Pigou o Hobbes?
Le scelte di bilancio dei governi locali in Italia
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***Understanding Inappropriateness in Health Care:
the Case of Caesarean Deliveries across Italian Regions***

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* Introduction & motivation

* Caesareans on the rise: a brief survey and preliminary evidence

* Model and data

* Empirical analysis

* Concluding remarks

* Public health spending on the rise is a relevant policy concern in almost all developed countries (OECD, 2010)

&

* Inappropriateness of health care treatments has been shown to be strongly positively correlated with expenditure differentials across countries/regions ➡ improving appropriateness as a way to reduce waste and contain spending rise

Our objective

* What are the main determinants of inappropriateness? ➡ empirical investigation based on caesarean section rates used as proxies for the inappropriateness

* Inappropriateness characterises health care treatments which could be performed ensuring at least the same effectiveness for the patient, but incurring lower risks and/or employing a lower amount of resources

* Why caesarean section rates?

    ➔ this is the indicator commonly used both in the literature and by policy makers (e.g. annual report by Italian Health Ministry, WHO surveys)

    ➔ being a surgical treatment, caesarean section shows a large cost differential w.r.t vaginal delivery (appropriate treatment in normal situations)

* We aim in particular at disentangling the impact of three groups of policy variables:

(1) structural supply indicators, to take into account the impact of different organisational arrangements (e.g. incidence of private hospitals)

(2) reimbursement and pricing policies, to control for the effect of financing mechanisms (e.g. introduction of regional DRG fees)

(3) political economy variables, in order to capture the influence of regional governments' characteristics and their quality (e.g. president experience, own funding share)
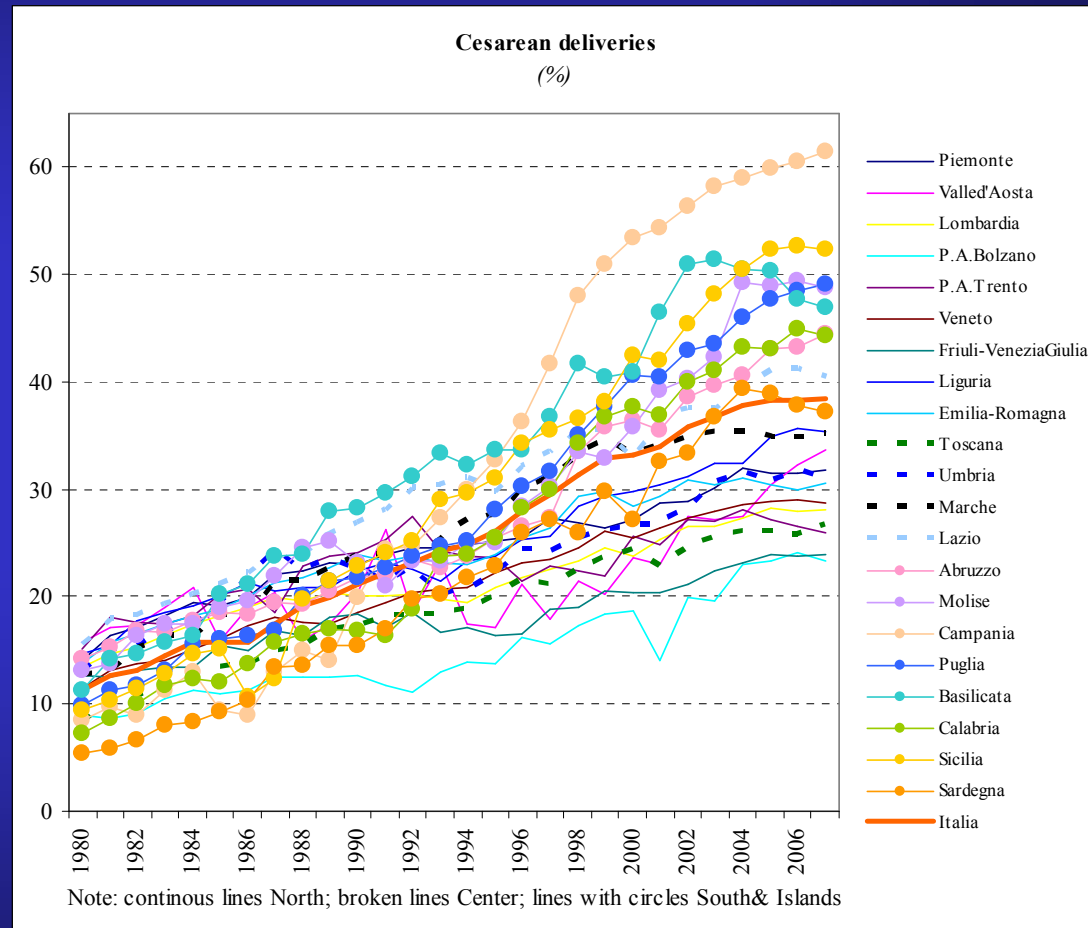
Caesareans on the rise: a brief survey

The literature has identified the main drivers accountable for the increase in caesarean section rates:

1. technological changes;
2. changes in patients' preferences;
3. changes in physicians/providers behaviours

* In particular, the economic literature has analysed the effects of: physicians demand for leisure and work time shifts (e.g. Brown, 1996); fear of malpractice lawsuits (e.g. Dubay et al., 1999); declining fertility rates (e.g. Gruber & Owings, 1996); tariff differentials (e.g. Gruber *et al.*, 1999, Grant, 2009); assortative matching between patients and hospitals (Grant, 2005, and for Italy Fabbri & Monfardini, 2008)

* A comprehensive assessment of the role played by *supply structure, financial incentives* and *political economy motivations* to explain the rise in caesarean rates is still missing ➜ this work is an attempt to move in this direction
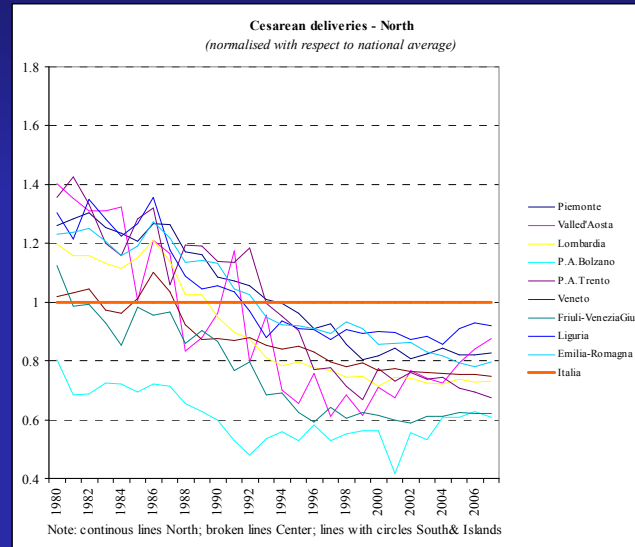
Caesareans on the rise: a brief survey : preliminary evidence for Italy

The increase in caesarean delivery rate has been remarkable ➔ the rate in 2007 was almost 3.5 times the value observed in 1980

Cesarean deliveries
(%)

Note: continous lines North; broken lines Center; lines with circles South& Islands

Legend: Piemonte, Valled'Aosta, Lombardia, P.A.Bolzano, P.A.Trento, Veneto, Friuli-VeneziaGiulia, Liguria, Emilia-Romagna, Toscana, Umbria, Marche, Lazio, Abruzzo, Molise, Campania, Puglia, Basilicata, Calabria, Sicilia, Sardegna, Italia

… *preliminary evidence for Italy*

North

Cesarean deliveries - North
(normalised with respect to national average)

Legend: Piemonte, Valled'Aosta, Lombardia, P.A.Bolzano, P.A.Trento, Veneto, Friuli-VeneziaGiulia, Liguria, Emilia-Romagna, Italia

Note: continous lines North; broken lines Center; lines with circles South& Islands

Centre

Cesarean deliveries - Centre
(normalised with respect to national average)

Legend: Toscana, Umbria, Marche, Lazio, Italia

Note: continous lines North; broken lines Center; lines with circles South& Islands

South & Islands

Cesarean deliveries - South and Islands
(normalised with respect to national average)

Legend: Abruzzo, Molise, Campania, Puglia, Basilicata, Calabria, Sicilia, Sardegna, Italia

Note: continous lines North; broken lines Center; lines with circles South& Islands
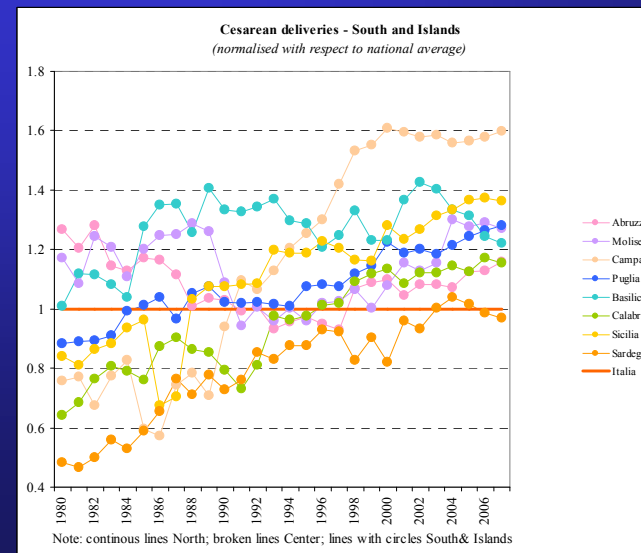
Significant regional variation and a clear geographical pattern ➔ Southern regions display a much faster ↑, with maximum values above 50% and 60% in Sicilia and Campania respectively

At a first glance caesarean section rates have been strongly influenced by changes in patients characteristics (e.g. mother's age). But there seems to be more …

% of caesareans and mother age by macro area
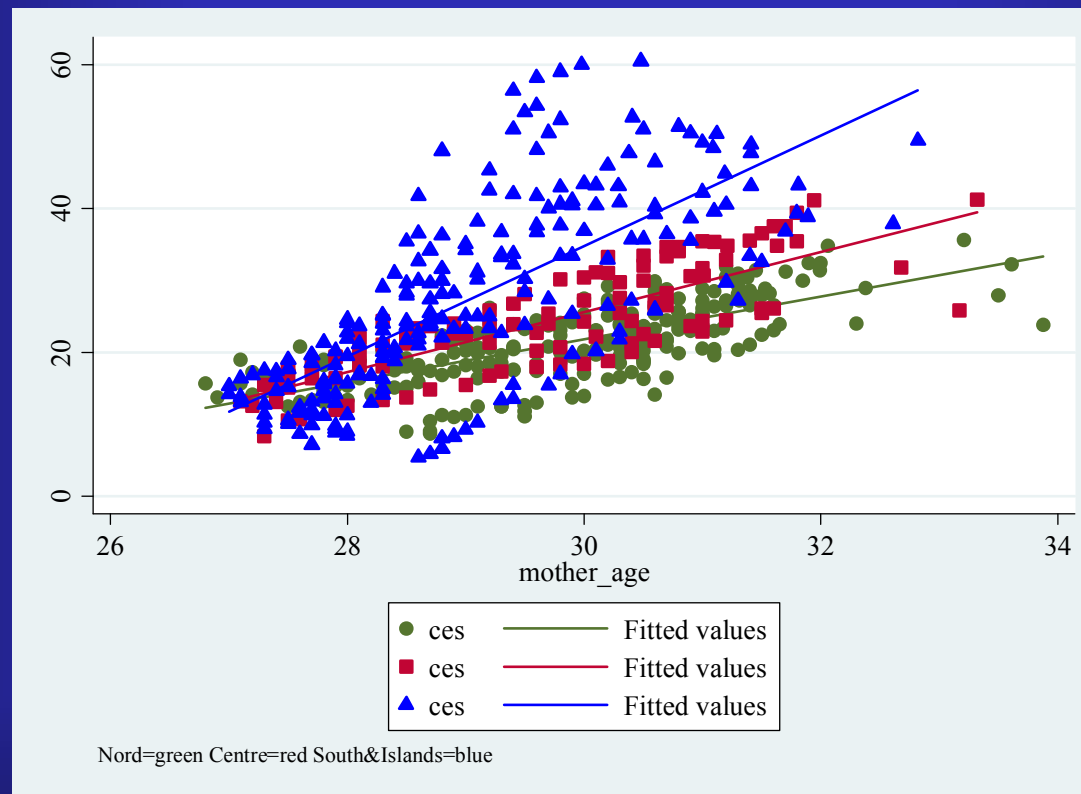
… in particular in the South (where mothers are on average younger) the reaction appears to be systematically stronger ➔ what other factors can account?

* Look at institutional features of Italian NHS ➔ management of health care policy devolved at regional level (e.g. purchases from private sector, DRG tariffs)

* Regional variability can help explain differential trends ➔ supply structure (e.g. nr. of beds in private hospitals) seems to matter…

* … the impact of other potentially relevant variables (e.g. pricing policies, government's features) is not easy to highlight

% of caesareans and share of beds in private hospitals
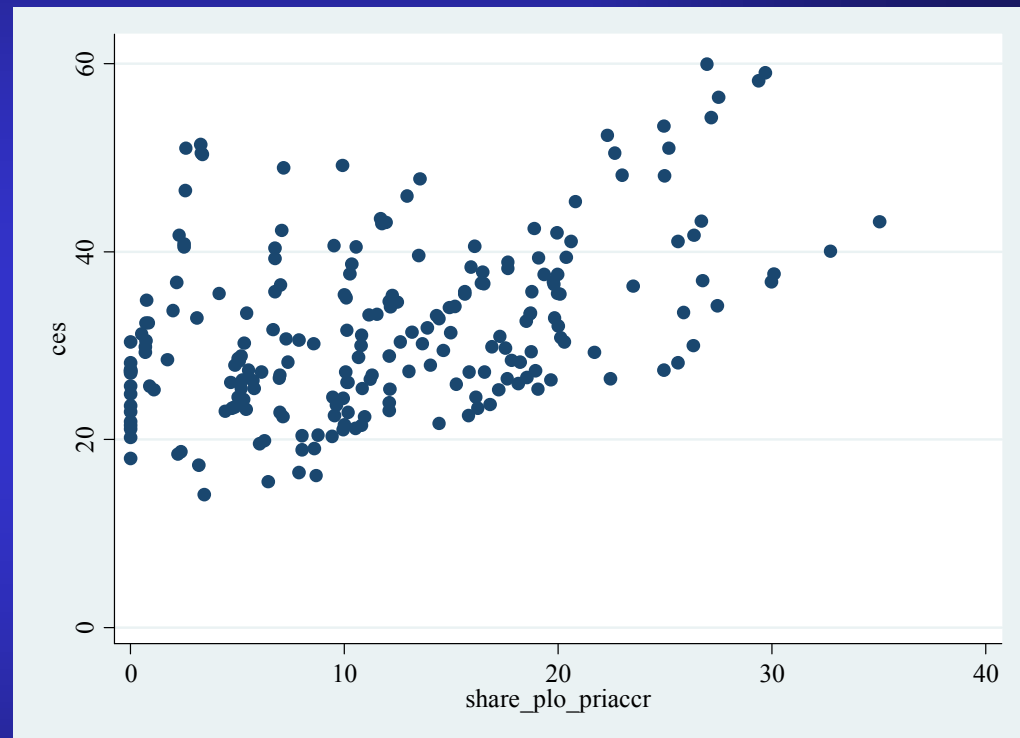
* Specification of a reduced-form model to disentangle the role played by the different factors influencing caesarean sections rates

* Sample of 21 Italian regions over the years 1997-2005:

$$(1) \quad y_{it} = \alpha + \alpha_i + \sum_{t=1}^{T} \beta^t d_t + \sum_{j=1}^{J} \beta_j^x x_{it}^j + \sum_{f=1}^{F} \beta_f^w w_{it}^f + \sum_{k=1}^{K} + \beta^k k_{it}^k + \sum_{h=1}^{H} \beta_h^z z_{it}^h + \varepsilon_{it}$$

- y_{it} is the log of the odd ratio of the share of caesarean deliveries in region i in year t
- α_i and d_t are respectively regional and year dummies
- x^j_{it} are $j = 1,\ldots, J$ control variables (e.g. socio-demographic features)
- w^f_{it} are $f = 1,\ldots, F$ supply structure indicators (e.g. private hospitals, workforce)
- k^k_{it} are $k = 1,\ldots, K$ pricing policy indicators
- z^h_{it} are $h = 1,\ldots, H$ characteristics of regional governments

* (1) is estimated using a fixed-effects panel model and controlling also for the presence of possible serial and spatial correlations

* Our interest is mainly on the effects of policy makers' behaviour on the average outcome. So we use a more aggregate approach with respect to most of the available literature ➔ aggregate data at regional level instead of micro data at individual (for each birth) level

* This choice also reflects the lack of accessible micro data for all the regions over a sufficiently long time period…

* … but it allows to analyse the impact of regional government's features and other institutional issues over a decade

empirical analysis: methodological issues

* Serial correlation:
  - some tests do no reject the hypothesis of serial correlation ➔ we therefore use robust standard errors in all specifications
  - we included also time lagged regressors to check for the need to specify a dynamic model (time persistence) ➔ none turned out to be significant

* Spatial correlation (mimicking behaviours by neighbouring jurisdictions)
  - we estimated both a spatial lag and a spatial error model, considering both a row standardised and a non-row standardised weighting matrix based on the Euclidean distances between the capitals of the regions
  - in the latter case spatial correlation is always rejected, while in the former results are mixed ➔ however the magnitude, sign and significance of the coefficients are generally confirmed

* The baseline approach seems then adequate

In the estimation we proceed by steps ➔ focus first on **control variables** only and then augment the model with the other factors discussed above:

(1) supply structure

(2) pricing policies

(3) political economy

Dependent variable - log of odds ratio of % caesarean deliveries

		A	B	C	D	E
control variables (x)	mother's age	0.138 ***	0.142 ***	0.144 ***	0.141 ***	0.129 ***
		0.043	0.040	0.040	0.034	0.035
	birth rate	-0.124 ***	-0.124 ***	-0.120 ***	-0.103 ***	-0.084 ***
		0.020	0.019	0.018	0.019	0.021
	% primary school educ (females)	0.013 *	0.010	0.010	0.013 *	0.011
		0.007	0.008	0.008	0.007	0.009
	neonatal mortality (first 6 days)	0.003	0.003 *	0.004 *	0.002 *	0.004 **
		0.002	0.002	0.002	0.001	0.002
structural supply indicators (w)	medical staff (% of total NHS employees)		0.008 *	0.007	-0.000	0.003
			0.005	0.005	0.005	0.006
	bed in private hospitals (ratio)		-0.001	-0.002	-0.002	0.001
			0.003	0.002	0.002	0.002
reimbursment tariffs (k)	regional tariffs (dummy)			-0.137 **	-0.165 **	-0.260 ***
				0.062	0.071	0.080
	introduction of regional tariffs					0.066 **
						0.031
	regional tariffs*(bed in private hospitals)			0.009 **	0.009 **	0.015 ***
				0.003	0.004	0.005
	introduction of tariffs*(beds in private hospitals)					-0.006 **
						0.003
political economy indicators (z)	in line with central government				-0.017	-0.013
					0.017	0.016
	share of own funding				-0.411 ***	-0.435 *
					0.125	0.211
	president gender				-0.013	-0.021
					0.042	0.042
	president experience				-0.009 ***	-0.010 **
					0.003	0.003
	president experience*(in line with central government)				0.009 **	0.008 ***
					0.004	0.002
	president is a doctor				0.061 **	0.075 ***
					0.025	0.018
constant		-3.957 ***	-4.487 ***	-4.492 ***	-4.029 ***	-4.012 ***
		1.283	1.338	1.367	1.189	1.267
# of observation		189	189	189	189	168
within R2		0.85	0.86	0.86	0.88	0.87

Significance levels: 1% ***, 5% **, 10% *
Robust standard errors in italics; all regressions include year dummies and region fixed effects.

* The socio-demographic variables have the expected impact

* We also control for an underlying measure of riskiness of births (the neonatal mortality rate, Gruber & Owings, 1996) ➔ more intense use of caesarean sections

Dependent variable - log of odds ratio of % caesarean deliveries		A	B	C	D	E
control variables (z)	mother's age	0.138 ***	0.142 ***	0.144 ***	0.141 ***	0.129 ***
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		0.007	0.008	0.008	0.007	0.009
	neonatal mortality (first 6 days)	0.003	0.003 *	0.004 *	0.002 *	0.004 **
		0.002	0.002	0.002	0.001	0.002

* When not interacted with other variables, supply structure indicators of the health care sector do not appear to be the main drivers of caesarean sections

structural supply indicators (w)	medical staff (% of total NHS employees)	0.008 *	0.007	-0.000	0.003
		0.005	0.005	0.005	0.006
	bed in private hospitals (ratio)	-0.001	-0.002	-0.002	0.001
		0.005	0.002	0.002	0.002

* We also controlled for the use intensity of hospital facility (average stay in hospital) and the productive capacity (beds on population) ➔ both measures are not significant and do not alter other findings
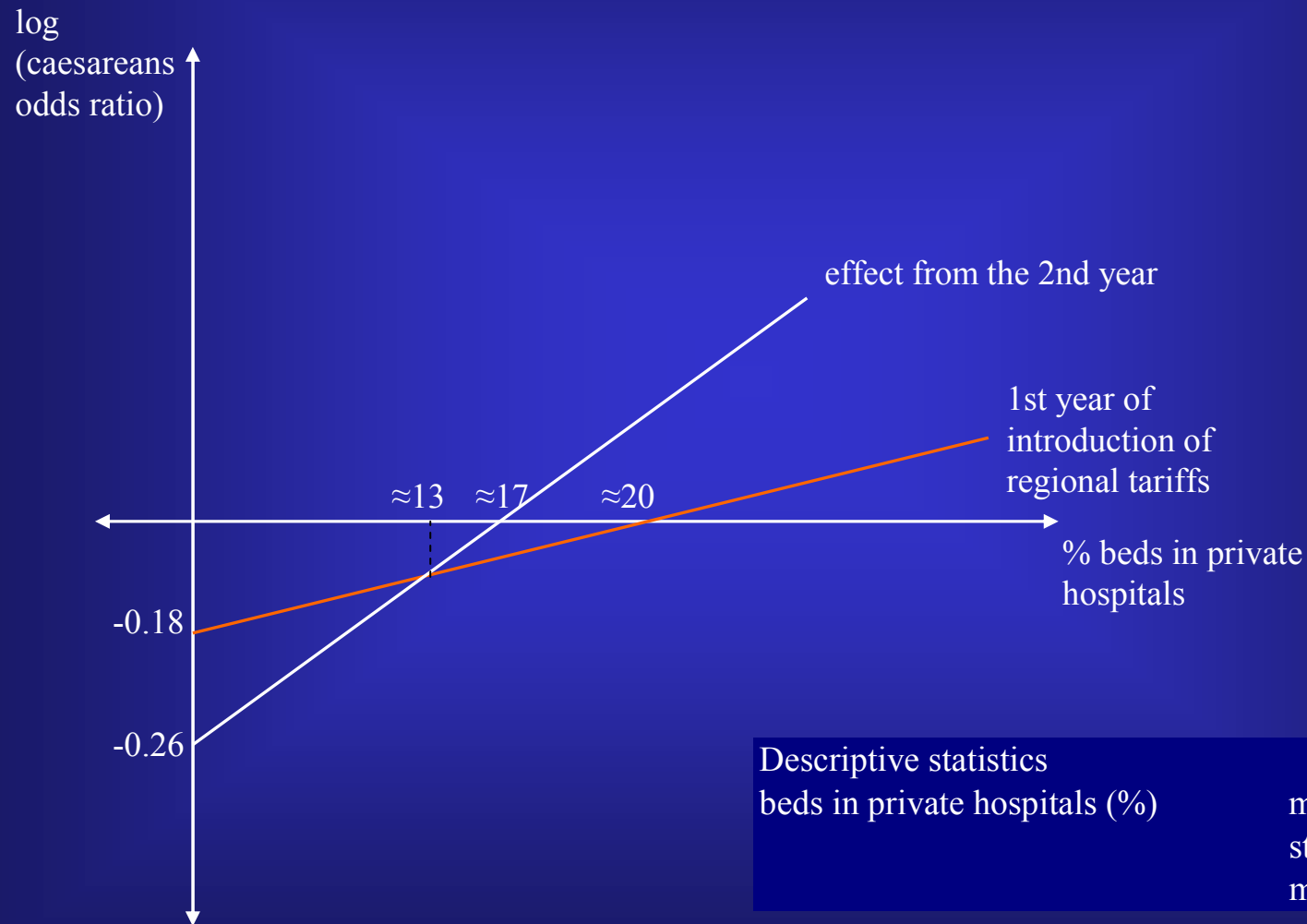
* Interesting role played by pricing policies:

- Region-specific DRG tariff policies are a signal that the region is putting effort in controlling health expenditure

- However, deviating from national reimbursement mechanisms does not *per se* imply superior outcomes ➔ when the share of private providers is very large, the incentive effect is mitigated (or even reversed), due to possible lobbying efforts

- Further evidence: the introduction of a regional tariff regulation requires some time to become fully effective in controlling inappropriateness (adjustment costs); however, adjustment costs ↓ with the ↑ of private providers ➔ a wider private sector might push for a rapid change in reimbursement levels, so as to exploit the new tariffs schedule

reimbursment tariffs (h)	regional tariffs (dummy)	-0.137 **	-0.165 **	-0.260 ***
		0.062	0.071	0.080
	introduction of regional tariffs			0.066 **
				0.031
	regional tariffs*(bed in private hospitals)	0.009 **	0.009 **	0.015 ***
		0.003	0.004	0.005
	introduction of tariffs*(beds in private hospitals)			-0.006 **
				0.003

* Characteristics of regional government are also relevant:

- President experience matters in ↓ inappropriateness, together with political alignment with the central government ➔ the positive sign suggests a loosening of the pressure to control inefficiencies (higher expectations of deficit bailouts)

- Own funding share is negative and significant ➔ 2 possible interpretations:

  ✓ a higher degree of fiscal autonomy → higher electoral accountability → increased efficiency (modern fiscal federalism theory, e.g. Weingast, 2009)

  ✓ the variable might also reflect tax base distribution and income inequalities across regions

political economy indicators (z)			
	in line with central government	-0.017	-0.013
		0.017	0.016
	share of own funding	-0.411 ***	-0.435 *
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	president experience*(in line with central government)	0.009 **	0.008 ***
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	president is a doctor	0.061 **	0.075 ***
		0.025	0.018

concluding remarks

* The goal of health expenditure containment can be achieved by ↓ the inefficiencies through an ↑ of the appropriateness of health treatments

* Our analysis of caesarean deliveries suggests that differentiating the tariff mechanism from the national DRG setting does not guarantee superior outcomes ➡ the structure of the regional health care system – in particular private sector incidence – does affect policy choices

* Experience and stability of regional administrators can also play a role; more importantly, having access to significant own resources for financing health expenditure seems to provide right incentives to regional governments

➡️ Where do we go from here?

* One important result we have is that attention must be paid to providers' behavioural responses ➔ the impact on care quality and health outcomes should be taken into account as well

* An improvement could certainly derive from using complete series for DRG tariffs. We have not yet been able to obtain them, at least so far…

* Exploring the role of indicators of good public management would also contribute to give a more complete picture ➔ available evidence on the performance of regional public administrations (Bank of Italy, Formez) could be a starting point