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The role of GP's compensation schemes in diabetes care: evidence from panel data

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Financial incentives and primary care

In the last decade FINANCIAL INCENTIVES have been increasingly employed for improving performances of healthcare providers.

- **This trend has involved both insurance based and NHS countries**

Some Regions within the Italian NHS have experienced the introduction of programs that provide General Practitioners (GPs) with extra-payments exceeding standard capitation.

- **The typical purpose of these programs is to promote PHYSICIANS' INTERNALISATION OF POLICYMAKER'S OBJECTIVES.**

The range of activities involved is diversified

Special bonuses may be provided for MEETING TARGETS defined in advance

- **They are usually associated to a more appropriate use of resources :**
  - **prescription rate of generic vs branded drugs,**
  - **hospitalisation rate kept under pre-defined thresholds etc**

Financial incentives may reward also:

- **DIRECT PROVISION OF TREATMENTS (e.g. immunisation uptake),**
- **ASSUMPTION OF RESPONSIBILITY for chronically ill patients,**
- **ADOPTION OF ORGANISATIONAL ROUTINES (e.g. participation in networks or adherence to evidence-based guidelines and clinical protocols).**

The degree of performance monitoring

PAY FOR PERFORMANCE (P4P) schemes typically associate financial transfers to the achievement of targets agreed in advance,

- **They define a stringent incentive structure in order to influence physicians in the desired direction.**

ALTERNATIVE APPROACHES reward PARTICIPATION in care improvement activities,

- **absence of a direct link between additional funds and the attainment of specific objectives;**
- **they are aimed at promoting cooperation between INDEPENDENT PROVIDERS, such as GPs, and the actors of the public system.**

Empirical evidence suggests that physicians respond to changes in the compensation scheme, but quality/outcome indicators are rarely considered.

Motivations of pay for participation

Alternative incentive schemes for quality improvements that try to align the interests of the principal with those of the agent by means of a looser incentive structure with respect to pay-for-performance mechanism .

Advantages

- Less at risk of crowding out intrinsic motivations, a potentially important determinant of physician's effort
- perceived by GPs as less intrusive than compensation schemes based on performance indicators (multitasking- tunnel vision)

Limitations

- absence of ex-post supervision may result in too weak incentives
- vulnerable to strategic behaviour (increase of list size)

Systematic empirical literature on this topic is scarce.

General purpose of the study

To evaluate the impact of financial incentives on promoting quality improvement in primary care.

We analyse the case of DIABETES in Emilia-Romagna, Region with around 4 millions inhabitants and a highly planned health care system.

The paper tests the hypothesis that:

> **(other things equal) the higher the fraction of professional income a GP receives from special payments for diabetes care, the lower the number of (avoidable) adverse outcomes experienced by his type-2 diabetic patients.**

Our aim is to verify whether physicians respond to financial incentives by improving patient supervision.

The Regional organisation of diabetes care

The Regional Diabetes Project (RDP) that defines roles and responsibilities for disease management (LHAs and GPs), proposes clinical guidelines and provides a general framework for introducing specific financial incentives.

According to RDP, Local diabetes management plans introduce additional payments in a variety of ways:

1) for the assumption of responsibility of patients, GPs receive a financial transfer that increases capitation for each diabetes patient registered in their list;

2) for attendance to audit meetings or contribution to dissemination of new guidelines, the additional transfers are associated to the specific activity promoted at the local level and not related to the number of diabetes patients followed by each GP.

Each agreement involves all GPs operating in a particular district.

An important feature of diabetes-related incentives in Emilia Romagna is that **THE ADDITIONAL PAYMENTS ARE NOT EXPLICITLY LINKED TO EX-POST MONITORING OF PERFORMANCES,** measured by clinical or economic indicators.

The main purpose of these financial incentives is:

- **to compensate GPs for the costs in terms of additional time and effort required to follow diabetics;**
- **to limit drawbacks due to motivation crowding-out if physicians perceive LHA supervision as intrusive of his relationship with the patient.**

Such concern appears particularly relevant in a context where primary care physicians are **INDEPENDENT CONTRACTED DOCTORS** that preserve a very large degree of professional autonomy.

Data base

The sources for this study are a series of regional databanks that include detailed information on all sources of GPs professional income paid by the Regional Healthcare Authorities and on the use of healthcare services by regional patients registered in the GPs' lists.

During the period 2002-2005 the average number of GPs active each year amount to 2960 (std.dv. 136).

The initial study population amounts to 2.618.087 inhabitants aged > 35, from which 164.574 type 2 diabetic patients are extracted* and followed from 2002 to 2005.

*** According to WHO criteria, we consider all individuals above 35 years who had at least one prescription for diabetes medications (oral agents or insulin) during the year 2002. We also include individuals who had at least one outpatient visit to a diabetic centre during the 2002 or an hospital admission with a diabetic code in the previous two years.**

Dependent variable

We consider the Ambulatory Care Sensitive Conditions (ACSCs) for which hospital admission is potentially avoidable if timely and effective outpatient care is provided (Billings et al., 1993).

- markers for quality : a high frequency of hospital admissions for ACSCs is typically associated to deficiencies in disease management and inadequate supervision.

The dependent variable is measured by the number of DIABETIC ACSCs referred to the patients list of each GP.

- Hospitalisations are identified from hospital records (SDO) in which ICD-9 codes 250.1, 250.2, 250.3, 250.8, 250.9, 250.0, 251 are documented as primary or most responsible diagnosis.

The total number of adverse outcomes in the four years period is 4357, averaging to 1089 (std.dv. 227) hospitalization per year.

Explanatory variables

GP Gender

Seniority

Postgraduate qualification

LIST average age

LIST size

LIST diabetics size

Insulin patients (illness severity)

Specialist visits (illness severity)

Practice type (Single handed or association)

Rural Practice location

FINANCIAL INCENTIVES

Year 2003

Year 2004

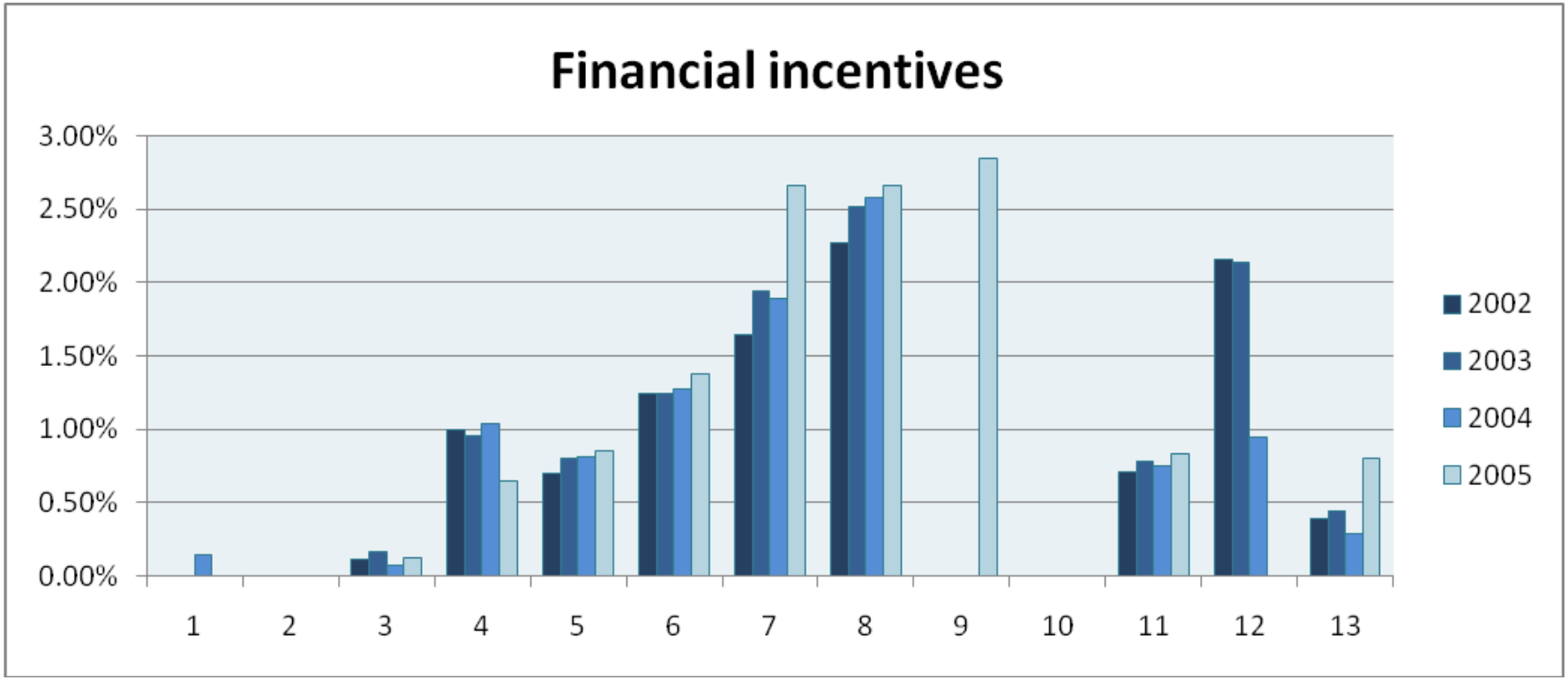
Year 2005

Descriptive statistics

Table 2 - **Descriptive Statistics, GP characteristics year 2002-2005**

Variable	Coding	Mean	Std. Dev.	Min	Max
Adverse outcome	continuous	0.37	0.67	0	9
Postgraduate qualification	(if yes=1)	0.05	0.22		
GP gender	Male=1	0.77	0.42		
Practice rural location	(if yes=1)	0.06	0.23		
Practice type	Associated	0.68	0.46		
GP seniority	continuous (yrs)	18	8	0	47
List average age	continuous (yrs)	47	5	12	76
List size	continuous (nr. of patients)	1162	383	10	1941
List diabetics size	continuous (nr. of patients)	53	23	1	137
Insulin patients	continuous (nr. of patients)	8	5	0	29
Specialist visits	continuous (nr. of patients)	48	40	0	255
Financial incentives	continuous (% annual income)	0.67	1.31	0	14

Financial incentives in % GP annual income. LHAs, 2002-2005



This mechanism includes direct financial incentives for each diabetic patients assumption of responsibility and financial bonus for participation in improvement activities and for compliance with regional and local guidelines of care.

Methodology: count data models

As the dependent variable is a count, we consider Poisson and Negative binomial regressions.

We employ likelihood ratio (LR) to test for overdispersion and the Poisson specification is rejected in favour of the Negative binomial.

We tested alternative specifications of the NegBin distribution, and the NEGBIN 2 model emerges as the most appropriate choice in our data. Its moments are:

$$E(y_i \mid \mathbf{x}_i) = \lambda_i \qquad Var(y_i \mid \mathbf{x}_i) = \lambda_i + \frac{1}{\theta}\lambda_i^2$$

Methodology: panel data models

We estimate three different nonlinear specifications:

(1)pooled regression model (with robust error specification)

(2) fixed effect (FE) model.

(3) random effect (RE) model.

Specification (1) is is rejected against (2) and (3) – LR test

According to Hausman test , the RE model is rejected in favour of the FE.

We report estimates for the different negative binomial model specifications.

Estimation results are fairly consistent across specifications.

Given the results of the Hausman test we focus our comment in particular on the results of the FE estimates.

Table 5 – **Count data estimations**
Dependent variable: number of diabetic ACSCs in GP's list. Year 2002-2005.

Variable	NB_Pool_Rob	NB_FE	NB_RE
Postgraduate qualification	0.0649	0.569	0.0233
GP gender	0.0575	0.0599	0.0455
GP seniority	0.0002	0.0030	0.0001
List average age	0.0036	0.0036	0.0036
List size	0.0002***	0.0002***	0.0002***
List diabetics size	0.0099***	0.0095***	0.0104***
Insulin patients	0.0449***	0.0445***	0.0465***
Specialist visits	-0.0022***	-0.0021***	-0.0022***
Practice rural location	0.2671***	0.2688***	0.2534***
Practice type	-0.0585	-0.0566*	-0.0704*
Financial incentives	**-0.0478*** **	**-0.0477*** **	**-0.0459*** **
year(2003)	-0.0652	-0.0658*	-0.0651
year(2004)	-0.3879***	-0.3861***	-0.3853***
year(2005)	-0.3106***	-0.3096***	-0.3023***
Constant	-2.1486***	-2.1320***	1.5770***

Conclusions

GPs' individual **characteristics** are poorly significant

The **characteristics of the LIST** emerge as important factors influencing the number of diabetic ACSCs: **list size** (+)**,** the number of **diabetics** (+) **and insulin treated patients** (+)

The **organisation of the practice** has a significant impact**:** patients followed by GPs operating in **single handed practices** (+) display a higher frequency of diabetic ACSCs**.**

Accessibility to primary and secondary care services play an important role**: rural location** (+) and **frequency of visits to diabetic centres (-).**

Coefficients associated to financial incentives are highly significant in all specifications.

GPs receiving a larger share of additional payments seem to reduce the expected number of avoidable hospitalisations experienced by diabetic patients included in their list.

Future research should be devoted to increase the robustness of these results:

a) **What happens in clinical areas that have received less attention from policymakers (e.g. no specific programs) ?**

b) **Does the effectiveness of the incentive survive over time?**

c) **Is it possible to derive reliable estimates for the financial savings that are associated to the reduction in avoidable hospitalisation rates ?**