

**IEFE**

Centre for Research on Energy and Environmental Economics and Policy



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# Energy Networks M&A: Does Ownership Matter?

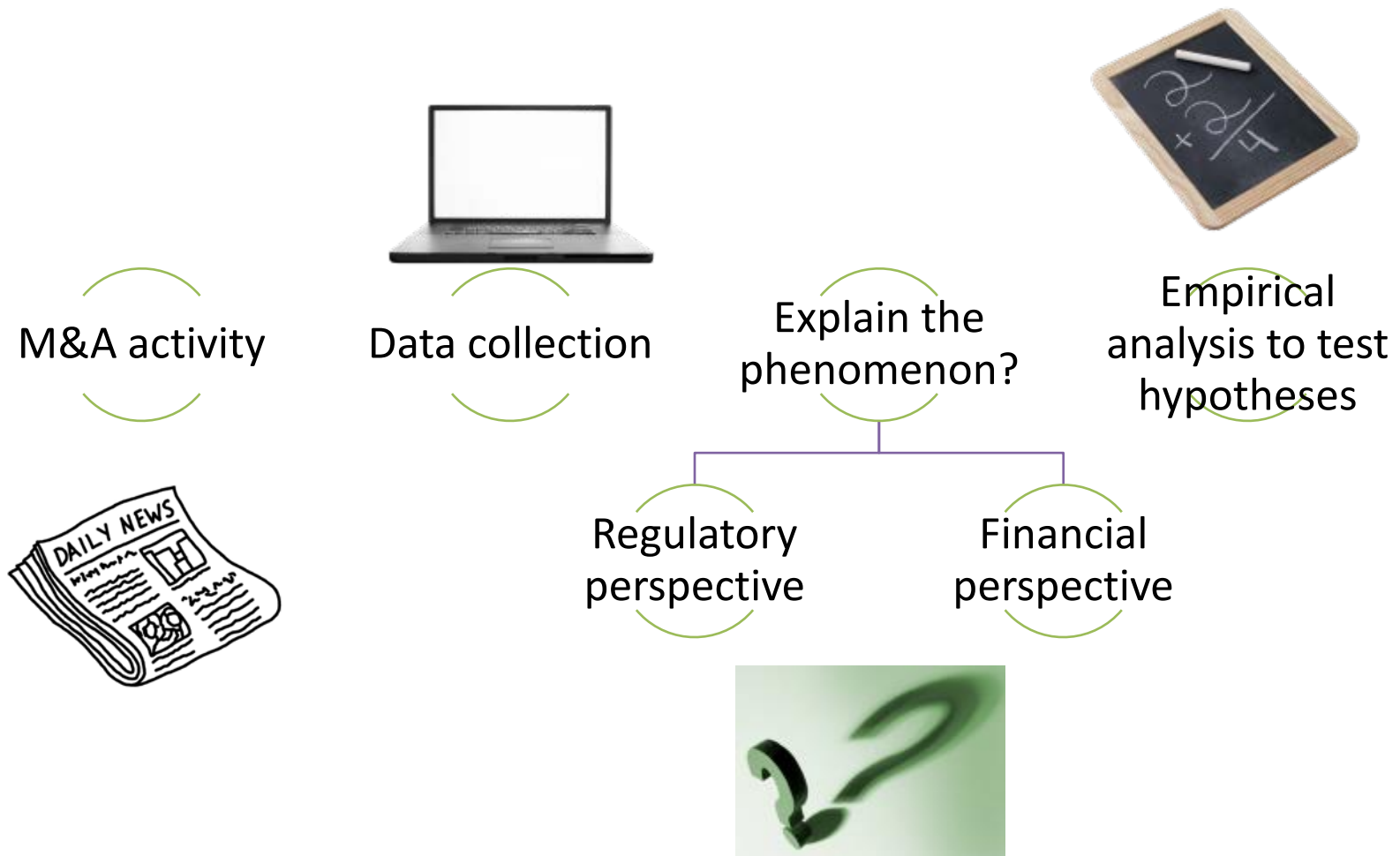
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joint with Matteo Di Castelnuovo

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# The paper in a nutshell



# Why do energy networks matter?

- Networks are the pillars of the architecture in the European Energy Union.
- Infrastructures have been playing an increasingly relevant role as they are required to provide:
  - More capacity (e.g. physical and virtual capacity)
  - More technology (e.g. smart grids, reverse flow)
  - More services (e.g. capacity market, hubs).
- Their importance is bound to increase due to EC's targets for its climate and energy policies.
- EU energy infrastructures face increasing financial pressure from the evolution in the market
  - E.g. decreasing regulatory incentives, lower demand, higher consumer bills, distributed generation, etc.
  - E.g. 2 In Italy network costs account for 18% in a typical gas bill of 1150 Euros and an electricity bill of 530 Euros.

# Regulatory milestones

1. Infrastructure Package (2013): “Modernise and expand Europe’s energy infrastructure [...] interconnect networks across borders”
  - Investment required up to 2020 in electricity and gas network infrastructures estimated at about EUR 200 billion (100 bn electricity, 40 bn smart grids and 70 bn gas)
  - Projects of Common Interest (PCI), based on priority corridors, with faster permit procedure and eligible for EUR 9.1 billion of EU funding (Connecting Europe Facility).
2. Third Energy Package (2009): separation of production/supply from networks
  - Three models with different extents of separation:
    - ISO (Independent System Operator)
    - ITO (Independent Transmission Operator)
    - OU (Ownership Unbundling), the “strongest”(e.g. Snam Rete Gas)

# Background

- Following unbundling:
  - Increasing number of M&A activities targeting energy network infrastructures.
  - Acquisitions of European energy network companies mainly carried out by other energy network companies (NC, typically from other countries) and financial investors (FI) such as pension funds.
- Concerns may arise as:
  - What if different types of owners will have different objectives (expectations from the investment) and different investment behaviours?
  - Increasing transaction costs for the presence of a plurality of owners that require coordination.

# Anecdotal evidences

## Example 1

In 2012 SGCC, the Chinese transmission and distribution company, purchased 25% of REN, the Portuguese power and gas grid company, from the Portuguese government for approximately € 390 million.

## Example 2

In 2012 a consortium of financial institutions (Macquarie, British Columbia Investment, Abu Dhabi Investment and MEAG Munich) bought Open Grid Europe, a German gas transport network owned by E.ON for € 3.2 billion.

## Example 3

In 2011 Fluxys, the Belgian gas transmission system operator (TSO), bought ENI's stakes in the TENP (Germany) and Transitgas (Switzerland) gas pipelines for a purchase price of approximately € 860 million.

# Research agenda

Tested propositions:

1. The ownership structure of energy network is dramatically changing, with the massive entry of new actors in the market that have heterogeneous fundamentals and thus heterogeneous behaviours. In particular:
2. Different owner types may have heterogeneous investment propensities.

# Methodology

1. Descriptive analysis for research question 1:
  - Analysis of the most relevant characteristics of the deals, useful as a basis to draw some stylized facts.
2. Econometric analysis for dataset 2:
  - Using the results of the descriptive analysis, come out with some educated guess on the consequences of ownership variations.

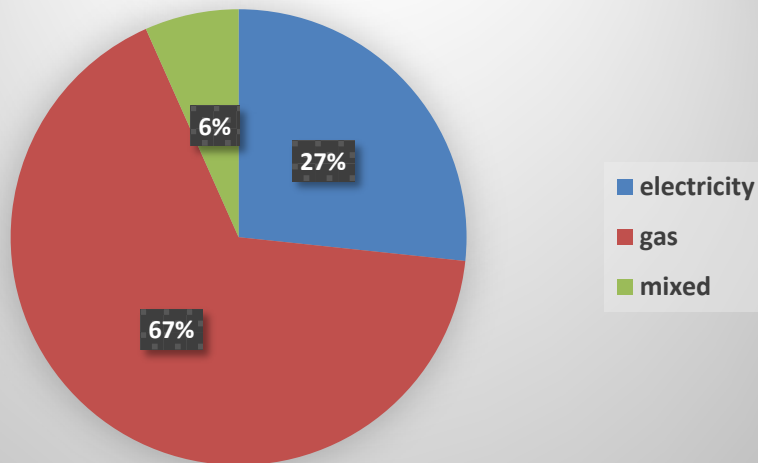


# Data

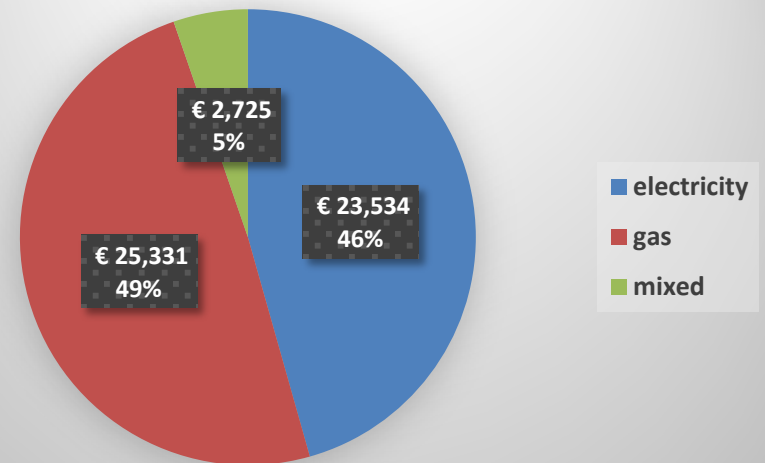
- 2 datasets:
  1. Mapping of M&A activities for gas and electricity, at transmission and (to a lesser extent) distribution level over the period 2008-2015.
  2. Panel of firms: 50 transmission system operators and interconnectors for both gas and power covering 26 European (EU and extra EU) countries over 10 years (2003-2012).
- Data sources:
  - Ownership and M&A activities: financial and economic press, Thomson Reuters and Zephyr (Bureau Van Dijk).
  - Financial statements: Amadeus and Orbis (Bureau Van Dijk) databases; Worldscope database.

# Research question 1

Number of deals per sector (%)

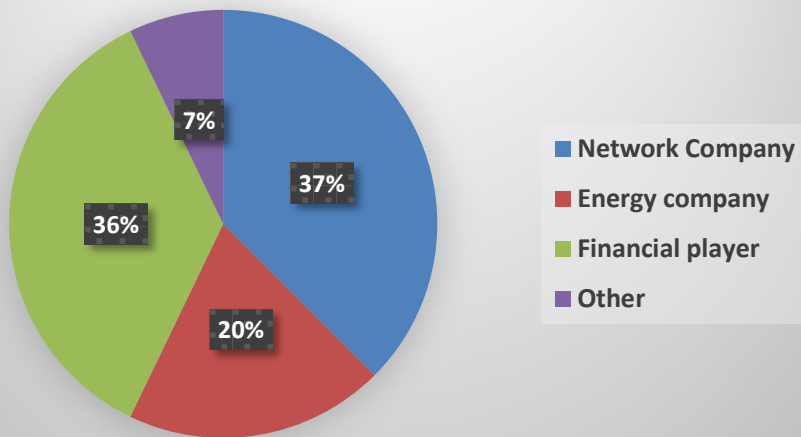


Deal value per sector

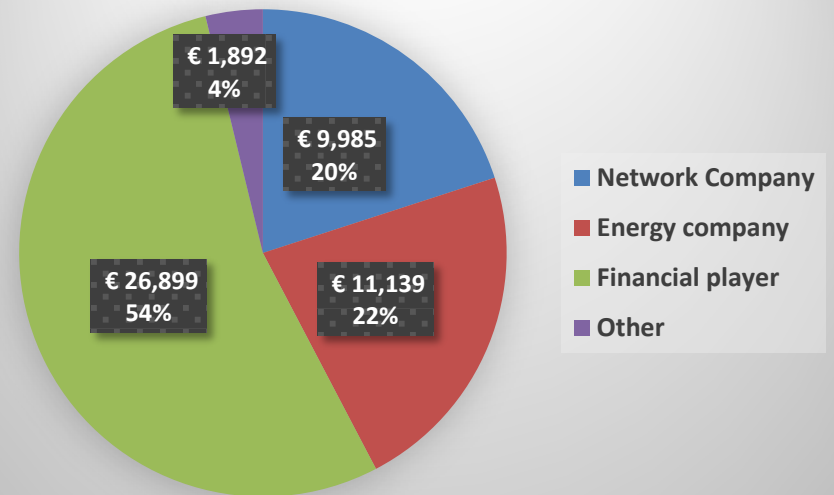


# Descriptive analysis

Number of deals by acquirer type (%)

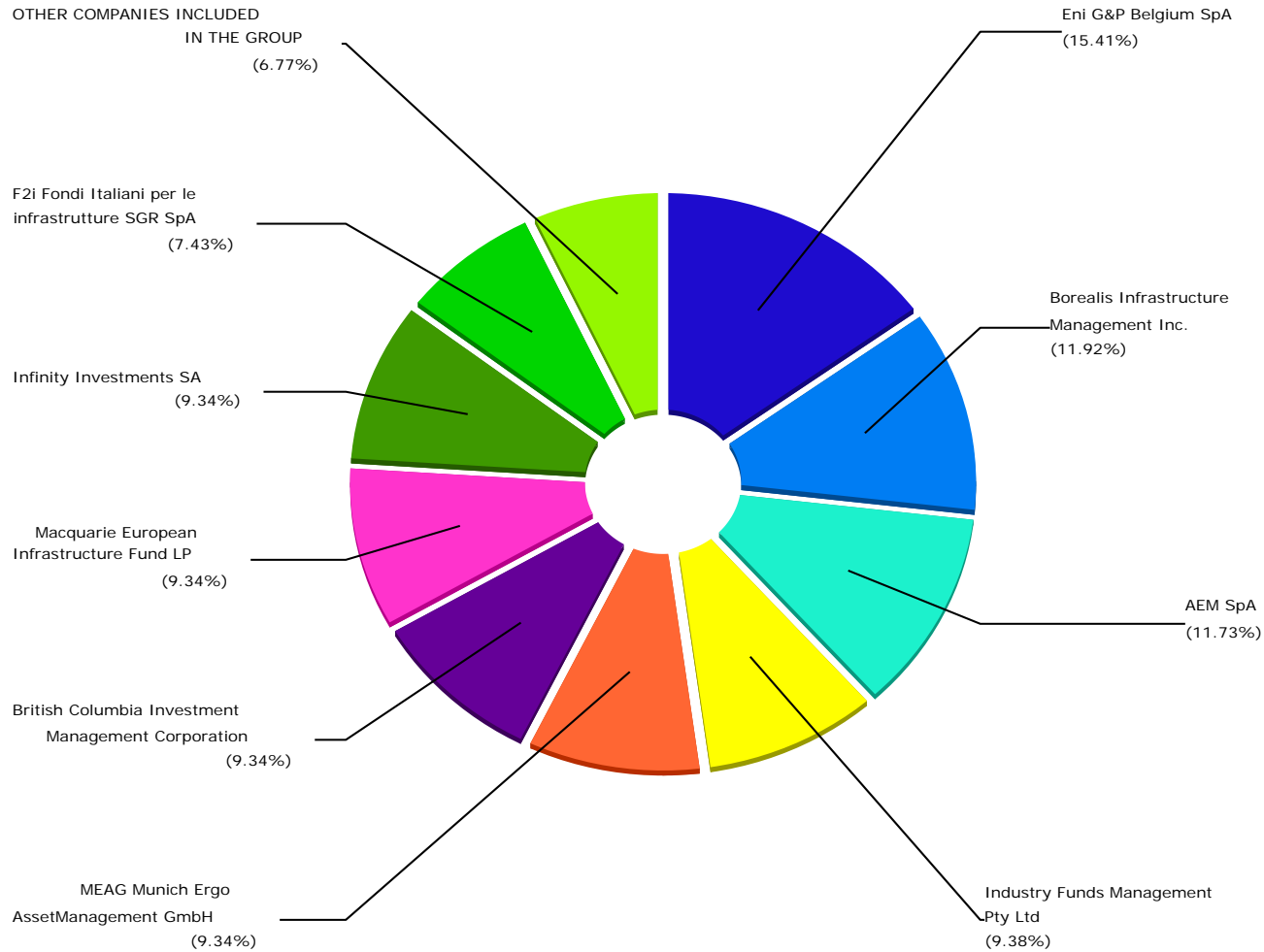


Deal value by acquirer type



# Top ten ACQUIRERS by deal value

## Electricity and gas, transmission and distribution networks



Breakdown of total value. Source: Zephyr, BvD.  
Years: 2008-2015

# Top ten ACQUIRERS by deal value

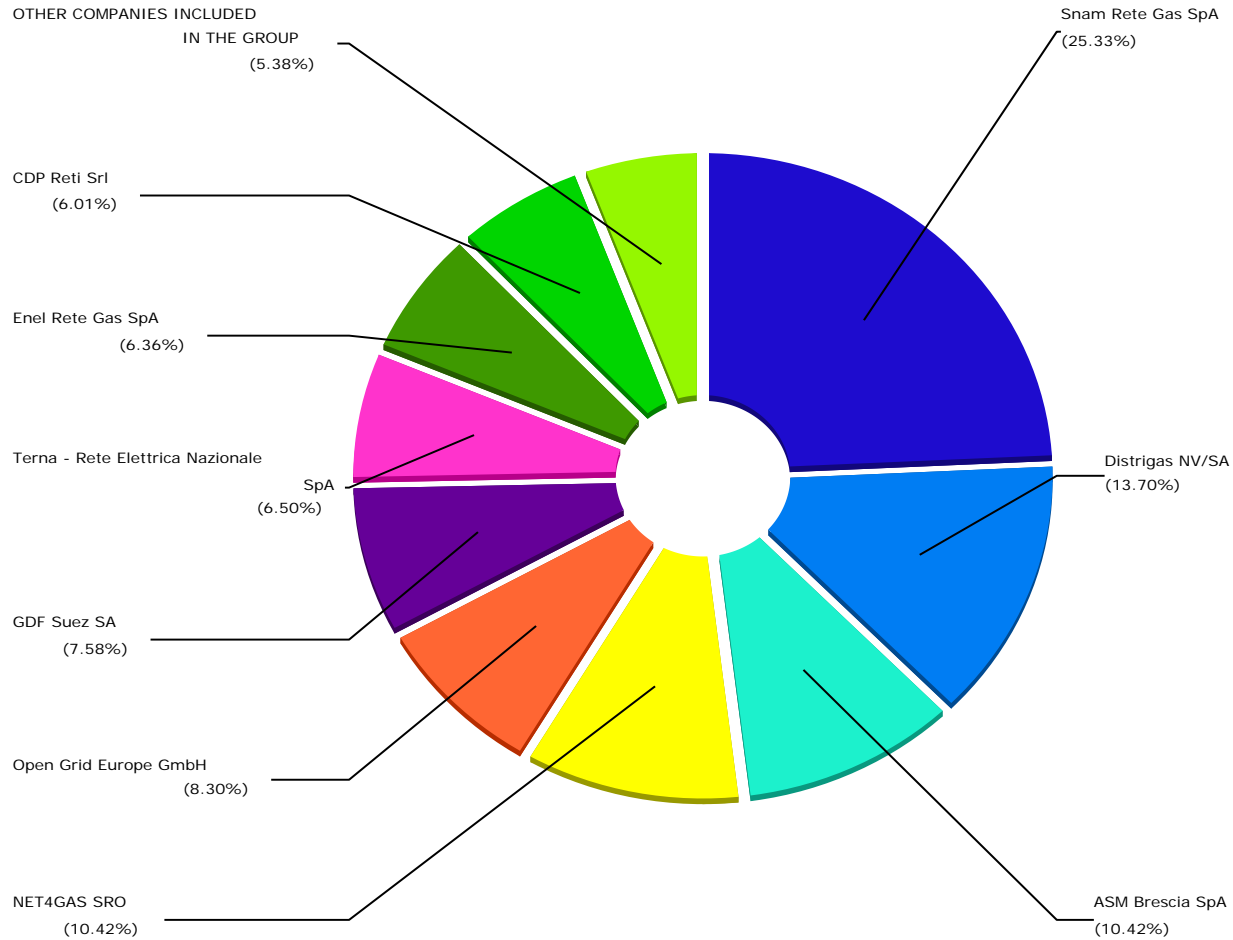
## Electricity and gas, transmission and distribution networks



Breakdown of total deal value. Source: Zephyr, BvD.  
Years: 2008-2015

# Top ten TARGETS by deal value

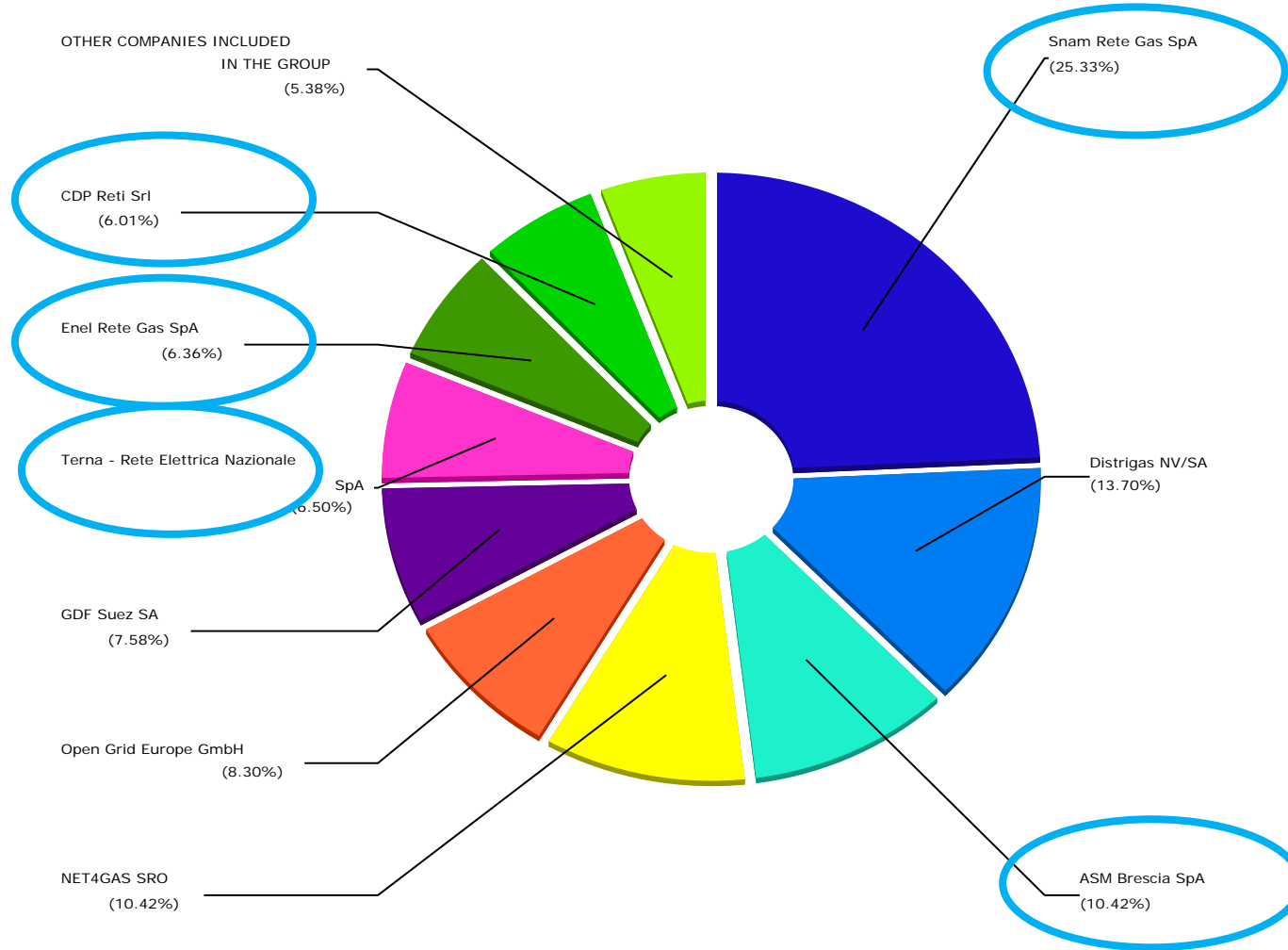
## Electricity and gas, transmission and distribution networks



Breakdown of total deal value. Source: Zephyr, BvD.  
Years: 2008-2015

# Top ten TARGETS by deal value

## Electricity and gas, transmission and distribution networks

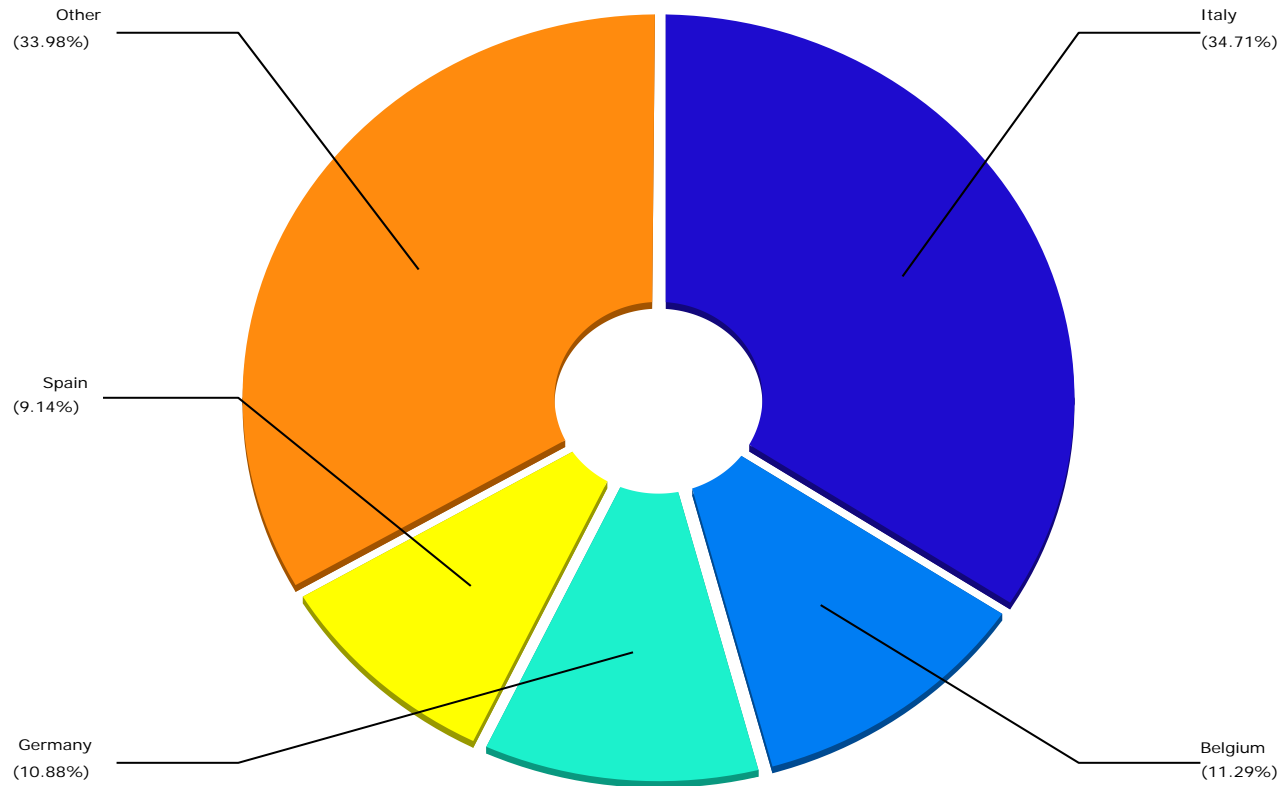


Breakdown of total deal value. Source: Zephyr, BvD.  
Years: 2008-2015

# Deal value by COUNTRY

## Electricity and gas, transmission and distribution networks

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*Breakdown of total deal value. Source: Zephyr, BvD.  
Years: 2008-2015*



# Res. question 2: econometric model specification

- Microeconomic literature on company investment (among others, Fazzari et al., 1988 and Cambini and Rondi, 2011):

$$\frac{I_{i,t}}{A_{i,t-1}} = \alpha_i + \alpha_t + \beta_1 I r_{t-1} \beta_2 \frac{CF_{i,t}}{A_{i,t-1}} + \beta_3 LTurnover + \beta_4 ROA + \beta_5 Ownership_{i,t} + \varepsilon_{i,t}$$

- $I r$  = investment propensity
- Country/year fixed effects
- $CFr$  = measure of markets imperfections that constrain investment decisions to the amount of internal funds
- $LTurnover$ : ratio of lagged turnover over lagged fixed assets; accounts for size and demand growth
- $ROA$ : measure of how effective a company's assets are in generating revenue

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- 3 ownership variables, NC, En, Fin, specified in a number of ways:
  - As percentages;
  - As decimals;
  - As log transformation;
  - As dummies.

## Results: OLS

	(1) OLSa	(2) OLSB	(3) OLSc
Ir_1	0.0750* (0.0295)	0.0739* (0.0294)	0.0744* (0.0294)
CFr	0.4419* (0.2235)	0.4764* (0.2236)	0.4709* (0.2226)
LTurnover	-0.1184*** (0.0214)	-0.1166*** (0.0213)	-0.1167*** (0.0213)
ROA	0.0028 (0.0029)	0.0022 (0.0028)	0.0023 (0.0028)
NCOwn	0.0008 (0.0010)	-0.0009 (0.0010)	
FinOwn	0.0026** (0.0010)		0.0012 (0.0011)
EnOwn		-0.0028** (0.0009)	-0.0019 (0.0011)
_cons	0.9325*** (0.0538)	0.8038*** (0.0533)	0.8589*** (0.0545)
N	229	229	229
r2	0.2693	0.2757	0.2769
F	13.6353	14.0870	14.1700

Standard errors in parentheses

\* p<0.05, \*\* p<0.01, \*\*\* p<0.001

# Results: OLS and Country, Year and Firm Fixed Effects

	(1) (OLS)	(2) (Country FE)	(3) (Year FE)	(4) (Country&Y~)	(5) cofirmFe
Ir_1	0.0750* (0.0295)	0.0230 (0.0291)	0.0788** (0.0297)	0.0285 (0.0290)	0.0041 (0.0286)
CFr	0.4419* (0.2235)	0.3709 (0.2432)	0.4052 (0.2282)	0.3214 (0.2441)	0.2822 (0.2498)
LTurnover	-0.1184*** (0.0214)	-0.1377*** (0.0271)	-0.1186*** (0.0213)	-0.1400*** (0.0268)	-0.1114 (0.0645)
ROA	0.0028 (0.0029)	-0.0004 (0.0035)	0.0021 (0.0029)	-0.0018 (0.0035)	0.0008 (0.0037)
NCOwn	0.0008 (0.0010)	-0.0002 (0.0016)	0.0009 (0.0010)	0.0001 (0.0016)	-0.0008 (0.0035)
FinOwn	0.0026** (0.0010)	0.0002 (0.0016)	0.0025** (0.0010)	0.0006 (0.0016)	0.0021 (0.0035)
N	229	229	229	229	229
r2	0.2693	0.4378	0.3029	0.4800	0.5519
F	13.6353	8.0776	7.1866	4.7654	4.7426

Standard errors in parentheses

\* p<0.05, \*\* p<0.01, \*\*\* p<0.001

## Results: Fixed Effects Specifications

	(1) FE1	(2) FE2	(3) FE3
Ir_1	0.0041 (0.0286)	0.0040 (0.0286)	0.0044 (0.0286)
CFr	0.2822 (0.2498)	0.2870 (0.2511)	0.2765 (0.2518)
LTurnover	-0.1114 (0.0645)	-0.1104 (0.0647)	-0.1109 (0.0648)
ROA	0.0008 (0.0037)	0.0008 (0.0037)	0.0006 (0.0037)
NCOwn	-0.0008 (0.0035)		-0.0018 (0.0077)
FinOwn	0.0021 (0.0035)	0.0023 (0.0035)	
EnOwn		0.0011 (0.0040)	-0.0012 (0.0086)
_cons	0.9752*** (0.1229)	1.0118*** (0.1127)	0.8954** (0.2749)
N	229	229	229

# Results: Random Effect Specifications

(1) RE1	(2) RE2	(3) RE3
0.0438 (0.0282)	0.0456 (0.0282)	0.0451 (0.0282)
0.3968 (0.2214)	0.4219 (0.2203)	0.4258 (0.2213)
-0.1267*** (0.0244)	-0.1252*** (0.0240)	-0.1252*** (0.0241)
0.0025 (0.0030)	0.0022 (0.0029)	0.0021 (0.0029)
0.0011 (0.0012)		-0.0008 (0.0012)
0.0028* (0.0012)	0.0012 (0.0014)	
	-0.0021 (0.0013)	-0.0030** (0.0011)
0.9741*** (0.0622)	0.8869*** (0.0610)	0.8323*** (0.0590)
229	229	229

## FE and RE comparison

	(1) FE1	(2) RE1
Ir_1	0.0041 (0.0286)	0.0438 (0.0282)
CFr	0.2822 (0.2498)	0.3968 (0.2214)
LTurnover	-0.1114 (0.0645)	-0.1267*** (0.0244)
ROA	0.0008 (0.0037)	0.0025 (0.0030)
NCOwn	-0.0008 (0.0035)	0.0011 (0.0012)
FinOwn	0.0021 (0.0035)	0.0028* (0.0012)
_cons	0.9752*** (0.1229)	0.9741*** (0.0622)
N	229	229

## Results: comparison

	(1) OLS	(2) FE	(3) RE
Ir_1	0.0750* (0.0295)	0.0041 (0.0286)	0.0438 (0.0282)
CFr	0.4419* (0.2235)	0.2822 (0.2498)	0.3968 (0.2214)
LTurnover	-0.1184*** (0.0214)	-0.1114 (0.0645)	-0.1267*** (0.0244)
ROA	0.0028 (0.0029)	0.0008 (0.0037)	0.0025 (0.0030)
NCOwn	0.0008 (0.0010)	-0.0008 (0.0035)	0.0011 (0.0012)
FinOwn	0.0026** (0.0010)	0.0021 (0.0035)	0.0028* (0.0012)
_cons	0.9325*** (0.0538)	0.9752*** (0.1229)	0.9741*** (0.0622)
N	229	229	229

## Methodology 2: Diff-in-Diff

- To rule out the possibility of selection bias, we run DD estimation.
- Card and Krueger, AER 1994: compare the means of the variables of interest before and after a policy treatment.
- Our policy treatment: Unbundling
- Year: 2009

Comparison	<=2009	>2009	
	Mean	Mean	Diff
Unbundling	0.137037	0.427673	<b>0.290636</b>
Fixed_Assets	2582793	3387154	<b>804361</b>
Total_Assets	3123433	4143445	<b>1020012</b>
Turnover	989524.4	1341126	<b>351601.6</b>
ebit	229504.1	294921.6	<b>65417.5</b>
ROA	8.789409	10.39533	<b>1.605921</b>
lr	0.9350021	0.908434	<b>-0.02657</b>
Leverage	0.2208955	0.257419	<b>0.036524</b>
LTurnover	0.6545297	0.672229	<b>0.017699</b>



# Results: Diff-in-Diff (in progress)

R-square: 0.2281

Covariates and coefficients:

Variable(s)	Coeff.	Std. Err.	t	P> t
CFr	3.159	0.424	7.457	0.000
LTurnover	-0.184	0.027	-6.811	0.000
ROA	-0.034	0.004	-8.107	0.000
NC	0.009	0.070	0.135	0.893
En	-0.011	0.076	-0.149	0.882
Fin	-0.055	0.083	-0.664	0.507

## DIFFERENCE IN DIFFERENCES ESTIMATION

Outcome Variable	BASE LINE			FOLLOW UP			DIFF-IN-DIFF
	Control	Treated	Diff(BL)	Control	Treated	Diff(FU)	
Ir	0.777	1.118	0.341	0.828	1.076	0.248	-0.093
Std. Error	0.136	0.091	0.122	0.146	0.101	0.144	0.182
t	5.72	12.26	2.79	5.67	10.67	1.72	-0.51
P> t	0.000	0.000	0.006***	0.000	0.000	0.086*	0.608

\* Means and Standard Errors are estimated by linear regression

\*\*Inference: \*\*\* p<0.01; \*\* p<0.05; \* p<0.1

# Conclusions

- The ownership structure of energy network companies has significantly changed in recent years.
- Divestments are mostly triggered by debt reduction and compliance with the Third Package.
- New types of owners have emerged, i.e. other network companies and various types of financial players.
- Financial players are leading the wave of acquisitions.
- Value of takeovers carried out by financial firms is higher than the value of takeovers by the other companies. It seems that they may have also a higher propensity to invest, but the result is not robust.
- Concerns may arise on the best way to regulate investment in networks, since different owners have different internal funds and cost of capital. Test to assess the investment propensities for the owners.
- The three types of owner did not robustly show heterogeneous investment propensities.
- But the test should be repeated with a more up-to-date dataset!

Thank you for your attention!

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