

2009 HTAi Annual Conference

SINGAPORE, June 2009

Do financing systems take account of the value of medical devices? Evidence from the cardiovascular setting in Italy

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Do financing systems take account of the value of medical devices? Evidence from the cardiovascular setting in Italy

- Summary -

- ❑ Background and rationale of the research
- ❑ Research aim and objectives
- ❑ Research methods
- ❑ Results
- ❑ Discussion
- ❑ Conclusion and directions for future research



BACKGROUND AND RATIONALE OF THE RESEARCH

- Regulatory policies and payment systems are often conceived as major drivers of medical technologies diffusion.
- Limited empirical evidence evaluating the impact of the policies adopted:
 - International studies refer predominantly to the American setting (Hashimoto et al 2006, Shih and Berliner 2009)
 - Need to develop relevant evidence base for evaluating the impact of medical technology payment systems at European Level



RESEARCH AIM AND OBJECTIVES

- The objective of the research is to analyse whether funding systems explain the propensity to adopt innovation in the medical technology sector.
- More precisely, the research aims at estimating the impact of reimbursement mechanisms (type and level of reimbursement) on the diffusion of new medical devices and correlated procedures.
- The analysis is applied to the Italian setting:
 - Regionalised (21) health care systems relying on 2 main types of funding mechanisms for providers: capitation and activity-based reimbursements (DRG tariffs)
 - High differentiation between Regions and across types of hospitals with regard to the level of DRG tariffs.



RESEARCH METHODS:

A. Device selection

- The research analyses the case of coronary **Drug Eluting Stents (DES)**
- Reason for the selection of the device:
 - **CLINICAL RELEVANCE:** innovative therapeutic technology introduced in the early 2000s;
 - **FINANCIAL DIMENSION:** clearly identifiable in terms of reimbursement mechanisms:
 - From an implicit to an explicit recognition of DES by the Italian financing system (introduction of ad-hoc DRG);
 - 112: Percutaneous interventions on the cardiovascular system (V. 10th/14th of the Grouper)
 - 517: Percutaneous interventions on the cardiovascular system with insertion of stent in the coronary artery without IMA (V.19th of the Grouper)
 - Relevant differences in the financing approaches adopted by Italian Regions.

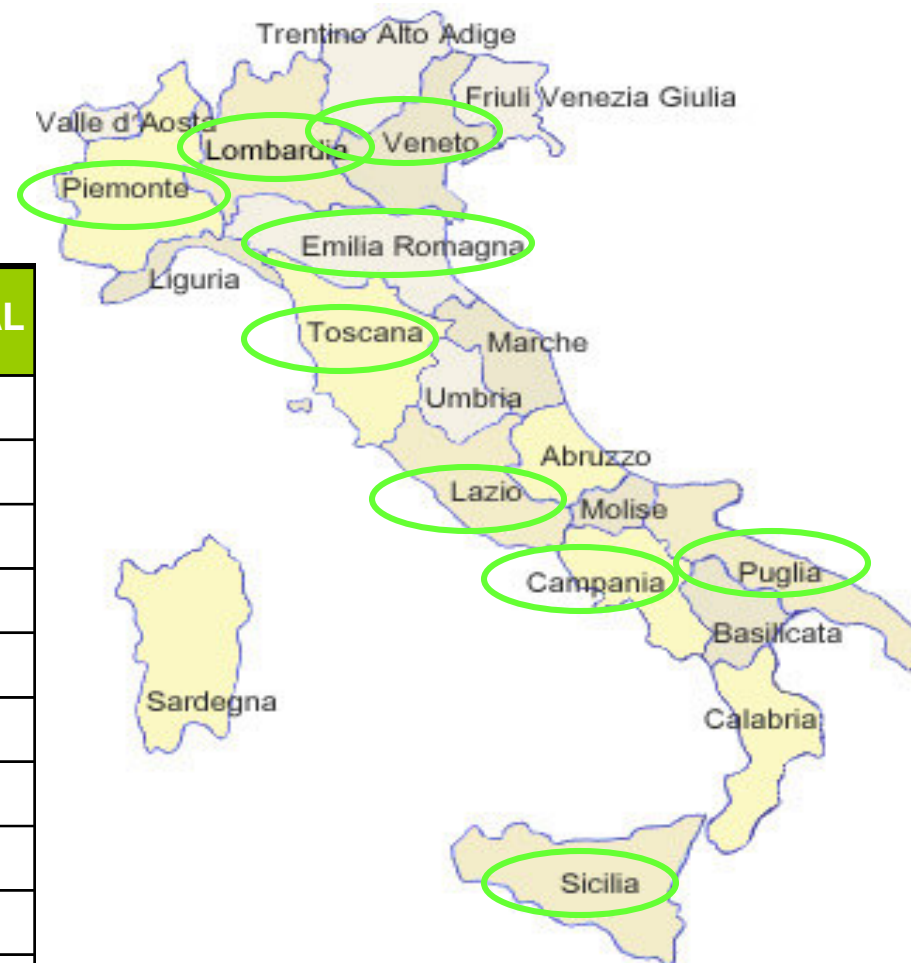


RESEARCH METHODS:

B. Sample selection

1 out of 2

- The **9 most densely-populated Regions**, accounting for approximately 80% of the whole Italian population



ELECTED REGION	POPULATION (2007)	% ON TOTAL
Campania	5,790,187	9.8%
Emilia Romagna	4,223,264	7.1%
Lazio	5,493,308	9.3%
Lombardia	9,545,441	16.1%
Piemonte	4,352,828	7.4%
Puglia	4,069,869	6.9%
Sicilia	5,016,861	8.5%
Toscana	3,638,211	6.2%
Veneto	4,773,554	8.1%
TOTAL	46,903,523	79.4%

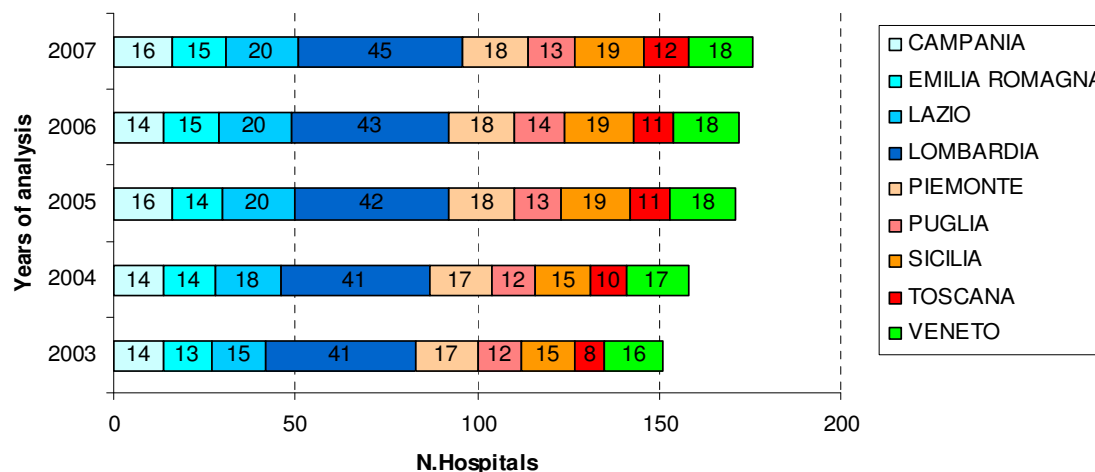
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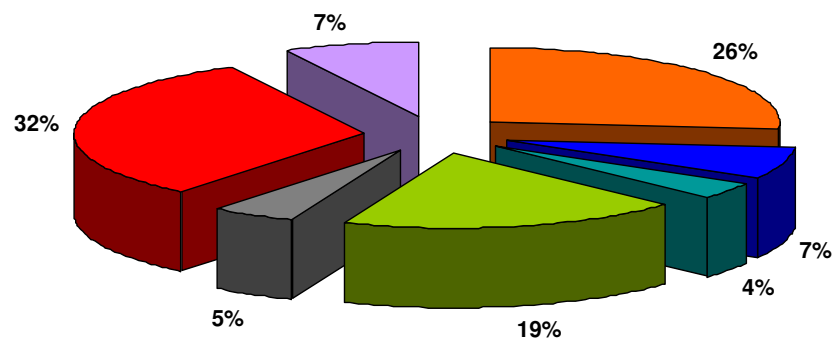
2 out of 2

- 186 Hospitals
- Timeframe: 2003-2007
- 824 Observations

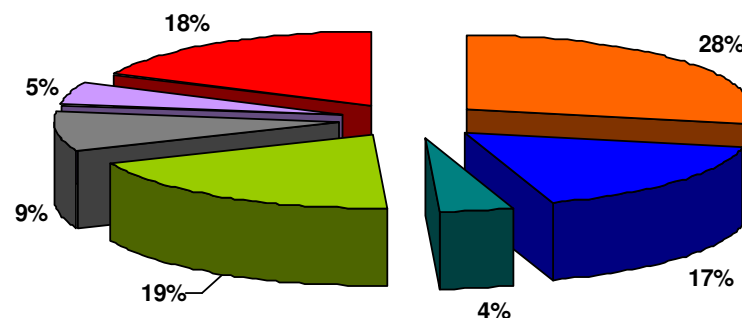
Hospitals included in the analysis by Region and year



N. Hospitals implanting DES, by type (2003-2007)



N. PTCA Procedures with DES, by type of H (2003-2007)



■ AO
 ■ University Hospital
 ■ Polyclinic Hospital
 ■ Private Accredited Hospital
 ■ IRCCS
 ■ LHU.Hospitals
 ■ Other



RESEARCH METHODS:

C. Data collection

Primary data at hospital level collected from multiple sources:

- Data on diffusion of technology: database of the Italian Society of Invasive Cardiology (GISE)
- Data on reimbursement schemes: Regional fee schedules and Ministerial databases



RESEARCH METHODS:

D. Model Specification

- Two-step process:
 - A. Influence of the type of reimbursement:
 - Matching technique to analyse the attitude of hospitals towards the adoption of DES, by hospital's main financing scheme (capitation vs activity-based financing);
 - B. Influence of the level of reimbursement of activity-based funding schemes:
 - Analysis restricted to hospitals reimbursed by DRG tariffs (124 Hospitals, 544 observations)
 - Unbalanced panel data (2003-2007) with Fixed Effect Model (FE)



RESEARCH METHODS:

D. Panel data model specification

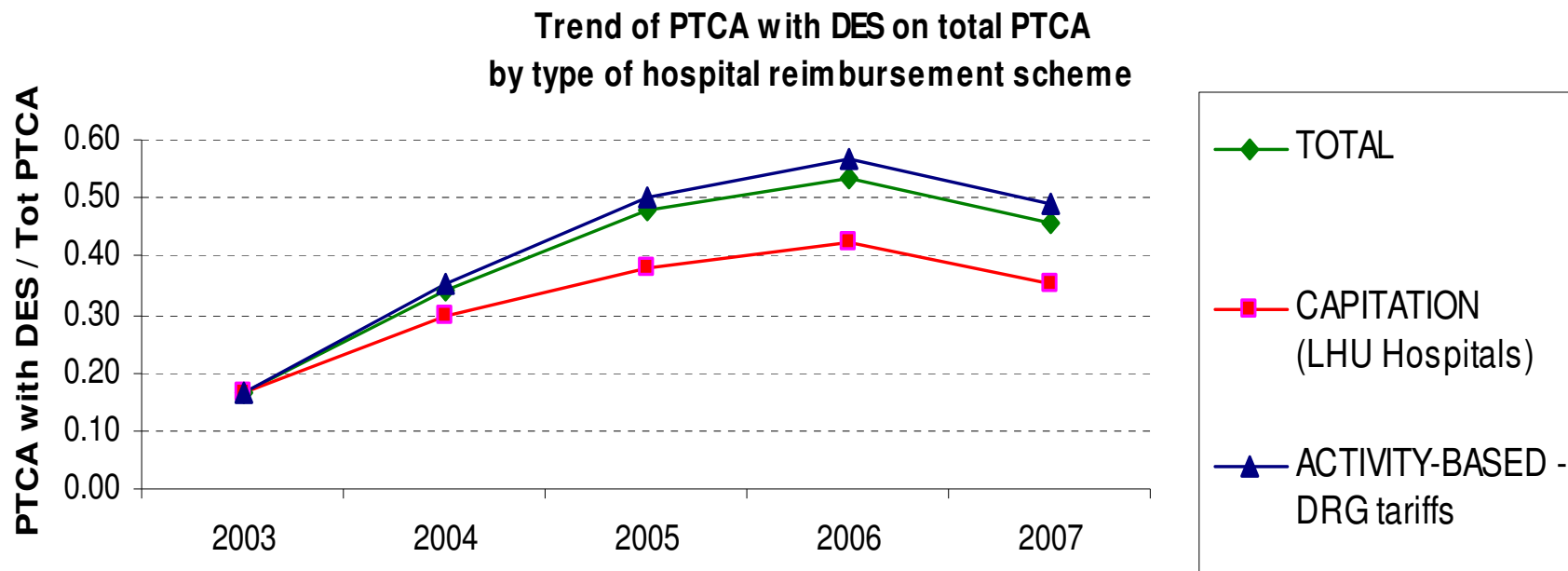
TYPE OF VARIABLE		MEASURE																		
DEPENDENT VARIABLE	Diffusion of DES: utilization at hospital level	<ul style="list-style-type: none"> ▪ Π: PTCA with DES / Tot PTCA 																		
INDEPENDENT VARIABLES	Reimbursement features at hospital level	<p>- DRG tariffs:</p> <ul style="list-style-type: none"> - <u>112</u>: Percutaneous interventions on the cardiovascular system (V. 10th/14th of the Grouper) - <u>516</u>: Percutaneous interventions on the cardiovascular system with IMA (V.19th of the Grouper) - <u>517</u>: Percutaneous interventions on the cardiovascular system with insertion of stent in the coronary artery without IMA (V.19th of the Grouper) <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>“DRG_average”</p> <table border="1"> <thead> <tr> <th>DRG Version</th> <th>Tariff included</th> </tr> </thead> <tbody> <tr> <td>V.10/14</td> <td>DRG 112</td> </tr> <tr> <td>V.19</td> <td>Aver. DRG 516-517</td> </tr> </tbody> </table> </div> <div style="text-align: center;"> <p>“DRG_elective”</p> <table border="1"> <thead> <tr> <th>DRG Version</th> <th>Tariff included</th> </tr> </thead> <tbody> <tr> <td>V.10/14</td> <td>DRG 112</td> </tr> <tr> <td>V.19</td> <td>DRG 517</td> </tr> </tbody> </table> </div> <div style="text-align: center;"> <p>“DRG_emergency”</p> <table border="1"> <thead> <tr> <th>DRG Version</th> <th>Tariff included</th> </tr> </thead> <tbody> <tr> <td>V.10/14</td> <td>DRG 112</td> </tr> <tr> <td>V.19</td> <td>DRG 516</td> </tr> </tbody> </table> </div> </div> <p>Add on payments for DES implant</p>	DRG Version	Tariff included	V.10/14	DRG 112	V.19	Aver. DRG 516-517	DRG Version	Tariff included	V.10/14	DRG 112	V.19	DRG 517	DRG Version	Tariff included	V.10/14	DRG 112	V.19	DRG 516
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CONTROL VARIABLES	Provider-related data	<p>Provider’s number of beds</p> <p>Provider’s nature (private)</p> <p>Provider’s case mix</p> <p>DES per procedure</p>																		

RESULTS:

A. Type of reimbursement

1 out of 5

- Two main financing schemes:
 - Capitation: LHU Hospitals
 - Activity-based funding (DRG tariffs): other public and private hospitals
- **Research question**: Is there a different trend in the level of DES diffusion in the two macro groups of hospitals reimbursed by capitation and by tariff?



RESULTS:

A. Type of reimbursement

However:

- Hospitals subject to capitation might be structurally different from hospitals subject to DRG.
- Inter-regional differences possible since health policies is at Regional level in Italy

In order to control for hospital characteristics and Regions, we use matching techniques:

- The main idea is to compare a “treated” group of hospitals subject to capitation with a “control” group of hospitals with similar characteristics but subject to DRGs

RESULTS:

A. Type of reimbursement

1. Matching using classes (5) of **case mix** and classes (5) of **number of beds**

- ✓62 capitation hospitals matched with 101 DRG hospitals
- ✓ttest on mean difference: $t= 3.7323$, $p\text{-value}=0.0003$
- ✓The null of no difference is rejected: the difference is significant

2. Adding **Region** as a matching parameter

- ✓29 capitation hospitals matched with 22 DRG hospitals
- ✓ttest on mean difference: $t= 1.0126$, $p\text{-value}=0.3162$
- ✓Once Regions are controlled for, no significant difference between capitation and tariff!

RESULTS:

B. Level of reimbursement

2 out of 5

	Base	Interact	Base2	Interact2
	(1)	(2)	(3)	(4)
Drg_average	-.00002 (9.80e-06)	-1.00e-05 (1.00e-05)		
Drg_elective			1.67e-06 (.00003)	6.96e-06 (.00003)
Drg_urgency			-1.00e-05 (.00002)	-1.00e-05 (.00002)
Add-on_pay	-.016 (.023)	-.018 (.024)	-.018 (.024)	.015 (.024)
Interaction (nature)		-9.39e-06 (8.44e-06)		-9.70e-06 (8.48e-06)
Des p.p.	-.045 (.021)**	-.044 (.021)**	-.045 (.021)**	-.044 (.021)**
N_beds	-.0002 (.00009)**	-.0002 (.00009)**	-.0002 (.00009)**	-.0002 (.00009)**
Case mix	-.013 (.069)	-.016 (.069)	-.010 (.069)	-.013 (.069)
e (N)	544	544	544	544
e (r2)	.656	.657	.656	.657

R2

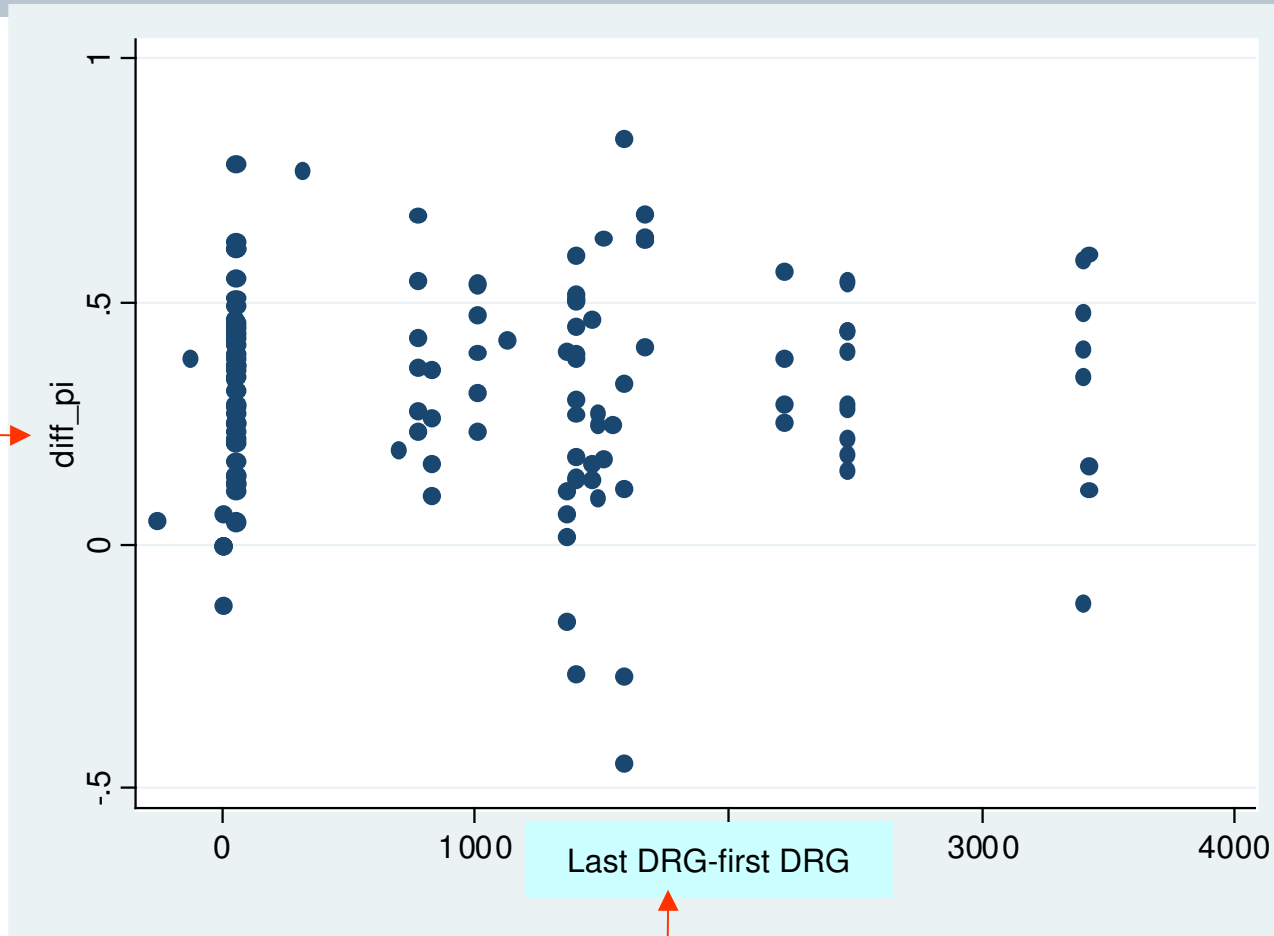
Minimum level of significance:
95% (marked **)

RESULTS:

B. Level of reimbursement

4 out of 5

Difference in the level of Π (PTCA with DES/tot PTCA) at hospital level (last-first year of observation)



Difference in the level of DRG tariffs applied to the hospital (last-first year of observation)



- **Type of reimbursement:**
 - Increasing divergent trend of DES diffusion between providers on the basis of their financing system..
 - ...however, mainly due to hospital local characteristics rather than strictly financing
- **Level of reimbursement:**
 - Robust model (R2 65%)
 - No statistical correlation between the level of reimbursement (DRG tariff) and the diffusion of DES
- The results should be interpreted in conjunction with other factors not explicitly included in the analysis:
 - Advancements in clinical practices (ie due to issue of national/international guidelines);
 - Professional dimension (role of the clinicians);
 - Local patients' clinical characteristics (indirectly controlled by the predominant *within variation* interpretation of the results)

- Evidence-based research that contributes to the debate on the impact of reimbursement mechanisms on the diffusion of medical technology at the European Level in highly decentralised healthcare systems
- Results consistent with the recent American literature (Shih and Berliner 2009)
- Limitations of the study:
 - Results to be interpreted predominantly as *within effects*: difficult to isolate the *between variability* among providers
 - Variables related to the financing system:
 - In capitation based financing systems medical technology not directly linked to reimbursement → difficult to isolate the level of payment for technologies
 - In tariff-based systems often medical devices (especially medical aids and implantable devices) are not univocally reimbursed by a single DRG → difficult to isolate the DRGs to be included in the analysis
 - Focus exclusively on payment systems for approved indications

- Other factors might steer providers' behaviours and therefore influence the pattern of medical technology innovation and diffusion:
 - At **hospital managerial level**: i.e. medical devices' purchasing strategies
 - At **professional level**: the role of formal and informal sharing of physicians' experience (Shih and Berliner 2009) and the role of incentives provided to professionals to align to organizational rules and objectives (Cappellaro, Fattore, Torbica 2009)



Medical technology diffusion as a dynamic process between different stakeholders at regulatory and organizational level

- Directions for further research:
 - Qualitative analysis to investigate the influence of professional behaviors and local management systems on the technology uptake in a restricted sample of hospitals included in the current research.
 - Expand the analysis to other healthcare systems

Thank you for the attention!

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