CONTINUITY OF SUPPLY REGULATION BY INCENTIVES, CUSTOMERS' WILLINGNESS TO PAY AND WILLINGNESS TO ACCEPT: the Italian experience

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A CONCEPTUAL MAP FOR SERVICE QUALITY REGULATION

	MAKE INFORMATION AVAILABLE	PROTECT WORST-SERVED CUSTOMERS	PROMOTE QUALITY IMPROVEMENT	FAVOUR AND TEST MARKET MECHANISMS
COMMERCIAL QUALITY	Publication actual quality levels	Guaranteed quality standards	Telephone response incentives	
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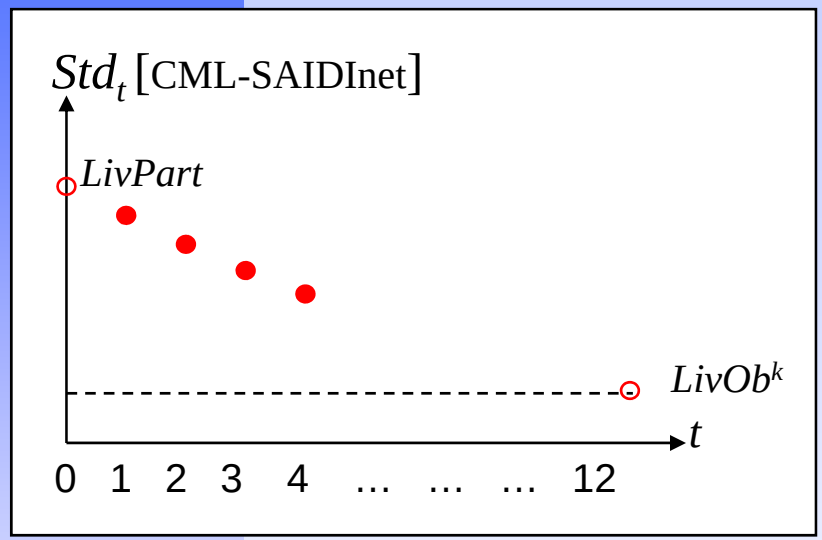
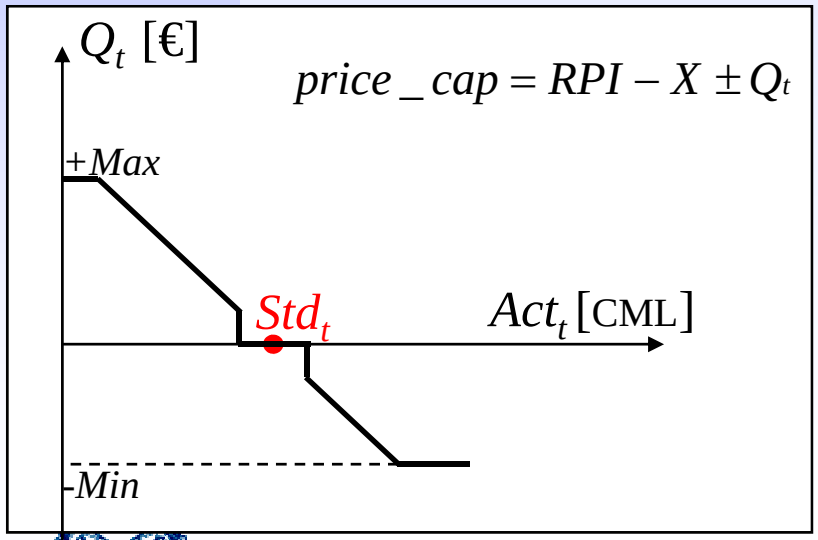
FOCUS ON CUSTOMER SURVEY DONE IN 2003 IN ITALY FOR ASSESSING INCENTIVE/PENALTY PARAMETERS

INCENTIVE REGULATION FOR CONTINUITY OF SUPPLY IN ITALY





FIRST STEP

SETTING STANDARDS AND REWARD/PENALTIES PARAMETERS

- *Ex-ante* for 4 years
- Reference to long-term objectives
- Reward/penalty parameters are based on WTP customer survey

FURTHER STEPS

COMPARING ACTUAL LEVELS AND STANDARDS AND REWARD/PENALISE

- Each year *t*, companies are rewarded or penalised according to their performance
- Tariff is consequently adjusted

  $\pm Qt$ = *(reward - penalty)/revenues*

INCENTIVE REGULATION FOR CONTINUITY OF SUPPLY IN ITALY

FIRST STEP: SETTING STANDARDS

$$Std_{j,t} = Std_{j,t-1} \times (1 - \alpha_j)$$

$$\alpha_j = \max\left[1 - \left(\frac{LivOb^k}{LivPart_j}\right)^{\frac{1}{12}}; 2\%\right]$$

k: territ. density

Unitary incentive/penalty [€/kWh-not-served] based on WTP/WTA survey

FURTHER STEPS: ASSESSING INCENTIVES AND PENALTIES

$$price\_cap = RPI - X \pm Q_t$$

$$Q_t = \sum_{j \in Districts\, i} (Std_{j,t} - Act_{j,t}) \times \left[\frac{c_{ndom} En_{j,t,ndom} - c_{dom} En_{j,t,dom}}{8760}\right]$$

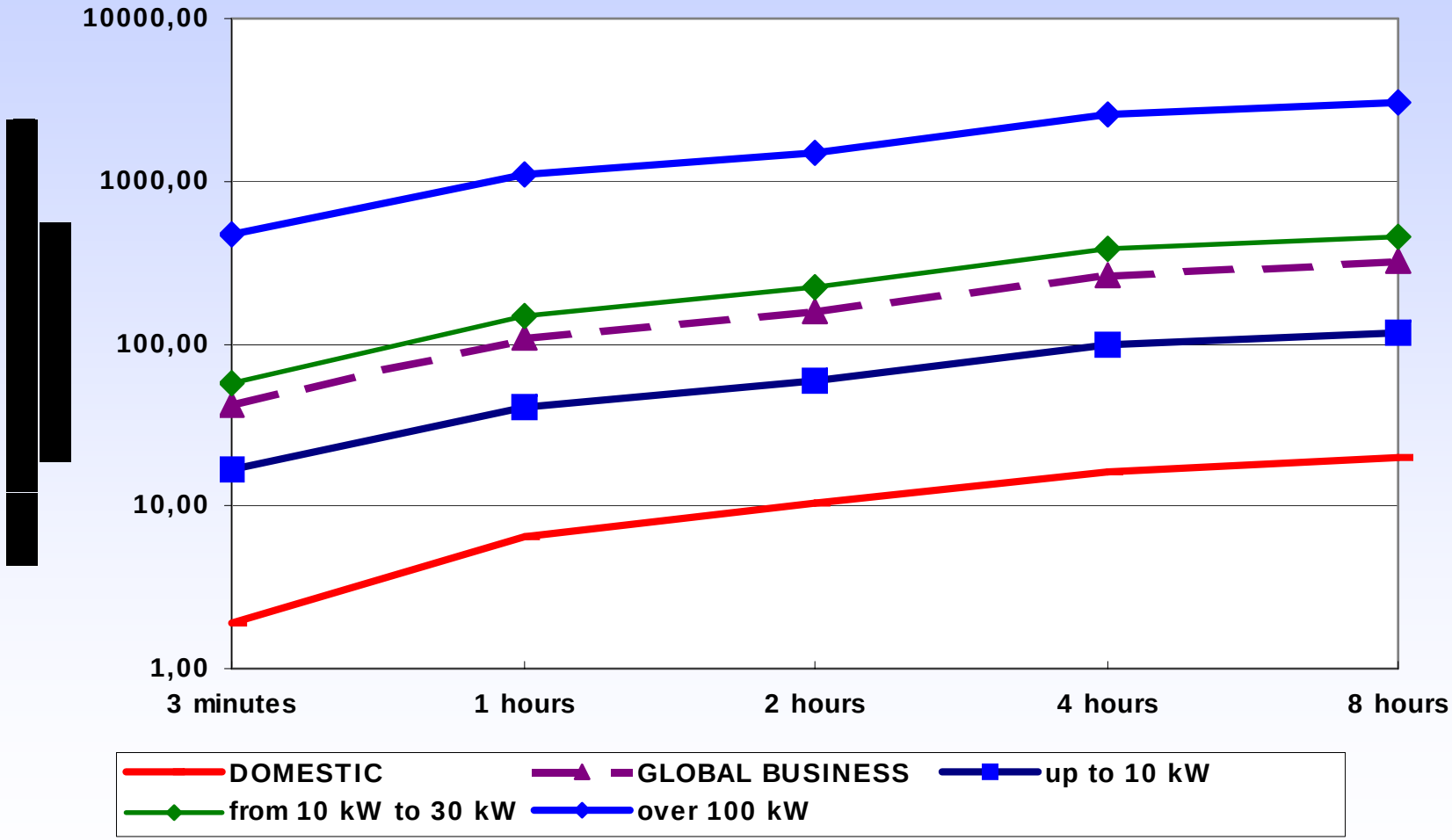
$$\left|Std_{j,t} - Act_{j,t}\right| < 5\% \Rightarrow Q_{j,t} = 0 \qquad Min \le Q_{j,t} \le Max = 2Min$$

ITALY SURVEY (2003) CHARACTERISTICS

- Methodology for the survey
  - Contingent valuation of customer Direct Cost for interruptions [CIGRE' 2001 "Billinton Report"], integrated with WTP/WTA
  - Respondent is offered compensation for accepting less reliable supply (Willingness to Accept) or is asked how much more he would pay for having a more reliable service (Willingness to Pay).
- Sample and questionnaires
  - Domestic customers: 1.100 interviews *vis-à-vis*
  - Business customers: 1.500 interviews *vis-à-vis*, sample stratified for: shop/industry/services; number of employees
  - Both samples representative of the whole Country and of different grades of density (urban/suburban/rural)
- Interruption scenarios: each respondent is requested to valuate:
  - 4 scenarios, with different activity (e.g. peak in the morning, intermediate, low in weekend)
  - 5 different interruption durations (1-2-4-8 hours, 3 min.)

NOT NORMALISED RESULTS: DIRECT COSTS

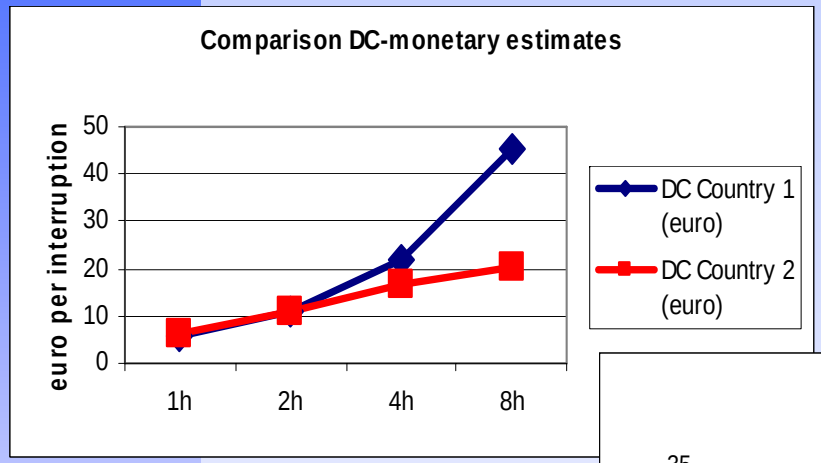
Italy, AEEG (2003, Cigrè methodology)



THE ISSUE OF COST NORMALISATION

- Raw data are given as monetary absolute values
  - DC, WTP/WTA are expressed in euro by the respondent
- But: absolute values are a function of a list of factors:
  - households/company's size: number of emplyees, building size, yearly turnover, etc.
  - yearly energy consumption
- Therefore, monetary absolute values must be normalized with (estimated) Energy Not Supplied
  - in order to make them comparable and averageble
  - Normalised DC, WTP/WTA are expressed in €/kWh-ENS
  - this normalisation entails problems for international comparison
  - see example in the next slide

THE ISSUE OF COST NORMALISATION
problems of international comparability



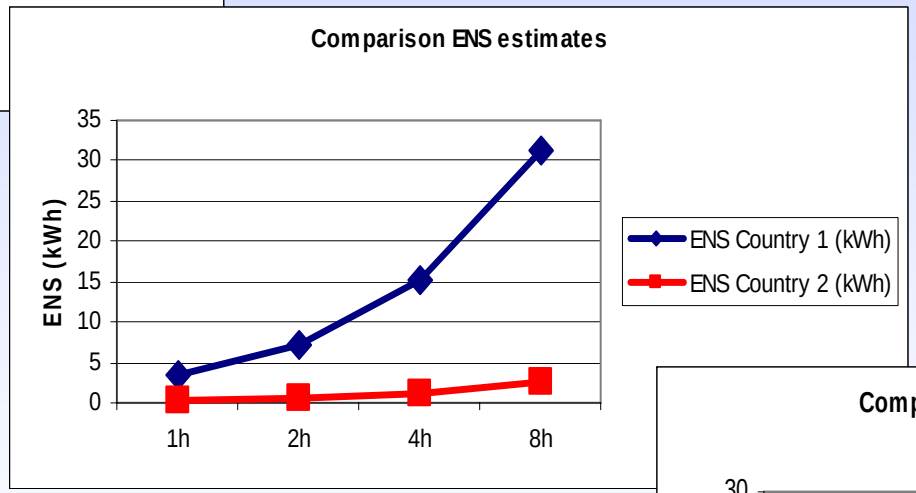
1. Direct cost [€/interr]

EXAMPLE:
domestic customers

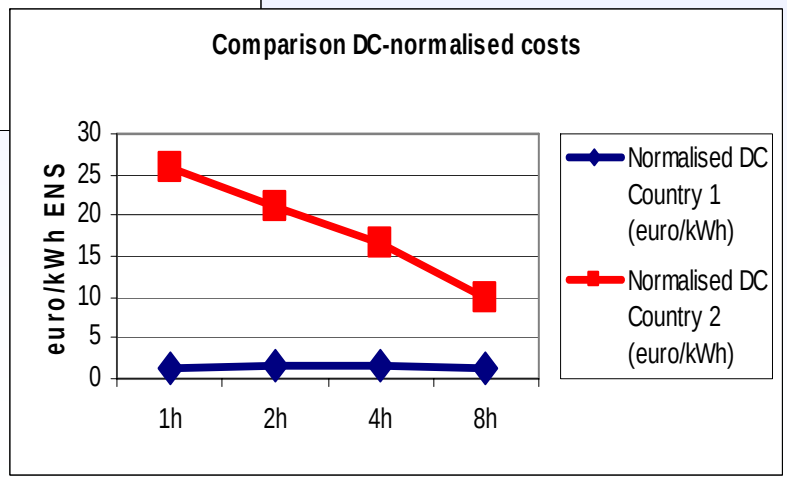
Country 1: electricity used for heating, avg 30.000 kWh/cust

Country 2: electricity not used for heating, avg 3.000 kWh/cust

2. Energy not supplied [kWhENS/interr]



3. Normalised outage cost [€/kWh ENS]

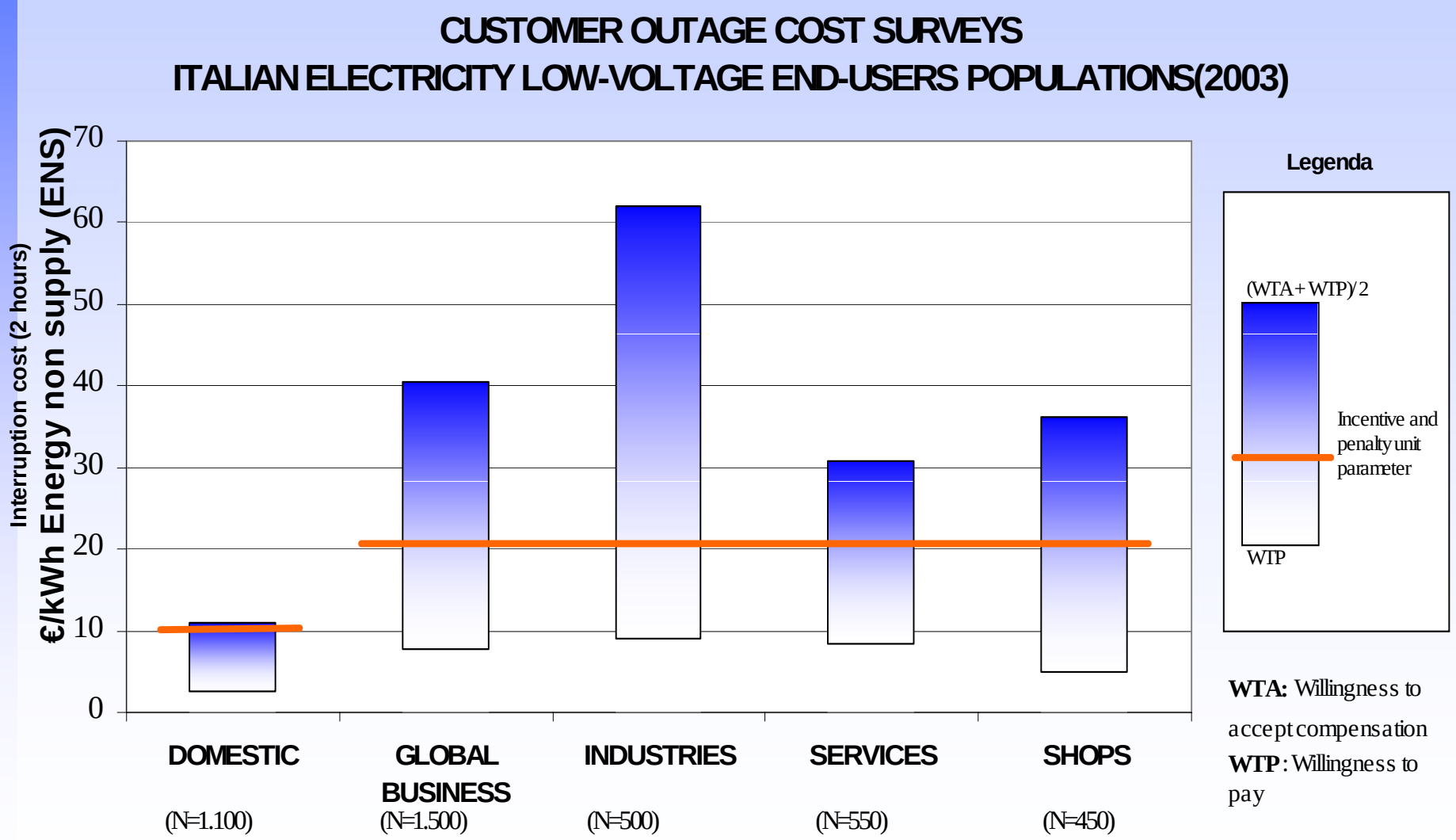


THE ISSUE OF DIFFERENCE BETWEEN WTP AND WTA

- How much can WTP and WTA differ?
  - Theory: Difference should be minimal
- Empirical Evidence: Large disparities exist
  - Inexperience with valuation periphery goods
  - Protest valuation
  - Lack of budget constraint
  - ... other reasons...
- Interpret WTP and WTA as bounds
  - Use a combination – average
  - E.g. NVE (Norway regulator): (DC+WTP)/2
  - E.g. AEEG (Italian regulator): a discretional but conscious choice in the band WTP ÷ (WTP+WTA)/2 *(see graph 1)*
- WTP and WTA are not fixed values
  - Function of: type of users, continuity levels and type of territory *(see graph 2)*

CUSTOMER SURVEY ON WTP / WTA TO SET UNITARY INCENTIVE / PENALTY PARAMETERS

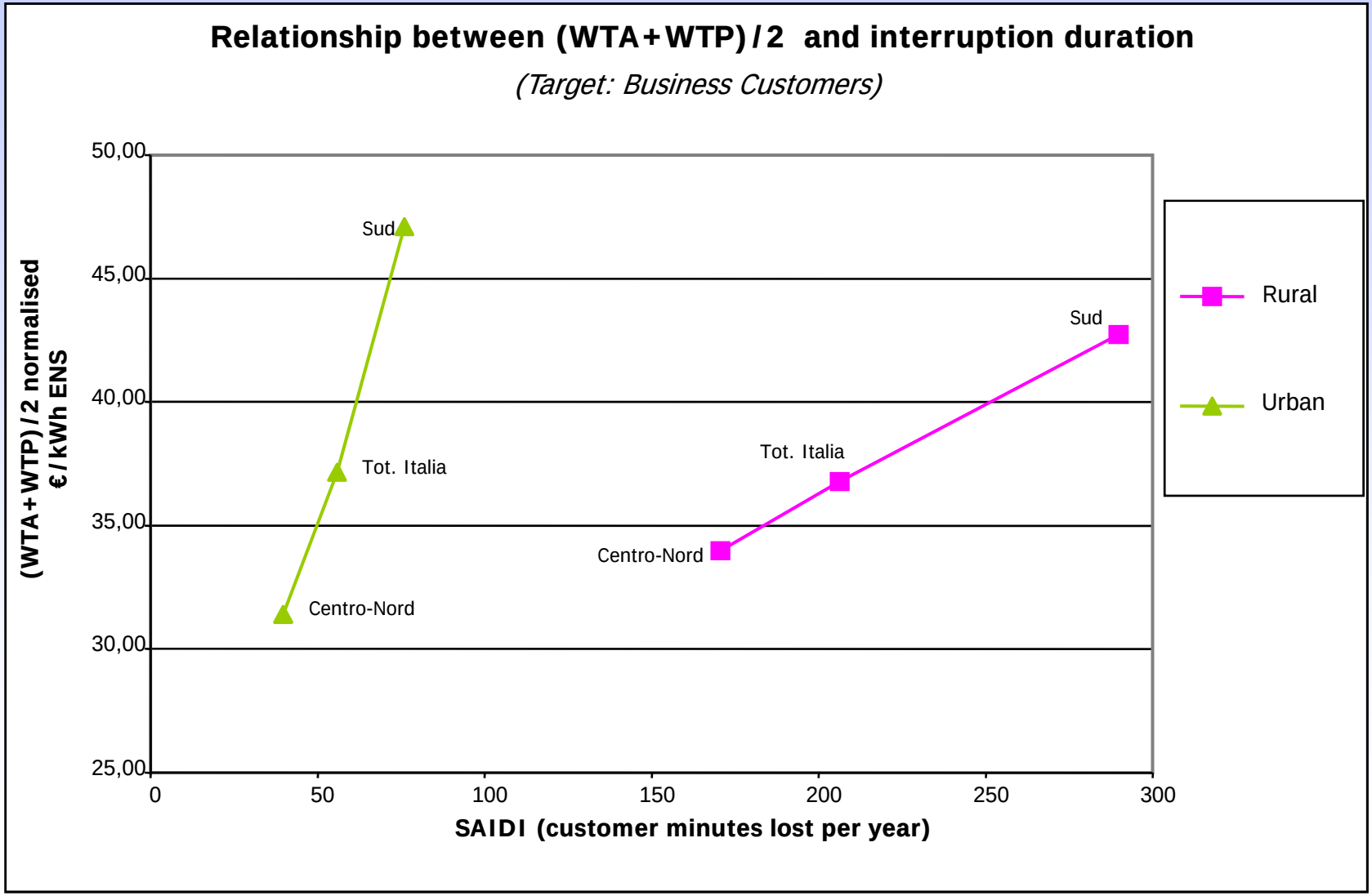
graph 1



Source: *Bertazzi, Fumagalli, Lo Schiavo,* CIRED (2005) paper n. 300

CUSTOMER SURVEY ON WTP/WTA TO SET UNITARY INCENTIVE/PENALTY PARAMETERS

graph 2



FINAL DECISIONS ON UNITARY INCENTIVE/PENALTY PARAMETERS …

	2nd regulatory period DOMESTIC CUSTOMERS	2nd regulatory period BUSINESS CUSTOMERS
Below national ref.	7.2 €/kWh-ENS	14.4 €/kWh-ENS
From 1x to 3x nat.ref.	10.8 €/kWh-ENS	21.6 €/kWh-ENS
Above 3x national ref.	14.4 €/kWh-ENS	28.8 €/kWh-ENS

national reference (SAIDI-net): urban 25 min/cust/year, rural 60 min/cust/year

…AND EFFECTS

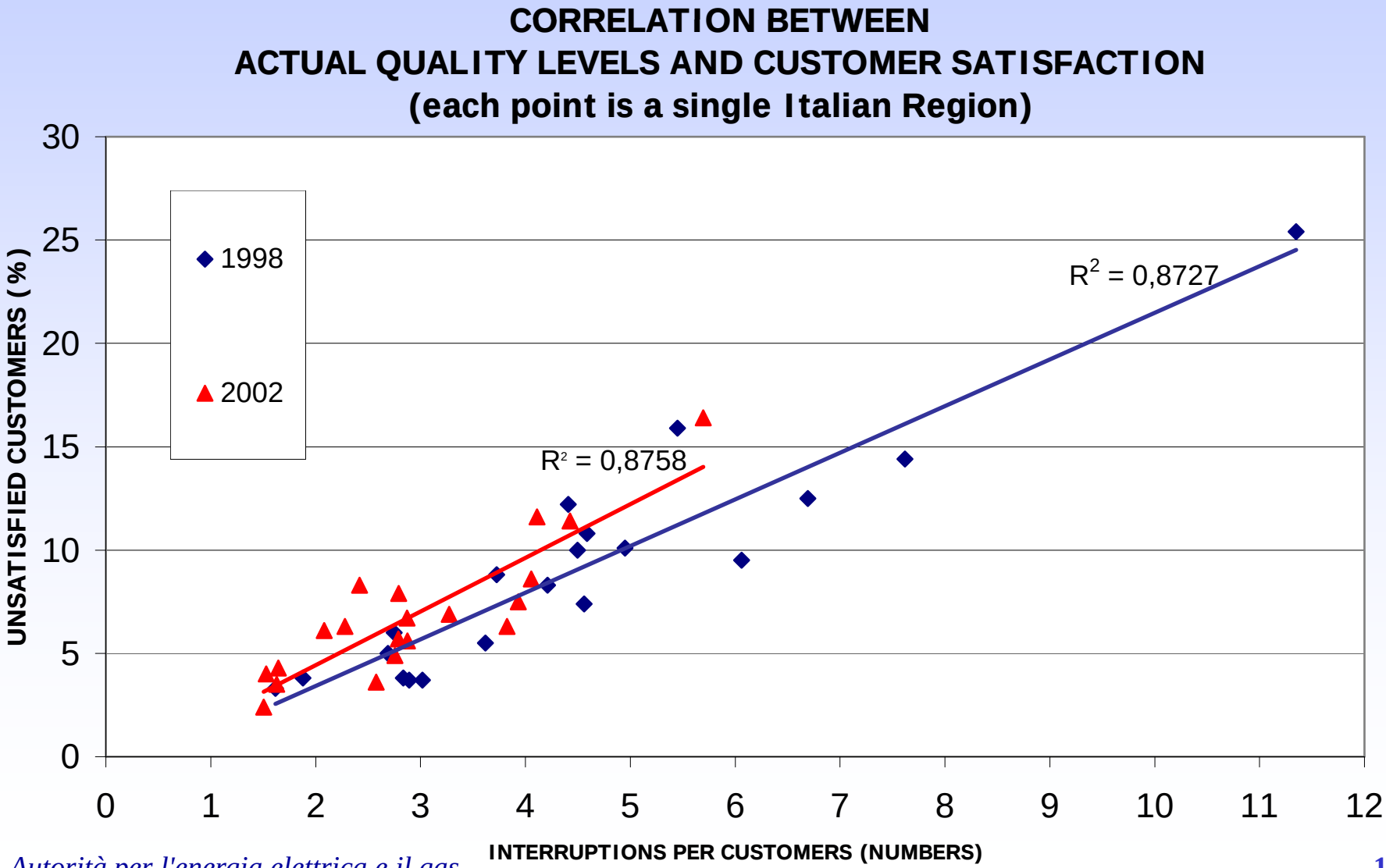
Year	2004	2005	2006	2007 *(estim.)*
Net incentives [M€] *(incentive-penalties)*	67	125	165	205
Impact upon tariffs [€/cust/year]	2nd regulatory period ≈ 4.0 €/cust/year			

OTHER TYPES OF CUSTOMER SURVEYS

- Customer satisfaction
  - the most common type of survey; useful for regulators:
    - in order to monitor the impact of liberalisation process
    - for inter-sectorial/international comparisons (see Eurobarometer 2004)
    - for correlating perceived quality and actual quality levels (see Italy example)
- Customer expectations
  - more difficult (need to avoid “idealistic” responses)
  - useful for setting quality standards
  - possibility to investigate importance of different quality factors
- Ex-post analysis
  - The most difficult survey
    - Occasionally used after big blackout
    - The only one applicable for voltage fast disturbances like voltage dips
  - Used in Italy to understand cost of large industrial customers for “microinterruptions” (voltage dips and very short interruptions)

USAGE OF CUSTOMER SATISFACTION TO CHECK THE EFFECTS OF REGULATION

Italy, ISTAT-AEEG



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CUSTOMER SURVEY ON EXPECTATIONS CAN BE USED FOR SETTING GUARANTEED QUALITY STANDARDS

CUSTOMER EXPECTATIONS

Italy, AEEG (1997)

Maximun time acceptable *(average)*	electricity (N=3.500)	gas (N=2.150)
➢ Network connection	10-11 days	11 days
➢ activation of supply	5-6 days	6 days
➢ estimate of charges	7 days	7-8 days
➢ response to written complaints	10 days	11 days
➢ re-activation of supply (non payment handling);	2 days	2 days

Maximun time acceptable *(average)*		
➢ Network fault	2-3 h	-
➢ gas leakage (on the network)	-	1 h
➢ gas leakage (on the customer premises)	-	less of 1 h

Domestic customers

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CUSTOMER SURVEY ON MICROINTERRUPTION COSTS FOR LARGE INDUSTRIAL CUSTOMERS

CUSTOMER SURVEY ON COSTS FOR "MICROINTERRUPTIONS" (VOLTAGE DIPS)

Italy, AEEG – Politecnico Milano (2007)

Politecnico di Milano (2007) – [€/kW-event]

ATECO classification	Entire sample (sub-sample)		
	average	median	interval
DM – auto manufacturing and automotive	2.9	2.9	0.7 – 5.0
DH – plastic	2.2	1.8	0.1 – 4.2
DB – textile	3.2	3.2	3.2
DE – paper	0.9 (1.0)	0.8 (0.9)	0.1 – 2.2
DF – petrolchemical	13.3	13.3	13.3
DJ – metal processing	3.3 (4.9)	1.1 (4.9)	0 (1.1) – 8.7
DI – glass and ceramics	0.9	0.8	0.1 – 2.3
DA – food processing	5.9	0.6	0.2 – 30
DG – chemical	0.5 (0.7)	0.6 (0.7)	0 (0.6) – 0.8
DL –elettrical machines	10.6	9.3	0.1 – 22.4
All sectors	**2.8 (3.3)**	**0.8 (1.1)**	**0 (0.1) - 30**

Note: "sub-sample" means excluding 0-values

Survey conducted on a limited sample of large industrial customers in Italy

Results have been presented at CIGRE' C4.107 Joint working group (Cassino, 8/11/07) and have been submitted for publication on *IEEE Transactions*

Just in sake of comparison...

EPRI (2005) - [$/kW-evento]

Sector	Interval
Automobile manufacturing	5 - 7.5
Rubber and plastic	3 - 4.5
Textile	2 – 4
Paper	1.5 – 2.5
Petrolchemical	3 – 5
Metal fabrication	2 – 4
Glass	4 – 6
Food processing	3 – 5
Pharmaceutical	5 – 50
Electronics	8 – 12

SOME TEMPTATIVE CONCLUSIONS

- Regulators need customer surveys
  - To understand customers' satisfaction, expectations and WTP/WTA
  - For both setting standards and setting incentive/penalty parameters
- But customer surveys need ...
  - Clarity in objectives
  - Time and management effort
  - Scientific oversight
  - Consciousness in setting questions
  - Economic resources
    - especially for the most complex survey that require *vis-a-vis* interviews
- ... and results are not easy to be translated in regulation
  - Data mining for extracting patterns
  - Robust theoretical framework
  - Consistency with the regulatory incentive/penalty scheme
  - Eventually the regulator must take some discretional choice