The Impact of Asymmetric Information in Vietnam's Health Insurance: An Empirical Analysis

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Abstract

The Vietnam Health Insurance Law in 2008 promulgated universal health care by 2014. To build up a sound and sustainable health insurance system towards this goal, we need to account for the effect of asymmetric information on the use of the health care services, namely moral hazards and adverse selection. This paper uses distinctive features of Vietnam's health insurance system to separately estimate the effect of each type. Our results show that the effect of asymmetric information is quite severe and prevalent for old people, and is insignificant for young people. The results can be used for the construction of health insurance policies for Vietnam.

Keywords: Asymmetric information, moral hazard, adverse selection, Health insurance, PSM

1. Introduction

In 1993, eight years after "Doimoi", the establishment of the Vietnam health insurance program marks a new era for the Vietnamese health care system in which health care services are no longer provided free for all residents. It is indisputable that the program plays an important role in helping Vietnamese residents access health services and in protecting them from financial shocks or poverty due to sudden serious illnesses (Wagstaff, 2005a, 2005b). As such, the Vietnamese government desires to make health insurance universal by 2014, which is stated in the Law of Health Insurance 2008. The roadmap to achieve this goal is stated clearly in the Law; however, it is not easy to make it work as planned. Over the years, not only did coverage increased slowly but were problems of shortages of funding in the health insurance budgets.

Despite the effort of authorities to expand insurance coverage, the result is still limited for both the compulsory schemes and the voluntary scheme. For the compulsory scheme, 20 years after its establishment, the participation rate was only at 50 percent in 2010, i.e. the other 50% of people avoid purchasing insurance even though it is compulsory for them. Many people blame the poor services when using insurance - such as the long queues or the inhospitable treatment from staffs (e.g., Khiet, 2008). According to Cuong (2011), 40% of the insured who have compulsory insurance do not use their insurance card when getting health care. In a developing country like Vietnam, where the surveillance system is still in its infancy, forcing residents to purchase insurance is not easy if they are dissatisfied with the program. So it is not a surprise that the situation with the voluntary insurance (HI) scheme is even much worse; the coverage is very limited at 20%, and the authorities are struggling to improve the situation.

Another problem with HI is funding. More than once, the HI fund has been on the edge of bankruptcy, and the authorities have had to amend insurance policies from time to time to cope, and the results are not always up to standard.

One of the causes that obstructs the development of the health insurance system in Vietnam is the asymmetric information between insurance providers and targeted recipients of health insurance. Asymmetric information theory was originally proposed by George A. Akerlof (1970) and further developed by Spencer (1973) and Stiglitz (1975) among others. The theory states that information asymmetry creates an imbalance in power between agents in transactions; this leads to a possibility that some agents may take advantage of the situation and results in market distortion. The common forms of behavior of the agents with information advantage are adverse selection and moral hazards. For a developing country like Vietnam where regulations as well as monitoring system are not yet well developed, the problem of moral hazards and adverse selection may be even more serious. Thus, evaluating the impact of moral hazard and adverse selection in health insurance could be helpful for constructing a sound insurance policy towards universal insurance.

In the health insurance market, adverse selection means that higher-risk people are more likely to buy insurance, and the moral hazard implies that once a person has insurance, he would use health care more than necessary. Hence both adverse selection and the moral hazard lead to a non-optimum premium level, and it may lead to market failure if the effects are too serious. Furthermore, as both moral hazard and adverse selection can only take place with insured people, and the motivation of adverse selection is unobserved by the insurers, it is often an ad hoc process to disentangle the impact of moral hazard from the adverse selection effect. More specifically, the insurance status in the health demand equation is endogenous, and traditional estimators of moral hazards become biased and inconsistent.

One way to deal with the endogeneity problem is to use instrumental variables (IV). The IV variables are ones that are correlated with the instrumented variables and at the same time, have no direct effect on the dependent variable. For most studies of this type, social-economic variables are often used as instruments for health insurance status. Joett et al. (2004) for example, use the number of mass organizations in which an individual belongs to as an IV for the health insurance status when studying the moral hazard effect among voluntary insured people in Vietnam. He finds that people at the lower income level strongly commit to moral hazards, and finds no evidence of this among high income people. This result may lead to a suggestion that the moral hazard effect may become smaller as the standard of living increases in a country. Other social-eco-

nomic variables such as social class and occupation can also be used as instruments for the health insurance status as in Vera-Hernandez (1999). Normally, finding appropriate instrument variables is very hard, and if inappropriate instruments are used, then the results may even be worse than the normal OLS estimators (Wooldridge, 2004).

Another method used widely in assessing moral hazards and adverse selection is the propensity score matching method (PSM). This method was originally proposed by Rosenbaum et al. (1983) as an alternative method for estimating the treatment effect of a program when the treatment is not randomly assigned. Since then, there have been many authors applying this method to evaluate either the moral hazard alone or both the moral hazard and adverse selection simultaneously in health insurance. For example, Barros et al. (2008) use the matching method to estimate the moral hazard effect on having ADSE insurance - which is provided by the Portuguese government to all civil servants and their dependents. Their estimation is based on the premise that the ADSE is exogenous, that means the ADSE is not correlated to a beneficiaries' health state. They find that moral hazards vary with age, in which young people (from 18-30 years of age) commit moral hazards while older people do not. In the same way of taking advantage of the special structure of the insurance market, Liu et al. (2011) used PSM to estimate the moral hazard and adverse selection for people in Croatia by examining the differences in the usage of health services between three types of insur-

ance statuses: no supplementary insurance, bought supplementary insurance, and supplementary insurance that is provided for free. They argue that the difference in health care usage between people who bought insurance and people who have it for free is due to adverse selection, and that the difference in health care usage between people who have it for free and people who have no insurance is due to the moral hazard. They found that the moral hazard and adverse selection prevail for all age cohorts, and that the level of the effects varies with age.

Among the works on health insurances, very little has been done about Vietnamese health insurance, except for the works of Jowett et al. (2003) and Cuong (2011). Jowett et al. used the multinomial logit model on data surveyed from three provinces in 1999 to evaluate the effects of moral hazard on people using voluntary insurance, and found that poorer people tend to commit moral hazard more. Also focusing on moral hazard effects, Cuong (2011) applies difference in difference method on data from 2004-2006 and found that having voluntary insurance increases the usage of inpatient and outpatient care 45% and 70%, respectively.

The main objective of this paper is to estimate the moral hazard and adverse selection effects in health insurance in Vietnam. This paper differs from that of Cuong (2011) and Jowett et al.(2003) in three aspects. Firstly, we evaluate not only the moral hazard but also the adverse selection effects at the same time. This is meaningful for policy purposes as policy dealing with moral hazard may vastly differ from that dealing with adverse selection. Secondly, we do not restrict our attention in this paper to voluntary insurance alone but also include compulsory insurance; therefore this may provide a more comprehensive picture of the health insurance system in Vietnam. Thirdly, the policy relating to health insurances has changed dramatically since 2006, and become rather stable since 2008 aftermath due to the approval of the Law of Health Insurance in 2008, hence a new evaluation using more updated data would be more appropriate for policy makers. Our work is similar to the works of Barros et al. (2008) and Liu et al. (2011). The main differences comes from the nature of data; the work of Barros is based on the differences between two groups; the first group has no ADSE insurance and the second group consists of people with ADSE insurance, which is granted by the government to public servants and their dependents. As there is no problem of selection in the data set, it is possible to estimate the moral hazard effects of people using ADSE insurance. However, the ADSE insurance is only supplementary to universal compulsory insurance in Croatia; hence the estimated moral hazard effect of having ADSE insurance may not fully reflect the moral behavior of insured people. In the work of Liu et al., apart from two groups of people, as in the work of Barros, there is another group that consists of people who choose to buy insurance. Therefore, they are able to estimate adverse selection as well as the moral hazard effects. It is not appropriate to conduct the same analysis as Liu et al. for Vietnam's data, however. The reason is that in Vietnam there

exist fundamental differences between people who get insurance for free (just like having ADSE insurance) and people who buy it, and it makes PSM irrelevant. Fortunately, as a country in a transition process, Vietnam's insurance exhibits a very salient feature that makes it possible to apply PSM to estimate the moral hazard and adverse selection at the same time. That is, in the country there exists both compulsory and voluntary insurance, each providing the same services, and more importantly, among the people who are under the compulsory scheme, many of them are uninsured.

The structure of our paper is as follows. The next section describes the development of health insurance in Vietnam during the last decade. Section 3 presents data used in the study. Section 4 describes the methodology and provides estimated results. Section 5 concludes.

2. The development of health insurances in Vietnam

Health insurance was first introduced in Vietnam in the early 1990s, several years after the broad economic reform of 1986, with a new concept of "sharing costs between the state and the people in the country"[1]. Health insurance is a non-profit organization and is regulated by the Social Security Unit, of the Ministry of Health. Health insurance in Vietnam is of two types: compulsory insurance and voluntary insurance. The main difference between the two types is the target. While compulsory insurance targets mainly people from the formal sector, voluntary insurance targets the rest of the population. Rooted in a totally free health care system, together with a population with low income, and a large informal sector in the economy, Vietnam moves forwards to universal health insurance with great caution.

Early period of development – piloting and searching for an appropriate model

For the first years of the development of health insurance, Vietnam has gone through different stages of constructing policies, implementing health insurance and expanding its coverage.

In 1989-1992, health insurance was first piloted in Vietnam with very limited coverage, in three provinces including Hai Phong, Vinh Phu and Quang Tri (on a large scale with both voluntary and compulsory schemes) and 14 other provinces (that only piloted a voluntary scheme). The compulsory and voluntary schemes were then applied nation-wide starting from 1993, after the issuance by the Government of the first decree 299/HDBT Health Insurance Regulation, dated on 15 September 1992. This period focused mainly on the compulsory scheme, which targeted public servants and people who work for large enterprises. The voluntary scheme was limited to school children and students as the main target.

Since 1998, the policy paid more attention to the voluntary scheme, indicated by the decree 58/1998/ND-CP issued by the Government, aiming at expanding the coverage of voluntary schemes as well as improving the benefit package for the insured. However, the main targets were still school children and

students, and the enrolment rate was still low.

Formally implemented nationwide

In 2003, the issuance of the circular 77[2] published by the Ministry of Health (MoH) and the Ministry of Finance (MoF) marked a new period of health insurance in Vietnam, in which the piloting program no longer existed. Since then, health insurance has been formally implemented for the compulsory scheme as well as voluntary scheme. Circular 77 is considered to be a good framework for insurance to be fully implemented – especially for voluntary insurance. However, the policy is still very cautious. Firstly, it imposes tough conditions to have insurance. If one person wants to buy voluntary insurance, the whole family also has to buy it; in addition, at least 10% of the households in the commune also have to buy insurance. Furthermore, the benefit is also low for voluntarily insured people, covering only 20.000 vnd, which is a very small amount, and the insured has to pay 20% of any amount that exceeds 20.000 vnd. The compulsory scheme does not target workers from firms that have less than 10 people. Such policies aim to minimize the moral hazard and adverse selection effects in health insurance. As such, the percentage of people who are insured is very low. Data from MOH shows that the percentage of people who were insured in 2005 was only 42%. This outcome does not fit the authority's purpose of better health care for all residents, and the authorities are under criticism from the media for making the policy too tight. Because of that, in 2005, the MOH decided to make a change through the issuance of decree 63/2005 (decree 63/2005-NDCP) which not only made

it easier to join the voluntary health insurance program (VHI), but also increased the list of services to be covered by insurance, and in addition erases the co-payment mechanism. This change, however, caused the VHI fund to be on the edge of bankruptcy. Just in the year 2006, the total reimbursement was 1843 billion VND while the total contribution was just 746 billion VND. And the MOH in 2007 and early 2008, again, had to reapply the co-payment mechanism, detailed as such:

- Fee: 320.000 VND (rural area); 240.000 VND (urban area) – for (non-student) voluntary insurance.

3% salary (1% paid by individual, 2% paid by employers) – compulsory

- Covered by insurance:

100% cost of outpatient treatment if less than 100.000 VND per visit

80% cost of outpatient treatment if exceeding 100.000 VND per visit and all inpatient treatment.

- Reimbursement capped: 20 million VND

As the average salary of a worker in 2008 was about 2-3 million VND (per month), the contribution paid by voluntary insured people and compulsory insured people was about the same.

The insured people can be put into different categories as follows:

(1) Compulsory insurance but paid either by the authority or Social Insurance Unit, including: the merits people, the poor, the minorities, people who work in the armed forces and their dependents, policemen and their dependents,

retirees, and children under 6.

(2) Compulsory insurance paid by the beneficiaries (1% of their salary) includes: contract workers who work for various types of firms, public servants and people who work for social associations (the employers paid 2% of their salary)

(3) Compulsory insurance paid by the beneficiaries: students from universities or colleges.

(4) Voluntary insurance paid 50% by the beneficiaries: near poor people and some special groups

(5) Voluntary insurance paid 100% by the beneficiaries: the rest.

The first period of the Law on Health Insurance.

After many adjustments of insurance policy over time, in 2008, for the first time, Vietnam had a Law for Health Insurance that made a solid and stable framework for implementing policies on health insurance. Now, according to the law, insured people are treated very much the same in both the voluntary scheme and the compulsory scheme. The law also reduces conditions for people to join the insurance program. For instance, it eliminates the condition that a person can only buy voluntary insurance if the whole family also buys it, and if 10% of households in the commune also bought it. The target for compulsory insurance was also expanded to include more groups of people. Furthermore, the premium fee and benefit packages are calculated based on the individual's salary or minimum wage instead of a fixed amount, so whenever the salary or the minimum wage change (which happens quite often in a developing country like Vietnam), all the values will change automatically.

The Law also sets a time line for the implementation of universal health insurance as follows:

After 1/1/2010: everyone except: farmers, members of cooperative units, the self-employed, contract workers' dependents and some special people.

After 1/1/2012: everyone except: members of cooperative units, the self employed, contract workers' dependents and some special people

After 1/1/2014: covers all residents

However, until 2012, the percentage of people who have insurance was still low at around 60%. This implies that even though the percentage is increasing over time, universal insurance as stated in the Law of Health Insurance still has a long way to go.

3. Conceptual framework and estimation approach

Imagine that people are divided into two groups: group 1 takes part in a certain program and group 2 does not. To evaluate the impact of the program, the quantity of most interest is the average treatment on treated (ATT), which can be expressed as follows:

$$ATT = E(Y(1)|_{D=1}) - E(Y(0)|_{D=1}) \qquad (1)$$

where $Y(1)$ is the outcome of a person who takes the program and $Y(0)$ otherwise, $D = 1$ for persons in group 1 and $D = 0$ for person in group 2. The term $Y(0)|_{D=1}$ denotes the out-

come of people in group 1 if the program had not taken place. The problem in estimation of (1) is that this term is not observed. If the assignment of the program is totally random - i.e. the distributions of each characteristic of two groups of people, except program status - are the same, then the outcome of people in group 1 if the program had not taken place would be the same as that of people in group 2:

$$E(Y(0)|_{D=1}) = E(Y(0)|_{D=0}) = E(Y(0)) \quad (2)$$

In that case, group 1 is the treatment group and group 2 the control group in a laboratory-condition experiment, and the impact of the program can be evaluated by looking at the differences between the outcomes of the two groups. In effect, however, program assignment is not a random process as mentioned in section 1, and using $(E(Y(0)|_{D=0}))$ as mentioned above will produce bias. This bias is often due to whether or not a person selects to join the program, which is named as "adverse selection effect" and can be expressed in average term as:

$$\text{Bias} = E(Y(0)|_{D=1}) - E(Y(0)|_{D=0})$$

Hence the difference between the observed outcomes of two groups is the overall effect of moral hazard and adverse selection, and in common situations, there is no way to disentangle one effect from the other.

One solution to this problem is to use the PSM method, which requires the *conditional mean independence condition (*Heckman et al., 1998), that is, the existence of covariates X's such as:

$$E(Y(0)|_{x,D=1}) = E(Y(0)|_{x,D=0}) = E(Y(0)|_x) \quad (3)$$

This condition implies that without the impact of a program, the outcome of a person in group 1 will be the same as that of a person in group 2 who has a similar value of Xs. The idea of the PSM method is then to compare the difference in outcome of people in group 1 with that of people in group 2 who share similar values of Xs. To make the comparison workable, it requires an additional condition, named as the *overlap condition*:

$$0 < P(D=1|X) < 1 \quad (4)$$

This condition states that for every possible value of X in the sample, there exist people from the treated group as well as from the control group.[3] Now we are going to show that the health insurance market in Vietnam fits into the above situation and then use the matching method to estimate the moral hazard and adverse selection of each group of people in the population.

***Grouping for health insurance status in Vietnam*:**

In the development from a total free health care to universal health insurance, Vietnam health insurance has a very special feature that makes it possible to evaluate the effects of moral hazard and adverse selection separately. More specifically, it consists of four groups of people:

Group 1 consists of insured people who bought insurance under the compulsory scheme, denoted by CY (C for compulsory, Y for yes – the person has insurance); the second group is insured people who bought insurance under the voluntary scheme, denoted by VY (voluntary – yes). Group 3, denoted by CN, for people who are under the compulsory scheme

but are not insured. And group 4, denoted by VN, for people under the voluntary scheme who did not buy insurance[4]. We are going to analyze the behavior of each group:

People in group CY have insurance regardless of their will, and the insurance assigned to them is not based on their state of health. Therefore people in this group may commit the moral hazard but not adverse selection.

People in group VY, on the other hand, have been insured by choice: they *choose* to purchase insurances. Hence they may commit both adverse selection and the moral hazard.

People in group CN have no insurance, often because their employers avoid the obligation of purchasing insurance regardless of the people's will. And this decision is mostly for economic reasons and not health related reasons. As such, people in this group commit no adverse selection and no moral hazard.

People in group VN have no insurance because they *choose* not to purchase insurances. The reason for that may be few: they are low risk people, or they have low income, and health insurance is not on their list of priorities yet. Our estimation is based on the premise that the main reason for them not to purchase insurances is health related. As such, they may also be under the adverse selection effect, but this selection effect would be different from that of people who choose to purchase insurance. So we call it "positive adverse selection".

From the above analysis, adverse selection and moral hazard effects can be estimated using the following strategy:

(1) Looking at CY – CN groups, where CY is the treated and CN is the control. The difference in the outcome between these two groups is the moral hazard effect of the CY group.

(2) Looking at CY – VY groups, where VY is the treated and CY is the control. The difference in the outcome between these two groups is the adverse selection effect of the VY group, assuming that the moral hazard effects of the two groups are the same.

(3) Looking at CN-VN groups, where VN is the treated and CN is the control. The difference in the outcome between these two groups is the adverse selection effect of the VN group.

Mathematically, we consider the following health usage equation:

$$Y_i = \beta_1 + X_i \beta + \alpha D_i + h_i + \varepsilon_i \qquad (5)$$

where Y_i measures health services used by person i, Xs are covariates that are observable determinants of health service usage, D_i is the insurance status – taking 1 for an insured person, and 0 for an uninsured person, ε_i is the usual error term with zero mean. h_i represents unobservable factors that may affect health service usage – which is often considered as private information about a person's health state. This private information may affect a person's decision to buy or not buy insurance, conditional on covariates Xs, hence presents adverse selection. And coefficient α presents the additional health service used by a typical insured person compared to a typical uninsured person who shares the same value of Xs and h, hence it measures the effect of the moral hazard. We proceed as follows:

From (5) we have:

$$E(Y|_{X,CY}) = \beta_1 + X_i\beta + \alpha + E(h|_{X,CY}) \quad (6)$$

$$E(Y|_{X,CN}) = \beta_1 + X_i\beta + \quad\quad E(h|_{X,CN}) \quad (7)$$

$$E(Y|_{X,VY}) = \beta_1 + X_i\beta + \alpha + E(h|_{X,VY}) \quad (8)$$

$$E(Y|_{X,VN}) = \beta_1 + X_i\beta + \quad\quad E(h|_{X,VN}) \quad (9)$$

From (6) and (7) we have:

$$E(Y|_{X,CY}) - E(Y|_{X,CN}) = \alpha + E(h|_{X,CY}) - E(h|_{X,CN})$$

As argued above, people in group CN and CY are very similar in every health-related aspect. Hence we have $E(h|_{X,CN}) = E(h|_{X,CY})$, therefore:

$$E(Y|_{X,CY}) - E(Y|_{X,CN}) = \alpha \quad\quad\quad (10)$$

Thus, comparing the outcome of group CY and CN will produce the effect of moral hazard of insured people.

From (6) and (8) we have:

$$E(Y|_{X,VY}) - E(Y|_{X,CY}) = E(h|_{X,VY}) - E(h|_{X,CY}) \quad (11)$$

The term in (11) measures the adverse selection effect of people in group VY compared with people from CY group. This term should be named as the relative adverse selection effect as it is the gap between the adverse selection effects of the two groups but not the selection effect in general. However, we argued that people in CY group has no selection effect, hence (11) measures the adverse selection effect of group VY.

Finally, comparing (9) and (6) yields:

$$E(Y|_{X,VN}) - E(Y|_{X,CN}) = E(h|_{X,VN}) - E(h|_{X,CN}) \quad (12)$$

Use the same argument, it can be said that the term in (12) can be rewritten as:

$$E(Y|_{X,VN}) - E(Y|_{X,CN}) = E(h|_{X,VN}) \quad\quad (13)$$

This term measures the adverse selection effect of group VN.

We are going to estimate the effect of moral hazard using (10) and the effect of adverse selection for group VY and VN using (11) and (13), respectively. Recall that we estimate these quantities in the context of ATT estimation, so we use the PSM method.

The main idea of the PSM method is to match people from the treated group with those in the control group with similar observable covariates. In that way, it creates a condition that is similar to a random experiment, hence it helps reduce the bias due to non-random assignment of a program.

4. Data set and estimation results

Data set

Our data set is extracted from VHLSS (Vietnamese Household Living Standard Survey) in 2008. The survey is conducted every second year by the General Statistic Office (GSO) and funded by the World Bank. The data contains the following variables: insurance status, number of sick days in the year, number of visits to health care facilities as an outpatient, number of visits as an inpatient, expenditure on health care, other household and individual characteristics that may have impact on the usage of health care services.

In the literature, usage of health services can be defined as the number of visits or the expenditure on the visits. However, using expenditure may involve a supply-induced effect; doctors may encourage an insured person to use more services or prescribe more drugs than necessary. As our objective is to estimate the effect of the moral hazard and adverse selection of the insured, we use the

Table 1: Basic statistics by insurance status

	Insured, compulsory (CY)	Not insured, compulsory (CN)	Insured, voluntary (VY)	Not insured, voluntary (VN)	Total
N	2534	752	1368	10896	15550
No of outpatient visits	2655	414	3170	10795	17034
Outpatient Visits per person	1.048	0.551	2.317	0.991	1.095
No of inpatient visits	864	167	742	3579	5352
Inpatient Visits per person	0.28	0.22	0.37	0.21	0.24
Sick days	5998	1678	10071	45480	63227
Sick days per person	2.367	2.231	7.362	4.174	4.066
Visits per sick day	0.443	0.247	0.315	0.237	0.269
Percent of female	0.461	0.368	0.608	0.526	0.515
Percent of rural	0.457	0.616	0.672	0.757	0.694

number of visits as the measurement of health service usage.

Our data set consists of 38253 observations. As our objective is to examine the behavior of the insured, we drop all people under 18 year of age, as most of them are students. The reason for that is this: even though students since the year 2008 have belonged to the voluntary scheme, in effect, they are often forced to purchase insurance so it is impossible to examine their motivation behind insurance status. We also drop all people who are given insurance for free (including poor people, 90 years or older and veterans). In the end, there are 15.550 useable observations in the data set.

We disaggregate data into 4 types of insurance statuses: insured compulsory, uninsured compulsory, insured voluntary, and uninsured voluntary, the basic statistics are shown in table 1.

In the data set, 51.5 percent are female, and 68.4% live in rural areas. When looking at health state (as measured by the number of sick days per year), a person gets sick on 4.055 days per year, on average. When it comes to people under compulsory schemes, there is not much difference between the insured and uninsured people with the numbers 2.367 and 2.231 sick days on average, respectively. This similarity may indicate that having insurance or not does not depend on health status, but something else. When looking at people under the voluntary scheme, however, the difference is obvious. The health state of insured people tends to be much worse than that of uninsured

people, indicating adverse selection among people who buy voluntary insurance.

Regarding the usage of health services, a person pays 1.085 visits per year on average. And this number differs vastly across insurance status. For people under the compulsory scheme, insured people pay a lot more visits than uninsured people; the same pattern goes for people under the voluntary scheme. This may imply that people with insurance use more services than people without it. However, this difference may not be solely assigned to moral hazards, as insured people may be at a higher health risk than uninsured people as a result of adverse selection. So it should be more relevant to look at the ratio of number of visits per sick day. Table 1 shows that per one sick day, people with compulsory insurance use 0.443 visits on average, while the number for uninsured people under the compulsory scheme is much lower at 0.237 visits. The same pattern is found with people under the voluntary scheme.

Estimation results

We are going to estimate the moral hazard and adverse selection with (1) number of outpatient visits as a measurement of health care usage, and (2) number of inpatient visits as a measurement of health care usage. All these estimations use the following list of covariates:

Rural = 1 for people living in rural area, 0 for otherwise

Female = 1 for female, 0 for otherwise

Exp_per: expenditure per head (in thousand vnd per year), Exper2= Exp_per ^2

Age1=1 if a person is above 18 and less than 45, 0 if above 45 or less than 65

Edu = 1 if a person has completed primary school at most, = 2 if a person completed high school, 3 for people with higher education

Occup =1 if a person has simple work, 2 if a person is a secondary technician, 3: people with higher skills, researchers and public servants

The quality of matching is reported in table 4 in the Appendix.

(1) Number of outpatient visits as a measurement of health care usage

First we run the estimation for all age groups as a whole, and then disaggregate the sample into two groups; group from 18 – 45 years of age and group from 45 to 65 years of age. The behavior of young people and the older ones may differ from one to another due to many reasons, the same as in other countries. In Vietnam, the difference may even be more evident. The reason for that is this: the old people used to have free health care before the 1990s, and have not quite gotten used to the idea of paying the fee. Further more, they have experienced a difficult time in terms of economic conditions, hence the way they spend their money may be a lot different from the way the young do. We therefore want to see the difference from the moral hazard and adverse selection perspective. The reason we do not show the result for people above 65 is that there are only a few people in the control group, and the estimation result would be not meaningful. We also divide people into only two groups - not as many groups as other authors may do. The reason is that if we disaggregate further, the number of observations will be too small for the result to be reliable.

The results are reported in table 2, which has two panels. The left hand side panel shows

the effect of moral hazard by looking at people who have compulsory insurance and those who are under the compulsory schemes but have no insurance. The panel on the right presents the adverse selection effects by comparing people who have voluntary insurance and people who have compulsory insurance. In each panel, the first column is the treated group, and the second column the corresponding control group, and the third one is the estimated ATT, the t-value as the next and the last column indicates total observations used in the estimation.

The left panel in table 2 shows the effects of moral hazard. It indicates that overall, there is strong evidence of the moral hazard effect. On average, a person with compulsory insurance pays 0.47 visits to health care facilities, more than their uninsured counterparts who are also under the compulsory scheme, and the difference is strongly significant at t- value = 3.15. The difference is rather large regarding the fact that an uninsured person pays only 0.67 visits on average. Another salient feature is that the

effect varies strongly between age groups, in which young people less than 45 years of age seem not to commit the moral hazard. The difference in the number of visits is not statistically significant. The older group, on the other hand, seems to commit a large level of moral hazard. While people without insurance have 0.39 visits on average, their insured counterpart makes visits 1.45 times per year on average, and this difference is again, strongly significant at t = 3.27.

The panel on the right shows a similar pattern for adverse selection effects. The young group commits no adverse selection while the effect of adverse selection is severe with the older group. For people from 45-65 years of age, people with voluntary insurance make 5.7 visits on average, while people who have compulsory insurance make just 1.4 visits, and the difference is strongly significant with t-value at 4.54.

(2) Number of inpatient visits as a measurement of health care usage

Table 2: Moral hazard and adverse selection on number of outpatient visits to health care facilities

Age group	Moral hazard					Adverse selection				
	CY	CN	ATT	t - value	N	VY	CY	ATT	t- value	N
all age	1.08	0.61	0.47	3.15	3332	1.86	1.06	0.80	2.19	3506
	(0.07)	(0.07)	(0.15)			(0.15)	(0.07)	(0.37)		
18-45	0.81	0.76	0.05	0.25	2165	1.06	0.79	0.27	0.90	1949
	(0.05)	(0.08)	(0.19)			(0.18)	(0.05)	(0.29)		
45-65	1.45	0.39	1.06	3.27	1254	5.70	1.40	4.30	4.54	1566
	(0.15)	(0.15)	(0.32)			(0.21)	(0.15)	(0.95)		

The numbers in the brackets are standard errors

Table 3: Moral hazard and adverse selection on number of inpatient visits to health care facilitates (whole sample)

Moral Hazards				
CY	CN	ATT	t - value	N
0.22	0.30	0.07	0.11	1044
Adverse selection				
VY	CY	ATT	t- value	N
0.42	0.29	-0.13	-0.85	1343

As the number of people with non-zero number of inpatient visits is small, we do not disaggregate the sample into different age groups. The result is reported in table 3.

Table 3 shows that there is no moral hazard or adverse selection in using inpatient services. This is somewhat contradictory with Cuong's (2011) study in which he found that moral hazards were present even with inpatient service. Our explanation is that during the period under Cuong's study, the policy was much more generous to the insured; they only have to co-pay if the amount exceeded 7 million vnd, whereas in our study, the number is just 100.000 VND. Furthermore, when checking in more detail by using the T test, the data shows that the reason for the average number of inpatient visits being higher with the group that bought voluntary insurance, is that this group consists of older people, who often have to use inpatient services more than younger people do. This is consistent with the fact that people go to the hospital for inpatient services only if it is really needed and that going to stay in a very crowded hospital is not an option unless it is necessary. In Cuong's study, it does not include "age" in the analysis; hence the impact of "age" may be hidden in the moral hazard effects.

5. Conclusion

In a country like Vietnam, where the standard of living is still low and health insurance is not completely compulsory, adverse selection and moral hazard are always a problem. As the strategies to deal with these effects are different from one to another, evaluating the effect of each type is crucial for the Social Insurance Unit and Ministry of Health to construct appropriate policies towards a sustainable universal health insurance.

Using the special features of Vietnam's health insurance in which compulsory and voluntary schemes co-exist, and more importantly, there exists a number of people who are under the compulsory scheme but do not get insurance, we are able to disentangle the moral hazard effect from the adverse selection effect. We also empirically test the hypothesis that people do not choose to buy voluntary insurance because they are healthier than average, which we named as "positive adverse selection effect".

In general, we find that both the moral hazard effect and adverse selection effect are age-dependent. While young people tend not to

commit moral hazard as well as adverse selection, old people tend to severely commit both moral hazard and adverse selection. This is consistent with the fact that the old have experienced a long period of time where health care was free of charge, and the younger generation may get used to the market economy mechanism. We also find that there is no evidence of the so-called "positive adverse selection effect", that is, there is no evidence supporting the hypothesis that people choose not to purchase voluntary insurance as they are healthier. It implies that the reasons for them not to have insurance are to do with something else such as: the difficulty in access to healthcare services, or the poor quality of services for insured people.

The result could have important implications for policy makers in building up a plan toward a universal and sustainable insurance system. Firstly, we still need to deal with adverse selection, as its impact is still quite large. It is clear that it is not a solution to exclude people from getting insurance, as the ultimate goal is to have universal insurance. One possible solution is to provide a moderate universal insurance to which all people are willing to join, and let the private sector provide supplementary insurance for high risk people who need it. Secondly, the effect of moral hazard is large despite the fact that many people blame the poor quality of health services for the insured. As the number of insured people keeps increasing over time, the demand for health services will increase more than proportionally. As such, the Ministry of Health needs to be aware of this potential increase in the demand and be well prepared for that, given the fact that for the time being, the shortage of supply in health facilities is already a big problem.

APPENDIX
Checking for the quality of matching
Table 4: The quality of matching

	Treated	Control	Bias	t	P
sickday	2.651	2.847	-2	-0.63	0.527
rural	0.464	0.471	-1.3	-0.47	0.638
age1	1.273	1.220	12.6	4.41	0.000
edu	1.265	1.255	1.7	0.58	0.562
occup	2.550	2.560	-1.4	-0.55	0.585
exp_per	146.400	152.060	-4.9	-1.94	0.052
exp_per2	317.240	350.120	-2.3	-1.79	0.074
female	0.469	0.487	-3.7	-1.3	0.193

The percentage bias is reasonably small for almost covariates, except for group age1. This is the reason why we disaggregated the sample into two age groups as in section 4. The result is similar to the estimation of adverse selection and is not reported here.

Notes:

1. History of development and expanding the program of voluntary health insurance in Vietnam, by VSS,

2. Circular number 77 /2003/TTLT-BTC-BYT

3. Because $P(D=1|X) = 1 - P(D=0|X)$

4. We do not include people who get insurance for free as otherwise the estimation may be biased due to price effect.

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