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# Curb Your Premium!

## Evaluating State Intervention in Medical Malpractice Insurance\*

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### Abstract

Using data of Italian public healthcare providers over years 2001 through 2008, we evaluate the impact of two policies adopted by Italian Regions (*i.e.*, States) to cope with increasing medical malpractice costs using a Difference-in-Difference specification. We assess the impact of the policies on premiums paid and legal expenditures. The first policy consisted in collecting information and monitoring both compensation requests and any legal action related to a medical malpractice claim against a public healthcare provider. The second policy is a switch from private to public insurance for damages up to 500,000 euros combined with a centralized-regional contracting out in the private insurance market for damages in excess of 500,000 euros. Both policies represent attempts to cope with multiple agency problems within the public sector. Our results show that the impact of central monitoring in malpractice claims trend can reduce up to 29% the premiums paid for the treated providers, while the effect is obviously stronger for public insurance (41%). We control for the effects of the latter also on the trend of legal expenditures as proxy for common pool behaviors which do not result from our data. Validity tests show that our results are not driven by a decreasing trend affecting the insurance expenditures of the analyzed units before the policies' introduction.

**JEL codes:** I18, G22, K32.

**Keywords:** Medical Errors, Medical Malpractice Premium, Legal Expenditures, Difference in Difference.

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# 1 Introduction

Soaring expenditures due to medical malpractice have become a major policy concern in both private and public healthcare systems because of the rising costs of medical malpractice insurance premiums, compensation amounts, and defensive medicine (OECD (2006)). However, the widespread increase in premiums can bite public healthcare systems more than private, due to soft budget constraints problems which often characterize the public system. There is an interplay of multiple agency problems when medical malpractice insurance is acquired by a public agent from the private market.<sup>1</sup> The public agency in charge of bargaining with the private insurance is one layer of government (generally the provider of the healthcare services) which might not have adequate incentives to fully internalize the bargaining (and contract) costs compared to the layer of government (generally the State) which has to pay the final bill. Related to this, there may be lack of incentives for the public agency bargaining with the private insurer to acquire adequate information on the service risks the public is contracting out to the private. For instance, as medical malpractice is concerned, a public hospital could not invest appropriate resources in collecting information on its own exposure to risk, both in terms of claims' frequency and awarded compensations.

The State has two options to cope with this framework: first it can bypass the agency problem by directly providing public insurance coverage, which, in first-best world, is known to be theoretically more efficient (Arrow and Lind (1970)); second, it can try to collect and spread information on malpractice to curb the lack of incentives that characterizes providers in raising their level knowledge. The latter solution, which could be linked to a process of budget hardening, should work as an incentive on the basis of a *I-know-that-you-know-that-I-know-that-you-know* game between the State and its suppliers. Its rationale lays in making both the State and counterparts more informed, and consequently, for instance, better able to work out efficient contracts and policies. This is particularly important when insurance contracts need to follow the process of public procurement auctions.<sup>2</sup>

In this paper we analyze the case for a higher level of State involvement in medical malpractice insurance and monitoring when the healthcare system is mainly public. We implement a Difference-in-Difference strategy using Italian data at the public provider level from 2001 to 2008 to evaluate 1) the relative efficiency of Regions (an administrative level equivalent to States)<sup>3</sup> oriented as opposed to market oriented solutions in terms of affordability of malpractice premiums (public insurance), and 2) the impact of a regional monitoring activity on the medical liability insurance premiums paid by the public healthcare providers, with the counterpart typically a private insurance provider. We

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<sup>1</sup>The same argument can be used for the contracting out of other services.

<sup>2</sup>For a political economy evaluation of better quality public auctions – more bidders, higher rebates, and mobility of bidders, among the others – see Coviello and Gagliarducci (2010), who use data on Italian municipalities.

<sup>3</sup>For a matter of simplicity, in this paper we use *Regions* and *States* interchangeably.

exploit the adoption of two medical malpractice related policies, given that they were introduced only in some Regions and in different years.

In particular, the monitoring policy is implemented by a regional monitoring system that collects data on both the number of compensation claims and legal action related to malpractice litigation. Adopting this system, Regions collect information on civil and criminal claims against public healthcare providers operating in their jurisdictions, from the stage of filing a suit to the end of trial, or to a settlement: eight Regions out of twenty-one have chosen this approach between 1997 and 2008. Within a system where each public provider can contract out its risk to the private sector, an increase in available information on malpractice could, for instance, have a positive impact on the public procurement procedure, since also the private insurer knows that the principal (State) knows.

The public insurance solution has been adopted by two Regions, which modeled the malpractice insurance plan according to a “mixed” scheme. Adopting Regions provide full coverage to their hospitals for damages up to 500,000 euros.<sup>4</sup> The healthcare providers are required to contribute to the pooled insurance. The private insurers are then called in for coverage in excess of the damage liability, so that the private insurer will apply a deduction of 500,000 euros, and the insurance contract is signed between the Region and the private company following a centralized bargaining process typically based on public procurement auctions. While the pros of this solution should be apparent (a drop in paid premiums and a reduction of transactions costs when the contracting out is in place), it is not always easy to devise empirical evaluation of the cons. If the pooled risks are managed without adequate monitoring, it could trigger higher frequency of malpractice claims due to a watering down of precaution standards. In order to control for this side effect, we devise an impact evaluation of adopting public insurance on legal expenditures per provider. A significant increase in legal expenditures could be read as an increase in compensation requests. Finally, we argue that rough cost-benefits calculations are needed when considering a public insurance solution. Obviously, if on average Regions end up paying more in compensations for malpractice claims than it would cost them to pay a private insurer, then this private solution would still be the more convenient option. It is impossible to make accurate evaluations for our case study.

Our main results from the Difference-in-Difference estimation show that both policies have an impact on insurance premiums paid by public healthcare providers: the monitoring policy decreases up to 29% of the premiums paid, while the switch to public insurance plus centralized contracting out decreased them up to 40%. Legal expenditures do not seem to be systematically affected by the implemented policies, but a positive coefficient is associated to the introduction of public insurance. The findings are robust to the introduction of covariates which could potentially explain the

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<sup>4</sup>One of the two Regions, Piemonte, sets a deductible equal to 1,500 euros, which can be considered as negligible given the average granted compensation in the same Region was 27,575 euros on average- data for 2005-2009. See Amaral-Garcia and Grembi (2011).

different trends in premiums among structures and Regions: for instance the migrations of patients to structures behold to have higher qualitative standards. Results are also robust to placebo test such as the introduction of “fake” policies which confirm that our results are not driven by a decreasing trend in premiums or legal expenditures.

The paper proceeds as follows. Section 2 provides reference to the literature mainly related to our research question. Section 3 lays out the institutional framework and our econometric strategy. Section 4 describes our dataset. Section 5 discusses the empirical results and Section 6 concludes.

## 2 Related Literature Review

The causes of the last decades’ skyrocketing increase of the insurance premiums for medical liability have been addressed by many works and according to different perspectives. Insurance companies blame legal professionals (*i.e.* with incentives to file ungrounded claims) and the inefficiency of the legal system (*e.g.* lottery-like compensations); lawyers blame the insurance companies (*e.g.* inadequate adjustments of the reserves); and physicians/hospitals blame both insurance companies (*i.e.* unavailable or prohibitive insurance coverage) and the legal system (*e.g.* amounts of compensation awards) (see, for instance, AMA (2011)). Although several authors have tried to link the premiums’ growth or the decisions of private insurance companies to withdraw from the market of medical liability to specificity of malpractice claims (*e.g.* Mello (2006), it has been difficult to establish such a link. As stated by the U.S. General Accounting Office (GAO), given the available information, it is not clear whether or not the affordability and the availability crisis affecting the insurance market for malpractice at least in the U.S. is related to insurance cycles rather than to frequency of malpractice claims or to compensations of iatrogenic damages awarded (GAO (2003a), GAO (2003b), and GAO (2003c)).

Governments reacted to the policy challenge related to medical malpractice according to the type of their healthcare system by taking initiatives to lower premiums paid and reduce cream-skimming distortions in medical practice (*i.e.*, negative defensive medicine, see Danzon (2000)). In countries such as the U.S., where the healthcare system is mainly private, States adopted legal reforms shaping the liability system, such as caps on the amount of damages awarded in cases of medical malpractice, which have been among the most popular types of reform (*e.g.*, see Sloan (1985); Williams and Mello (2006); Kessler (2011)).<sup>5</sup> Exploiting the variation in interventions across U.S. States, several studies estimate the impact of legal reforms on malpractice premiums, malpractice claims frequency, award payments, or defensive medicine, to name the main outcomes of interest (*e.g.*, see Mello and Kachalia (2010); US-CBO (2004); Danzon, Epstein, and Johnson (2004); Thorpe (2004); Kilgore, Morrissey, and Nelson (2006); Nelson III, Morrissey, and Kilgore

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<sup>5</sup>See Avraham (2010) for an updated list of reforms in the U.S. States.

(2007)).<sup>6</sup> Most of these studies have identified caps on noneconomic damages as the most effective reform. Following the introduction of noneconomic damage caps, medical malpractice premiums—either at the State or at the individual physician level—usually fall. In some cases, States sponsored forms of physicians’ self-insurance (bedpan mutuals) which eventually ended up with an important role in the market for medical liability (Mello and Brennan (2003)).<sup>7</sup>

In countries with mainly public healthcare systems, such as most European countries, rising malpractice costs have often induced governments to replace private with public insurance. In some case, such as Sweden’s, this shift to public insurance was accompanied by the adoption of a no fault liability system,<sup>8</sup> while in others, such as for the U.K., an enterprise fault liability system was adopted. The risk of individual physicians directly employed by the National Health System (NHS) was transferred to the NHS hospitals (see Fenn, Gray, and Rickman (2004)) and the latter were subsequently covered by a public insurance scheme managed by the NHS Litigation Authority (NHSLA).<sup>9</sup> The English case study pinpoints the importance of the principal (NHS) control on its agents (hospitals and their employees), since public providers have limited incentives to take efficient levels of care. Yet, estimations of side-effects consequences for the public sector are difficult, because the reform was implemented throughout the entire system.

### 3 Institutional framework

#### 3.1 The Italian HealthCare System

The Italian National Health System provides universal coverage to citizens.<sup>10</sup> The current organization and management of the Italian NHS is done at three levels: at the central level, by the national State; at the regional level, by each Region; within each Region, by population-based local health units (LHUs) (*Aziende Sanitarie Locali*) “independent” hospitals (IHs)(*Aziende Ospedaliere*), research hospitals (RHs)(*Istituti di Ricovero e Cura a Carattere Scientifico*)- essential to perform research and provide assistance with specific pathologies-, and, in case a medical school is present,

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<sup>6</sup>For the assessment of the link between malpractice pressure and treatment decisions, with specific reference to the costs of defensive medicine, see Kessler and McClellan (1996) and Kessler and McClellan (2002).

<sup>7</sup>See for instance the case of the Physician Insurers Association of America (PIAA), which argues that in 2003 a share equal to the 60% of the insurance market for physician liability was run by other than “commercial” companies. The number was equal to 40% for the hospitals’ liability (PIA (2003)).

<sup>8</sup>For an updated report on the Swedish public insurance plan see at —link on sweden—.

<sup>9</sup>The public insurance formula—the Clinical Negligence Scheme for Trusts (CNST)—pools malpractice risks of public structures and this process took place initially with hospitals left free to set their deductibles but after 2002 the NHSLA provided a full coverage for claims (see Fenn, Rickman, and Gray (2007) and Fenn, Gray, Rickman, Vencappa, Rivero, and Lotti (2010)).

<sup>10</sup>Healthcare is mainly provided by public entities and citizens are not allowed to opt out from the system and search private healthcare only (Lo Scalzo, Donatini, Orzella, Cicchetti, Profili, and Maresso (2009)).

by teaching hospitals (THs)(*Policlinici Universitari* and *Aziende Ospedaliere Universitarie*)(France and Taroni (2005); Fiorentini, Lippi Bruni, and Ugolini (2008); Lo Scalzo, Donatini, Orzella, Cicchetti, Profili, and Maresso (2009)).

The Central state defines the minimum (national) standards of health care (*Livelli Essenziali di Assistenza-LEA*) that Regions must provide to their residents. Additionally, it partially funds 19 regions and 2 autonomous provinces (*Provincia Autonoma di Trento* and *Provincia Autonoma di Bolzano*) through an equalizing fund. This fund, together with regional revenues, accounts for financing the regional health care expenditures (France, Taroni, and Donatini (2005)). Regional Governments are in charge for the entire healthcare budget and are responsible for its management to both their residents and the National State, as in a decentralized system. Regions are responsible, among other things, for ensuring the delivery of the healthcare, for the allocation of resources to the healthcare providers, and for the “accreditation ” of public and private health providers with the system (CERGAS, SEVERAL years).

Regions are free to regulate and finance health care services additional to the required LEA (Fiorentini, Lippi Bruni, and Ugolini (2008)) and they can implement different healthcare management schemes, to the point that several authors have stated that in Italy there are 21 health care systems.<sup>11</sup> Each regional health care system is organized in LHUs , IHs, RHs and THs, and private institutions. LHUs are population-based care organizations that provide primary medical services and coordinate non-emergency admissions to hospitals in their geographical area. LHUs provide medical services through hospitals they own and IHs, RHs, and THs.<sup>12</sup> The IHs are essentially structured like the British National Health System’s Trusts (Anessi Pessina, Cantu, and Jommi (2004)). Patients are covered by health plans provided by LHUs according to their place of residence even though they can also choose to receive hospital care from a hospital that does not belong neither to their LHU area nor to their region of residence. Therefore, a proxy for the health care

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<sup>11</sup>The current decentralized structure of the Italian Health System is the product of several reforms which starting from the Nineties tried to make the Regional governments more fiscal responsible, coping with soft-budget constraint problems (Bordignon and Turati (2009)) on one side, and to make the overall mainly public system more competitive and efficient. The reforms introduced managerialism, fiscal tools for decentralization and quasi-market mechanisms (Fattore (1999); Jommi, Cantu, and Anessi-Pessina (2001); France, Taroni, and Donatini (2005)). In the aftermath of these reforms, the number of IHs increased while the number of LHUs decreased as Regions were trying to reshape their own health care governance, especially in those realities characterized by a stronger preference for competition (CERGAS, 2004). In 1992, before the reforms took place, there were 659 LHUs, they were reduced to 228 in 1995 and further reduced to 146 in 2010. LHUs’ dimension care vary substantially: in some case a LHU can cover a municipalities, for bigger municipalities we have generally more than one LHUs, but in some case there might be just one LHU which cover an entire Region such as in Valle d’Aosta. As for IHs, in 1995 there were 81 IHs. The total number of IHs increased to 97 in 2001 to suffer a decrease to 82 in 2010. See Carbone, Ferre, and Liotta (2010) for more details - in Italian.

<sup>12</sup>Hospitals other than those managed directly by the LHUs are paid by Diagnostic Related Group (DRG) tariffs. See Anessi Pessina, Cantu, and Jommi (2004).

system quality can be provided by the *mobility rates*: *internal mobility* when migration takes place within the region of residence, and *external mobility* when migration involves structures outside the Region of residence. Providers in Northern regions are generally considered higher quality than their equivalent in the South and this seems to be confirmed by works (see for instance Fabbri and Robone (2010)) showing that the proportion of patients searching for hospital care outside of their LHUs of residence (*exit rate*) was higher for poorer Regions, with variation according to the type of care (more severe for patients with cancer).

### 3.2 Medical Malpractice: Legal Elements, the Insurance Market, and Regional Choices

Italy possesses no specific statute law to regulate the physician-patient relationship, although attempts have been made. Therefore the physician-patient relationship is regulated mostly by judge-made law just like in the United States, in particular through the jurisprudence developed by the Court of Cassation (the higher court for civil and criminal jurisdictions). The duties of a medical care provider (staff member, public or private hospital employee or independent practitioner) towards the patient are interpreted as contractual obligations as far as liability is concerned. Tort law liability rules (*responsabilità aquiliana*) are not applicable here; the regulation of doctors and hospitals' position before patients is formally regulated by principles of contract law (Arts. 1218, 1176, and 2236 of the Civil Code).<sup>13</sup>

Injured patients can find compensation not only through the civil justice but also through the criminal system.<sup>14</sup> As a matter of fact, criminal judges can decide over the compensation due to medical liability even when the main indictment is criminal (*i.e.*, minor or major personal injury) (Garoupa and Grembi (2010)). Public health care providers (LHUs, IHs, RHs, THs, and hospitals directly managed by LHUs) are not legally obliged to insure for medical malpractice themselves, but they must provide insurance for their medical personnel. The insurance covers professional liability against third-parties.<sup>15</sup> According to the data released by the Italian Association of Insurance Companies (ANIA), during the period 2000-2008 there were 13-14 compensation requests for every 100 physicians, with an average paid damage of 39,779 euro (2005 data) and an increasing trend between 1995 and 2004.<sup>16</sup> The ratio between the filed suits and the number of compensation

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<sup>13</sup>The main implication, in liability terms, is related to: 1) the burden of proof, which is on the defendant (physician or hospital) (Art. 1218 of Civil Code); 2) applicable provisions on professional diligence requirements (Art.1176 of Civil Code); 3) on the liability of an employee (Art. 2236 of Civil Code); and 4) the statute of limitations, currently ten years, rather than the standard five years for compensation claims not originating from a contract. For further detail, see Garoupa and Grembi (2010).

<sup>14</sup>Besides, they can sue both the physicians and the hospital.

<sup>15</sup>According to the national contract signed on February 2005, the insurance needs to provide a coverage up to 1,549,370.68 euro for each case of damage, and up to 1,032,913.80 euro for each involved person.

<sup>16</sup>There are no national data available on the number of paid requests. Just to have a reference mean - even though



requests seems to be quite low (significantly lower than 20%), although the only evidence on this index is available for a very reduced number of regions (Amaral-Garcia and Grembi (2011)).

Like all public agencies, public health care providers (LHUs, IHs, RHs and THs) are not allowed to go into the market to freely select an insurer: they need to open a call for tenders (public procurement auctions) in order to contract out the coverage. The insurers operating in the Italian market for medical malpractice are private companies, covering health care providers on the basis of a yearly premium calculated as a percentage of the annual gross payroll of the public entity, which can vary considerably (MdS, 2009). While the insurance premiums have substantially increased, with a shift from *occurrence-based* liability insurance coverage to *claims-made* liability,<sup>17</sup> their calculation does not contain any reference to other activity related statistics such as the number of beds, the average recovery length, the average number of surgeries, or the number of wards, to name only a few. Hence, the lack of experience rating<sup>18</sup> seems to play an important role also in the Italian market. Starting from the end of the Nineties, Italian hospitals began to reveal a degree of uneasiness about finding full and affordable coverage for medical liability from the private market. For instance, Buzzacchi and Gracis (2008) summarize the *status quo* on insurance coverage for LHUs and IHs from 2003 to 2006: out of the 308 collected calls for bids, the authors certify successful bids only in 55 cases. A failure in a total of 53 cases was found: in 40 calls there was a lack of bidders or a lack of qualified bids; in 13 cases, there was a new call for bids opened within one year after the previous award. For the remaining 200 cases there was no information on the outcome of the call. It is not possible to infer an increase in the lack of insurance availability for public providers since time series statistics have not been provided, but Buzzacchi and Gracis (2008) suggest a low degree of competition in the calls process and a scarcity of appropriate information monitoring on the public agents' side.<sup>19</sup> In this scenario, 8 regions out of 21 implemented between 1997 and 2008 monitoring systems—*Claims*—for medical malpractice claims. In the same period, 2 out of 21 regions adopted a public insurance policy—*InsMgmt*—up to a compensation limit, which counts as a deductible on the private market for medical malpractice insurance. In Table 1 the timing of the policies and the Regions involved are specified.

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plain comparisons should not be made given the differences in samples collections and healthcare systems- in Texas, the number of compensation requests was equal to 20 in 2000 (Black, Hyman, Silver, and Sage (2005)). In Florida, in 2003, the median paid damage was equal to 150,000 dollar (300,000 the mean) (Vidmar, Lee, MacKillop, McCarthy, and McGwin (2005)).

<sup>17</sup>While according to the former the injury is dated at the moment in which it took place, the latter sets the injury date when the patient claims damage compensation. This is a *de facto* transfer of risks since the consequences of medical malpractice injuries can become apparent even after several years.

<sup>18</sup>For a discussion of experience rating in medical malpractice insurance see Sloan (1990).

<sup>19</sup>Different attempts to estimate the cost of malpractice insurances for the Italian health care system have been done, but often the findings are aggregated or they cover limited time periods (MdS, 2006). A 2005 estimation assesses in almost 600 millions euro the expenditure for medical malpractice premiums in that year.

Table 1- Institutional details- here

13 Regions never adopted any policies during the observation time, one region was under the monitoring policy before 2001 (Provincia Autonoma di Trento, since 1997), and the main variation for the monitoring policy is due to 7 Regions.

## 4 Evaluation framework

### 4.1 Econometric Strategy

To identify the effect, if any, of the two treatments (*Claims* and *InsMgmt*), we use a Difference in Difference (DID) estimator that exploits the regional changes taking place at different points in time as already adopted in the literature (Autor, Donohue III, and Schwab (2006); Acemoglu, Cantoni, Johnson, and Robinson (2011)). Define  $Y_{irt}$  as paid malpractice premiums or legal expenditures by provider  $i$  delivering health care in Region  $r$  at time  $t$ . We estimate the following equation:

$$Y_{irt} = \gamma_i + \lambda_t + \delta Post1_t * Claims_r + \theta Post2_t * InsMgmt_r + X'_{it}\beta + Z'_{rt}\omega + \varepsilon_{irt}$$

where  $\gamma_i$  is a vector of health care provider intercepts and  $\lambda_t$  is a vector of year dummies, so that we control for both structure specific trends and time aggregated shocks.  $Post1_t$  is a dummy equal to 1 if  $t \geq t_1^*$  and 0 otherwise and  $Claims_r$  is equal to 1 for Regions adopting monitoring. In this setting,  $t_1^*$  is equal to the adoption year of *Claims*.  $Post2_t$  is a dummy equal to 1 if  $t \geq t_2^*$  and 0 otherwise and  $InsMgmt_r$  is equal to 1 for Regions adopting public insurance. Coherently to the previous case,  $t_2^*$  is equal to the adoption year of *InsMgmt*.  $\delta$  and  $\theta$  represent the DID estimators and they can be written according to the following standard equations

$$\begin{aligned} \delta = & \{E[Y_{irt}|Claims_r = 1, Post1_t \geq t_1^*] - E[Y_{irt}|Claims_r = 1, Post1_t < t_1^*]\} \\ & - \{E[Y_{irt}|Claims_r = 0, Post1_t \geq t_1^*] - E[Y_{irt}|Claims_r = 0, Post1_t < t_1^*]\} \end{aligned}$$

and

$$\begin{aligned} \theta = & \{E[Y_{irt}|InsMgmt_r = 1, Post2_t \geq t_2^*] - E[Y_{irt}|InsMgmt_r = 1, Post2_t < t_2^*]\} \\ & - \{E[Y_{irt}|InsMgmt_r = 0, Post2_t \geq t_2^*] - E[Y_{irt}|InsMgmt_r = 0, Post2_t < t_2^*]\} \end{aligned}$$

In our model we take into account two vectors of control variables per healthcare unit,  $X'_{it}$ , and regions,  $Z'_{rt}$ , which according to the literature on malpractice could have some impact on the trend of malpractice premiums as well as on legal expenditures (see, for instance, Thorpe (2004)).

$Z'_{rt}$  includes four regressors available at the regional level. The first set is composed by socio-economic characteristics of the operational context of public health care providers which includes: 1) a weighted measure for the resident population per LHU calculated as the number of regional residents divided by the number of LHUs operating within the Region. Although an approximation, this variable provides an assessment of the patients set for which the LHUs have to buy or provide medical services either directly or through other structures. Therefore, this variable is a proxy for both dimensions and activity levels of LHUs, as well as the related structures that have to deal with them; 2) a litigation rate index calculated as the regional ordinary civil proceedings filed in First-Instance Courts weighted per 1,000 residents. It is important to include this variable because it can be a direct driver of legal expenditures and claims requests; 3) the average duration of First Instance cases resolution; and 4) the regional GDP to control for territorial differences in economic conditions of both the patients and the providers (partially funded by regional taxes).

$X'_{it}$  groups structural characteristics of the providers. These include: 1) a set of dummies for the type of healthcare provider (LHUs, IHs, THs and RHs), since different structures tend to have different management and organizational arrangements, which might affect insurance; 2) the amount of medical personnel payroll, given that in Italy insurance companies set the premiums according to a percentage of the payroll; 3) two indexes to consider patients' mobility that providers need to manage. These indexes control for qualitative differences, which could affect the number of errors or the probability of patients filing claims. Hence, we use: a) the ratio of revenues due to medical care provided to residents from other public structures within the same region (*entry rate*), being higher revenues potentially associated with higher quality; b) the ratio of expenditures due to services that patients received by other public structures within the same Regions (*exit rate*).<sup>20</sup> The latter is an index for poor quality. In fact, it could not be interpreted differently: if exit rates were triggered by long waiting list, for instance, it would mean that the deserted providers are characterized by low quality level, being the length of waiting lists a proxy for quality.

## 4.2 Validity tests

The different performance in the terms of premiums expenditures could be driven by an anticipation effect or, in some case, the reforms could have caught up a trend triggered by the operational context characteristics. For instance, it could be the case that if hospitals do not get easily the insurance coverage then their paid premiums amount decreased because the structures were not able to get insurance in the first place, and we would have a decreasing trend independent from the treatments.

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<sup>20</sup>We did not use the mobility rates from and to out of the Region structures, cause the reliability of the data is not very accurate for this case. Generally the financial transfers are done among regions and not structures, even two years after the cares delivery. Therefore the financial values reported under out of the region mobility is severally underestimated. See Anessi Pessina (2011).

Consequently, we run two falsification tests, one for each policy we have analyzed. For the monitoring policy, we run a placebo test, using a fake measure of the treatment (see table notes) estimating the following model

$$Y_{irt} = \gamma_i + \lambda_t + \delta Post1_{t\_fake} * Claims_r + \theta Post2_t * InsMgmt_r + X'_{it}\beta + Z'_{rt}\omega + \varepsilon_{irt}$$

where  $Post1_{t\_fake}$  is equal to 1 when providers operate in Regions adopting *Claims* and  $Post1_{t\_fake} \geq t\_fake$  with  $t\_fake = mean(t^* - 2001)$ . If the “fake” treatment has a significant effect it means that the regional policy cannot be regarded as responsible for whatever impact we could detect with the model presented in the previous section.

For the second treatment, we use a validity test which is a Granger test (Autor, Donohue III, and Schwab (2006); Angrist and Pischke (2009); Acemoglu, Cantoni, Johnson, and Robinson (2011)) running the following model

$$Y_{irt} = \gamma_i + \lambda_t + \delta Post1_t * Claims_r + \sum_{b=1}^3 \theta_{-b} D_{i,t_2^*-b} + \sum_{a=0}^3 \theta_a D_{i,t_2^*+a} + X'_{it}\beta + Z'_{rt}\omega + \varepsilon_{irt}$$

where  $a$  represents years after the treatment of interest and  $b$  years before. This specification allows to control for both pre and post trends, so to check also if causal effects get stronger or weaker as time is passing. If our treatment is effective then we should have that the coefficients of the pre-treatment years are not statistically significant while those of the post-treatment years should be significant and supposedly with a negative sign.<sup>21</sup>

## 5 Data and Descriptive Statistics

We collected data from the Ministry of Health (MdS), the Italian National Institute of Statistics (Istat), and the Ministry of Justice, from 2001 to 2008, being the 2008 the last available financial year in spring 2011. The Ministry of Health releases the annual balance sheets of each LHU, IH, RH, and TH in every Region. From this source we obtain the two outcomes of interest: paid insurance premiums and legal expenditures. Paid insurance premiums are a proxy for medical malpractice liability premiums, since the share of the latter are not specified in the former aggregate measure. However, since 2008, regional public providers need to declare the paid medical liability premiums, distinguishing them from other insurance bought by the provider.<sup>22</sup> A check on 2008 data shows that medical liability premium counts on average for 84% of the total paid insurance premiums.

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<sup>21</sup>Using the same test for the the monitoring policy would imply to loose several Regions from the check, so we decide not to follow this way. See Table 1 for details.

<sup>22</sup>For instance, a hospital could buy a fire insurance or against burglary.

All in all, the aggregate measure can be regarded as a good proxy for paid medical malpractice premiums. Legal expenditures are an aggregate measure as well, and they are available only till 2007.

Figure 1 shows the per capita increase in paid premiums at the regional level. All Regions experienced an increase which is, on average, approximately equal to 120%. Regions opting for public insurance suffer an increase in paid insurance premiums much lower than the national average: premiums paid in Piemonte increased by 44% and in Friuli Venezia Giulia the increase was only of 13%.

Figure 1 - Premia per capita variation- here

Our sample consists of an unbalanced panel from a minimum of 264 structures to a maximum of 323 public healthcare providers. LHUs are the most represented type of healthcare structure in the sample, followed by IHs, THs, and RHs (Table 2).

Table 2- Types per year- here

THs are paying, on average, higher premiums than the other structures, which seems to account for their risk exposure related to, among other things, the interns. However, LHUs registered higher increase rates: in 2001, a LHU paid on average 894 thousand euro in premiums while in 2008 this amount was equal to 2,248 thousand euro (2009 euro) (Table 3). A similar trend is detectable for legal expenditures (Table 4).

Table 3- Paid Premiums per type and year- here

Table 4- Legal Expenditures per type and year- here

In table 5 the number of structures affected by each policy are shown.

Table 5- Structures per treatment and year- here

At a first glance is apparent that paid premiums increased for all the structures in both the treated and not treated sample, and this holds for both treatment types. Tables 6 and 7 show the average paid premiums and legal expenditures for the treatment and control group. Overall, if we considered the treatment on *Claims*, paid premiums increased on average 97% for the treated while this increase was equal to 142% for the control group.

Table 6- Paid premiums treated and control under each policy- here

The trend is softer for structures paying premiums in Regions adopting the *InsMgmt* treatment: the rate of variation for treated providers is equal to 56%, while non-treated providers experienced an increase of 118% (Table 7).

Table 7- Paid Legal Expenditures treated and control under each policy- here

We provide graphical analysis to show the trend of the variables of interest before and after each Regional treatment introduction. For each policy we consider three years before the treatment and three years after (the year of adoption is included). The trends seem to show evidence that introducing monitoring on malpractice claims decreases paid malpractice premiums (Figure 2); the adoption of the policy seems to have had no impact on legal expenditures (Figure 3).

Figure 2 and 3 - Premiums and Legal Expenditures first policy- here

Legal expenditures appear to increase after the introduction of the *InsMgmt* treatment (Figure 5). Nevertheless, this policy seems to have a decreasing effect on premium expenditures (Figure 4).

Figure 4 and 5 - Premiums and Legal Expenditures second policy- here

## 6 Empirical results

We run the models specified in sections 4.1 and 4.2 distinguishing between the entire sample and the sample made by only LHU observations.<sup>23</sup> The split is due to the fact that *exit rate* has a meaning only for LHU, since it will be the LHU of the patient residency to pay for the care delivered to her by another provider. In Tables 8 and 9, we show the results of the model described in section 4.1 for both paid malpractice premium and legal expenditures. We present 4 regressions for each sample adding controls in a stepwise way to show the robustness of the treatments' estimates. Regression (4) include *litigation rates* and *duration* for the entire sample and *exit rate* for the sample made only by LHUs.

Tables 8-9- results- here

The impact of  $Post1 * Claims$  ( $\delta$ ) is assessed in a range between -29 (Model 3) and -34% (Model 4),<sup>24</sup> while the impact of  $Post2 * InsMgmt$  ( $\theta$ ) is between -40 (Model 3) and -42% (Model 4). There are no significant effects on legal expenditures although the signs of the coefficients are positive when we consider the introduction of public insurance. Yet, this is an important results for us, because it means that legal expenditures are still mainly driven by other factors. A significant effect on the paid premiums is exerted by the potential population of their patients and the paid payroll, which do not affect in the same way legal expenditures. Mobility rates are not significant even if their sign is consistent with what we could expect when the outcome is paid insurance: negative for *entry rate* - which stands for good quality - and positive for *exit rate* - which stands for bad quality. The signs revert when the outcome is legal expenditure with better providers, with

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<sup>23</sup>We address the autocorrelation problem of DID (Bertrand, Duflo, and Mullainathan (2004)) clustering the errors.

<sup>24</sup>Model 4 includes observations until 2007 given the use of the judiciary controls.

more patients to treat, having also higher legal expenditures. However the coefficient is significant only when the LHU sub-sample is considered.

Results of the validity tests shown in tables 10-13 confirm the robustness of results shown in tables 8 and 9.

Tables 10-13- results of validity tests- here

Tables 10 and 11 show the results when the outcome is paid premiums. While  $Post1_{t\_fake} * Claims_r$  is not significant, the dummies for the post-public insurance adoption shown a general decreasing trend. In model 3 (Table 11) the decrease on paid premiums move from 40 (T1) to 47% (T3), while if 2008 is dropped (Model 4) the trend is from 42 (T1) to 36% (T3), yet in this case we are not considering the third year for the structures working in Friuli Venezia Giulia (see Table 1). When only LHU observation are considered (Models 7 and 8) the policy impact is definitely growing from 37 (T1) to 43% (T3). There are no effects due to the validity tests on the legal expenditures.

## 7 Conclusion

We showed that State initiatives to cope with multiple agency problems can be effective, evaluating their impact on medical malpractice paid premiums at the level of healthcare provider in a mainly public healthcare system. Such positive impact runs along two processes: on the one hand, improving the amount of available information on malpractice (at least on the legal side) produces cheaper insurance. This might be due to an increased ability of local providers to extract the rent from the private bidders, with a raise, for instance, in the public procurement quality indexes (e.g. number of bidders), but it might also due to an increase of better weighted deductibles at the provider level now more aware of their risk exposure. On the other hand, a public insurance solution, together with a Regional level contracting out of the residual risk, decreases as expected insurance expenditures. Given the amount of available information it is impossible to evaluate if this solution is convenient by any means. We produce a check on legal expenditures, which did not increase as a consequence of risk-pooling due to public insurance. Yet, the final check is represented by the comparison between the amount of total compensations paid by the Region and the premium of a competitive private insurance market. If, as usual in medical malpractice, claims ending up with awarded compensations are significantly lower than the originally filed claims, the combo used by the Italian Regions could be a useful benchmark.

## 8 Tables and Figures

Table 1: Institutional Details

Regions	2001	2002	2003	2004	2005	2006	2007	2008
Abruzzo								
Basilicata								
Bolzano								
Calabria								
Campania								
Emilia Romagna			C	C	C	C	C	C
Friuli Venezia Giulia					IM	IM C	IM C	IM C
Lazio							C	C
Liguria								
Lombardia				C	C	C	C	C
Marche								
Molise								
Piemonte				IM	IM	IM	IM	IM C
Puglia							C	C
Sardegna								
Sicilia								
Toscana					C	C	C	C
Trento	C	C	C	C	C	C	C	C
Umbria								
Valle d' Aosta								
Veneto								

Note: C=Claims, IM=InsMgmt. Source: AGENAS (2009).



Table 2: Structures Types per Year

<b>Type</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>Total</b>
LHU	184	197	197	196	196	180	171	157	1,478
IH	52	68	65	61	63	63	63	63	498
TH	28	32	32	34	43	43	45	43	300
RH	0	0	20	22	21	20	21	21	125
<b>Total</b>	<b>264</b>	<b>297</b>	<b>314</b>	<b>313</b>	<b>323</b>	<b>306</b>	<b>300</b>	<b>284</b>	<b>2,401</b>

Note: LHU: *Local Health Units*; IH: *Independent Hospitals*; TH: *Teaching Hospitals*; and RH: *Research Hospitals*.

Table 3: Average Paid Premium per Type and Year

<b>Type</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>Total</b>
LHU	894	950	1,234	1,531	1,681	1,833	1,968	2,248	1,520
IH	1,023	1,022	1,220	1,518	1,602	1,734	1,857	1,844	1,482
TH	1,591	1,642	1,885	2,326	2,376	2,320	2,052	2,238	2,090
RH	.	.	564	692	903	881	989	922	828
<b>Total</b>	<b>995</b>	<b>1,041</b>	<b>1,255</b>	<b>1,561</b>	<b>1,708</b>	<b>1,819</b>	<b>1,889</b>	<b>2,059</b>	<b>1,548</b>

Note: Values are in 1,000 euros deflated at 2009. LHU: *Local Health Units*; IH: *Independent Hospitals*; TH: *Teaching Hospitals*; and RH: *Research Hospitals*.

Table 4: Average Paid Legal Expenditures per Type and Year

<b>Type</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>Total</b>
LHU	151	164	255	304	440	423	428	309
IH	83	122	146	284	222	185	193	178
TH	96	101	105	160	258	170	200	163
RH	.	.	61	142	174	95	190	129
<b>Total</b>	<b>131</b>	<b>148</b>	<b>205</b>	<b>273</b>	<b>358</b>	<b>319</b>	<b>334</b>	<b>256</b>

Note: Values are in 1,000 euros deflated at 2009. LHU: *Local Health Units*; IH: *Independent Hospitals*; TH: *Teaching Hospitals*; and RH: *Research Hospitals*.

Table 5: Structures per Treatment and Year

		2001	2002	2003	2004	2005	2006	2007	2008
<b>Claims</b>	<i>Non-Treated</i>	262	296	294	246	240	212	174	137
	<i>Treated</i>	1	1	20	67	83	94	126	147
<b>Ins Mgmt</b>	<i>Non-Treated</i>	263	297	314	284	282	265	259	252
	<i>Treated</i>	0	0	0	29	41	41	41	32
<b>Total Structures</b>		263	297	314	313	323	306	300	284

Note: The total number of structures suffered some changes, namely due to mergers.

Table 6: Average Paid Premium per Year and Group

Year	<i>Claims</i>		<i>Ins Mgmt</i>	
	<i>Non-Treated</i>	<i>Treated</i>	<i>Non-Treated</i>	<i>Treated</i>
2001	810	1,090	986	856
2002	844	1,235	1,060	916
2003	1,011	1,493	1,283	1,063
2004	1,288	1,828	1,598	1,318
2005	1,505	1,908	1,767	1,304
2006	1,713	1,913	1,940	1,039
2007	1,765	2,003	2,031	993
2008	1,962	2,149	2,151	1,338
<b>Total</b>	1,370	1,708	1,611	1,100

Note: Values are in 1,000 euros deflated at 2009.

Table 7: Average Paid Legal Expenditures per Year and Group

Year	<i>Claims</i>		<i>InsMgmt</i>	
	<i>Non-Treated</i>	<i>Treated</i>	<i>Non-Treated</i>	<i>Treated</i>
2001	140	115	140	50
2002	164	131	162	46
2003	252	159	226	62
2004	310	238	304	75
2005	481	232	400	77
2006	396	248	355	94
2007	482	195	374	94
<b>Total</b>	<b>325</b>	<b>190</b>	<b>285</b>	<b>72</b>

Note: Values are in 1,000 euros deflated at 2009. Legal Expenditures are only available until 2007.

Table 8: The Impact on Paid Premiums

	All sample				Only LHU			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post1*Claims	-0.36*** (-5.31)	-0.35*** (-5.19)	-0.35*** (-5.17)	-0.41*** (-5.37)	-0.33*** (-4.21)	-0.28*** (-3.67)	-0.28*** (-3.55)	-0.27*** (-3.48)
Post2*InsMgmt	-0.49*** (-4.70)	-0.50*** (-4.75)	-0.51*** (-4.82)	-0.54*** (-5.50)	-0.40*** (-3.61)	-0.41*** (-3.64)	-0.43*** (-3.77)	-0.46*** (-3.55)
GDP	-2.22 (-1.17)	-2.41 (-1.33)	-1.83 (-1.02)	-0.76 (-0.36)	-0.86 (-0.49)	-0.38 (-0.23)	0.59 (0.36)	0.53 (0.32)
IH	3.81 (1.21)	5.05* (1.75)	5.00* (1.74)	-2.26 (-0.50)				
TH	2.53 (0.80)	3.79 (1.31)	3.74 (1.30)	-3.46 (-0.76)				
RH	1.98 (0.37)	4.92 (1.02)	4.19 (0.85)	-0.55 (-0.43)				
Av_LHU_Pop	0.20** (1.98)	0.21** (2.00)	0.22** (2.02)	0.04 (0.40)	0.45*** (2.91)	0.36** (2.56)	0.35** (2.48)	0.35** (2.48)
WageHealth		0.60** (2.25)	0.63** (2.26)	1.07*** (3.40)		0.86*** (5.30)	0.89*** (5.52)	0.92*** (5.56)
Entry_Rate			-0.14 (-1.00)	-0.14 (-0.94)			-0.17 (-1.06)	-0.23 (-1.17)
Litig_Rate				0.04 (0.97)				
Duration				0.00** (2.29)				
Exit_Rate								0.19 (1.31)
<i>Observations</i>	2347	2347	2240	1832	1452	1452	1382	1352
<i>R</i> <sup>2</sup>	0.83	0.84	0.85	0.85	0.83	0.84	0.85	0.86
<i>Adj Rsq</i>	0.80	0.81	0.82	0.82	0.80	0.81	0.83	0.83

Notes: Dependent variable, *GDP*, *Av\_LHU\_Pop*, and *WageHealth* are in natural log. All regressions include Structure and Year Fixed Effects. Robust standard errors clustered at the structure level in brackets. Significance at the 10% level is represented by \*, at the 5% level by \*\*, and at the 1% level by \*\*\*.

Table 9: The Impact on Paid Legal Expenditures

	All sample				Only LHU			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post1*Claims	-0.17 (-1.56)	-0.18 (-1.63)	-0.16 (-1.43)	-0.13 (-1.11)	-0.12 (-0.74)	-0.14 (-0.83)	-0.13 (-0.76)	-0.15 (-0.88)
Post2*InsMgmt	0.06 (0.45)	0.06 (0.45)	0.08 (0.61)	0.11 (0.81)	0.04 (0.24)	0.04 (0.24)	0.05 (0.33)	0.09 (0.56)
GDP	-4.99 (-1.59)	-5.13 (-1.63)	-4.51 (-1.37)	-3.55 (-1.07)	-5.10 (-1.34)	-5.28 (-1.39)	-5.08 (-1.28)	-5.53 (-1.37)
IH	-9.89** (-2.17)	-9.49** (-2.07)	7.44 (1.35)	-2.74 (-0.88)				
TH	-9.50** (-2.08)	-9.11** (-1.98)	7.82 (1.42)	-2.38 (-0.76)				
RH	-3.88*** (-3.69)	5.62** (2.24)	21.23 (1.64)	3.34*** (11.96)				
Av_LHU_Pop	-0.09 (-0.56)	-0.08 (-0.52)	-0.07 (-0.41)	-0.01 (-0.07)	-0.50 (-0.84)	-0.43 (-0.70)	-0.40 (-0.64)	-0.41 (-0.66)
WageHealth		-0.17 (-0.71)	-0.23 (-1.00)	-0.16 (-0.69)		-0.21 (-0.74)	-0.24 (-0.86)	-0.31 (-1.14)
Entry_Rate			0.18 (0.96)	0.23 (1.22)			0.32 (1.42)	0.56** (2.54)
Litig_Rate				-0.01 (-0.13)				
Duration				-0.00* (-1.73)				
Exit_Rate								-0.28 (-1.10)
<i>Observations</i>	1885	1885	1789	1660	1166	1166	1099	1070
<i>R</i> <sup>2</sup>	0.75	0.75	0.75	0.76	0.78	0.78	0.78	0.78
<i>Adj Rsq</i>	0.69	0.69	0.69	0.70	0.74	0.74	0.73	0.73

Notes: Dependent variable, *GDP*, *Av\_LHU\_Pop*, and *WageHealth* are in natural log. All regressions include Structure and Year Fixed Effects. Robust standard errors clustered at the structure level in brackets. Significance at the 10% level is represented by \*, at the 5% level by \*\*, and at the 1% level by \*\*\*.

Table 10: The Impact on Paid Premiums: Validity Test 1

	All sample				Only LHU			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post1_Fake*Claims	0.10 (1.16)	0.10 (1.29)	0.10 (1.26)	0.04 (0.54)	0.07 (0.84)	0.09 (1.24)	0.09 (1.23)	0.11 (1.48)
Post2*InsMgmt	-0.56*** (-4.07)	-0.57*** (-4.22)	-0.57*** (-4.20)	-0.50*** (-4.10)	-0.45*** (-2.96)	-0.48*** (-3.26)	-0.49*** (-3.30)	-0.55*** (-3.32)
GDP	-3.05 (-1.61)	-3.24* (-1.76)	-2.55 (-1.40)	-1.10 (-0.47)	-1.80 (-1.03)	-1.21 (-0.72)	-0.16 (-0.10)	-0.20 (-0.12)
IH	5.27* (1.68)	6.65** (2.22)	6.62** (2.24)	-3.04 (-0.60)				
TH	3.90 (1.23)	5.31* (1.76)	5.28* (1.77)	-4.35 (-0.86)				
RH	4.10 (0.77)	7.16 (1.45)	6.32 (1.26)	-0.78 (-0.53)				
Av_LHU_Pop	0.18* (1.94)	0.19** (2.00)	0.20** (2.06)	-0.00 (-0.01)	0.32*** (2.67)	0.25** (2.13)	0.24** (2.13)	0.24** (2.14)
WageHealth		0.63** (2.28)	0.65** (2.28)	1.18*** (4.04)		0.97*** (6.26)	0.99*** (6.63)	1.02*** (6.64)
Entry_Rate			-0.22 (-1.61)	-0.20 (-1.40)			-0.25 (-1.56)	-0.34* (-1.78)
Litig_Rate				0.06 (1.29)				
Duration				0.00* (1.87)				
Exit_Rate								0.22 (1.44)
<i>Observations</i>	2347	2347	2240	1832	1452	1452	1382	1352
<i>R</i> <sup>2</sup>	0.83	0.83	0.84	0.84	0.83	0.84	0.85	0.85
<i>Adj Rsq</i>	0.80	0.80	0.81	0.81	0.79	0.81	0.82	0.82

Notes: *Post1\_Fake\*Claims* is equal to one if Region is equal to Lombardia and *year*  $\geq$  2002; Piemonte and *year*  $\geq$  2005; Lazio and *year*  $\geq$  2004; Puglia and *year*  $\geq$  2004; Friuli Venezia Giulia and *year*  $\geq$  2003; Toscana and *year*  $\geq$  2003; and if Region is equal to Emilia Romagna and Trento. Dependent variable, *GDP*, *Av\_LHU\_Pop*, and *WageHealth* are in natural log. All regressions include Structure and Year Fixed Effects. Robust standard errors clustered at the structure level in brackets. Significance at the 10% level is represented by \*, at the 5% level by \*\*, and at the 1% level by \*\*\*.

Table 11: The Impact on Paid Premiums: Validity Test 2

	All sample				Only LHU			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post1*Claims	-0.38*** (-5.80)	-0.37*** (-5.68)	-0.37*** (-5.69)	-0.39*** (-5.69)	-0.34*** (-4.56)	-0.29*** (-4.06)	-0.29*** (-3.95)	-0.28*** (-3.94)
Tm3	0.06 (0.69)	0.06 (0.75)	0.08 (0.94)	0.12 (1.18)	0.06 (0.73)	0.05 (0.59)	0.07 (0.76)	0.22** (2.04)
Tm2	0.11 (1.13)	0.11 (1.18)	0.11 (1.19)	0.16 (1.44)	-0.02 (-0.25)	-0.03 (-0.31)	-0.02 (-0.29)	0.16 (1.44)
Tm1	0.08 (1.04)	0.08 (1.09)	0.08 (1.09)	0.08 (1.07)	-0.03 (-0.53)	-0.04 (-0.71)	-0.04 (-0.70)	-0.04 (-0.67)
T1	-0.52*** (-4.14)	-0.51*** (-4.00)	-0.52*** (-4.06)	-0.55*** (-3.95)	-0.42*** (-3.08)	-0.44*** (-3.22)	-0.47*** (-3.39)	-0.47*** (-3.34)
T2	-0.62*** (-4.12)	-0.62*** (-4.10)	-0.63*** (-4.18)	-0.66*** (-4.13)	-0.51*** (-3.40)	-0.53*** (-3.46)	-0.56*** (-3.64)	-0.57*** (-3.63)
T3	-0.62*** (-4.88)	-0.63*** (-4.84)	-0.63*** (-4.74)	-0.44*** (-3.93)	-0.54*** (-3.69)	-0.56*** (-3.69)	-0.56*** (-3.68)	-0.57*** (-3.61)
GDP	-1.78 (-0.95)	-1.97 (-1.12)	-1.39 (-0.80)	-0.11 (-0.05)	-1.07 (-0.60)	-0.57 (-0.34)	0.37 (0.23)	0.29 (0.17)
IH	3.05 (0.98)	4.29 (1.53)	4.30 (1.55)	-0.83 (-0.19)				
TH	1.76 (0.57)	3.02 (1.08)	3.03 (1.09)	-2.08 (-0.48)				
RH	0.77 (0.15)	3.71 (0.79)	3.04 (0.64)	-0.18 (-0.15)				
Av_LHU_Pop	0.14 (1.47)	0.15 (1.52)	0.15 (1.56)	0.03 (0.26)	0.32** (2.32)	0.23* (1.92)	0.21* (1.82)	0.20* (1.67)
WageHealth		0.60** (2.21)	0.62** (2.22)	1.07*** (3.45)		0.87*** (5.35)	0.90*** (5.57)	0.95*** (5.71)
Entry_Rate			-0.16 (-1.12)	-0.15 (-1.03)			-0.18 (-1.16)	-0.27 (-1.43)
Litig_Rate				0.06 (1.16)				
Duration				0.00** (2.40)				
Exit_Rate								0.38** (2.15)
<i>Observations</i>	2347	2347	2240	1832	1452	1452	1382	1352
<i>R</i> <sup>2</sup>	0.84	0.84	0.85	0.85	0.84	0.85	0.86	0.86
<i>Adj Rsq</i>	0.81	0.81	0.82	0.82	0.81	0.82	0.83	0.83

Notes: *Tm1* is equal to 1 for the year before the adoption of the policy (public insurance) and zero otherwise. *T1* is equal to 1 for the adoption of the policy (public insurance) year and zero otherwise. Dependent variable, *GDP*, *Av\_LHU\_Pop*, and *WageHealth* are in natural log. All regressions include Structure and Year Fixed Effects. Robust standard errors clustered at the structure level in brackets. Robust standard errors clustered at the structure level in brackets. Significance at the 10% level is represented by \*, at the 5% level by \*\*, and at the 1% level by \*\*\*.

Table 12: The Impact on Paid Legal Expenditures: Validity Test 1

	All sample				Only LHU			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post1_Fake*Claims	-0.07 (-0.57)	-0.07 (-0.57)	-0.06 (-0.46)	0.01 (0.09)	-0.05 (-0.31)	-0.05 (-0.32)	-0.04 (-0.25)	-0.06 (-0.37)
Post2*InsMgmt	0.12 (0.76)	0.12 (0.76)	0.14 (0.84)	0.12 (0.71)	0.08 (0.39)	0.08 (0.40)	0.09 (0.43)	0.14 (0.68)
GDP	-4.59 (-1.43)	-4.67 (-1.46)	-4.09 (-1.22)	-3.58 (-1.04)	-4.97 (-1.27)	-5.09 (-1.31)	-4.92 (-1.21)	-5.29 (-1.28)
IH	-9.29** (-1.99)	-8.69* (-1.86)	6.85 (1.21)	-2.75 (-0.85)				
TH	-8.95* (-1.91)	-8.35* (-1.79)	7.18 (1.27)	-2.42 (-0.75)				
RH	-3.72*** (-3.34)	5.17** (2.05)	19.47 (1.48)	3.27*** (11.84)				
Av_LHU_Pop	-0.12 (-0.79)	-0.12 (-0.77)	-0.10 (-0.61)	-0.03 (-0.18)	-0.72 (-1.38)	-0.70 (-1.32)	-0.64 (-1.21)	-0.69 (-1.28)
WageHealth		-0.10 (-0.44)	-0.17 (-0.75)	-0.11 (-0.49)		-0.15 (-0.53)	-0.18 (-0.67)	-0.23 (-0.89)
Entry_Rate			0.17 (0.94)	0.21 (1.14)			0.32 (1.44)	0.56*** (2.62)
Litig_Rate				-0.01 (-0.08)				
Duration				-0.00* (-1.79)				
Exit_Rate								-0.26 (-1.03)
<i>Observations</i>	1885	1885	1789	1660	1166	1166	1099	1070
<i>R<sup>2</sup></i>	0.75	0.75	0.75	0.75	0.78	0.78	0.78	0.78
<i>Adj Rsq</i>	0.69	0.69	0.69	0.70	0.74	0.73	0.73	0.73

Notes: *Post1\_Fake\*Claims* is equal to one if Region is equal to: Lombardia and *year*  $\geq$  2002; Piemonte and *year*  $\geq$  2005; Lazio and *year*  $\geq$  2004; Puglia and *year*  $\geq$  2004; Friuli Venezia Giulia and *year*  $\geq$  2003; Toscana and *year*  $\geq$  2003; and if Region is equal to Emilia Romagna and Trento. Dependent variable, *gdp*, *avlhupop*, and *wagehealth* are in natural log. All regressions include Structure and Year Fixed Effects. Robust standard errors clustered at the structure level in brackets. Significance at the 10% level is represented by \*, at the 5% level by \*\*, and at the 1% level by \*\*\*.



Table 13: The Impact on Paid Legal Expenditures: Validity Test 2

	All sample				Only LHU			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post1*Claims	-0.18 (-1.58)	-0.19 (-1.65)	-0.16 (-1.43)	-0.12 (-1.10)	-0.13 (-0.76)	-0.15 (-0.86)	-0.14 (-0.78)	-0.16 (-0.92)
Tm3	-0.05 (-0.28)	-0.05 (-0.27)	-0.04 (-0.26)	-0.06 (-0.33)	-0.08 (-0.36)	-0.07 (-0.35)	-0.09 (-0.43)	-0.27 (-0.90)
Tm2	0.01 (0.05)	0.01 (0.05)	0.02 (0.08)	0.01 (0.06)	0.01 (0.04)	0.01 (0.05)	0.00 (0.00)	-0.23 (-0.69)
Tm1	-0.16 (-0.95)	-0.16 (-0.95)	-0.17 (-0.95)	-0.17 (-0.97)	-0.01 (-0.07)	-0.01 (-0.06)	-0.02 (-0.09)	-0.03 (-0.14)
T1	0.06 (0.39)	0.06 (0.38)	0.06 (0.39)	0.08 (0.52)	0.10 (0.56)	0.11 (0.58)	0.11 (0.58)	0.13 (0.66)
T2	0.09 (0.48)	0.09 (0.49)	0.11 (0.60)	0.13 (0.68)	0.05 (0.21)	0.06 (0.22)	0.05 (0.21)	0.05 (0.20)
T3	0.03 (0.15)	0.03 (0.14)	0.09 (0.43)	0.13 (0.64)	-0.02 (-0.08)	-0.02 (-0.09)	0.00 (0.00)	0.01 (0.03)
GDP	-5.14 (-1.62)	-5.29* (-1.66)	-4.65 (-1.39)	-3.65 (-1.09)	-5.06 (-1.30)	-5.25 (-1.35)	-5.03 (-1.24)	-5.56 (-1.34)
IH	-9.26** (-2.00)	-9.77** (-2.10)	7.61 (1.36)	-2.83 (-0.89)				
TH	-8.82* (-1.91)	-9.34** (-2.01)	8.04 (1.44)	-2.40 (-0.75)				
RH	-3.05*** (-2.86)	5.74** (2.26)	21.75* (1.66)	3.35*** (11.96)				
Av_LHU_Pop	-0.08 (-0.53)	-0.08 (-0.49)	-0.06 (-0.37)	-0.01 (-0.03)	-0.49 (-0.82)	-0.42 (-0.69)	-0.39 (-0.63)	-0.37 (-0.62)
WageHealth		-0.17 (-0.72)	-0.23 (-1.01)	-0.17 (-0.70)		-0.22 (-0.75)	-0.24 (-0.86)	-0.33 (-1.21)
Entry_Rate			0.18 (0.98)	0.23 (1.25)			0.33 (1.45)	0.61** (2.59)
Litig_Rate				-0.00 (-0.02)				
Duration				-0.00 (-1.63)				
Exit_Rate								-0.49 (-1.21)
<i>Observations</i>	1885	1885	1789	1660	1166	1166	1099	1070
<i>R</i> <sup>2</sup>	0.75	0.75	0.75	0.76	0.78	0.78	0.78	0.78
<i>Adj Rsq</i>	0.69	0.69	0.69	0.70	0.73	0.73	0.73	0.72

Notes: Dependent variable, GDP, Av\_LHU\_Pop, and WageHealth are in natural log. All regressions include Structure and Year Fixed Effects. Robust standard errors clustered at the structure level in brackets. Significance at the 10% level is represented by \*, at the 5% level by \*\*, and at the 1% level by \*\*\*.

Figure 1: Paid Premium per capita 2001-2008

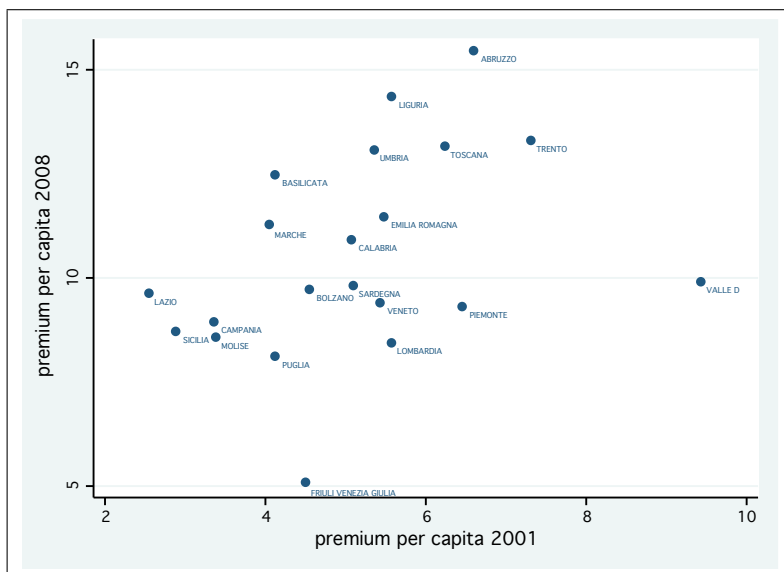


Figure 2: Paid Premium of Treated under Claims

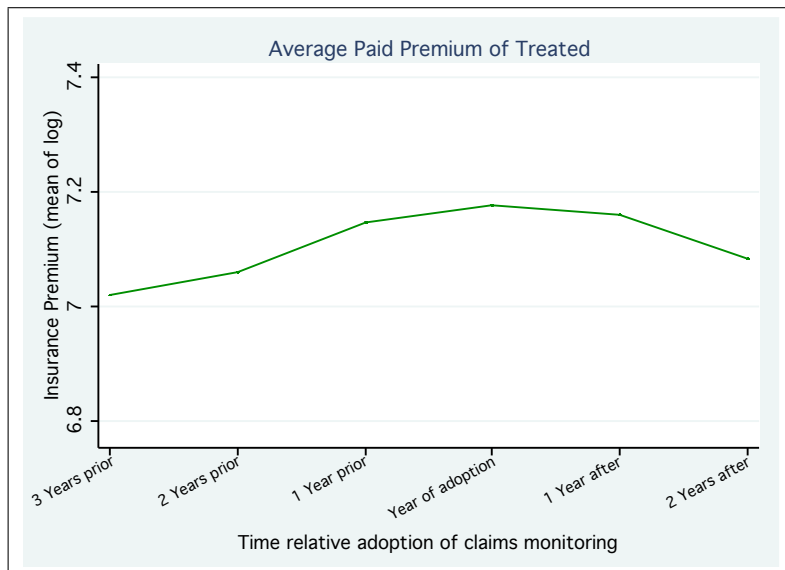


Figure 3: Paid Legal Expenditures of Treated under Claims

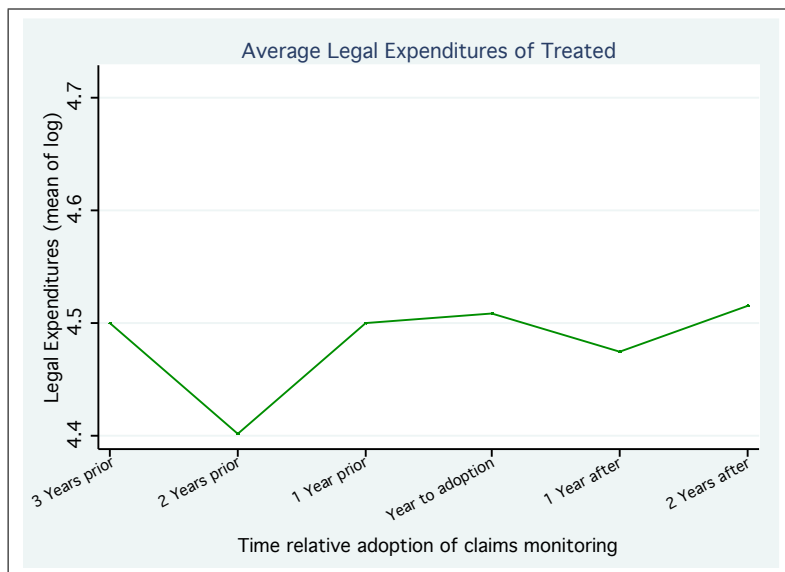


Figure 4: Paid Premiums of Treated under Insmgmt

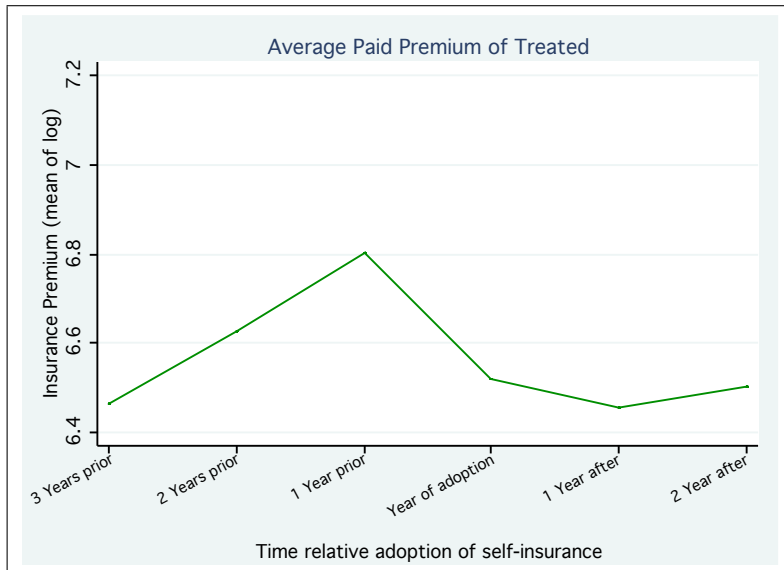


Figure 5: Paid Legal Expenditures of Treated under Insmgmt

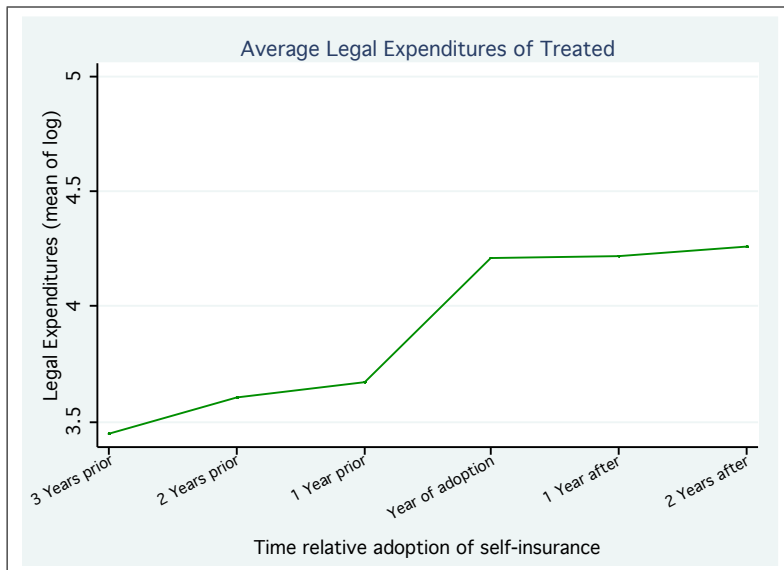


Table 14: Variables Description

<b>Variable</b>	<b>Type</b>	<b>Definition</b>	<b>Source</b>
<i>Claims</i>	Dummy	Equal 1 for those regions in which a monitoring policy on claims was active, 0 otherwise	AGENAS
<i>Ins_Mgmt</i>	Dummy	Equal 1 for those regions in which a central insurance contracting policy was active, 0 otherwise	AGENAS
<i>Premium</i>	Continuous (1.000€)	Paid Insurance premium per healthcare unit	MdS
<i>Leg_Exp</i>	Continuous (1.000€)	Legal expenditures per healthcare unit	MdS
<i>Gdp</i>	Continuous (€)	Regional GDP	Istat
<i>WageHealth</i>	Continuous (1.000€)	Total wages of healthcare personnel per healthcare unit	MdS
<i>Av_LHU_Pop</i>	Continuous	Resident population averaged by the number of LHUs (in the region)	Health for All-Italia
<i>Litigation Rate</i>	Continuous	Ordinary civil proceedings filed in First-Instance Courts per 1,000 inhab. in the region (excludes cases assigned to special divisions: labor, social security, family law and bankruptcy)	Istat (with data from the MoJ)
<i>Duration</i>	Continuous	Mean duration of ordinary civil proceedings filed in First Instance Courts in days (estimated)	Istat (with data from the MoJ)
<i>LHU</i>	Dummy	Equal 1 if the unit is a Local Health Unit, 0 otherwise	MdS
<i>IH</i>	Dummy	Equal 1 if the unit is an Independent Hospital, 0 otherwise	MdS
<i>TH</i>	Dummy	Equal 1 if the unit is a Teaching IH, 0 otherwise	MdS
<i>RH</i>	Dummy	Equal 1 if the unit is a Research Hospital, 0 otherwise	MdS

Table 15: Variables Description

(Cont.)

Variable	Type	Definition	Source
<i>Entry_Rate (ShRev_PublInt)</i>	Continuous [0,1]	(Revenues from public entities intra-region)/(Total revenues from healthcare)	MdS
<i>Exit Rate (Sh_HC_AmbCost_PublInt)</i>	Continuous [0,1]	(Total costs with ambulatory and hospital care with public intra-regional entities) / (Ambulatory costs + Healthcare costs)	MdS
<i>ShRev_PublExt</i>	Continuous [0,1]	(Revenues from public entities extra-region) / (Total revenues from healthcare)	MdS
<i>Sh_HC_AmbCost_PublExt</i>	Continuous [0,1]	(Total costs with ambulatory and hospital care with public extra-regional entities) / (Ambulatory costs + Healthcare costs)	MdS
<i>ShRev_PublExt</i>	Continuous [0,1]	(Revenues from public entities extra-region) / (Total revenues from healthcare)	MdS
<i>Sh_HC_AmbCost_PublExt</i>	Continuous [0,1]	(Total costs with ambulatory and hospital care with public extra-regional entities) / (Ambulatory costs + Healthcare costs)	MdS
<i>Sh_HC_AmbCost_PublInt</i>	Continuous [0,1]	(Total costs with ambulatory and hospital care with public intra-regional entities) / (Ambulatory costs + Healthcare costs)	MdS
<i>Internal Revenues</i>	Continuous (1.000€)	Revenues from public entities intra-region	MdS

Notes: All monetary variables are in 2009 prices. *MdS* - Ministry of Health; *Istat* - Italian National Institute of Statistics; *AGENAS* - National Agency for Regional Healthcare Services; *MoJ* - Ministry of Justice.

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