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HEALTH INSURANCE FOR THE POOR: IMPACT ASSESSMENT OF MOROCCO'S *RAMed* PLAN ON HEALTHCARE CONSUMPTION USING A HOUSEHOLD PANEL SURVEY DATA

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Abstract:
The general objective of this research paper is to evaluate the causal effect of *RAMed* medical insurance coverage on health care expenditures of poor and vulnerable families in Morocco. To do this, we used a longitudinal data from the second (2013) and third (2015) waves of the Household Panel Survey, which were produced by the National Observatory of Human Development. In this respect, we used the quasi-experimental technique called difference in difference to estimate the real impact of the *RAMed* medical scheme on health care expenditures. The econometric modelling shows that the impact of *RAMed* on health expenditure depends on the multi-faceted interactions between the diet and the characteristics of the patient. In addition, the results suggested that *RAMed* health coverage does not reduce the health costs of the poor families. In fact, after controlling for observable characteristics such as age, marital status, area of residence and standard of living, we found that the policy evaluated had a negative and statistically insignificant impact at the critical threshold 5% on the treaty group. That means, people who are covered by *RAMed* spend like those who not covered by any health insurance plan, even when are taking into account the characteristics of

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household. Hence, the implementation of the *RAMed* program has been associated with an increase in healthcare expenditure, particularly indirect expenses incurred by households (transport, accommodation costs, support costs, etc.). This supports the fact that poor and vulnerable Moroccan households contribute in financing of health care despite the State's efforts made in order to ameliorate this regime. Therefore, the review of this scheme is necessary in order to ensure the sustainability of its services especially with regard to the flexibility of non-compliance with the pathway of care by patients especially for those who come from rural areas and the acceleration of the implementation of advanced regionalization, which will make it possible to have one hospital per region.

JEL: E20, E22, L60, L81

Keywords: impact assessment, *RAMed* health coverage, difference-in-differences, health care expenditures, household panel survey data

1. Introduction

The Medical Assistance Plan for the person Economically Deprived (*RAMed*) is a medical coverage system, which is part of the pillar of health financing reform and which mainly aims to guarantee to the poor and vulnerable population the rights to health care, as provided by Article 31 of the 2011 Moroccan Constitution. Experienced for three years from the pilot area of Tadla-Azilal (province of Beni-Mellal Khenifra, middle of Morocco) before being generalized all over Morocco since 2012. (National Observatory of Human Development, 2014)

Hence, what is the real impact of this program on the beneficiary population? Does it effectively reduce household health care expenditures?

To answer to all of these questions, we have organized this paper as follows. The first section is a theoretical framework in which we presented an overview on the literature review of health economics. In the second, we exposed the technic method and the used materials. The third section is an empirical framework in which we estimated the adopted model. In last one, we have given a brief conclusion of discussed topic.

2. Literature background

Many prior articles have examined the effect of Health insurance on the utilization and expenses but only a few of them have dealt with the case of Moroccan medical insurance. According to Deborah Stone (2008), health insurance coverage, by reducing the price of medical care, induces patients to get more health care without having to pay its full cost, which can cause reduction in prevention activities.

The majority of the empirical studies have found a significant and negative relationship between health insurance and health care expenses (Jowett al., 2004) and (Berman, 2001). Anderson (1978) and Grossman (1972) did the first work on the effect of health insurance, in the 1900s. These have shown that medical insurance has a considerable effect on health utilization and health expenditures.

Indeed, according to Grossman model, an increase in the level of education increases the marginal products of medical care. The other important consequence is the effect of income on individual consumption of care. Many empirical studies suggest that when people become richer, they will demand more and better care expensive care. Tanti-Hardouin (1994) revealed that the health demand is correlated with income (individual's income and state income).

Additionally, Dong et al., (2002) have shown from an empirical study that household income, the gender of individual and level of study impact significantly health expenses.

Some years later, Jowett et al., (2004) have shown that individuals holding a health coverage are more likely to seek health care services. Moreover, they revealed that absence of health insurance leads to significant impact on individual consult decision and utilization of health care services. The same result has been proved by Berman (2001) using Egyptian data. Hence, does Moroccan *RAMed* coverage produce the same impact and in the same direction?

2. Materials and methods

2.1 Data source and assumptions

Our panel data set used in this paper came from National Observatory of Human Development (NOHD, Morocco) particularly from the second (2013) and third wave (2015) of the Moroccan Household Survey Panel Data (MHSPD).

It should be noted that the MHSPD is a longitudinal survey whose main characteristic is the regular monitoring of the same sample of households and household members over time. The survey contained a sample of 8000 households and obtained information on each individual within in their household particularly education, health, consumption, household expenditures, employment, housing conditions and other sectors of social life.

As to the basic assumption of this study and based on the theoretical framework (by construction), we expect that the *RAMed* program has a negative impact on health care expenditures and subsequently promotes access to care and reduces household's spending on health care.

2.2 Method

In this article, we used Difference-in-differences (Diff-in-Diff) method. In fact, Diff-in-Diff method is a quasi-experimental evidence that involves comparing the before-and-after difference (1st difference) for the group receiving the treatment to the before-after

difference (2nd difference) for those who did not. In other words, Diff-in-Diff compares gains in persons test scores who got *RAMed* program with the gains in persons test scores who did not get it.

Using this method requires assuming that, in the absence of the program, the result in the treatment group (counterfactual) would have moved in tandem with the outcome in the control group.

In fact, we compare the variations of the behaviours of the beneficiaries with the non-beneficiaries of the program. We expect that average behaviours differ between treatment and counterfactual benefits before the program, but we assume also that these average behaviours would have experienced the same variations in the absence of the program.

2.3 Presentation of the variables

Health expenditures (Health_exp): Our outcome variable. A quantitative variable, which reflects the level of expenditures of households on health care services.

Annual expenditure per Household (AEPH): We have used this quantitative variable in order to overcome the deficit of the household income variable. Indeed, household income in developing countries especially in Morocco is generally difficult to capture and estimate because most people underreport and underestimate their income. Hence, the importance of this household proxy variable. It was taken as a qualitative variable and measured on a three-point scale from 0 or poor then 1 as middle class to 2 as a rich person.

Gender: Male or female. Gender was defined as a dummy; therefore, we assigned the value 1 for male and 0 otherwise.

Marital status (Marit_stat): It measured on a scale from zero to two; 0 = single, 1 = married and 2 = Widower or Divorced.

Age: In this study, age was taken as a quantitative variable.

Compulsory Health Insurance (CHI): If the person insured by Compulsory Health Insurance, it is assigned the value 1 and the value 0 in the opposite case.

Medical Assistance Plan (*RAMed*): The most important variables to be looked at in our research is *RAMed* insurance coverage. It is a binary variable that takes 1 if the household has the *RAMed* health insurance and 0 otherwise.

Complementary Medical Insurance (CMI): The Complementary Medical Insurance variable used in this paper is measured as a binary variable. The value 1 has been assigned to people with supplemental insurance and 0 otherwise.

Household size (Hh_size): A quantitative variable that refers to the number of persons living together in the same house and pooling common resources.

Area of residence (Residence): Rural or urban. A dummy variable was used to capture area of residence. If the head of household lives in the urban area we assign the value 1 and 0 otherwise.

Literacy: This is defined as the ability to read and to write at least one language. The value 1 assigned to the literate individual and zero in otherwise.

```
. ttest DSS , by(RAMED)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |   11380    4284.684    107.8128    11501.16    4073.352    4496.015
       1 |    2578    4303.673    208.6979    10596.43    3894.441    4712.906
---------+--------------------------------------------------------------------
combined |   13958    4288.191    95.97722    11339.13    4100.063    4476.319
---------+--------------------------------------------------------------------
    diff |           -18.98947    247.3399               -503.8089    465.8299
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.0768
Ho: diff = 0                     degrees of freedom =    13956

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.4694         Pr(|T| > |t|) = 0.9388          Pr(T > t) = 0.5306

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end of do-file
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Figure 1: Student test (basic test) on average health spending

Variable		Year	
		2013	**2015**
RAMed	Yes	3666.42	4456.66
	No	3645.84	4956.55

Figure 2: Household health expenditures pre and post-intervention of *RAMed* plan

The analysis of the two figures upper (figures 1 & 2) showed that, there is a difference in the average household health care expenditures between the insured's by *RAMed* and the uninsured. In fact, the insured by *RAMed* plan spent more in health care compared to uninsured persons. Thus, their health expenditure went from 4456 dirhams in 2013 to nearly 4956 dirhams in 2015. This means that thanks to the implementation of *RAMed*, health care expenditure has decreased slightly. Does it remain true when we control by the other exogenous variables? In what follows, our aim will be to re-estimate the delta (real impact) parameter while controlling for the individuals and their household's characteristics.

3. Empirical strategy

3.1 Methodology

Diff-in-Diff is a statistical technique commonly used to evaluate the impact of a policy, an intervention or a public measure. For this purpose, we assume that the first subgroup is exposed to the treatment (*RAMed*) in a second period not the 1rst one. While the 2^{nd} subgroup (control or counterfactual group) is not exposed to the treatment. In order to assessment the impact of this program, we use the following standard linear regression model:

$$y_{it} = X_{it}\beta + \theta 1(t = 1) + \gamma 1\ (D_i = 1) + \delta 1(t = 1)1(D_i = 1) + \mu_{it} \qquad (1)$$

Where:

- y_{it} is the dependent variable (the outcome of interest) for household i = 1, 2, ...N at time t.
- X_{it} is a vector of explanatory (control) variables, and refers to demographic and socio-economic variables.
- β represents a vector of unknown parameters.
- θ refers to the change in y_{it} over time (2015 versus 2013),
- γ is a parameter estimate for insurance group.
- The errors terms μ_{it} are assumed to be normal, independent over t, and homoskedastics.
- The coefficient on the interaction term δ measures the Diff-in-Diff estimate of the treatment effect. (The estimated impact of *RAMed*)

That means, we can estimate our policy effect as a difference in differences. The real impact of the program is defined as:

$$\delta = E(y_{i,T_1} - y_{i,T_0} \mid D_i = 1) - E(y_{i,T_1} - y_{i,T_0} \mid D_i = 0) \quad (2)$$

Where y_{i,T_1} and y_{i,T_0} are the value of logarithm of the household health expenditures in the second (2015) and the first period (2013) respectively.

The first difference eliminates the individual effects while the second difference eliminates the temporal effects. The Diff-in-Diff estimator can be estimated by the Ordinary Least Squares (OLS) regression.

3.2 Estimation

We used STATA 14 for Windows 10 to obtain parameter estimates. The results from OLS regression for the outcome variable (estimated coefficients, associated robust standard errors, and level of significance) are obtained.

Table 1: Diff-in-Diff Estimators and level of significance

Variables	Modalities	Estimation	Significance
CHI	Yes	0,177***	Sig.
		(0,0415)	
	No	Ref	
Age		0,0108	Not Sig.
		(,0074)	
Age_2		1,79e-05	Not Sig.
		(6,58e-05)	
Marit_stat	Single	Ref	Sig.
	Married	-0,177*	
		(0,0965)	
	Widow	-0,0854	Not Sig.
		(0,107)	
Residence	Urban	Ref	Sig.
	Rural	-0,136***	
		(0,0395)	

Literacy	Yes	-0,0359	Not Sig.
		(0,0406)	
	No	Ref	
RAMed	No	Ref	Sig.
	RAMed poverty	0,188**	
		(0,0849)	
	RAMed Vulnerability	0,300	Not Sig.
		(0,226)	
Time		0,431***	Sig.
		(0,0331)	
δ (*RAMed* poverty)		-0,0647	Not Sig.
		(0,102)	
δ (*RAMed* vulnerability)		-0,340	Not Sig.
		(0,244)	
CMI	No	Ref	Not Sig.
	Yes	0,0540	
		(0,129)	
AEPH	Poor	Ref	Sig
	Middle class	0,535***	
		(0,0462)	
	Rich	1,092***	Sig.
		(0,0479)	
Hh_size		-0,0444**	Sig.
		(0,0187)	
Hh_size _2		0,00190	Sig.
		(0,00121)	
Constant		6,748***	Sig.
		(0,210)	
Observations		9 059	
R-squared		0,180	
R-adjusted squared		0,172	
Population size		8 207 474,6	
Design df		6012	
F(16, 4299)		79,50	
Prob > F		0,0000	

Source: Authors calculations using MHSPD.
Note: Parentheses indicate robust standard errors;
*p<0.1, **p<0.05; ***p<0.001;
Estimates shown are Diff-in-Diff.

4. Discussion and conclusion

4.1 Discussion

As indicated, we have used STATA 14 software to estimate Diff-in-Diff model to obtain parameters reported in table 1 below.

At this level, it should be noted that, the option robust have been added in our model in the purpose to control for heteroskedasticity.

Additionally, and since we are working on a large sample almost 9 059 households, that means the problem of the normality of the errors terms is not posed.

Furthermore, and according to table 1, the p-value (Prob ≥ F) of our Diff-in-Diff model is equal to 0.000. It is lower than the level of 5 percent. That means, we have to reject the null hypothesis that assume that the coefficients of the parameters in our regression is equal to zero. Which means, a statistically significant relationship could be existed between the health expenditures and the block of the explanatory variables.

Also, as the coefficient R-squared revealed the amount of variance of the endogenous variable explained by the exogenous variables. In our model, it explained 17.2 % of the variance in health care expenses. At the microeconomic level, this rate is very acceptable. That means, a strong association may be existed between y_{it} and X_i.

On the other hand, by applying the OLS method, we found that three variables are not significant at the level of 5 percent namely Compulsory Health Insurance (CHI), age (respectively age squared) and literacy. Besides, the gender of the individual was omitted because it was a constant variable and the Diff-in-Diff method erases the variables that remain unchangeable over time.

In addition, with respect to the sign and interpretation of variables, our empirical results strongly suggest that the overall impact of *RAMed* medical coverage on treated households is negative and extremely insignificant at the critical 10% threshold ($p < 0.1$). More specifically, and contrary to what was planned, *RAMed* coverage does not reduce health care expenditures. This result remains valid, true for both forms of *RAMed*. In sum, it can be strongly argued that being covered by *RAMed* does not promote a reduction in direct and indirect health care spending by households.

In addition, the impact of health coverage is particularly important for people with supplementary health insurance. In fact, supplementary insurance promotes access to care and considerably increases the cost of caring for individuals since insureds pay a reimbursement of care costs by insurance organizations. ($p <0.001$)

An interesting feature of our results is the role played by household size. The model adopted asserts that large families spend less on health care. In particular, as long as the size of the household increases and the expenses of care decrease. That is, it is inversely correlated with health expenditure. This result is robust and statistically significant. ($p <0.05$).

The other explanatory variables of the econometric model adopted generally have effects in the expected directions. (See table 1 above, for more details)

4.2 Conclusion

This paper attempted to evaluate the treatment effect of *RAMed* health insurance targeted to the poorest and vulnerable families in Morocco on the household health spending using a longitudinal household survey data.

To do this, we have used the Diff-in-Diff technic. It is an empirical ex-post policy evaluation that enable to assessment individuals covered by *RAMed* scheme. Our finding results strongly showed that the impact of *RAMed* on health care expenditures

is dependent upon multifaceted interactions between plan and patient characteristics. Specifically, the results suggested that *RAMed* health coverage does not reduce the health costs of the poor. The results provided evidence that a person who are covered by insurance spends less on healthcare even when are controlling for individual and household characteristics. In fact, after controlling for observed factors such as age, marital status, place of residence and standard of living, the policy evaluated had a negative and statistically insignificant impact at the 5% on the group of treaties. Specifically, people covered by *RAMed* spend like those not covered by any scheme, even when taking into account the characteristics of the individual and his or her household of origin.

It follows from the above that the implementation of the *RAMed* program has been associated with an increase in indirect expenses incurred by households (transport, accommodation costs, support costs, etc.).

That is, poor and vulnerable Moroccan households contribute to the financing of health care despite efforts to enhance this scheme. Therefore, the revision of this scheme in particular as regards:

- The extension of medical coverage;
- Flexibility in terms of non-respect of the care sector by patients, especially for those coming from rural areas;
- The construction of new local health centers (dispensaries);
- The acceleration of the implementation of advanced regionalization, which will make, it possible to have one UHC per region;
- Improving the quality of care provided to insured persons in order to generate substantial benefits for the poor and vulnerable population

4.3 Limitations

This paper has some limitations particularly:

At the household level, our MHSPD do not provide information about the quality of the services offered by health care centers to insured, which could have a significant impact on recourse and health care expenses,

This document helps to enhance the methodology for measuring catastrophic expenses by house- holds and individuals. We only showed one scenario as an instance in this study. Improvements can be made by looking, in the Moroccan context, for the other explanatory variables that could better explain health care spending.

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Conflicts of interest
The authors report no conflicts of interest.

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