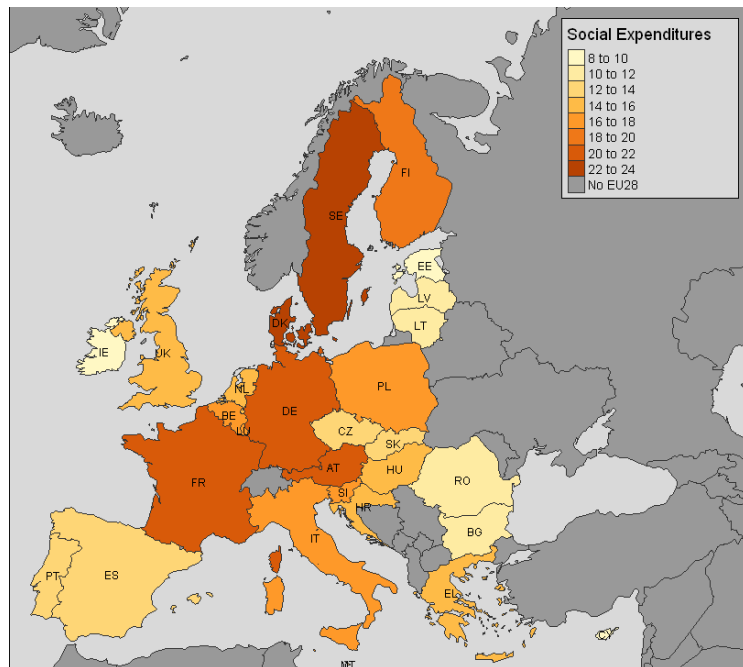
# Characteristics for the three resilience indicators

## Regression results

	UNIVARIATE		BIVARIATE	
	Selected variables	Adjusted R <sup>2</sup>	Selected variables	Adjusted R <sup>2</sup>
<b>Panel A. Impact</b>	- Social expenditures (2000-2007)*** - Total government expenditures (2000-2007)**	0.301 0.160	- Social expenditures (2000-2007)*** & Trade openness (2005-2007)	0.345
<b>Panel B. Medium-run</b>	- Political stability (2008-2010)** - Trade openness (2008-2010)**	0.181 0.116	- Political stability (2008-2010)*** & GDP level (2005-2007)**	0.301
<b>Panel C. Bouncing forward</b>	- Political stability (2008-2010)** - Ease of doing business (2010)*	0.142 0.104	- GDP level (2000-2007)*** & Voice and Accountability (2005-2007)***	0.275

\*\*\* significant at 1%, \*\* significant at 5% and \* significant at 10%

## Expenditures in social protection as prime resilience characteristic



# A purely illustrative dashboard

	IMPACT								
	Expenditure in social protection			Gender Equality Index			Non routine manual workers		
	2000-2007	2013-2015	Change	2005	2015	Change	2000-2007	2014-2016	Change
A	16.9	18.9	2.0	64.4	69.0	4.59	21.3	19.0	-2.334
B	13.7	18.8	5.1	49.9	56.0	6.15	29.6	29.8	0.187
C	8.6	12.0	3.4	45.9	55.1	9.15	33.2	35.5	2.316
D	17.2	21.3	4.1	49.2	62.1	12.90	23.1	29.2	6.098
E	15.0	16.8	1.8	67.8	72.9	5.07	22.1	28.4	6.310
F	16.4	18.0	1.6	60.8	68.4	7.64	18.8	21.9	3.060
G	15.9	15.6	-0.2	49.5	50.8	1.38	22.9	26.5	3.583
H	12.3	13.1	0.8	53.6	53.6	0.05	18.4	20.9	2.457
I	22.6	24.0	1.4	74.6	76.8	2.21	27.5	31.7	4.249
J	10.6	11.3	0.7	55.8	56.8	1.01	26.0	23.7	-2.242
K	17.6	16.1	-1.5	52.4	56.8	4.41	22.8	22.6	-0.214
L	10.3	11.5	1.2	49.9	52.4	2.55	24.8	30.3	5.480
M	13.9	15.1	1.2	52.5	52.4	-0.18	23.4	27.5	4.098
N	10.4	11.5	1.2	53.4	57.9	4.42	28.8	28.3	-0.502
O	20.5	21.6	1.1	59.5	63.3	3.84	24.9	26.8	1.944
P	9.9	12.3	2.4	52.2	56.7	4.52	23.6	21.5	-2.195
Q	12.7	17.6	4.9	62.2	68.3	6.18	30.7	36.3	5.553
R	14.4	20.1	5.7	46.8	50.0	3.12	23.3	34.3	10.951
S	11.7	13.4	1.7	56.0	58.0	1.96	27.8	32.4	4.586
T	20.2	18.9	-1.3	60.0	65.5	5.43	20.1	22.4	2.207

	MEDIUM RUN					
	Political stability			Openess to trade		
	2008-2010	2013-2015	Change	2008-2010	2014-2016	Change
A	1.5	1.4	-0.090	318.6	400.0	81.399
B	0.8	0.8	-0.007	66.8	79.7	12.926
C	0.5	0.5	0.062	107.8	127.5	19.653
D	0.4	0.4	-0.012	50.9	56.3	5.427
E	0.9	1.0	0.132	129.7	154.8	25.097
F	1.0	0.9	-0.039	124.6	145.3	20.625
G	0.6	0.7	0.095	153.8	169.8	16.047
H	0.9	1.0	0.043	122.2	155.5	33.226
I	1.0	0.9	-0.091	96.2	101.7	5.479
J	0.7	0.8	0.123	121.3	153.3	31.974
K	0.9	0.9	-0.021	79.4	96.7	17.355
L	0.3	0.1	-0.119	66.3	83.1	16.722
M	1.0	1.0	0.035	151.2	183.5	32.203
N	0.4	0.5	0.159	95.9	121.0	25.106
O	1.2	1.3	0.057	96.1	102.3	6.225
P	0.6	0.7	0.149	132.7	156.5	23.885
Q	-0.4	0.2	0.579	51.5	63.2	11.628
R	0.0	-0.2	-0.147	53.3	64.1	10.760
S	0.3	0.1	-0.252	107.0	127.6	20.562
T	0.8	0.9	0.008	77.0	84.8	7.865

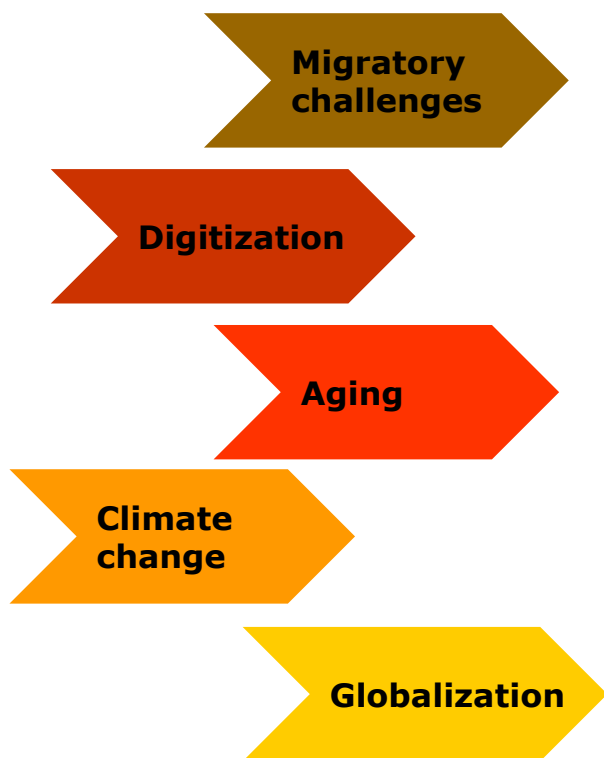
	BOUNCING FORWARD					
	Ease of doing business			Voice and accountability		
	2010	2017	Change	2008-2010	2013-2015	Change
A	65.7	68.8	3.140	1.5	1.6	0.013
B	70.3	77.4	7.130	1.1	1.1	-0.045
C	66.6	72.7	6.100	1.1	1.0	-0.045
D	66.1	72.3	6.130	1.0	1.0	-0.016
E	75.2	76.4	1.180	1.5	1.6	0.075
F	62.8	76.1	13.390	1.0	1.0	-0.072
G	65.4	73.1	7.680	0.9	0.6	-0.324
H	63.2	76.7	13.520	1.0	1.0	-0.005
I	84.2	84.9	0.630	1.6	1.6	0.020
J	73.4	80.6	7.260	0.9	1.0	0.085
K	63.0	77.8	14.850	1.0	1.0	0.056
L	64.1	74.3	10.200	0.5	0.4	-0.084
M	68.7	75.6	6.880	0.9	1.0	0.067
N	73.4	78.8	5.420	0.8	0.8	0.011
O	76.4	78.9	2.560	1.4	1.4	0.002
P	76.0	81.1	5.080	1.1	1.1	0.063
Q	68.2	75.7	7.550	1.2	1.0	-0.163
R	62.4	68.7	6.230	0.9	0.6	-0.274
S	68.3	73.5	5.260	0.5	0.4	-0.193
T	79.5	79.9	0.380	1.3	1.4	0.100



It offers entry points for monitoring resilience and for policy interventions.



# The JRC framework can be adapted to assess resilience against different shocks and persistent structural changes/stress



*Resilience is “a broad concept encompassing all individuals and the whole of society” that features “democracy, trust in institutions and sustainable development, and the capacity to reform”.*

***EU Global Strategy, 2016  
Joint Communication on Resilience, 2017***

# The way forward

- Finalize and publish the **Pilot case analysis at country level**
- Expand the work at **regional level**
- Resilience to the challenge of **migration**
- Resilience to the challenge of **digitization**

# Thank you and stay in touch



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