Measuring the impact of Voluntary Health Insurance on out of pocket costs and socioeconomic-related inequality: methodological challenges and potential solutions with an application to Vietnam

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ABSTRACT

Aims: This study has three aims: 1) to measure the impact of the Vietnamese Voluntary Health Insurance (VHI) programme on out-of-pocket (OOP) costs of health care after correcting for care-seeking and insurance-seeking self-selection biases; 2) to measure the effect of the VHI programme on socioeconomic-related inequality in out-of-pocket costs; and 3) to measure the role of VHI in preventing catastrophic health care costs.

Data: This study is based on cross-sectional household survey data collected from three provinces of Vietnam: Hai Phong, Ninh Binh and Dong Thap. A total of 1,650 adults and 1,101 children were randomly selected and interviewed during the year 1999. Individual level data were available on the cost of health care in the last three months, the insurance status, personal and socioeconomic variables, health status and health care utilisation. In the sample, 1,192 individuals felt sick at least once in the last three months, and 985 of them sought care.

Methods: The standard regression approach of measuring the average impact of VHI does not correct simultaneously for care-seeking and insurance-seeking biases. Also, the standard approach of measuring vertical equity in financing fails to account for the unmet need for care. This thesis proposes an improved approach, based on Heckman's selection model, to estimate the impact of insurance on the cost of health care, after correcting for self-selection biases. To measure socioeconomic-related inequality in health care costs, a need standardised concentration index was proposed. This approach standardises for differences in the level of need between individuals, in turn controlling for the unmet need for care. Progressivity analysis was carried out using Kakwani's index of progressivity. Finally, the incidence of catastrophic health care costs was modelled using probit equations that accounted for self-selection biases.

Result: Analysis shows that insurance is negatively associated with expected cost of care, and this effect becomes more pronounced after correcting for selection biases. Need-standardised concentration indices demonstrate that insurance makes the distribution of health care costs more pro-poor. Kakwani indices suggest that insurance reduces the regressivity of financing. Finally, the study finds that VHI is associated with a lower probability of financial catastrophe.

Conclusion: Membership in the Vietnamese VHI appears to have a protective effect on health care costs; this effect is augmented after controlling for selection biases due to unobserved characteristics. Insurance membership also appears to reduce the regressivity of health financing and the incidence and intensity of catastrophic health care costs.

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Chapter 1

Introduction

1.1 Introduction

Out of pocket (OOP) payment is the predominant mechanism of health care financing in most developing countries. This is a regressive form of financing, due to its alignment with the level of health care use, rather than the socioeconomic status of an individual. The consequence is a disproportionately high cost burden on the poor (Xu et al 2003; O'Donnell and van Doorslaer 2005 and Jutting 2003). To reduce the negative impact of OOP costs, many developing countries have embarked on formal and informal risk pooling mechanisms that decouple the relationship between financial contributions and level of service use. One such mechanism is Voluntary Health Insurance (VHI), which provides formal means of risk pooling for countries with predominantly informal economies (Witter et al 2000).

The aim of this thesis is to critically evaluate, and improve on, the current methodological practice of measuring the impact of VHI on the individual level cost of health care, and the distribution of the cost burden across the socioeconomic gradient. The thesis uses Vietnamese VHI as a case study; however the focus of the study remains methodological. The dataset used in this thesis was initially analysed by Dr Matthew Jowett for his PhD studies at the University of York. The findings of this earlier analysis that are relevant to the current thesis were published in Jowett et al (2003). The current thesis argues that the earlier analysis by Jowett et al had the following limitations:

1. The analysis was limited to individuals who sought health care. Hence the findings could not be generalised to all individuals who were ill.
2. Potential bias associated with care-seeking self-selection decision was not taken into account during the analysis.
3. The insurance probit model used to control for insurance-seeking self-selection bias did not use unique identifying variables.

In chapter 4 of this thesis, the study aims to correct for the potential limitations of Jowett et al (2003). The other two analyses, presented in chapters 5 and 6, are new and were not part of Dr Jowett's study.

The remaining chapter is organised as follows. Section 1.2 will discuss the context of health care financing and OOP payments in developing countries. Section 1.3 will briefly outline the context of Vietnam and the VHI programme (further details will be discussed in chapter 2). Section 1.4 will highlight the methodological challenges in measuring the impact of VHI on the cost of health care and what this thesis aims to add to the literature. Section 1.5 will outline the research questions addressed in this thesis, and section 1.6 will discuss the organisation of the thesis.

1.2 Health care spending and OOP payments in the developing countries

Health sectors in most developing countries have been struggling to provide their populace with accessible and affordable care. The situation has been particularly challenging owing to recurring funding crises, lack of governance capacity and institutional weakness (Tabor 2005). The aggregate health sector spending of low- and middle-income countries is only 11 percent of the US$3 trillion global expenditure on health care. In sharp contrast, the world's poor bear 93 percent of the global burden of disease (Preker and Carrin 2004). Individual government spending on health care tends to average around 2% of the GDP in most developing countries, which may translate to as low as $11 per person per year for the least developed countries (Butz 2005). This is significantly lower than the minimum financing standard of US$30 to US$40 per person per year recommended by the World Health Organisation to finance essential health care interventions (WHO 2001). Furthermore, Lionel (1997) found that the distribution of these limited resources tend to favour the urban hospital-based services; as a result the public health subsidies are inequitably distributed to the advantage of the rich who can more readily access hospital care. Consequently, the primary health centres in rural villages tend to suffer seriously from lack of resources and adequately trained medical staff.

In situations where the public sector budget is constrained, health care is mainly financed through OOP payments. World Development Indicators (2000) suggest that, in the period 1990-98, OOP expenditure accounted for 66% of the total health expenditure in the developing countries (reaching 77% in South Asia). When access to care is dictated by OOP contributions, the potential for the domestic financial pool to run into an inescapable vicious cycle of debt and repayments is very high. It is estimated that globally more than 44 million

households face catastrophic health care payments every year, pushing more than 25 million households below the poverty line (Carrin, Evans and James 2005). In addition, because ofanticipated high OOP payments, the poor tend to delay seeking care until disease severity has progressed so far that more prolonged and expensive treatments are required (Carrin 2002; Waddington 1989; Fabricant et al 1999).

1.3 The context of Vietnam: VHI and cost of health care

Vietnam introduced health sector reforms in the 1980s, which resulted in the introduction of user fees for which was previously free of charge. The health care system was deregulated in 1991, allowing health professionals to practice privately and private pharmacies to be opened. In 1993, Vietnam introduced its health insurance programme, which included compulsory health insurance for civil servants, and voluntary health insurance for formal and informal sector employees, the unemployed and children. In 1998, about 12% of the Vietnamese population was covered by the insurance programme, with a little over half covered by the VHI programme (Wagstaff and van Doorslaer 2003). The focus of this thesis is on voluntary health insurance; hence, unless explicitly specified otherwise, the term health insurance will imply voluntary health insurance.

van Doorslaer and van Doorslaer (2007) observed that, among Asian countries, reliance on OOP payments was highest in Vietnam and India, where more than 80% of the total expenditure on health was funded by OOP payments. User fees in Vietnamese health facilities witnessed an exponential increase in the 1990s. Between 1993 and 1998, public sector user fees rose by over 1000% in real terms. During the same time period , fees for private health professionals rose by almost 600%. As a result, according to the Vietnamese Living Standards Survey (VLSS) data of 1998, the incidence of financial catastrophe in Vietnam, defined at a threshold level of 10% of the pre-payment income, was observed to be 14.2% (Wagstaff and van Doorslaer 2003). Most of this OOP payment was spent on purchasing medicines (88.0%). Thuan et al (2006) further noted that the catastrophic OOP payments in Vietnam were incurred mostly as a result of relatively minor communicable illnesses, including respiratory infections, diarrhoea and fever.

OOP contributions were observed to be far more devastating when households had to seek hospital care. The VLSS (1998) data estimated that, for individuals in the bottom two

socioeconomic quintiles, the cost of a single contact with a public hospital was equal to approximately 22% of the annual non-food consumption expenditure; this proportion was only 5% for the richest quintile. Furthermore, a single inpatient admission, on average, amounted to almost 60% of the annual non-food expenditure for the poor and middle income quintiles (Sepehri et al 2006).

One of the important objectives of the Vietnamese VHI programme was to reduce financial barriers and improve access to health care. Based on the VLSS data from 1993 and 1998, Sepehri et al (2006) found that, when insurance endogeneity was not accounted for, insurance membership (both compulsory and voluntary) appeared to increase the average cost of health care; however, when self-selection bias was taken into account, insurance appeared to reduce the cost of care by 16% and 18% in 1993 and 1998. Wagstaff and Pradhan (2005) found a similar impact of insurance on health financing, although in their study, the magnitude of the effect was estimated to be higher. Jowett et al (2003) analysed the impact of VHI on total health care expenditure, and found that insurance membership reduced the total cost by more than 200%.

1.4 Methodological challenges in measuring the impact of VHI

The impact of VHI on health financing is commonly evaluated using the observed health care costs that are actually incurred by individuals. It has been noted in the literature that the observed cost of care may be biased due to potential correlation between the unobserved determinants of cost of care and care-seeking/insurance-seeking self-selection decisions and possible non-random distribution of unmet need for health care. Therefore, an analysis of the impact of VHI based on the observed cost may produce biased estimates.

Care-seeking bias may occur when individuals with certain characteristics are more or less likely to seek health care given their illness. For instance, when poor individuals are faced with high expected costs of health care, they may decide not to seek care because of their inability to afford health care costs. In such a case, their unobserved expected cost of care would be high, but the observed cost would be zero. If the care-seeking decision is not randomly distributed in the population, and is systematically associated with high or low expected costs of care, then an analysis based on the observed costs will produce biased estimates.

Similarly, when insurance-seeking decisions are systematically associated with high or low expected cost of care, then this correlation between the insurance self-selection decision and health care expenditure will produce biased estimates of the cost of care analysis. For instance, if individuals who expect to have high health care costs are also systematically more likely to seek VHI, then the impact of insurance membership on the cost of care will be underestimated.

Finally, when evaluating the socioeconomic-related distribution of health care costs, if the unmet need for health care is not accounted for, and the level of unmet need for care is associated with the socioeconomic status, then a distributional analysis based on the observed health care costs will systematically underestimate costs for certain socioeconomic groups. This will, in turn, produce biased estimates of equity and progressivity of health financing. These concepts are discussed in detail in subsequent chapters.

Sepehri et al (2006) found that when they did not take account of the potential endogeneity of insurance, the net effect of insurance appeared to increase the average level of health care expenditure; however, when the insurance-seeking bias was taken into account, the effect was found to be significantly negative. Ekman (2007a), in a study of VHI in Zambia, did not account for insurance-seeking and care-seeking biases, and found that insurance membership was associated with the increased probability of financial catastrophe. Similarly, in a household survey of China, Wagstaff and Lindelow (2008) controlled for the insurance self-selection decision in their analysis and still found that insurance membership increased the likelihood of catastrophic expenditure. The authors suggest, among other possible explanations, that not accounting for the care-seeking decision could have potentially produced biased estimates (insurance membership can increase the likelihood of seeking care when ill and therefore increases the mean expenditure).

Therefore, in the literature, self-selection biases are either not taken into account or are corrected partially (i.e., either the insurance-seeking bias or care-seeking bias is corrected) in the cost of care analysis. Similarly, the literature does not make any attempt to take account of the unmet need for health care when evaluating the distribution of health care costs across the socioeconomic gradient. This thesis will propose improved methods to correct for these potential biases.

1.5 Thesis research questions

The aim of this thesis is to measure the impact of the Vietnamese VHI on individual level OOP cost of health care, and its distribution across the socioeconomic gradient, after correcting for care-seeking and insurance-seeking self-selection biases, and for the unmet need for health care.

This thesis will aim to achieve the following research objectives:

1. To measure the impact of VHI on average OOP cost of health care after correcting for self-selection biases (addressed in chapter 4). The specific objectives of the chapter are:
    a. To model the individual level cost of care, by controlling for need and non-need variables, including insurance membership;

    b. To evaluate and correct for the presence of care-seeking and insurance-seeking self-selection biases in the cost of care model, to estimate an unbiased relationship between VHI insurance membership and the cost of care

2. To measure the effect of VHI in reducing regressivity of health care financing (addressed in chapter 5). The specific objectives of the chapter are:
    a. To evaluate whether insurance membership, on average, has a pro-poor effect on the expected cost of health care;

    b. To compare the observed cost distributions of insured and uninsured groups to assess the level of pro-poorness and progressivity or regressivity of health care financing;

    c. To evaluate the effect of need standardisation processes on progressivity or regressivity of cost distributions for insured and uninsured groups;

    d. To assess the impact of correcting for care-seeking and insurance-seeking self-selection biases on need-standardised cost distributions.

3. To measure the effect of VHI in reducing the incidence and intensity of financially catastrophic events (addressed in chapter 6). The specific objectives of the chapter are:
    a. To compare the crude incidence and intensity of catastrophic events in the insured and uninsured groups;

    b. To analyse the impact of VHI membership on the probability of catastrophic event using discrete regression models;

    c. To correct for the potential bias in catastrophic probability models due to unobserved correlation between self-selection decisions and cost of care;

    d. To analyse the catastrophic risk reduction attributable to insurance membership, and compute the number needed to treat in order to prevent one catastrophe event; and

    e. To evaluate the socioeconomic distribution of the protective effect of insurance on catastrophic event occurrence

1.6 Organisation of the thesis

This thesis is organised in seven chapters. Chapter 2 provides an overview of the context of Vietnam and the Vietnamese voluntary health insurance programme. Chapter 3 will present the literature review of the methodological issues addressed in the thesis and also discuss the potential biases in the standard analyses. Chapter 3 presents the literature review for this study. This chapter has been sub-divided into five sections. These sections address: 3.1) methods of health financing in the developing countries; 3.2) review of self-selection biases in cost of care models; 3.3) outline of the equity argument in this thesis; 3.4) review of equity and progressivity indices; 3.5) concept and measurement of catastrophic cost of health care. Chapter 3 sets the contextual scene by identifying the implications of uncorrected biases in the standard methodological practice. Chapters 4 – 6 present the empirical results of the cost of care analysis, equity and progressivity analysis and catastrophic incidence modelling. Finally, chapter 7 will conclude the thesis with a discussion of the empirical findings and direction of future research.

Chapter 2

Vietnam: its demography, health care system and Voluntary Health Insurance programme

2.1 Introduction

The aim of this chapter is to provide an overview of the context of Vietnam, its health care system and the structure of the Vietnamese Voluntary Health Insurance programme at the time of the survey, i.e. the year 1999. The chapter is organised in the following manner. Section 2.2 provides an overview of the demographic, socioeconomic and health indicators of Vietnam, followed by section 2.3 which discusses Vietnamese poverty and inequality indicators. Section 2.4 discusses the administrative structure of the regions of Vietnam, while section 2.5 presents the recent history of health sector reforms in Vietnam in relation to the structure of its health care system in 1999. Section 2.6 discusses the structure of Vietnam's public health care system in 1999. Section 2.7 outlines the role of the private sector in health care provision in Vietnam. Finally, sections 2.8 and 2.9 discuss the Vietnamese health financing system and the VHI programme. All the facts and figures, unless otherwise stated, relate to 1998-99. When relevant statistics were not available for these years, figures from the closest year were used. This background will provide a contextual understanding of the analysis to follow.

2.2 Vietnam: background of the context

Vietnam is the easternmost country in the Indochinese peninsula, bordering China to the North, Laos to the Northwest and Cambodia to the Southwest (see Appendix 1 for the map of Vietnam and its neighbouring countries). It was the thirteenth most populous country in the world in 1999, with a population of 76.6 million, of which 76.4% lived in rural villages. Children under the age of 16 made up 30.6% of the populace. The overall population growth rate in 1999 was recorded as 3.6%. As a result, the population of Vietnam in 2008 had increased to 83.1 million, of which 73.0% lived in rural villages (General Statistics Office of Vietnam, 1999). Population density is highest in the fertile Mekong Delta in the south, near Ho Chin Minh City, and the Red River Delta in the north, near the capital city Hanoi (Ensor 1995; Barbieri et al 1996). Samples for our current study were drawn from the populous Hai Phong and Ninh Binh provinces (Red River Delta) and Dong Thap province (Mekong River Delta).

With an economic growth rate of 4.2%, Vietnam was one of the fastest growing Asian economies in the 1990s (World Bank 2000). Despite the economic boom, its gross national product (GNP) was close to just US$400 per capita per annum at the turn of the millennium, which placed it in 157th place of 207 countries in the world. In 1999, Vietnam's GNP was comparable to neighbouring Laos, but was less than half that of China. The economy was dominated by agriculture, especially rice growing, which comprised 62.5% of the total economic activity in the year 1999-2000. Rice production saw an increase of 200% over the 15 years period preceding 1999, compared to a population growth of 30% (Thang and Popkin 2003). National census data for 1999 showed that 66.5% of the population over the age of 13 were employed, 13.1% were students, 7.7% were household workers, and the remaining individuals were not in paid employment. Vietnam had maintained a remarkable adult literacy rate which was recorded close to 91% in 1999, with 74.2% of the under 17 still at school (General Statistics Office of Vietnam, 1999).

Despite its poor economy, some of Vietnam's health indicators were far better than other developing countries with comparable GNPs. With life expectancy at birth of 67.4 years and 12.8% probability of dying before the 40th birthday, Vietnam was trailing just behind the overall average for Asia. This has been attributed to relatively low infant mortality (27.5 per 1,000 live births) and under-5 mortality (34.2 per 1,000 children). The corresponding rates for East Asia and the Pacific in the same year were 35.5 and 44.7 per 1,000 respectively. These relatively low mortality rates were partly due to highly successful vaccination campaigns which reached 97% coverage (Flessa and Dung 2004). During the same period, maternal mortality was recorded as 130 per 100,000 live births. In contrast with mortality rates, childhood nutritional improvements had lagged behind other health indicators. The Vietnamese national human development report 2001 showed that the percentage of underweight children below the age of five was 36.7% between the years 1995 and 2000 (National Human Development Report 2001). This rate was estimated to be 1.3 times higher than what would be expected based on the macro-level relationship between income and health indicators. Thang and Popkin (2003) used logistic regression models on cross-sectional individual level survey data to establish that these statistics were far worse for rural and poor households, and those with ethnic minority backgrounds. This mixed picture of good survival rates and poor nutrition may reflect the dual effects of socioeconomic inequality and health system performance.

Regional differences in health indicators in Vietnam are obvious in table 2-1. The Northwest and Central Highlands have higher infant mortality rates, and lower percentages of those over 65 years of age, compared to the national average. This pattern can partly be explained by the high prevalence of malaria in these regions.

Table 2-1: Regional differences in the health indicators of Vietnam (1998-1999)

Regions	**Infant mortality rate (%) 1999**	**People over 65 years (%) 1999**	**Crude birth rate (1998)**	**Malaria cases (per 100,000 people) in 1998**	**TB* cases (per 100,000 people) in 1998**	**People not expected to survive to age 40 (%) in 1999**	**Under-weight children > 5 year (%) in 1998**
Red River Delta	25.2	7.4	17.0	136	83	6.5	33.5
North East	38.0	5.3	20.6	683	78	11.3	40.1
North West	57.7	4.3	28.8	1239	47	14.9	41.7
North Central Coast	36.7	6.9	22.9	570	90	10.5	42.9
South Central Coast	39.0	6.6	21.3	700	125	12.3	39.2
Central Highlands	65.0	3.5	32.9	2235	51	21.3	48.9
South-eastern	17.2	4.7	19.1	325	147	6.7	30.0
Mekong River Delta	35.3	5.1	20.4	304	146	9.7	32.2
Sampled provinces							
Hai Phong	20.8	7.1	15.5	82	83	6.5	33.9
Ninh Binh	26.3	7.5	16.8	324	69	10.7	36.5
Dong Thap	45.7	5.2	21.2	38	189	8.9	31.8
All Vietnam	33.1	5.8	20.6	502	109	9.7	36.7

* TB = Tuberculosis Source: National human development report (2001)

Table 2-1 also shows that in all regions of Vietnam at least 30% of children under the age of five were underweight. Indicators for the sampled provinces, Hai Phong and Ninh Binh, show a mixed picture of better mortality indicators and average malnutrition prevalence, whereas Dong Thap showed a relatively poor picture of mortality and life expectancy. One of the reasons for high infant mortality in Dong Thap is its poor access to safe water (13.2%) and sanitation (4.0%) in the region (National Human Development Report 2001).

2.3 Poverty and inequality

Vietnam's national poverty survey (1999) reported that 28.2% of the population lived below the poverty line; the majority of these people lived in rural villages. Regional concentration of poverty is striking in the Northern uplands, North Central and Central Highlands regions, with an average poverty incidence of 50%, in contrast to the South East where the incidence was estimated to be 8% (see table 2-2). However, a longitudinal assessment of poverty in the 1990s showed that, compared to the year 1993, the average incidence of absolute poverty had fallen sharply by the end of 1998 (Fritzen 2002).

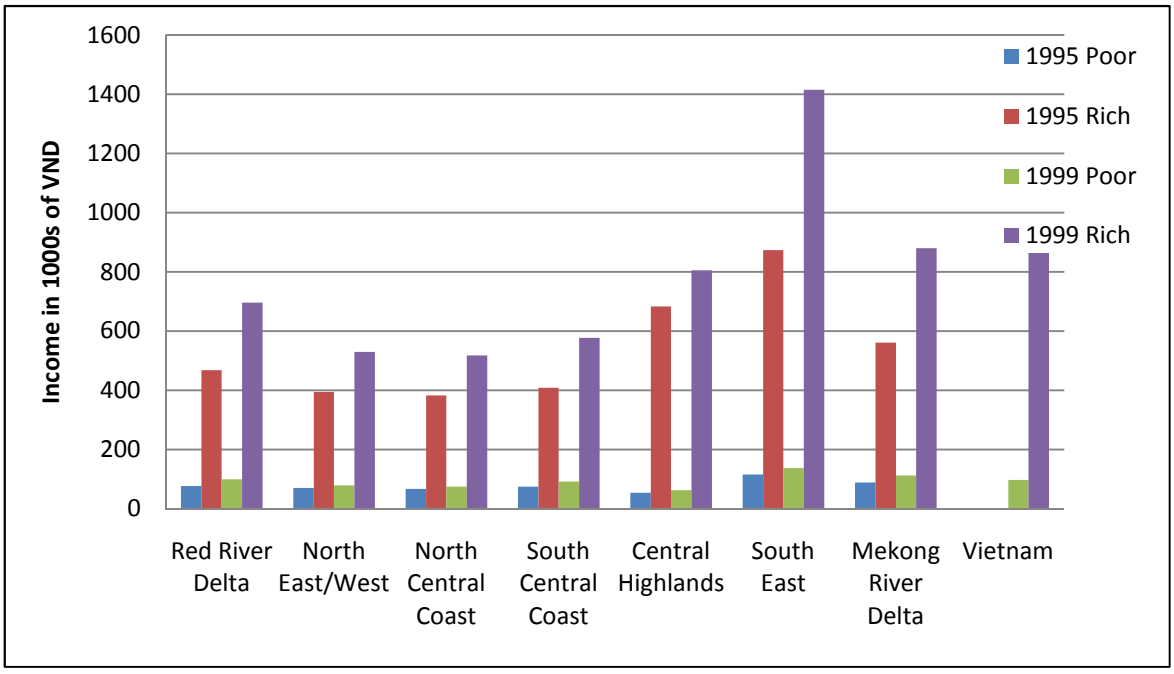
Table 2-2: Sub-national socioeconomic indicators of Vietnam

Regions	**Population (1998 million)**	**Incidence of poverty (%)**		**GDP growth rate (average 1995-1999)**	**GDP per capita (1999-$PPP)**	**HDI score (1999)**
		1993	**1998**			
Vietnam	75.8	58	37	7.6	1860	0.696
Northern Upland	13.5	79	59	7.0	899	0.629
Red River Delta	14.9	63	29	6.9	1616	0.723
North Central	10.5	75	48	4.9	939	0.662
Central Coast	8.1	50	35	6.6	1238	0.676
Central Highlands	2.8	70	52	11.5	1102	0.604
South East	9.7	33	8	9.9	3809	0.751
Mekong Delta	16.3	47	37	5.5	1496	0.669

Sources: Fritzen (2002), World Bank (1999) and NCSSH (2001)

Relative socioeconomic inequality was observed to have widened significantly during the period following economic transition that started in the 1980s. While the average monthly income per capita was 295,000 Vietnamese Dong (VND) [equal to US$23.17 in 1998], differences between and within regions were very prominent. Gini coefficient of income inequality for Vietnam increased at an alarming rate between 1995 and 2000 from 0.36 to 0.41 (Fritzen 2002). The richest socioeconomic quintile in Vietnam earned an average of 10,360 thousand VND per annum, which was almost nine times the average income of the poorest quintile (1,164 thousand VND). Figure 2-1 shows the distribution of the income gap between the richest and the poorest quintiles across all regions of Vietnam.

Figure 2-1: Income of the richest and the poorest quintiles in 1995 and 1999



Source: General Statistics Office of Vietnam

2.4 Administrative structure of the regions of Vietnam

Vietnam is geographically divided into 8 regions, namely North West, North East, Red River Delta, North Central Coast, South Central Coast, Central Highlands, South East and Mekong River Delta. Administratively, regions are further subdivided into 59 provinces, and 5 centrally controlled municipalities that exist at the same level as provinces. Provinces are further divided into districts, provincial cities and towns. Each district is formed by

communes and townlets, whereas provincial cities and towns are formed by communes and wards. In total, there are 597 districts and 10,331 communes in Vietnam. Rural communes are subdivided into villages, which are headed by village leaders, who would also be members of the Commune People's Committee. These committees are responsible for the welfare of the households living within the commune. Similarly, District and Provincial Peoples' Committees are administratively responsible for their respective regions. Members of these committees are elected by local community members, and are responsible for coordinating and managing local activities with the government.

2.5 History of the health sector reforms in Vietnam with relevance to the health care structure in 1999

Vietnam's health system has been shaped through decades of socio-political ideologies and economic reforms. Soon after its independence from the French in 1954, the country was separated into North and South Vietnam. The North followed a largely egalitarian philosophy and prioritised principles of equity in the delivery of health care. It was one of the first countries in the world to embrace a primary health care policy, focused on improving access to health services for both rural and urban households (Khe et al 2002). Evidence suggests that North Vietnam had achieved almost universal coverage of primary health care in the urban areas and around 75% coverage in rural areas, with patchy distribution in mountainous regions (Witter 1996). The Vietnamese primary health care model partly inspired the approach later adopted by the World Health Organisation at Alma Ata in 1978 (WHO 2002).

Between 1954 and 1975, the public sector was the sole provider of health care in the North, while private providers and pharmacies were prohibited to practise or sell medicines. The health system was entirely financed through taxation, communal funds and foreign aid. Whereas district and provincial hospitals received their funding directly from the government, the network of local health stations, village nurses and health workers was supported by commune level agricultural cooperatives. Health care was provided free of charge and drugs were heavily subsidised by the government (Gerald 1997).

After the victory of the communist North in the Vietnam War, the country reunified to form the Socialist Republic of Vietnam in 1975. After reunification, the North attempted to replicate the same model of primary health care in South Vietnam, which at the time did not

have a well-established health infrastructure. Extension of a heavily subsidised health care system placed a huge strain on the available public sector budget. Limited resources were further aggravated when an official ban on private medical practice and private pharmacies was extended to the South. As a result, a large number of doctors emigrated from southern Vietnam (Sepehri, Chernomas and Lodhi 2003), and many health workers either completely abandoned their professions, or started unofficial practice to support their below subsistence level incomes from the public sector (Beresford 1988).

During the same period, the country's economy underwent socialist reforms and enforced collective ownership of agricultural assets, nationalisation of industries and commerce and a severe crackdown on private businesses (Riedel 1995). This resulted in a disastrous slowdown of economic progress across the country, only to be aggravated by failure to acquire promised foreign funding after Vietnam's invasion of Cambodia in 1978. Public sector and state-owned enterprises suffered from large deficits, and by the mid-1980s inflation had reached its peak at 400 percent (Pham 1999). As a result of the economic crisis, by the late 1980s public health care spending had progressively decreased from 0.82% of GDP in 1984 to 0.38% in 1988. In 1989, government health care spending in Vietnam was US$0.83 per capita, which was the lowest of all the low-income countries in Asia (World Bank 1992). Health care workers were demoralised by years of hyperinflation, irregular payments and termination of state subsidies for housing and education. The situation was further exacerbated by the unavailability of drugs and medical equipment at health care facilities. This resulted in a sharp decline in utilisation rates of government health services during the 1980s. Sepehri et al (2003) report that, by 1989, the average consultations in Vietnam had reduced to 1.2 visits per person per year. This was a sharp decline from 2.3 consultations per person in 1984. As the quality of government health services worsened, the illegal private health sector started to grow in the early 1980s. Private sale of drugs continued, and many health workers began to work informally from their homes to supplement their incomes (Dung 1996).

In 1986, the government of Vietnam introduced market reforms called Doi Moi (literal meaning: renovation), that had a dramatic social and economic impact. Agricultural production was de-collectivised, subsidies were removed, price liberated and, most importantly, participation in the private sector was promoted. As part of these reforms, farm cooperatives were replaced by non-communal family farms, which deprived commune level

health stations and community nurses of their source of financing (Fforde and Vylder 1996; World Bank 2005). These reforms were further extended to the health sector in 1989, to introduce neoliberal health policy changes. These reforms included the following measures (Hong Ha et al 2002):

a. User fees were introduced at district, provincial and national level health facilities to improve cost recovery. Exemptions were granted to the disabled, war veterans, very poor households and children under the age of six. User fees were not comprehensively applied to commune health stations, where drugs were usually not available. Prescriptions had to be purchased from local pharmacies.
b. Private provision of health services was legalised. Also medical professionals in the public sector were allowed to establish private services during out of office hours.
c. Permission to establish private pharmacies and sell drugs in an open market was granted.
d. State control over the pharmaceutical companies was substantially reduced and the industry was liberalised.

These reforms of 1989 had a pronounced impact on health service delivery, especially on primary health care in the rural villages of Vietnam. Below we discuss the structure of the health sector by 1999, which was formed as a result of the above changes.

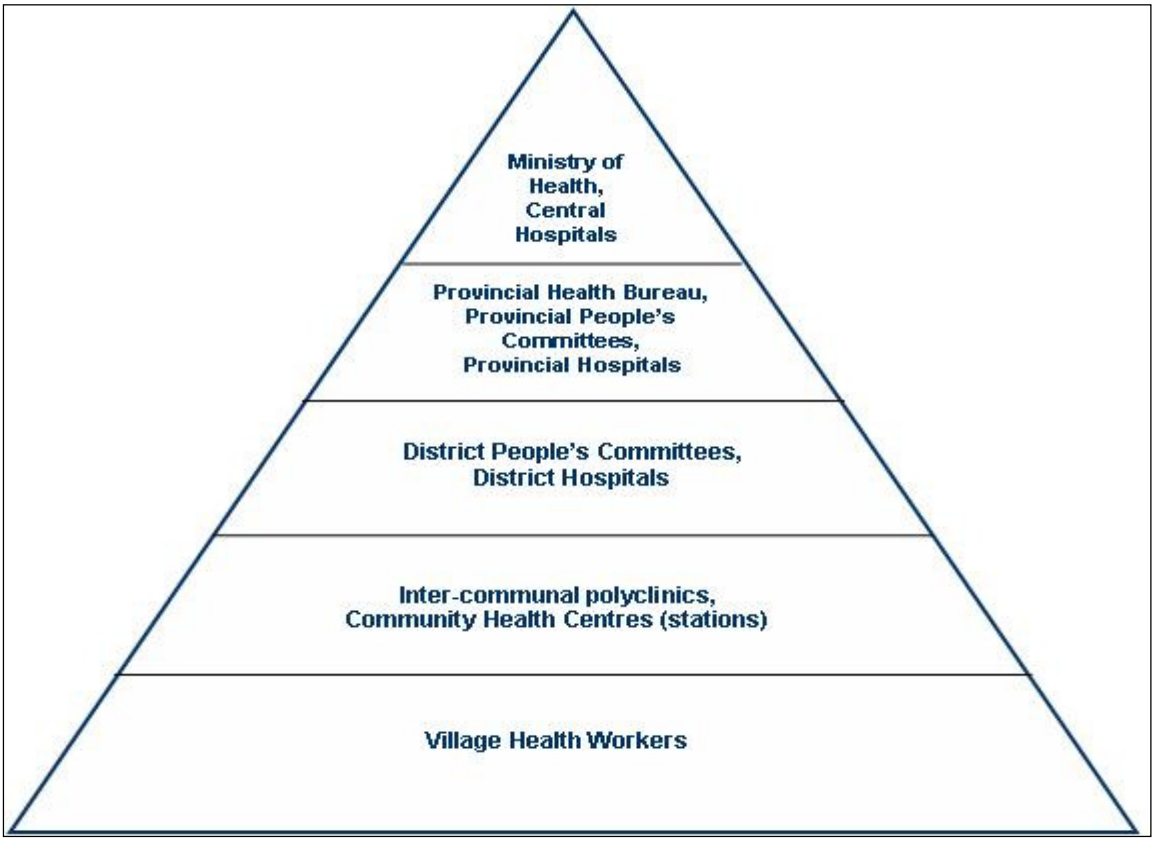
2.6 Structure of the public health care system of Vietnam

The public sector health care system in Vietnam is organised into a four-tiered system (figure 2-2). The Ministry of Health is at the top of the structural hierarchy, followed by Provincial, District and Commune level People's Committees. The ministry is responsible for policy-making, planning, training of professionals and setting prices for the public health care system. At the second level are the Provincial Health Bureaus that liaise with the Provincial People's Committee and the Ministry of Health for programme planning and funding.

Although the economy is centrally planned, provincial governments are given substantial authority and responsibility for much of the health care (Ensor 1995). Committees have the

key responsibility for overseeing the administration of services and ensuring appropriate delivery of care at each level. Administrative responsibilities are decentralised to health bureaus that manage the provincial facilities, and also oversee the delivery of care through district hospitals and communal health stations.

Figure 2-2: Structure of the public sector health care system of Vietnam



Each province has at least one general hospital, with a capacity of 200 – 1,000 beds with specialised departments including internal medicine, surgery, obstetrics and gynaecology, paediatrics, infectious diseases and traditional medicine. Each hospital, on average, serves a population of 1.2 million people. Although lower level health facilities are meant to be referral centres, the gate-keeping function does not always work well, and it is common for people to use hospitals as primary centres for consultation (Flessa and Dung 2004). Sometimes maternity care is directly referred to the next hospital level by health workers without consultation with a health station. In addition, households living close to district or provincial hospitals frequently bypass primary health care services, and seek care at the outpatient department of the nearest hospital, as hospital services are perceived to be of better quality (Whitehead 2001).

On the third level are the District People's Committees that manage district hospitals. These hospitals serve a population of between 50,000 to 300,000 people, and have general medical and surgical departments alongside maternal and child health and family planning units. At the bottom of the health service structure are Inter-Communal Polyclinics and Communal Health Stations. These clinics mainly provide primary health care services to between 2,000 and 10,000 people, and have limited resources for any inpatient admissions. More complicated cases are referred to the next level of service delivery.

Vietnam's network of primary health care services is remarkably strong, with around 1,006 polyclinics and 9,806 health stations. These institutions rely on village health workers, who are local community members willing to act as a bridge between health clinics and the community. Local health workers provide preventive health care, basic curative care, and also refer cases to local health stations and polyclinics. Commune Health Centres work closely with Commune People's Committee and District Health Bureau. There are nearly 43,000 primary health care workers at the commune level and over 60,000 at district level. Table 2-3 summarises the ratio of doctors and nurses to the population in 1995 and 1998.

Table 2-3: Doctor-population and nurse-population ratios in 1995 and 1998

Regions/provinces	Doctors (per 100,000 people in 1995)	Doctors (per 100,000 people in 1998)	Nurses (per 100,000 people in 1995)	Nurses (per 100,000 people in 1998)
Red River Delta	37	42	56	50
North East	35	38	46	50
North West	27	32	74	75
North Central Coast	26	29	44	44
South Central Coast	34	37	48	48
Central Highlands	34	39	54	55
South-eastern	41	47	64	60
Mekong River Delta	25	27	35	36

Sample provinces				
Hai Phong	58	56	79	83
Ninh Binh	40	43	44	40
Dong Thap	26	29	27	33
All Viet Nam	42	44	65	60

Source: National human development report (2001)

2.7 Role of the private health care sector

Vietnam also has a parallel system of privately provided health care that is particularly active in outpatient care (Berman 2000). Though entities within the private health system function independently of each other, it can be informally understood as an unstructured, unconnected and usually unregulated three-tier system (Hong Ha, Berman and Larsen 2002). The first tier is formed by the three private hospitals which are based in large cities, and have the capacity to provide modern medical and surgical services. The second tier is constituted by partially equipped, privately operating, qualified primary care physicians, working either independently or in small groups. They are based in cities, towns and rural areas, and primarily cater to the needs of middle-income individuals. The final tier is made up of partially trained mobile health workers, who operate as physicians in rural villages, and provide services at flexible hours, visit patients at home and usually accept fees as cash or in other forms. Some provinces had reported having at least five of these 'physicians' operating in each commune (Hong Ha, Berman and Larsen 2002). These health workers play a vital role in providing health care to rural Vietnamese, who often do not have easy access to public health facilities. People commonly use private providers for illnesses like arthritis, asthma, coughs and fever.

Using a small sample of 153 individuals, Tuan et al (2005) found that the mean scores of patient satisfaction with physicians were consistently higher for private providers, though the difference was not statistically significant owing to the small sample size. The same study found that practitioners at public sector health centres had better clinical knowledge and skills, at least for some illnesses, than private physicians. This suggests that patient

satisfaction may be influenced by the clinic environment, attitude of physicians and ease of access. Hong Ha et al (2002) used a multivariate logistic regression model, finding that the richest two quintiles were twice as likely to choose private care over public care for illnesses affecting children under the age of 15. For adults, the difference was far less obvious. The preference for private health care was obvious in all regions of Vietnam, especially in the north central and southeast regions and central highlands.

Table 2.4 summarises the findings of VLSS 1997-98, which suggests that health service utilisation was consistently high in the richest socioeconomic quintile, except for the use of commune health stations, which are based mostly in rural villages. The socioeconomic difference in utilisation was observed to be highest in the use of hospital care.

Table 2-4: Distribution of health services utilisation across socioeconomic quintiles, 1998

Provider	Poorest quintile	Quintile 2	Quintile 3	Quintile 4	Richest quintile
All public providers	13.5	16.2	20.9	21.2	28.2
Public hospitals	7.9	11.2	16.0	23.0	41.9
Commune health stations	20.0	23.0	25.5	19.1	12.4
Private clinics and doctors	11.2	15.5	21.7	20.3	31.2
Drug vendors	15.0	19.1	21.2	21.1	23.6
Traditional healers	12.2	14.7	16.1	22.2	34.7

Source: Sepehri et al (2005)

Since Doi Moi, private pharmacies also exist in most parts of the country. There were around 3,000 licensed pharmacies in Vietnam in the early 1990's, with almost one-third of them in Hanoi. There were an additional 1,000 state-run retail pharmacies at the time. Sales at private pharmacies accounted for almost three quarters of the total pharmacy sales in the country (Valedin et al 1992).

2.8 Financing of the health care system

The public sector health care system of Vietnam is financed primarily from general taxation. Both provincial and district governments retain much of the revenue raised through taxation, and use it to fund services in the region. Some of the vertical programmes run by the central government are funded directly by them. Communal funding also forms a small part of the resources generated at the local level, though much of it is undocumented (Ensor 1995). Sepehri, Chernomas and Lodhi (2005) report that, in the year 1998, approximately 47% of public hospital revenue was sourced from the state budget, while out-of-pocket user charges and health insurance contributions added another 30% and 15% respectively (table 2-5). It should be noted that the focus of this thesis is only on the out-of-pocket expenditure component of health care financing.

Table 2-5: Sources of public health financing contributions in 1990s[1]

Year	State budget	Out of pocket user fee	Health insurance contribution	Other
1994	76	9	8	7
1995	54	19	10	17
1996	55	23	13	9
1997	52	27	17	4
1998	47	30	15	8

Sources: Sepehri, Chernomas and Lodhi (2005) and
Vietnamese Living Standard Survey (1997-98)

In 1997, the state budget for health was 4,328 billion VND (US$ 47 million), 62% of which was spent on curative care (Khe et al 2002). Although the public health expenditure per capita increased by 3.86 times between 1991 and 1998, it was only 0.6% of the GDP in 1998. The public health expenditure in Hai Phong province was highest among the sampled provinces in 1998, although the expenditure as a proportion of the provincial GDP was only 0.5% (table 2-6).

[1] These figures only represent the contributions made towards financing public health facilities. Expenditure made to purchase health care at private facilities is not taken into account.

Table 2-6: Public health expenditure in regions of Vietnam in 1990s

Region	Public health expenditure 1991 (VND per capita)	Public health expenditure 1993 (VND per capita)	Public health expenditure 1998 (VND per capita)	Public health expenditure as % of GDP (1998)	Public health expenditure as % of total local government expenditure (1998)
Red River Delta	5810	13015	23055	0.6	6.1
North East	6074	12862	26867	1.1	6.2
North West	5439	9595	34335	1.8	7.1
North Central Coast	3775	11276	22390	0.9	7.1
South Central Coast	6554	13308	23850	0.8	6.1
Central Highlands	5798	14625	33913	1.0	6.6
South-eastern	13386	26302	31345	0.4	5.4
Mekong River Delta	4542	11027	20942	0.6	6.0
Sampled provinces					
Hai Phong	12810	22835	25442	0.5	6.3
Ninh Binh	4504	11362	22072	1.1	6.8
Dong Thap	4711	9306	19928	0.7	6.0
All Viet Nam	6495	14336	25132	0.6	6.1

Source: National Human Development Report (2001)

Out of pocket (OOP) payment for health care is an important mechanism of financing in Vietnam for both public and private health care systems. When the expected cost of care is high, households often decide not to seek care because of their poor ability to pay. In a small sample of 418 individuals, Khe et al (2002) reported that 20.2% of the sick individuals in the bottom quintile (compared to 8.2% in the richest quintile) were deterred from seeking formal

care because of lack of money. Table 2-7 shows the distribution of average out-of-pocket expenditure for hospital visits and the average length of hospital stay across the socioeconomic quintiles. These figures suggest that the richest quintile spends substantially more in absolute monetary terms and also has a longer length of hospital stay, compared to the poorest quintile. Table 2-8 presents the average OOP expenditure per contact as a percentage of annual non-food expenditure per capita. This table suggests that the proportionate socioeconomic sacrifice made by the richest quintile to achieve better access to health care is less than the proportion sacrificed by the poor.

Table 2-7: Average out-of-pocket expenditure per contact and length of hospital stay (in '000 of Vietnamese Dongs - VND)

		Socioeconomic quintiles (based on per capita expenditure)				
	Average	**Poorest**	**Quintile (2)**	**Quintile (3)**	**Quintile (4)**	**Richest**
OOP expenditure per hospital contact	169.0	82.0	143.0	169.0	186.0	193.0
OOP expenditure per hospital admission	862.0	217.0	405.0	600.0	1038.0	1907.0
OOP expenditure per patient day	60.0	21.0	38.0	43.0	71.0	101.0
Annual admission rate (per 1000)	50.4	33.9	43.5	49.3	61.9	63.3
Length of hospital stay (days)	14.3	10.3	10.9	13.9	14.6	18.8
Distribution of aggregate hospital days (%)	20.0	9.7	13.2	19.0	25.1	33.0

Sources: Sepehri, Chernomas and Lodhi (2003) and Vietnamese Living Standard Survey (1997-98)

Table 2-8: Affordability ratio (average OOP expenditure per contact as percentage of annual non-food expenditure per capita) 1998

	Affordability ratio					
	Average	**Poorest quintile**	**Quintile 2**	**Quintile 3**	**Quintile 4**	**Richest quintile**
Commune health stations	1.3	3.8	3.1	2.0	1.4	0.9
Private clinics and physicians	2.1	5.5	5.3	4.4	1.6	1.0
Hospitals						
All contacts	10.9	22	21.8	17.6	12.2	4.6
Hospital admissions	55.7	57.9	61.6	62.4	67.9	45.3

Source: Sepehri et al (2003)

Informal payments for health care, often called 'envelope payments' in Vietnam, are common practice in the system. Without such payments, treatment is not thorough and often delayed. Sepehri et al (2005) also add that there is growing evidence that the number of laboratory investigations also depend on the method of financing and on envelope payments. In some studies, these payments have accounted for up to 36% of the hospital fee and 19.6% of the total hospital bill (Tran 2001).

2.9 Background on health insurance in Vietnam

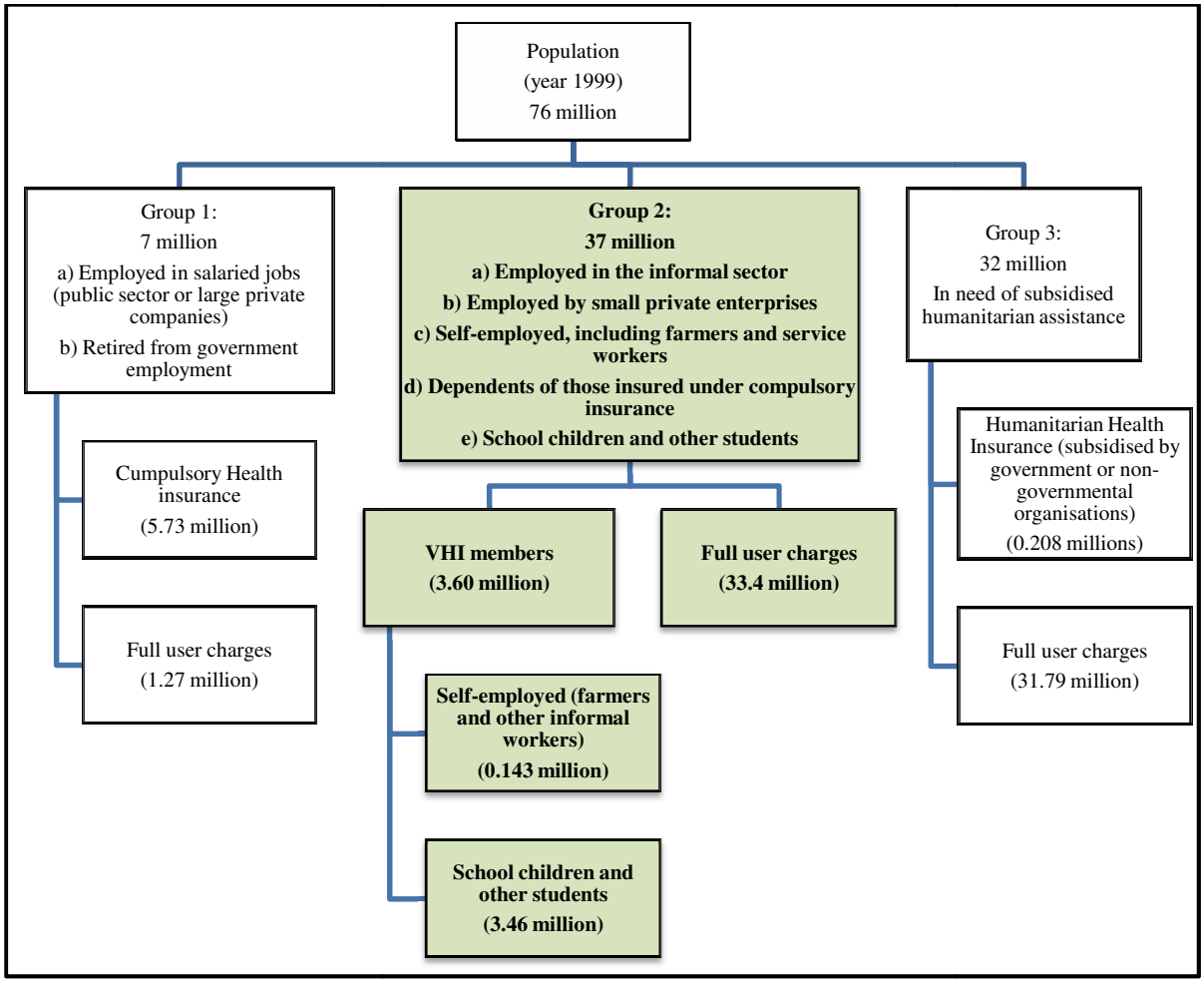
The Health Insurance programme in Vietnam was formally launched in August 1992, following the issuing of the National Health Insurance Decree (Ministerial Decision No. 299/HDBT), which called for Compulsory Health Insurance (CHI) for salaried workers in both public and private sectors (the latter for companies with over ten employees). The stated goals of the scheme included raising additional resources, assisting in poverty alleviation efforts (particularly for special merit groups), and increasing financial protection against uncertain future health care expenditures (Solon and Tien 1997). The health insurance programme was later expanded to include a Voluntary Health Insurance (VHI) component which provided coverage for those who were not covered by the CHI. The focus of this thesis is on this latter component of the insurance programme, i.e. VHI.

Figure 2-3 (below) summarises three distinct population groups based on their eligibility to enrol in the CHI or the VHI programme. Only group 2 (individuals eligible for VHI) is relevant to the current thesis.

Group 1 (CHI eligible group) consists of individuals who are currently in formal employment (public or private sector), and those who have retired from public sector employment. This group is required to purchase membership in the compulsory health insurance programme. Members of the CHI programme contribute 1% of their salaried income, with employers contributing a further 2%. More than 80% of the approximately seven million people eligible for this scheme were enrolled in the CHI programme in the 1990s (Ensor 1995; Jowett and Thompson 1999). This thesis does not study the CHI programme; hence, group 1 is not a subject of this study.

Group 2 (VHI eligible group) consists of the individuals who are: i) employed in the informal sector; ii) employed by small private enterprises that are not part of the CHI programme; iii) self-employed, including farmers and service workers; iv) dependents of those insured under the CHI programme; and iv) school children and other students. These individuals were encouraged to insure themselves under the VHI programme. In 1999, approximately 10% of those eligible for VHI membership had purchased insurance. Those who did not purchase the insurance cover paid full user charges. Several reasons have been suggested for the low uptake of voluntary insurance amongst adults. One is the lack of institutional capacity at provincial and district levels to develop mechanisms that facilitate VHI enrolment. For example, monthly contributions would allow those who cannot afford to pay the full annual premium in one go, to join. Similarly, no regulations exist concerning how premiums should be set under voluntary insurance, e.g. linking to local income levels, or limiting the frequency of premium increases. Since the focus of this study is on the VHI programme, this thesis is only concerned with Group 2.

Figure 2-3: Target group for the Vietnamese Health Insurance programme



During the initial years of the VHI programme, schoolchildren and students in higher education were the primary focus of membership, with between 20-30% of this group enrolled by the end of 1998 (Carrin et al 1999). This scheme was soften referred to as 'soft compulsory', given the reported pressure on schools from local authorities to enrol all of their students, i.e. entire classes. In return, teachers received a commission for collecting contributions once a year, and in many cases a large part of the funds went to maintain a school medicine chest which, it has been reported, often contained adult drugs, such as hypotensives, for the teachers themselves. Later on, the programme was extended to include all self-employed, those in informal employments and the dependents of the members of compulsory insurance programme.

Group 3 (those eligible for health insurance on humanitarian basis) consists of individuals who were not covered by the CHI and were too poor to afford the VHI membership. These

individuals were therefore eligible for humanitarian health insurance assistance, paid for by the government or non-governmental organisations. In 1998, over 99% of those low-income individuals eligible for free health insurance, i.e. group 3, were not covered by health insurance; they were awaiting allocations from poverty alleviation funds or non-governmental organisations such as the Red Cross. Enrolment in this group is only likely to increase substantially if sufficient funds are available and politicians make the issue a priority. This thesis does not focus on humanitarian health insurance.

For the VHI programme, provincial funds proposed a contribution level to the Provincial People's Committees, who gave the final approval. Premiums were fixed within provinces, but varied between them, and are typically in the region of US$ 2-10 for an annual policy (Jowett et al 2003). Fixed premiums are likely to lead to the problem of adverse selection, i.e. those at greater risk of falling ill or those who are already ill are more likely to subscribe to the VHI programme. Since the premiums are generally calculated on the basis of average risk of illness, if significantly greater number of high risk individuals bought insurance membership, the VHI programme would struggle to achieve solvency. Hence, when establishing an insurance premium, there is a trade-off between ensuring that the premiums are affordable to the large majority of the population, whilst also making sure that the risk pool is sufficiently balanced between high and low risk individuals to avoid insolvency. In the case of Vietnam, while the National Directorate of the Voluntary Health Insurance Agency (VHIA) undertook costing studies, premiums appeared to be based on informal estimates of willingness and ability to pay at the provincial level.

One measure taken by central government was to establish a ceiling on a patient's annual out-of-pocket health expenditures, equivalent to half the minimum annual salary, approximately 860,000 VND (Solon and Tien 1997). This applies to both individuals paying full user charges and to those making co-payments under health insurance. Co-payments were introduced as part of Article 7, Decree 58/1998, to limit excessive use of health services (Jowett et al 2003). Under this measure, insured patients are obliged to make a copayment of 20% of the full user charges applicable, for the services they receive.

At the time of the survey, membership was based around individuals, rather than families, under both compulsory and voluntary schemes.

2.9.1 Health care benefit of VHI

Under the initial decree of 1992, benefits under compulsory insurance were defined as including medical examinations, diagnostic tests, drugs, and diagnostic and treatment operations. Two types of policy are offered under the voluntary scheme, one covering only inpatient services, and a second covering both inpatient and outpatient services, with the benefits covering consultation fees, diagnostic tests and medicines. At the time of purchasing an insurance policy, individuals must designate one public health facility at which benefits can be obtained which, in most cases, is a District Hospital. Members were thus unable, at the time of the survey, to use the insurance policy at private or non-designated public facilities.

Health insurance essentially offers financial benefits (i.e. an 80% reduction in user charges), rather than coverage for additional health services, or service provision in a separate facility. During the survey, it became clear that in some provinces separate consultation rooms and wards are made available, with ceiling fans, as well as tea-making facilities. However, in many cases these benefits appear to be only for those with compulsory insurance, which highlights the lack of clarity on this issue.

Health facilities are reimbursed by provincial health insurance funds for the services they provide to insured patients. Reimbursements are made on a fee-for-service basis, which generally includes a flat fee for accommodation, and a standard fee for medical tests and procedures. A Ministry of Health Circular in October 1995 revised the approach to reimbursing providers from a fixed in-patient day payment to a fee-for-service basis.

This chapter provided an overview of the context of Vietnam, its socio-demographic context and health financing system. The next chapters will discuss the methods used to evaluate the impact of Vietnamese VHI on cost of health care and its socioeconomic distribution.

Chapter 3

Literature Review

3.1 Health financing methods in the developing countries

3.1.1 Introduction

Improving health status of the poor is fundamental to socioeconomic development and poverty reduction in the developing countries (Strauss and Thomas 1998). When access to health care is determined primarily by ability to pay, the distribution of health and health service utilisation is likely to be distributed in an inequitable manner (Bloom and Canning 2003; Rocio and Jairo 2002; Wagstaff and van Doorslaer 2003). Hence, extending financial protection mechanisms to improve access to health care is a major policy objective in most low- and middle-income countries.

The aim of section 3.1 is to discuss health financing strategies used in the developing countries. The remaining part of section 3.1 is organised as follows. Sub-section 3.1.2 will outline the issue of uncertainty in the nature of health care costs, followed by a discussion in sub-section 3.1.3 on risk management strategies used by households in the developing countries. Finally sub-section 3.1.4 will discuss the commonly practiced health financing methods in the developing countries.

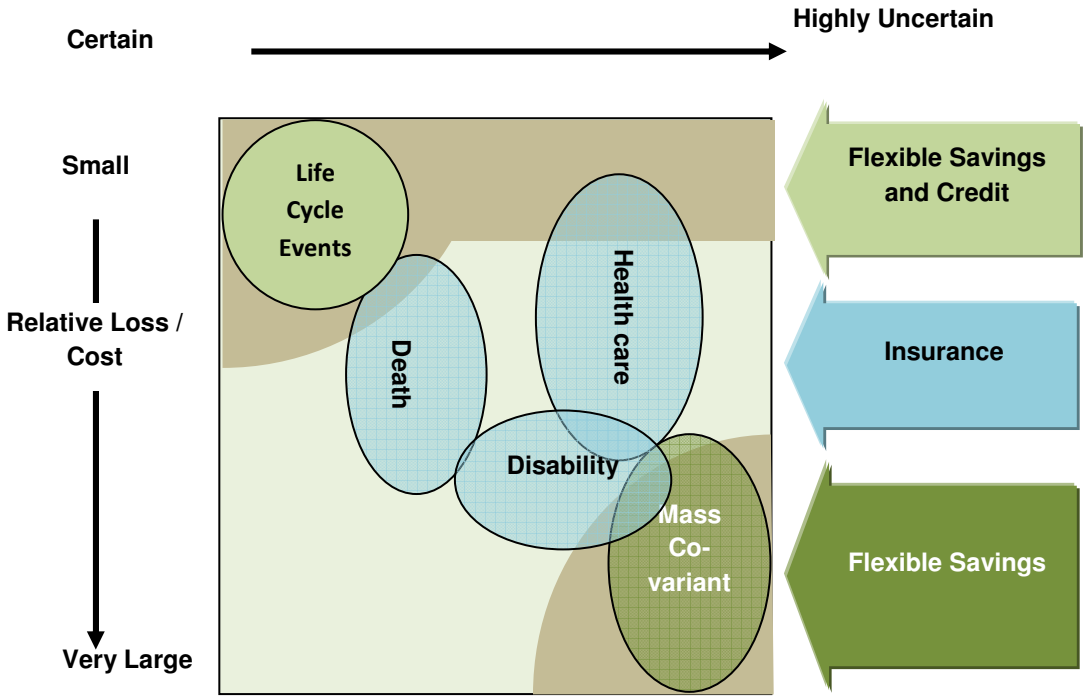
3.1.2 Uncertain nature of health care costs

Health care costs, unlike some other household expenses, are intrinsically uncertain. This is because health care need is not only unpredictable in its magnitude but also in its frequency and timing in the life cycle of an individual (Brown and Churchill 1999). Economists have often attempted to model and predict future health care need and level of health service utilisation based on age, health status, genetic predispositions and socioeconomic status. Vliet (1992) noted that, despite these modelling attempts, no more than 20 percent of the total cost variation in utilisation can be explained in a typical model.

Narayan et al (1999) added that uncertainty in health care costs is also well appreciated by poor households. In their analysis of interviews conducted with more than 20,000 low-income individuals in 23 developing countries, Narayan et al found that low-income households considered illness (or injury) and death to be the most unpredictable events in their lives. In a similar vein, Brown and Churchill (1999) found that households associated different degrees of uncertainty to five groups of events; the least amount of uncertainty was

associated with regular life cycle events, followed by death or disability, and finally events requiring health care or those affecting massive population proportions (mass co-variants including epidemics and natural disasters). Figure 3-1-1 shows the relative position of these events in terms of uncertainty and expected cost. In Brown and Churchill's study, health care costs were suggested to have moderate to high levels of uncertainty, and moderate level of cost impact. This makes insurance a relevant concept in this context to provide protection against financial risk.

Figure 3-1-1: Uncertainty and relative costs of household events



Source: Brown and Churchill (1999)

3.1.3 Risk Management strategies

To manage uncertainty in health care costs, households use various risk management strategies. Here risk is defined in terms of an event (e.g. risk of falling ill) or its consequence (e.g. financial catastrophe) (Fischhoff et al 1984). Households may change their health behaviour to reduce the risk of illness, and may use financial strategies to manage the consequences of health care. Here, the thesis is concerned with the latter which includes, among other methods, health insurance programmes.

Households use both formal and informal strategies of managing financial risk associated with the use of health care. This thesis will discuss the strategies under three main categories:

- Risk reducing strategies;
- Risk coping strategies; and
- Risk pooling strategies.

Risk reducing strategies include saving and investment mechanisms. These methods are planned ex ante, i.e. households plan and act in advance of the risk event to reduce the probability of financial catastrophe. Risk coping strategies, on the other hand, are ex post mechanisms used to cope with the damaging impact of a risk event. These include selling of assets and borrowing from lenders in formal or informal sector. Finally, risk pooling strategies, including insurance mechanisms, are also planned ex ante to protect against the undesired financial consequences of risk events. Households often use more than one risk strategy to manage risk.

Risk management strategies exist both in formal and informal varieties. Here, the formality of a strategy is defined in terms of the organisational structure of the institutions involved in risk management, and their ability to legally enforce contractual agreements. This thesis will briefly discuss formal strategies of risk management. The examples discussed do not provide an exclusive list of methods, but are useful for the purpose of illustrating the strengths and weaknesses of each group of strategies.

3.1.3.1 Formal risk reducing mechanisms

To reduce the risk of financial catastrophe from health care costs, households may use strategies including, but not limited to, medical savings accounts, micro-savings, investment in businesses and diversification of income. Here, medical savings accounts and micro-savings in community banks will be briefly discussed.

Medical Savings Accounts (MSA)

MSAs currently operate mainly in China (Hindle 2000), South Africa (Matisonn 2000), the United States (Decker 2000) and Singapore (Phua 1997). They are inter-temporal self-insurance schemes where individuals or households deposit voluntary or compulsory

contributions into personalised savings accounts that are designed to spread the financial risk of health care over time (Dixon 2002). Funds are operated either by the state, an insurance company or a bank. Individuals manage their own accounts, and, at least theoretically, there is no incentive for moral hazard. MSAs are usually set up in conjunction with a private health insurance plan to protect individuals from catastrophic health care expenditure. Since there is no risk sharing or pooling involved, some would argue that MSAs do not reduce inequity in financing or improve access to health care. Dixon (2002) notes that MSAs had in fact aggravated inequalities between rural and urban populations. Further research is required to establish the usefulness of MSAs in the context of developing countries.

Community Banks

The concept of community banking has been operationalised in several forms in developing countries; these vary from the less formal village banks to the well-regulated micro-finance institutions. Two of the largest community banks targeting the poor are Grameen Bank (Bangladesh) and SEWA (India). These are community-based savings and credit associations that do not require collateral or group guarantees, and operate on no joint liability principles. With a total deposit standing at US$973.02 million in April 2009, Grameen is probably the largest community bank in the world. Both Grameen and SEWA mainly target rural women, and through them have facilitated a culture of savings and self-sufficiency. These banks have established a network of community workers who collect small savings from the poor, which can then be used to protect against financial catastrophe at a later date.

Critics argue that formal community banking systems may be less efficient than Self-Help Groups (SHG) that operate on the same principle but are more flexible and less structured than community banks (Harper 2002). Large community banks may have a high staff per client ratio compared to SHGs. Another limitation that affects formal savings institutions is due to the fact that community banks only deal with cash contributions, the rural poor often have limited access to cash and rely on in-kind transactions that are not accepted at community banks.

It should be mentioned here that many of these community banks also offer micro-insurance plans to support the health care of its members. Grameen, BRAC and SEWA are important examples of this dual-purpose community banking system.

3.1.3.2 Formal risk coping mechanisms

Risk coping strategies mainly involve borrowing money or selling resources to pay for health care. Commercial banks, community banks, credit unions and micro-credit banks offer formal risk coping mechanism in the developing countries. Most of these institutions, except for the community banks discussed above, require collateral before any loan is disbursed. Bouman and Houtman (1988) note that credit programmes of the formal banking system may be beyond the reach of the rural poor who do not have any collateral. Consequently, the low income households either end up selling their assets or using the exploitative services of pawnbrokers. Where community banks exist, affordable borrowing mechanisms may provide a promising mechanism of risk coping.

3.1.3.3 Formal risk pooling mechanisms

The WHO (2000 p.115) defines risk pooling as 'the practice of bringing several risks together for insurance purposes in order to balance the consequences of the realization of each individual risk'. An ILO (1996 p.35) study adds that risk pooling mechanisms facilitate 'reduction or elimination of uncertain risk of loss for the individual or household by combining a larger number of similarly exposed individuals or households who are included in a common fund that makes good the loss caused to any one member'.

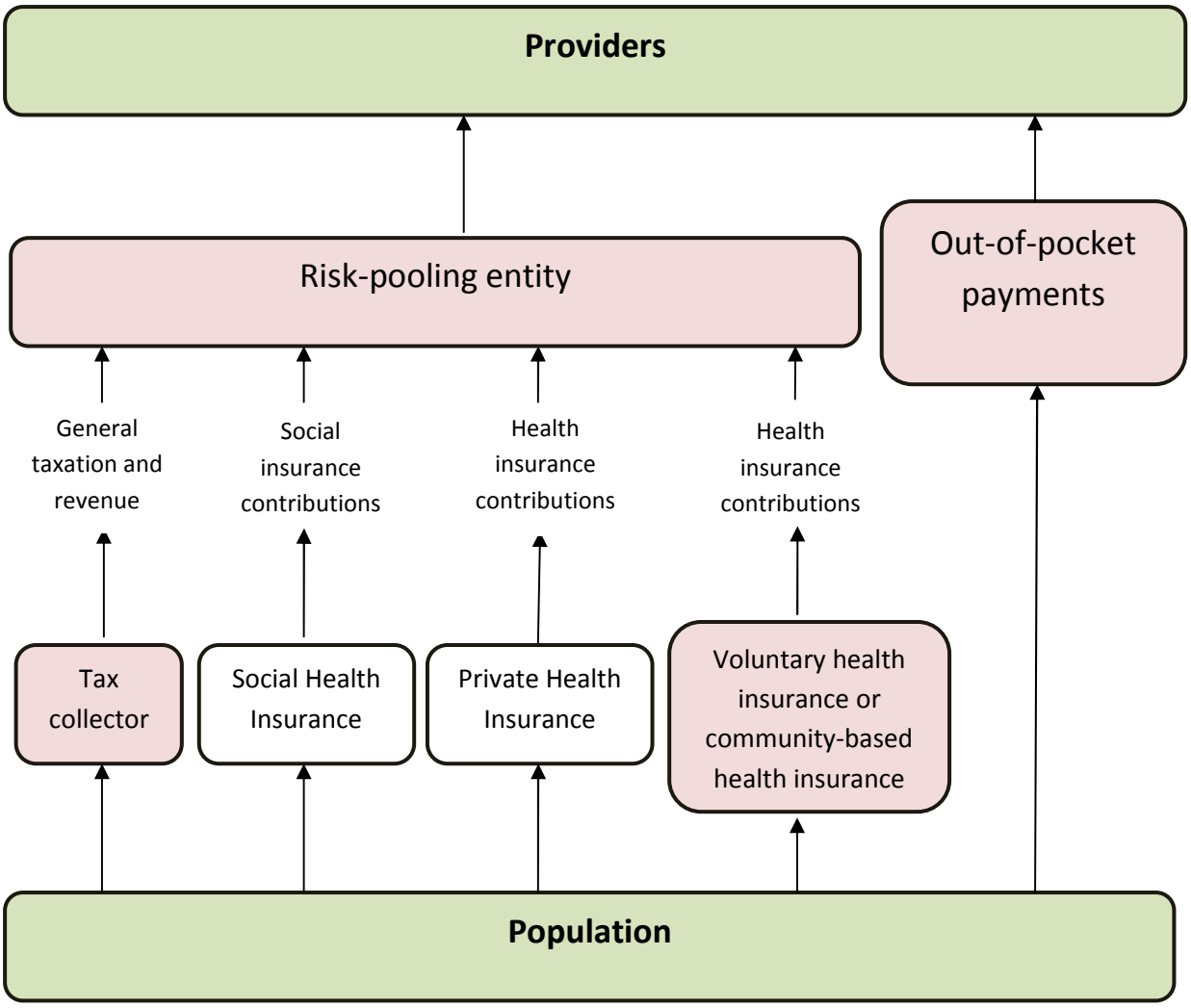
Formal risk pooling mechanisms include, among others, social health insurance, private health insurance, and voluntary or community-based health insurance programmes. While each of these mechanisms is practiced in the developing countries to various extents, the next sub-section will discuss only the most common methods of health financing in this context.

3.1.4 Health financing methods in developing countries

Figure 3-1-2 identifies health financing methods practiced in the developing countries, highlighting the ones that are more common than others. The following health financing methods account for the greatest share of the total health care spending and will be discussed in more detail below:

- out of pocket (OOP) user-fees;
- income taxation and general revenue-based financing;
- voluntary and community-based health insurance (not for profit).

Figure 3-1-2: Health financing methods in the developing countries



Source: Adapted from Normand and Busse (2002) – modified for the case of developing countries

The other formal methods of health financing in developing countries include Social Health Insurance (SHI), private for-profit health insurance and medical savings accounts. These are not discussed here as they account for a relatively small share of health care spending in developing countries.

3.1.4.1 Out of pocket user fees

This is the most common method of health financing in developing countries. Using this method, health care is bought directly in return for the payment made. Hence, the cost incurred by an individual is a direct function of the quantity and quality of care received. Jowett et al (2003) noted that since the wider introduction of user fees in government

facilities in the developing countries, access to health facilities is largely determined by a household's income level. Waddington and Enyimayew (1989) adds that, owing to the financial implications of health care costs, households often delay seeking care until the disease severity has progressed and more expensive treatment is required. Furthermore, when treatment is expensive, poor households often rely on informal medical care that is more affordable but less effective and potentially damaging to health (Fabricant et al 1999).

Hardeman et al (2004) noted that, due to poor targeting of fee exemptions policies in Cambodia, OOP payments have often failed to protect the poor from financial catastrophe. Both inclusion and exclusion errors have accounted for this failure. Inclusion error occurs when resources leak to those who are better off, and exclusion occurs when those who need exemption are unable to receive it. Inclusion errors commonly occur when there is lack of accountability and absence of clear guidelines. Exclusion error occurs when user fees serve to top up health care providers' income and each exemption is seen as a loss of revenue; or in another case when health workers do not have the expertise, resources, time and incentive to objectively assess patients' ability to pay (Huber 1993).

Literature shows that introduction of user fees has usually done more harm than good. User fees tend to reduce the demand for health care, increase the likelihood of financial catastrophe and poverty, and promote inequities in health care use (Gilson and Mills 1995; Mbugua, Bloom and Segall 1995; Meessen et al 2006). Xu et al (2003 p.111) add that poor households 'can be protected from catastrophic health expenditures by reducing a health system's reliance on out-of-pocket payments and providing more financial risk protection'. Some of the African countries, including Uganda and South Africa, have recently abolished user fees for primary health care. Similarly, Zambia has eliminated user fees at rural health facilities. These changes have generally resulted in an increase in utilisation, at least in the short-term. In the case of Uganda, health service attendance increased by almost 50-100% (Xu et al 2006). However, the increase in use was observed mainly in relation to curative care, which in some cases crowded out the preventive care (Wilkinson et al 2001). However, these findings should be interpreted with caution, since early evaluation of user fee elimination may overestimate the impact of the policy. Furthermore, studies have also found that, although the volume of care increased after fees elimination, the quality of care rapidly declined.

3.1.4.2 General taxation and general revenue-based financing

General taxation and revenue-based financing are the main sources of public health financing in 106 of the 190 countries evaluated by the WHO (Savedoff 2004). In high income countries, almost two-thirds of public sector expenditure is funded through tax revenues, while in low-income countries virtually all of the public health expenditure is generated through this source (WHO 2001). However, public health expenditure accounts for a significantly smaller proportion of total health care expenditure in the developing countries; most of the financing of public and private health care occurs through OOP payments.

Some of the strengths of the general taxation and revenue-based health financing system are as follows:

- Since the tax-based system relies on a broad revenue base, the financial burden can be spread over a larger proportion of the population. Value added taxes, sales taxes and import taxes account for a large proportion of the total revenue generated in developing countries.
- Income tax structure can be designed to be progressive so that the amount of contribution reflects the socioeconomic status of an individual.
- General taxation can be designed in an equitable manner by selectively taxing the services and commodities that are more likely to be consumed by the higher socioeconomic groups.

However, in the case of developing countries, general taxation or a revenue-based system of financing has several weaknesses and limitations. Some of these limitations are outlined below:

- Tax collection requires well-developed administrative and economic capacity, which is generally low in the developing countries.
- Administratively, income tax collection can be highly challenging when a major part of the economy is employed in the informal sector. The ILO (1996) estimates that approximately 61% of the urban employment sector in Africa is informal. In Vietnam in 1998, the informal economy managed by non-farm households alone employed 24% of adult workers. Furthermore, a sizeable proportion of the farm-based economy was classed as informal. As a result, income taxation only generates 7% of the total

revenue in the developing countries in contrast to 22% of the total GDP in developed countries (Auriol and Warlters 2004).

- General taxation can be highly regressive. This is particularly the case when governments add heavy taxes on items of regular household consumption.

With these limitations of the OOP payments and general taxation/revenue-based financing, voluntary health insurance has seen a substantial increase in developing countries. Below I will discuss the general concept of VHI along with its strengths and weaknesses.

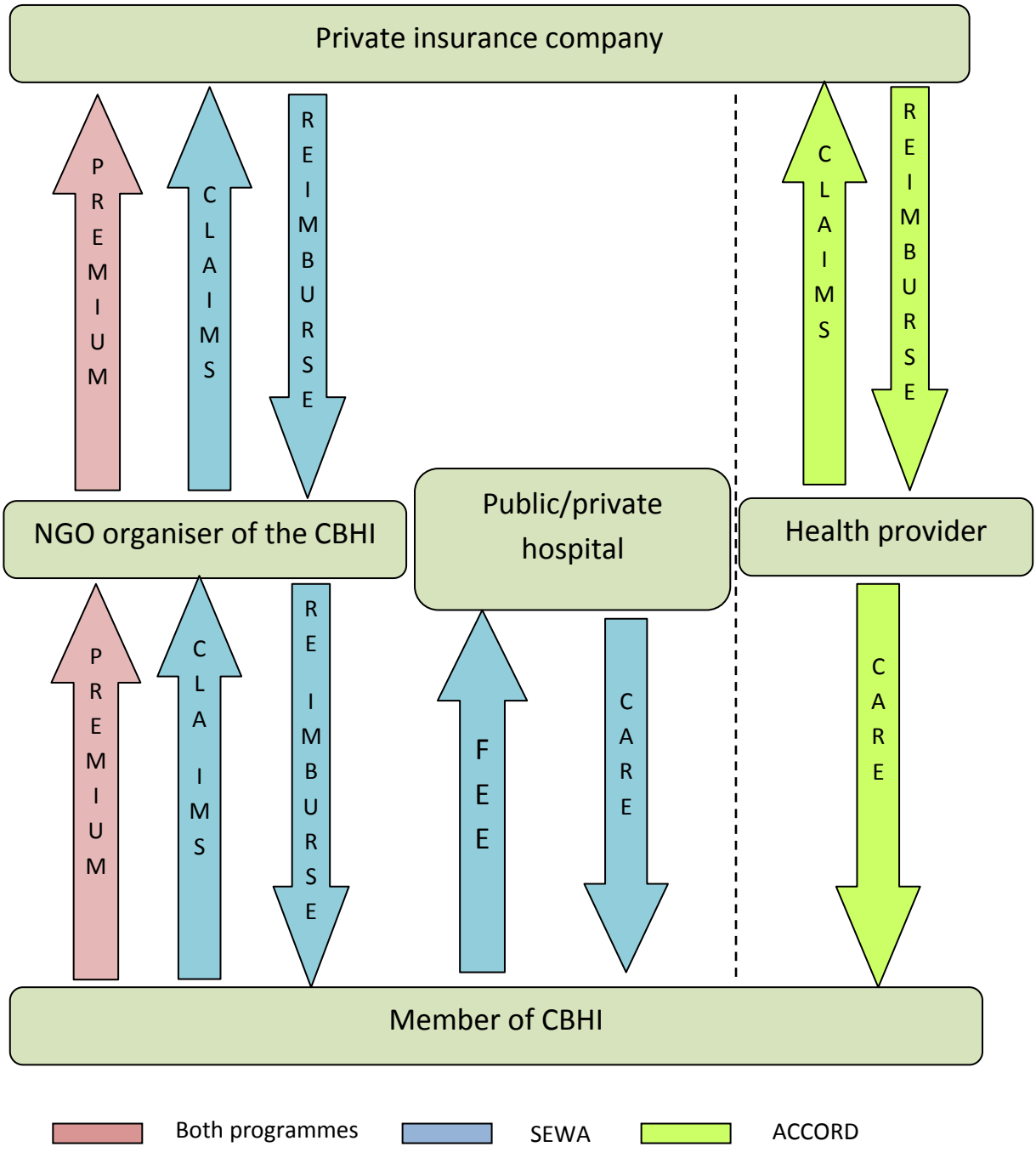
3.1.4.3 Voluntary health insurance or community-based health insurance

While some studies define voluntary health insurance (VHI) under the umbrella term of community-based health insurance (CBHI) (Ekman 2004), this thesis distinguishes between them. CBHI is a generic term used in the literature to refer to risk pooling mechanisms where premiums are community rated, i.e. all members make a flat rate contribution, irrespective of their risk status. Whereas CBHIs are usually managed by non-governmental entities (including, but not limited to, communities themselves and non-governmental organisations), VHI programmes are generally managed by public sector organisations. CBHI programmes may be organised at the level of small communities or larger regions, while VHI programmes are generally managed at regional, provincial or national level. The underlying principle of the two mechanisms is broadly the same, i.e. to provide accessible and affordable health care to the population. Both CBHI and VHI are managed on a non-profit basis.

Under VHI and CBHI programmes, members contribute insurance premiums at the time of registration, which may be supplemented further by co-payments for the services at the time of seeking access to care. Insurance premiums are usually collected by the programme organiser directly or through intermediate bodies; these may include community members or designated public sector individuals/bodies. When seeking care, depending on the design of the programme, an insured member may need to pay the user fees for the care sought, or may get a discount from the provider on the care sought. If the members are required to pay user fees, the payment claims are then sent to an insurance programme operator who would subsequently reimburse the payment after thorough assessment. If instead the patients get a direct discount at the health facility, the service provider would submit the reimbursement requests to the insurance operator. In the case of CBHI, the operating NGOs may re-insure the risk with a private insurance company. Figure 3-1-3 summarises the general models of

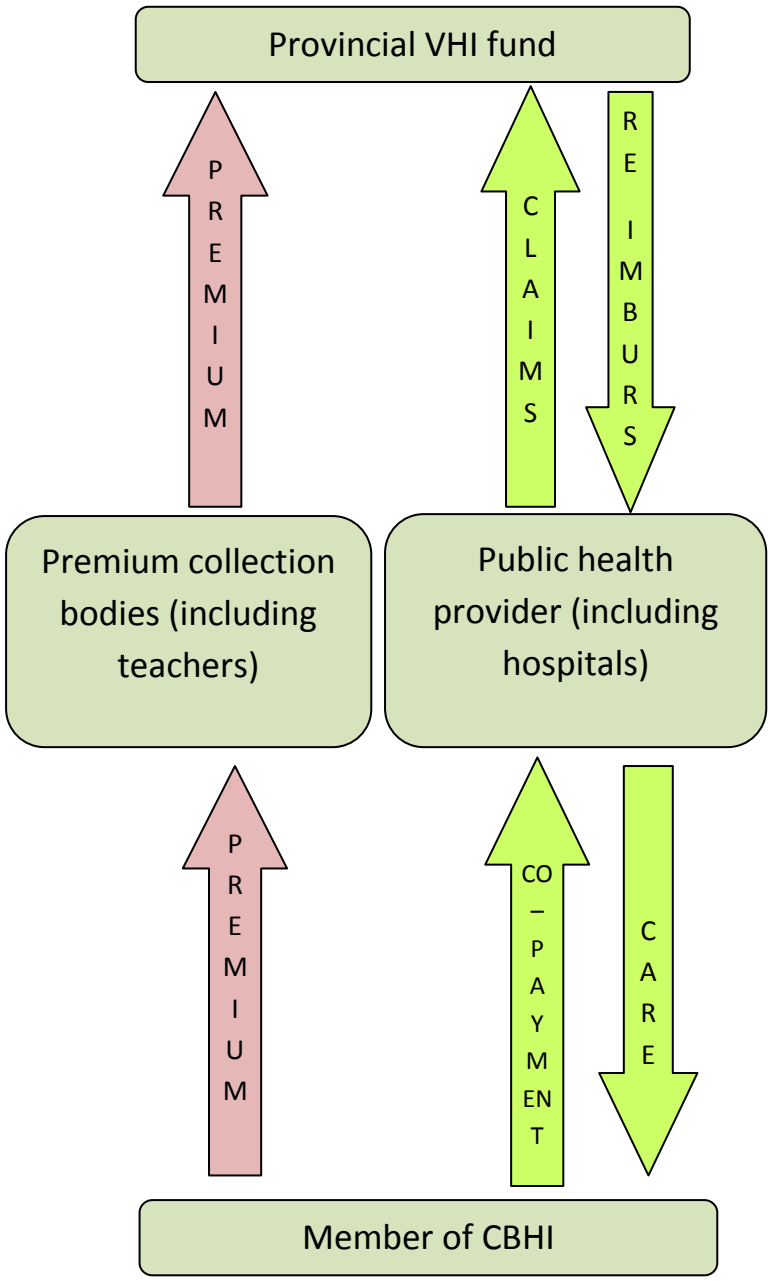
two CBHI schemes in India. In the SEWA scheme, the insured members make the full payment at the health facility and then send the reimbursement claims to the CBHI operator. In the ACCORD programme, the insurer provides a direct discount at the time of seeking care. Figure 3-1-4 presents a simplified structural organisation of the Vietnamese VHI programme. It is interesting to observe that the organisational structure is very similar to the ACCORD scheme in India which is implemented at a much smaller scale.

Figure 3-1-3: Insurance benefit and reimbursement structure of two Indian CBHI schemes



Source: Adapted from Devadasan et al (2007)

Figure 3-1-4: Insurance benefit and reimbursement structure of the Vietnamese VHI programme



VHI and CBHI programmes also vary in terms of the level of risk pooling (for instance, national as opposed to community level), type of operator (for instance, provider-based as opposed to community-based), level of coverage of the programme, the benefit package offered, and the level of contributions and co-payments made. Ekman (2004), in a systematic review of CBHI, found strong evidence to support the argument that these programmes provide effective protection by reducing the level of OOP payment for health care, although

the study points out that most schemes fail to provide protection to the poorest households. Jowett et al (2003) suggests that highly cohesive communities, and those endowed with dense horizontal networks, are more prone to collective action, and thus more likely to purchase health insurance, which is also suggested in previous studies.

The key strengths of VHI and CBHI programmes are summarised below:

- Jakab and Krishnan (2001) reviewed 45 published and unpublished reports on the experience of CBHI and VHI to conclude that these programmes improved the level of access to health care in low-income settings, especially for the poor, by reducing the price of health care.
- Voluntary insurance also tends to protect individuals from the catastrophic impact of health care costs. This in turn protects households from compromising their financial capacity to afford basic subsistence goods.
- Health insurance programmes tend to improve resource mobilisation, although the resources mobilised may not be sufficient to make the programmes financially self-sustainable.
- VHI and CBHI programmes are especially appropriate for countries where the majority of the adult population is employed in the informal sector. For instance, in Tanzania, where the social health insurance programme covers the workers in the formal sector, the CBHI was found to be more appropriate for those employed in the informal sector (Bennett, Kelley, and Silvers 2004).
- VHI and CBHI can pave the way towards an employment based social health insurance programme.

In the literature, the following have been highlighted as potential weaknesses of the VHI and CBHI programmes:

- While the VHI and CBHI programmes have shown evidence of reducing barriers to financial access, membership does not provide complete protection against financial catastrophe. Devadasan et al (2007), in their study of two community health insurance programmes in India, found that voluntary insurance halved the incidence of catastrophic expenditure. Furthermore, Ekman (2004) and Preker and Carrin (2004) noted that, since the poorest households had limited access to insurance due to their inability to pay for insurance premiums, the level of protection for the poorest

households was, in some cases, was less than that for the relatively better-off (Bennett, Kelley, and Silvers 2004).

- Since the premiums charged by VHI and CBHI programmes tend to be low, in most cases the resources generated may not be great and the programme needs to be supplemented by other sources of revenue including user fees, government subsidies, and donor assistance. This is further aggravated by the small size of the insurance pool, especially in case of CBHIs. The ILO STEP study found that, out of 85 programmes evaluated, 70% had less than 200 members (ILO and STEP 2002). Consequently, the sustainability of these programmes may sometimes be questionable. Some of the CBHI schemes reinsure the risk pool with larger private insurance programmes that have greater ability to cope with financial shocks.
- VHI and CBHI programmes tend to attract individuals with high expected costs of care. As a result of this moral hazard, insurance pools often tend to deplete very quickly (Hsiao 2001).
- Evidence suggests that the insurance operators very rarely negotiate the quality of care provided for the insured members. Hence, insurance programmes have not been observed to improve care when the quality is poor. This finding is further confirmed by the ILO and STEP study, which illustrate that only a minority of schemes (16 percent of the 62 cases for which information is available) negotiate the quality and costs of services with providers. Most simply purchase services at market prices (ILO and STEP 2002). Ekman (2004) found that there is weak or no evidence that schemes have an effect on the quality of care, or the efficiency with which care is produced.

With their strengths and limitations, voluntary insurance schemes have now been a highlight in health sector development for more than a decade. This study will explore the impact of the Vietnamese VHI programme on the average cost of care and its socioeconomic distribution after correcting for self-selection biases.

3.2 Self-selection biases in cost of care models

3.2.1 Introduction

Self-selection biases are recognised as important methodological concerns when modelling individual-level health care costs. These costs are only observed when an individual decides to seek health care, given his/her illness. If the care-seeking decision is correlated with the expected cost of care through unobserved factors, the endogeneity of care-seeking decision can introduce bias in the cost of care models. This kind of self-selection is termed 'care-seeking self-selection'. The other kind of self-selection that this thesis addresses relates to an individual's decision to seek insurance membership. Since the insurance decision can also be correlated with the expected cost of care through unobserved factors, the potential for bias cannot be ignored. This kind of self-selection is termed 'insurance-seeking self-selection' in this thesis.

The aim of this section of the literature review is to discuss how these two kinds of self-selection decisions can potentially bias regression estimates. This discussion will then turn to the models presented in chapter 4, which aim to correct for the two types of self-selection.

3.2.2 Care-seeking self-selection

Care-seeking self-selection bias is a form of sample selection bias that occurs when the outcome of interest is only observed for a sub-sample of the population that meets some criterion defined with respect to certain exogenous variable, and this selection criterion is related to the outcome of interest (Breen 1996; Bhat and Jain 2006). In the context of health care expenditure analysis, the cost of care (the outcome of interest) is only observed for individuals who decided to seek health care (the selection criterion). Therefore, while a larger proportion of the sample may be in need of health care, only a sub-sample is observed having incurred non-zero costs, leaving non-care-seekers with zero observed cost. If this decision to seek health care, i.e. the selection criterion, is randomly distributed in the population or if the decision to seek health care was unrelated to costs when health care was sought, then there would be no cause for concern. However, if the care-seeking decision is distributed such that it is associated with the expected cost of care, through factors not known to the analyst, then the parameter estimates from the cost model, based only on the observed cost, will be biased. In other words, if the unobserved factors affecting the care-seeking decision are correlated

with the unobserved factors determining the level of health care costs when care is sought, then the model estimates cannot be generalised to the entire population of sick individuals.

For example, risk averse behaviour may be an unobserved factor associated with the care-seeking decision and also with the expenditure incurred when care is sought. Risk averse individuals may be more likely to seek health care, but when care is sought their expenditure would be lower than the population expectation. Hence, estimating a model for expected expenditure based on only the observed sample of individuals who utilise health care may underestimate expected expenditure in the population. In another example, if there is a systematic tendency in the sample, such that the sicker individuals living in poverty tend to avoid seeking care because of the high levels of expected cost, then the parameter estimates from cost models will be biased downwards. They will not reflect the true relationship between the expected cost and the socioeconomic variable in the population. In summary, if there are systematic differences between those who self-selected, and those who did not, and such differences are systematically associated with unobserved factors that determine the outcome variable, then the expected value and population regression function cannot be directly estimated (Jones 2007).

To put this mathematically, let the cost of care model be expressed as:

$$Y_i = x_i\beta_y + \varepsilon_{yi} \qquad [3.2.1]$$

Here Y_i is the cost of seeking health care and x_i is a vector of exogenous variables. Y_i is only observed if an individual seeks care, i.e. Y_i depends on an exogenous variable z_i such that:

$$Y_i \begin{cases} > 0 \;\; if \; z_i = 1 \\ = 0 \;\; if \; z_i = 0 \end{cases} \qquad [3.2.2]$$

z_i represents the care-seeking decision which can be estimated as a probit model that uses the cumulative standardised normal distribution to model binary choice variable. A probit model for care-seeking decision can be expressed as [3.2.3]:

$$\Pr[z_i = 1] = \Phi(\omega_i\beta_z + \varepsilon_{zi}) \qquad [3.2.3]$$

Here ω is a vector of exogenous determinants of care-seeking decision and Φ is the cumulative normal density function. Equation [3.2.3] can be manipulated to show that an individual would seek care when

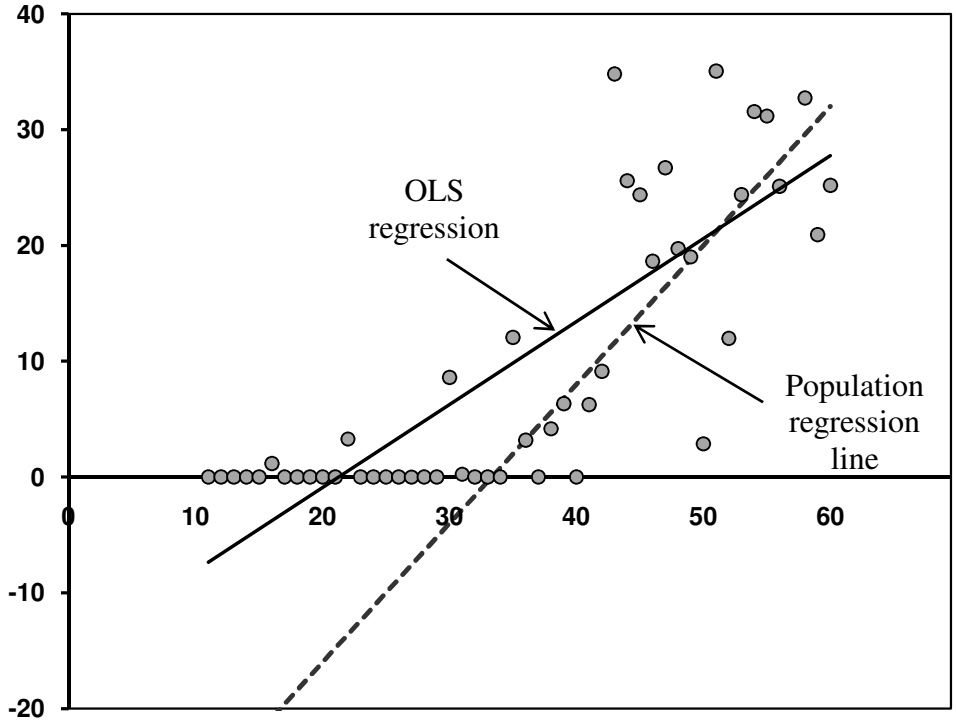
$$\varepsilon_{zi} \geq -\omega_i \beta_z \qquad [3.2.4]$$

If the expected value of the unobserved factors, represented by ε_i, is equal to zero, i.e. the unobserved factors are distributed randomly, then equation [3.2.1] is a good estimator of the population regression function. However, if the unobserved variables of the two processes in equations [3.2.1] and [3.2.3] are not independent of each other, then the expectation of ε_{yi} in equation [3.2.1], conditional on care-seeking, will not be equal to zero. This is because the expectation of ε_{yi} will also depend on the care-seeking process, as shown in equation [3.2.5]:

$$E(\varepsilon_y | x, z = 1) = E(\varepsilon_y | x, \varepsilon_z \geq -\omega\beta_z) \qquad [3.2.5]$$

This endogenous dependence of the error term violates one of the fundamental assumptions of least squares regression, which assumes that the error term in the model is randomly distributed, with an expectation of zero. As a result, the sample regression function will not be a good estimator of the population regression function. This is represented in figure 3.2.1, which shows that when the observed cost for non-care-seekers is zero, the OLS regression function is less steep than the population regression function. Hence, the care-seeking bias would result in an under-estimation of the regression coefficients.

Figure 3-2-1: The effect of care-seeking self-selection on regression estimates



Source: Sigelman and Zeng (1999)

Heckman (1976, 1979) explains that self-selection bias stems from the common problem of omitted variable bias. This is obvious from equation [3.2.6] below, which shows that the expected value of cost of care for the sample data now also on ω, which was omitted in equation [3.2.1].

$$E(Y \mid x, z = 1) = x\beta_y + E\left(\varepsilon_y \middle| \varepsilon_z \geq -\omega\beta_z\right) \qquad [3.2.6]$$

Self-selection bias was first studied by labour economists, who were interested in estimating a model for the potential wage function for a population. Data on wages is only observed for the individuals who self-selected to participate in the labour market, while those who did not participate had zero observed wages. Labour economists have explained that individuals only decide to participate in the labour market if their unobserved threshold of wage demand is met. In cases where the market offers lower wages than the reserved threshold, individuals stay unemployed, and in turn have zero observed wages (Gronau 1974; Heckman 1974; Winship and Mare 1992; Kyriazidou 1997). Heckman (1974) argued that, if one is aiming to model the wage function of the population, then the self-selection decision cannot be ignored. He showed that when modelling female labour supply or their market wages, the presence of

unaccounted self-selection bias will produce biased and inconsistent coefficients on OLS regression.

3.2.3 Insurance-seeking self-selection

Classical linear regression assumes that all the independent variables in the model are exogenous, i.e. they are determined outside of the model. In other words, correlation among the independent variables in the model, and also between the independent variables and the unobserved factors in the error term of the model should be zero. If this condition is violated, then the model suffers from endogeneity bias, and therefore the parameter estimates based on such a model will be biased.

Insurance status influences both the care-seeking decision and the cost for health care function of an individual. If part of this influence occurs through unobserved determinants of insurance-seeking decisions that also have a bearing on care-seeking and cost of care models, then insurance status is not an exogenous variable, because part of it is determined within the model (Gruber 2000).

Like the care-seeking self-selection decision [equation 3.2.3], the insurance-seeking decision can also be represented as a probit model with binary dependent variable:

$$\Pr[M_i = 1|v_m] = \Phi\,(v_{mi}\beta_m + \varepsilon_{mi}) \qquad [3.2.7]$$

Here M_i is the insurance status of an individual and $v_m^{'}$ represents a vector of exogenous variables. Endogeneity bias can arise in care-seeking models if there is a non-zero correlation between ε_{mi} for the insurance equation, and ε_{zi} for the care-seeking model. Similarly, it can arise in the cost of care equation if there is a correlation between ε_{mi} and ε_{ri}. In other words, as sample size increases, regression coefficient $\hat{\beta}$ does not converge in probability to the true value of population parameter β. The bias will be equal to $\rho\,{}^{\sigma_\varepsilon}/_{\sigma_m}$, where ρ is the correlation between the error terms of care-seeking and insurance-seeking models, or care-seeking and cost of care models, σ_ε is the variance of the error term of the outcome model, and σ_m is the variance of endogenous variables.

This bias is more likely to occur in the case of VHI programmes, that tend to attract sicker individuals, or individuals who expect to have high cost of health care. Regression models can control for the observed differences in health care needs, but many inherent risk-related characteristics of an individual are not observed, and therefore cannot be controlled for in the analysis.

Besides individual intrinsic factors, there may be environmental factors affecting self-selection decisions and the cost of health care. Consider an example where the probability of an individual purchasing health insurance is reduced, due to the large distance between his/her village and the nearest health facility where the insurance card is accepted. This distance may also reduce the probability of the individual seeking care when sick, and in turn the observed cost of health care, with or without insurance. If the distance variable is an unobserved factor in the study, then part of the calculated association between health insurance status and the cost of health care may not actually be due to insurance, but underlying unobserved factors. Similar consideration can be given to other unobserved characteristics related to an individual's personal preferences, which may affect the tendency to purchase insurance as well as health spending behaviour. However, the direction of this bias cannot be predicted without an empirical analysis of the insurance programme (Meer and Rosen 2003). Anticipation of a relatively high level of utilisation in the future may incline an individual to seek health insurance, which will lead to an upward bias in the estimated association between insurance and health care utilisation. On the other hand, insurers may introduce procedures that would cream off only the most profitable low-risk clients, and decline insurance to individuals with high expected utilisation (Sekhri and Savedoff 2005; Osei-Akoto 2003). In such scenarios, due to low levels of utilisation and expenditure among the insured compared to the wider population, the estimated impact of health insurance on the cost of health care may be biased downwards. In another example, Dor et al (2006) point out that if insurance is correlated with an unobserved trait, say 'awareness', then it may lead individuals to purchase insurance and also to seek health care, then the error terms would be positively correlated and the bias would be downwards. Similarly, if insurance is associated with an unobserved trait, say 'negligence', then the correlation would be negative and the bias upwards.

Hadley (2003) reviews the literature on the role of health insurance in improving access and utilisation of health care, and notes the scarcity of research that adjusts for insurance endogeneity bias. In recent years, however, there are more studies considering endogeneity

bias. Ekman (2007b) uses the national household survey data from Jordan to analyse the impact of health insurance on health care utilisation and expenditure. The author used a two-part model, with the first part modelling the probability of non-zero utilisation, and the second part modelling health care utilisation or expenditure conditional on positive utilisation. Ekman (2007b) found that the effect of health insurance on improving access to health care, and reducing health care expenditure, became more pronounced after correcting for endogeneity bias. Dor et al (2006) used data from a US national health and retirement study, and found a six-fold increase in insurance effect on health scores after adjusting for insurance endogeneity. Similarly, van Dalen (2006) uses Chinese health and nutrition to study the effect of health insurance membership on demand for health care. After correcting for endogeneity bias, using the instrumental variable method, they find that insurance does not seem to have a significant effect on health care utilisation and expenditure. This is partly attributed to high levels of out-of-pocket payments made by both the insured and uninsured. Finally, Waters (1999) uses data from the Ecuador Living Standards Measurement Survey 1995 to evaluate the impact of health insurance on health care utilisation. After correcting for insurance endogeneity bias, Waters found that the General Health Insurance programme in Ecuador has a strongly positive association with curative health care, but has no significant effect on the use of preventive care.

3.3 Outline of equity argument

3.3.1 Introduction

Health care payments in most developing countries are directly linked to the quantity of care received, regardless of the household's socioeconomic status. As a result, millions of poor households are left without much access to affordable health care (Lewis 2007, Falkingham 2004; Xu et al 2003; Whitehead 2001). Such disparities in the socioeconomic distribution of health care costs have been of serious concern among policy makers and researchers in recent years (Gwatkin et al 2004). Studies have found that the richer quintiles of population systematically contribute less as a percentage of their total disposable income or consumption expenditure towards health care (Glinskaya 2005; Fabricant et al 1999; Wagstaff et al 1999). Despite this, their contribution is high enough, in absolute monetary terms, to facilitate privileged access over the poor (Makinen et al 2000). These concerns over inequity have been addressed widely in the literature on both developed countries (Rubio, Smith and Doorslaer 2008; Rice and Smith 2001; van Doorslaer et al 1999; Wagstaff et al 1999; Larison et al 1995) and the developing countries (O'Donnell et al 2005; Schneider and Hanson 2006; Yu, Whynes and Sach 2008; Cisse´ et al 2007; Abu-Zaineh et al 2008; Gilson et al 2001; Markova 2007; Castano et al 2002; Hajizadeh and Connelly 2009).

The equity concerns raised in this thesis stem from two observations about health care financing:

a) A disproportionately high cost burden on poor households in relation to their ability to pay deters them from seeking health care, and in turn aggravates the unequal distribution of health across the socioeconomic gradient.

b) This cost burden can also have a disproportionately high impoverishing effect on poor households in terms of their consumption of essential goods and services.

These arguments form the basis of the case for developing health financing policies which decouple the relationship between the level of payment and the level of service use (to promote horizontal equity in delivery), and also to link health care payments to ability-to-pay (to promote vertical equity in financing) (Culyer and Wagstaff 1993; Wagstaff 2002b).

The primary objective of this section of the chapter is to briefly discuss the concept of equity from a pragmatic perspective for the current thesis. The remaining section is organised in the following manner, and will discuss as follows: sub-sections 3.3.2 and 3.3.3 will discuss practical definitions and principles of equity for the current study, sub-section 3.3.4 will discuss the choice of reference distribution for the current study; sub-section 3.3.5 will discuss the concepts of vertical and horizontal equity, and their relevance to health care financing.

3.3.2 A pragmatic approach to equity

Equity is an ethical concept grounded in the theory of distributive justice (Rawls 1985). It is different from individual preference, since 'the source of value for making judgments about equity lies outside, or is extrinsic to, preferences' (Culyer 1980, p.60). Hence, the principles of equity are derived from social value judgments about the claims that individuals ought to have (Wagstaff and van Doorslaer 2000), without having to rely on the discretionary benevolence of other members of the society or the state.

A theoretical debate around the conceptual foundations of equity is not the subject matter of the current review. Instead, discussion is built on a working definition of equity. Braveman and Gruskin (2003) define equity in health as 'the absence of systematic disparities in health (or in the major social determinants of health) between social groups who have different levels of underlying social advantage/disadvantage — that is, different positions in a social hierarchy'. Here 'health' can be interpreted broadly to encompass related concepts including access to and financing of health care.

Whitehead (1992) adds that any differences in health and health-related distributions should be considered inequitable if they are unnecessary, avoidable, unfair and unjust. Hence, a distribution of health care costs may be inequitable if it systematically disadvantages those already marginalised as a result of existing disparities (McIntyre et al 2006). These equity concerns may be reinforced by efficiency concerns about potential productivity losses among the poor, which may limit economic growth for the whole of society (Chima, Goodman and Mills 2003). The pursuit of equity also finds support in the constitution of the WHO (WHO 1946) and international human rights treaties.

3.3.3 A focus on distributive justice

Normative research is commonly concerned with the distributive and procedural justice of a health care system. In the current study, the interest lies with the former with respect to health care costs. One classic idea of egalitarianism is based on the principle of distribution in relation to merit or need. The Aristotelian principle of justice argues that individuals should be treated the same if they are the same in morally relevant respects, and that when individuals are different in morally relevant respects they should be treated differently (Meurer 1999). This argument has laid the foundation of the concepts of vertical and horizontal equity. When applied to the financing of health care, for instance, vertical equity might imply that rich individuals ought to pay more than poor individuals – usually argued to be in proportion to the ability to pay (Wagstaff, Doorslaer and Paci 1989).

3.3.4 Reference distribution for equity analysis

Health economists generally tend to evaluate the distribution of health-related variables against the socioeconomic gradient in the society. For the purpose of analysis, certain baseline inequalities are, for justifiable reasons, taken as given. For instance, when studying equity in health care utilisation, the existing differences in need for care, caused by underlying inequalities in health, are usually not the primary subject of analysis. Rather it is the inequity in the distribution of use in relation to the need for care, which is of concern. Similarly, when measuring inequity in the financing of health care, the baseline distribution of income, consumption expenditure or wealth is taken as given, and the subject of study is inequity in the relationship between socioeconomic distribution and health care costs.

Fleurbaey and Schokkaert (2009) argue that an exclusive focus on socioeconomic inequality can potentially overlook the inequalities associated with other, perhaps equally important factors, such as regional variations, that may limit access to health care. While this argument may carry weight in the context of health and health care utilisation, the context of socioeconomic distribution remains the most relevant baseline comparator when analysing health care financing. This is mainly because socioeconomic status forms the most important barrier to seeking health care (van Doorslaer and O'Donnell 2008).

3.3.5 Horizontal and vertical equity

In the context of health care, fairness and justice are usually measured based on two important concepts: horizontal and vertical equity. Horizontal equity refers to 'equal treatment of equals', while vertical equity refers to 'appropriately unequal treatment of unequals' (O'Donnell et al 2007a). Horizontal equity has primarily been studied in the context of health care utilisation, where the focus is on equal utilisation for equal need, irrespective of other characteristics such as socio-economic status (van Doorslaer et al 2000; Wagstaff and van Doorslaer 2000; Wagstaff, van Doorslaer, and Paci 1991). In a survey of health care decision makers, Mooney et al (1995) found that the majority of respondents supported this principle of equal access for equal need, and were not prepared to deviate from this principle by, for example, weighting health gains for the poor more highly than health gains for the rich, or vice versa. Vertical equity, on the other hand, has mainly been of concern in health care financing, where the usual argument is that payments should be in proportion to the ability to pay. Hence, individuals with unequal ability to pay should face appropriately unequal costs of health care (Wagstaff, van Doorslaer and Paci 1989; McIntyre and Gilson 2002).

Vertical equity is of special interest when health care is financed through out of pocket payments, and the care received is a direct function of the payment made. The principle of vertical equity would argue that, if individuals X and Y have different abilities to pay, such that X earns twice as much as Y, then X should pay twice as much as Y for health care, irrespective of the level of need and service use. Hence, based on this principle, a financing system would be regarded as unequal, on grounds of vertical equity, if payments are not in proportion to income (or wealth or consumption or other socio-economic variable measured in money terms).

This thesis proposes a new approach to defining vertical equity in financing that also incorporates the concept of vertical equity in utilisation. It argues that health care utilisation should be in proportion to the level of need while health care payments should be in proportion to the ability to pay. In other words, this thesis argues for differential use for differential need and differential payment for differential ability to pay. Hence, it is proposed that those in greater need should be able to receive greater health care, whilst being able to pay based on the ability to pay and not the quantity and quality of care received. This

approach controls for the unmet need for health care use, which is ignored in the traditional approach to vertical equity.

This thesis analyses vertical equity in health care financing in Vietnam, and evaluates the impact of the Vietnamese voluntary health insurance programme on equity. The next section will discuss the equity indices and the potential biases associated with standard methods of equity measurement.

3.4 Review of equity and progressivity indices

3.4.1 Introduction

Recent years have seen a significant increase in the number of health insurance programmes in developing countries. These programmes include both for-profit and not-for-profit schemes providing different levels of cover (Drechsler and Jütting 2005). When insurance programmes use price discrimination based on individual risk of ill-health, equity concerns are severely exacerbated (Jack 2002). Hence, not-for-profit health insurance programmes with premiums based on "community rating" – i.e. everyone in the community pays the same, irrespective of their health risk – have been seen as more equitable alternatives.

The aim of this section is to discuss the common methods employed to measure vertical equity in the distribution of health care financing, and to highlight their limitations. The concept of vertical equity in financing has been elaborated in sub-section 3.3.5. The remaining section is organised in two parts. Sub-section 3.4.2 will discuss the standard approaches used to measure equity and progressivity in financing. Then sub-section 3.4.3 will evaluate the methodological challenges that arise when these approaches are used in the case of out-of-pocket costs. In chapter 5, the thesis will propose improved methods that could be used to overcome the methodological limitations of the standard approach.

3.4.2 Standard approaches of measuring equity

Health financing policies are frequently evaluated against their equity goals (van Doorslaer and Koolman 2004; Yip and Eggleston 2004; Bundorf and Pauly et al 2006). This sub-section of the review will focus on two approaches commonly used to quantitatively measure vertical equity in financing:

i) Evaluation of the magnitude and direction of the interaction term between individual socioeconomic status and health insurance status while modelling health care costs.

ii) Evaluation of the distribution of health care costs against the socioeconomic variable, and measurement of the degree of departure from proportionality using concentration and Kakwani indices.

Both of these approaches are discussed separately below.

3.4.2.1 The first approach: evaluation of the interaction term in the cost of care regression model

An interaction term between insurance and socioeconomic status of an individual is commonly employed in regression models to analyse the equity impact of insurance membership on health care costs (Ekman 2007b; Sepehri, Sarma and Simpson 2006; Jowett, Contoyannis and Vinh 2003) and health service utilisation (Yip and Berman 2001; Waters 2000). Interaction terms are useful when the effect of an independent variable (x_1) on the dependent variable (y) is moderated through another independent variable (x_2), whose magnitude dictates the level of effect of x_1 on y (Jaccard and Turrisi 2003). In the case of health insurance, we test the hypothesis that the relationship between socioeconomic status and the cost of care depends on the insurance status of the individual. The coefficient on the interaction term suggests the direction and magnitude of the influence of insurance membership, if any, on this relationship.

Statistically speaking, the coefficient on the interaction term represents the difference between the insured and the uninsured, in the slope of the regression line representing the relationship between the cost of care and socioeconomic status. In other words, the coefficient is equal to the amount by which the slope of the average relationship between cost of care and socioeconomic status is expected to change when insurance status changes from insured to uninsured. The coefficient is calculated by taking the second order partial derivative of the expected value of cost of care (y) with respect to the socioeconomic variable (x_1), and then dividing it by the change in insurance status (x_2) (see equation 3.4.1).

$$\beta_{int} = \frac{\Delta \frac{\partial E[y|x_n]}{\partial x_1}}{\Delta x_2} \qquad [3.4.1]$$

The coefficient on this interaction term provides an estimate of the equity impact of the health insurance programme on the predicted cost of care. Suppose that the insurance variable is coded 1 if an individual purchased health insurance and 0 otherwise. Here, a negative coefficient on the interaction term in the cost of care model would suggest that the average change in the expected cost of care for a unit increase in the socioeconomic variable, keeping all else constant, is greater for the uninsured group compared to the insured. This would manifest itself graphically as a steeper cost of care curve for the uninsured. The equity interpretation of a negative coefficient is that insurance reduces the cost of care significantly for the lower socioeconomic groups than for the higher socioeconomic group (Jowett, Contoyannis and Vinh 2003). In other words, insurance has a greater protective effect on the poor. On the other hand, if the coefficient was positive, the average relationship between the cost of care variable and socioeconomic status would favour the richer quintiles.

When cost of care and socioeconomic variables are both log-transformed in the model due to their skewed distributions, the coefficient on the interaction term represents the difference in elasticities (Wooldridge 2003). In other words, the coefficient estimates the difference between insured and uninsured groups, in the percentage change in the expected cost of care associated with a one percentage point change in the socioeconomic variable.

The advantage of using a regression-based interaction analysis is that it controls for the differences in observed need and non-need variables, whilst estimating the relationship between insurance and cost of care. This can be crucial when there is reason to suspect that the insurance purchase decision was not random, and that observed differences in individual characteristics may have made some individuals more likely to enrol in the programme. However, as discussed earlier, an ordinary least squares model will not correct for the differences in the unobserved determinants of self-selection, leading to biased estimates of the interaction coefficient. Nevertheless, corrective models can be employed which will be discussed in chapter 5.

The other challenge in using the interaction term approach is that it only estimates the average effect of the interaction between insurance membership and socioeconomic status, and tells us nothing about the distribution of health care costs across socioeconomic groups. It is in this context that the equity and progressivity indices become valuable.

3.4.2.2 Second approach: measuring equity and progressivity of financing

While the first approach to equity analysis evaluates the impact of insurance membership on the expected cost of care, the second and more common approach focuses on the distribution of health care costs in relation to a socioeconomic variable. This approach measures equity in financing based on concentration and Kakwani indices. These indices and the approach are discussed below.

3.4.2.2.1 Measuring inequality in cost of care distribution using concentration index

A concentration curve is the generalised form of the well known Lorenz curve. Technically speaking, the concentration curve is a monotonically increasing cumulative density function showing distribution of the variable of interest sorted by socioeconomic status (Roy, Chakravarty and Laha 1959, Mahalanobis 1960, Wagstaff, van Doorslaer and Paci 1991, Kakwani, Wagstaff and van Doorslaer 1997, Cowell 1995). This distribution is subsequently compared with a uniform distribution that represents equality. In the current study, we evaluate the cumulative proportion of cost of health care plotted against the cumulative proportion of population ranked by consumption expenditure. A concentration index (CI), in turn, measures the departure of the concentration curve from an egalitarian distribution, and is therefore used as a summary measure of socioeconomic inequality in the distribution of health care costs.

Following the notation from O'Donnell et al (2007a), a concentration index (CI) can be represented as twice the area between the concentration curve and the line of equality:

$$CI = 1 - 2\int_0^1 L_h(p)dp \qquad [3.4.2]$$

where $L_h(p)$ is the cumulative function of cost of health care sorted by socioeconomic status.

The concentration index is best applied to cardinal variables with non-negative values; hence cost of health care is an appropriate candidate. Since CI is invariant to multiplication or division by a constant scalar (Kakwani 1980), choice of the type of currency or its denomination, or a uniform change in the time period of cost incurrence that does not alter the proportional relationship between individuals in terms of relative cost incurrence, the

value of concentration index will not change. Also, if the choice of the socioeconomic variable changes from consumption expenditure to total income or wealth, and such change does not alter the rank order of individuals, then the concentration index will remain unchanged.

The value of any CI varies between -1 and +1, with a negative sign suggesting a higher concentration of the cost of health care among the poor [pro-rich], and a positive sign suggests a higher concentration among the rich [pro-poor]. A negative [positive] index can occur in two instances:

1. If the concentration curve always lies above [below] the 45 degrees line, or

2. If the concentration curve crosses the 45 degree line and the area above [below] the 45 degree line is greater than the area below [above].

Similarly, the index would take a value of zero if it lies everywhere on top of the egalitarian line, or if it crosses the line of equality, and the areas above and below the line are equal (Wagstaff 2002a). This can be potentially misleading, and therefore the index should always be studied in conjunction with the concentration curve.

In summary, the sign of index suggests direction of the relationship between cost of health care and the socioeconomic variable, and the magnitude of the index suggests the strength of this relationship (O'Donnell et al 2007a).

3.4.2.2.2 Progressivity in financing and the Kakwani index

Although the concentration index is a useful indicator to measure the degree of socioeconomic inequality in the cost of health care, it does not enable one to say much about progressivity or regressivity of a financing system, defined in relation to the baseline distribution of socioeconomic status. Castano et al (2002) add that a pro-poor pattern of concentration curve may be a delightful finding for an analyst. However if the Lorenz curve for the socioeconomic variable exhibits a pro-rich distribution that outdoes the pro-poor pattern of cost of care, then the true regressive nature of the system will only be revealed when the two distributions are graphically compared.

The standard approach used to measure progressivity in health financing involves calculating the Kakwani Index of progressivity (KI). KI compares the concentration index for the cost of care variable with the Gini index, which represents inequality in socioeconomic variables (Kakwani 1977). The Gini index is defined as the area between cumulative distribution of the socioeconomic variable, represented by the Lorenz curve, and the line of equality. Podder (1995) explains that, conceptually, the KI is a measure of elasticity that quantifies proportional change in the cost of care variable in relation to change in socioeconomic status.

Mathematically, the Kakwani index is twice the area between the concentration curve for the cost of care and the Lorenz curve for the socioeconomic variable (equation 3.4.3).

$$\pi_k = 2\int_0^1 \left[L_y(p) - L_h(p)\right]dp \qquad [3.4.3]$$

Here π_k is the Kakwani index, $L_y(p)$ represents the Gini index (G) based on the Lorenz curve, and $L_h(p)$ is the concentration index (CI) based on the concentration curve. Equation 3.4.3 can be simplified as:

$$\pi_k = CI_h - G_y \qquad [3.4.4]$$

If the cost of care is progressive [regressive], the concentration curve will lie below [above] the Lorenz curve, and KI will be positive [negative] (Wagstaff and Doorslaer 2000). The value of the KI ranges from +1 to -2, where +1 represents a scenario when the pre-payment socioeconomic variable is distributed equally among all members of society, but cost of care is borne only by one individual. -2 signifies the other extreme, whereby all of the pre-payment socioeconomic variable is concentrated in the hands of the richest individual, but the entire cost of care is borne by the poorest individual.

In reality, the value of the KI lies between these two extremes. The Kakwani index will be zero if cost of care is perfectly correlated with socioeconomic status, and the two curves lie on top of each other, representing proportionality of financing, or in another case when the concentration curve crosses the Lorenz curve, and the areas above and below the point of crossing cancel out. This makes it important for the KI to be evaluated alongside the graphical representations of the concentration and Lorenz curves (Wagstaff et al 1989).

3.4.3 Methodological challenges in the use of standard approaches

When standard approaches of measuring equity in financing are applied to the case of out of pocket cost of care, the analysis can produce misleading and biased estimates. This is primarily because the standard approaches ignore the benefit side of health care financing, and also do not control for potential care-seeking and insurance-seeking self-selection biases. Below we discuss these methodological issues in terms of how they can potentially bias the equity analysis.

3.4.3.1 Potential bias in equity analysis due to unmet need

In a predominantly out-of-pocket (OOP) system of health financing, health care is bought directly in return for the payment made. Therefore, when an individual cannot afford to pay much and the amount of care received is therefore small, the level of unmet need for health care may be high. Need is generally defined using the Culyer and Wagstaff (1993) definition as the amount of resources (expenditure) required to exhaust capacity to benefit. In case of the current study, since care is received directly in return for OOP payment, need is defined as the OOP payment required to exhaust capacity to benefit.

The traditional concentration index approach to equity in financing focuses on the distribution of observed health care costs, and does not take account of the level of care received in return for the payment. This approach may be reasonable in high income countries with universal health care systems, where the receipt of care is, to a large extent, decoupled from the ability and willingness to pay. However, when the amount of care received is closely tied to the actual payment for health care and often grossly out of proportion to the level of need, as in most developing countries with predominantly OOP health care financing, the standard approach will produce only a biased assessment of equity. In a similar vein, O'Donnell et al (2007a) point out that an analysis of the welfare-reducing effect of observed health care costs that ignores the welfare-increasing effect of health care consumption (tied with health care costs), can potentially lead to misleading results. This argument applies to most of the developing countries where financing is not independent of utilisation, and the quantity of care received is a direct function of the ability to pay.

To demonstrate the above-mentioned bias in distributional analysis, consider an example of two individuals, X and Y, who have the same level of need for health care which requires

them to spend £100 each to exhaust their respective capacities to benefit. They both desire access to full treatment but have different abilities to pay: the disposable income of X is £1000 and the disposable income of Y is only £500. Consequently, rich individual X purchases the entire treatment that costs him £100 – i.e. 10% of his income - whereas poor individual Y can only afford partial treatment that costs £20 – i.e. 4% of his income. Individual Y will effectively have an unmet need for health care consumption equal to £80. Here we assume that cost of care reflects the use value of care, and that £20 buys only one-fifth of the care bought by £100 in terms of value.

When the above example is analysed using the traditional distributional analysis based on concentration and Kakwani indices, the results would suggest a pro-poor distribution of the cost of care, since poor individual Y contributes a smaller proportion of the income compared to the rich. In turn, he is implicitly assumed to make a smaller welfare sacrifice than X. The analysis, however, fails to account for the unmet need of individual Y, which results in a smaller treatment-related welfare gain compared to individual X. The traditional approach becomes even more questionable when Y has a higher need for health care than the rich individual, which is typically the case, resulting in an even greater unmet need for the poor.

The equity approach proposed in this thesis standardises for individual differences in the level of need, in turn controlling for the unmet need for health care. The need standardised variable represents the cost of seeking health care when all individuals had the average level of need. The socioeconomic distribution of health care costs (i.e. the concentration curve) is thus determined by the differences in non-need variables and their influence on the predicted cost of care.

The equity principle argued in this thesis is that individuals should pay for health care according to their ability to pay, whilst being able to exhaust their capacity to benefit from health care (which has been standardised in this thesis).

3.4.3.2 Potential bias due to care-seeking self-selection

As discussed earlier, the traditional equity analysis is based on evaluating the socioeconomic-related distribution of the observed health care costs for the insured and uninsured groups. However, cost of care is only observed (and used in the traditional equity analysis) if an

individual seeks health care. If the unobserved determinants of the care-seeking decision are correlated with the socioeconomic status and/or the insurance status of an individual, then the actual cost of care will be systematically more likely to be observed for certain socioeconomic and/or insurance groups. As a result, an equity analysis of the socioeconomic-related distribution of the observed cost of care and the effect of insurance on this distribution cannot be generalised to the whole population.

To illustrate the case, consider an example of a small community of one hundred individuals, one half of whom sought insurance membership while the other half did not. It is likely that the poorer individuals in the community may be systematically less likely to seek care when ill because of their poor ability to pay (and/or low expectations and poor information). Hence, the cost of care may be systematically more likely to be observed for those in richer socioeconomic groups. However, for those with insurance membership, the price of health care at the point of delivery will be reduced; this in turn will influence the likelihood of care-seeking. Therefore, it is likely that a higher proportion of the insured poor may decide to seek care compared to the uninsured poor, and in turn have non-zero costs. This potential correlation between insurance/socioeconomic status and the care-seeking decision can influence the cost distribution across the socioeconomic gradient.

The care-seeking self-selection bias is, in principle, similar to the bias attributable to the unmet need for health care (identified in sub-section 3.4.3.1). For the current analysis, the primary difference between the two potential biases lies in the methodological treatment proposed to correct for the biases. To account for the bias attributable to unmet need for care, the proposed need standardisation is applied to the data for which the cost of care is observed. However, to account for the care-seeking self-selection bias, we first account for the potential correlation between the care-seeking decision and the cost of care model, and only after that apply the corrective measures of need standardisation.

If care-seeking bias is not taken into account, as is the case with the traditional approach to equity analysis, the equity results will not be generalisable to the whole sample of sick individuals, but will be limited to those who sought health care. The corrective models will be discussed in detail in chapter 5.

3.4.3.3 Potential bias due to endogeneity of insurance decision

Earlier in the literature review, it was argued that the insurance decision can have a potential endogeneity effect on the expected cost of care. Here we add that, since the insurance decision is likely to be associated with the ability to pay, the endogeneity effect may not be equally distributed across all socioeconomic quintiles.

Consider an example of a community to whom health insurance is offered. Further suppose that the insurance programme is designed in a way that the cost reduction benefit of insurance is greater for the services available at tertiary care facilities, which tend to be more accessible to those with higher socioeconomic status. In such case, there will be a differential effect of insurance membership across the socioeconomic gradient and the insurance benefit will be more pronounced for those with higher income. This, in turn, will influence the equity analysis that evaluates socioeconomic-related distribution of health care expenditures. The underlying cause of this endogeneity bias is attributable to the correlation between the unobserved determinants of insurance decision and socioeconomic status.

In chapter 5, we propose methods to standardise need differences, and also simultaneously control for care-seeking and insurance-seeking self-selection biases. These methods will be applied to the case of the voluntary insurance programme of Vietnam.

3.5 Review of catastrophic cost of care analysis

3.5.1 Introduction

Protection from catastrophic health care costs is widely considered to be a policy objective for health financing systems (WHO 2000; Filmer, Hammer and Pritchet 2002). Since most developing countries rely heavily on out of pocket financing, a pay as you go principle leads to payments rising in proportion to service use. Consequently, households without any form of prepayment risk-cover often end up depleting their resource pools when the need for health care is high. This leaves very little for subsistence. If the incurred cost of health care is considered high in proportion to ability to pay, the resulting financial shock is termed 'catastrophic'. One common ethical position on catastrophic cost of care is that no one should have to spend more than a pre-specified fraction of their income, wealth, consumption or other monetary socioeconomic variable (Wagtsaff and van Doorslaer 2003). Xu et al (2003) found that catastrophic consequences are more common among households whose heads are elderly, disabled or unemployed.

Catastrophic health care payments should not be treated the same as large health care costs defined in absolute monetary terms. A large surgery bill, for instance, may not be financially catastrophic for households with large pool of resources, whereas a regular episode of malaria can be financially devastating if a household does not have any reserves (Xu et al 2003). Catastrophic costs are therefore characterised in relation to the socioeconomic status of the household.

3.5.2 Perspectives on the definition of a catastrophic event

Wyszewianski (1986) defined catastrophic costs in terms of their effect on long-term spending and living standards. He argued that health care costs should be considered catastrophic if they lead to a reduction in basic subsistence spending, an increase in borrowing, a depletion of essential savings or the sale of essential assets over a period of time. Such a long-term impact has often been estimated in the literature when the researchers have access to panel data across several years (Lindelow and Wagstaff 2005; Wagstaff 2007; DeWeerdt and Dercon 2006; Gertler and Gruber 2002). When only cross-sectional data is available, it is not possible to model the degree of consumption smoothing over financial shocks. Hence the common approach is to estimate the welfare impact of health care costs on

the current level of consumption (Wagstaff and van Doorslaer 2003, O'Donnell et al 2007b, Russell 1996).

The catastrophic cost fraction can be represented as:

$$C_i = \frac{H_i}{S_i} \qquad [3.5.1]$$

Here C_i is the catastrophic cost fraction, H_i represents the health care costs and S_i is the socioeconomic status variable. The underlying principle argues that the higher the fraction of health care costs, the greater will be the compromise made on the non-health care expenditure to cope with the shock. This will result in a cut back on essential spending, and subsequently on basic survival necessities.

The level of reference threshold is based on what the researchers think is the appropriate cut-off fraction, beyond which health care costs will seriously disrupt the consumption of other goods. Some authors have used a threshold of 10% of the budget share beyond which costs are labelled catastrophic (Devadasan 2007; Wagstaff and van Doorslaer 2003; Russell 1996), while others have used a range of values between 5% and 30% (Somkotra and Lagrada 2008; van Doorslaer and O'Donnell 2007; Wyszewianski 1986; Berki 1986; Ranson 2002; Waters et al 2004). Some WHO studies suggest a higher threshold of 40% of the socioeconomic variable (Murray and Evans 2003; Xu et al 2003); this has been supported by few other studies (Sun et al 2009). To avoid making any subjective value judgment about the threshold value, researchers usually report the catastrophic incidence at multiple threshold levels, and leave it to the reader to reach his/her own conclusions. We have followed this strategy in the current study, and have used values between 10% and 40% with intervals of 10%.

3.5.3 The choice of denominator for catastrophic analysis

The incidence of financial catastrophe depends on both the incurred health care costs (the numerator) and the choice of socioeconomic variable (the denominator). Researchers have commonly used either total consumption expenditure or income as the relevant denominator. The life cycle income hypothesis suggests that individuals tend to smooth their consumption over their life cycle, in order to ensure a desirable level of consumption across all life periods (Ando and Modigliani 1957). Hence, the current level of consumption is a good indicator of

the long-term socioeconomic status of an individual. Xu et al (2003) suggest that consumption smoothing can be reflected by the following equation:

$$C_o = \left[\frac{Y_o + A_o + \sum_{t=1}^{L} Y_t P_t \delta^t}{1 + \sum_{t=1}^{L} P_t \delta^t}\right] \qquad [3.5.2]$$

Here C_o is consumption at time t = 0, Y_o and Y_t are incomes at time t = 0 and t > 0 respectively, A_o is the annualised value of savings and debts at time t = 0, δ is [1/(1+r)] (r being the market interest rate), and P_t is the probability of being alive in the subsequent future year. This equation suggests that, when a household has access to savings and borrowings, the current level of consumption is a function of current income, current holding of assets, the probability of living and earning in future successive years, and the market discount rate. Hence the current consumption level captures the interactive dynamics of the socioeconomic context of an individual.

One argument against the use of consumption expenditure as the appropriate denominator is due to its direct relationship with health care costs, i.e. the numerator (health care cost) is also part of the denominator (total consumption expenditure). However, the other alternative, i.e. the cost-income ratio, is regarded to be insensitive to the source of health financing (O'Donnell et al 2005). Households may use means other than income (savings, borrowings or assets) to finance health care, but this will not be reflected in the denominator. More importantly, it will not be obvious whether health care costs have displaced non-health care consumption, because consumption is not captured in the equation.

When using consumption expenditure as the relevant denominator, it is common practice to evaluate catastrophic incidence with reference to total and non-subsistence consumption expenditure separately. Subsistence is usually defined in terms of the absolute minimum considered essential for survival. Since food is generally agreed to be the basic survival necessity, researchers commonly use non-food consumption expenditure as a proxy indicator of the non-subsistence socioeconomic variable (van Doorslaer and O'Donnell 2007).

3.5.4 Incidence of catastrophic costs in developing countries and the potential role of insurance

Financial catastrophe is a common consequence of health care use in developing countries. Naga and Lamiraud (2008) proposed that the performance of an insurance programme should be measured against the catastrophic incidence rate among the insured. When insurance cover is insufficient, either because the proportion of the population insured is low, or because of the lack of generosity of insurance benefits, the overall level of protection would be highly compromised (Scheil-Adlung et al 2006).

Most of the studies in the past decade have found a positive role for insurance in offering protection against financial catastrophe. A comparative analysis of health care payments in 11 Asian countries found that health systems relying heavily on out-of-pocket payments, and not offering a widely accessible insurance programme, are most likely to have a high rate of financial catastrophe (van Doorslaer and O'Donnell 2007). Among the Asian countries, Vietnam, India and Nepal were notable for out of pocket financing of at least three-quarters of total health care costs.

Devadasan et al (2007) investigated the impact of voluntary health insurance on catastrophic incidence among hospitalised patients. Based on their analysis of two voluntary health insurance programmes in India, ACCORD and SEWA, they found that insurance membership halved the incidence of financial catastrophe. In a similar study, Sun et al (2009) evaluated the impact of China's New Cooperative Medical Scheme on the probability of catastrophic events before and after insurance reimbursement, and found that programme membership reduced the catastrophic intensity by 18.7%. Similarly, Knaul et al (2006) found that the catastrophic incidence was significantly reduced in parts of Mexico when insurance cover was extended.

In a study of the impact of user fee elimination in Uganda, Xu et al (2006) found that the catastrophic incidence rate was closely related to the cost of therapeutic drugs. They found that the catastrophic incidence did not fall after fee abolition, primarily because of the unavailability of essential drugs at public facilities. This led to financial catastrophe, because the cost of private medication was high. Similar phenomena can be seen when the insurance benefits fall short of protecting against drug costs.

3.5.5 Potential biases in catastrophic event analysis and relevance of the current thesis

Analysis of catastrophic incidence may suffer from the self-selection biases discussed in earlier sections. These potential biases may under or over-estimate the impact of insurance on catastrophic event rate. In a recent paper, Galárraga et al (2008) evaluated the impact of insurance membership on catastrophic health care costs in Mexico and found that insurance endogeneity had resulted in an under-estimation of the protective effect of the Seguro Popular insurance scheme. In another study, Wagstaff and Lindelow (2008) found that, after correcting for potential insurance endogeneity using instrumental variables, insurance membership increased the likelihood of catastrophic events in China. They proposed that the increased risk could be attributed to the higher probability of care-seeking associated with insurance membership; their analysis did not correct for care-seeking self-selection bias.

Hence, in the literature on catastrophic incidence analysis, only a handful of studies have endeavoured to account for insurance-seeking self-selection bias, and, to the best of my knowledge, none of these studies have accounted for care-seeking self-selection. Also, the evaluation and simultaneous correction of the two biases has not been attempted. In this regard, the current thesis will make a significant contribution to the literature.

Chapter 4

Measuring the impact of the Vietnamese Voluntary Health Insurance programme on the cost of health care

4.1 Introduction

The aim of this chapter is to measure the direct impact of the Vietnamese Voluntary Health Insurance (VHI) programme on the cost of health care of sick individuals, after correcting for care-seeking and insurance-seeking self-selection biases. The specific research objectives are to:

i) Model the cost of care after controlling for individual level need and non-need variables inclusive of insurance membership;

Test and correct for the presence of care-seeking and insurance-seeking self-selection biases in the cost of care model, in order to estimate the unbiased relationship between VHI insurance membership and the cost of care. The cost of care models proposed in the current study aim to estimate the direct effect of health insurance on health care costs. However, the relationship between insurance and health care costs is complex. While insurance membership has a direct effect on the price of care at the point of delivery, it can also have elastic demand and supply effect which can actually increase the overall expenditure on health care by potentially increasing the frequency of treatment episodes, extent of diagnosis and investigations, quality and quantity of care received and the intensity of treatment. Furthermore, insurance membership can also impact on the likelihood of hospital inpatient admission and drug prescription patterns. Hence, insurance can have both direct and indirect effect on cost of care. However, in case of Vietnam, the precise magnitude of insurance coverage is uncertain, given the varying implementation of the VHI programmes. Hence, the models proposed in this thesis estimate only the direct effect of insurance on health care costs.

It should be mentioned at the outset that this study is based on a secondary analysis of cross-sectional data collected in Vietnam during 1999 and initially analysed by Jowett et al (2003). The current study aims to correct for the potential biases present in the earlier analysis.

The remaining chapter is organised in the following sections. Section 4.2 will discuss the survey methodology used for data collection in the current study. This will be followed by section 4.3 discussing the econometric models used for correcting self-selection bias. The following two sections, 4.4 and 4.5, will discuss the results of descriptive data analysis, and

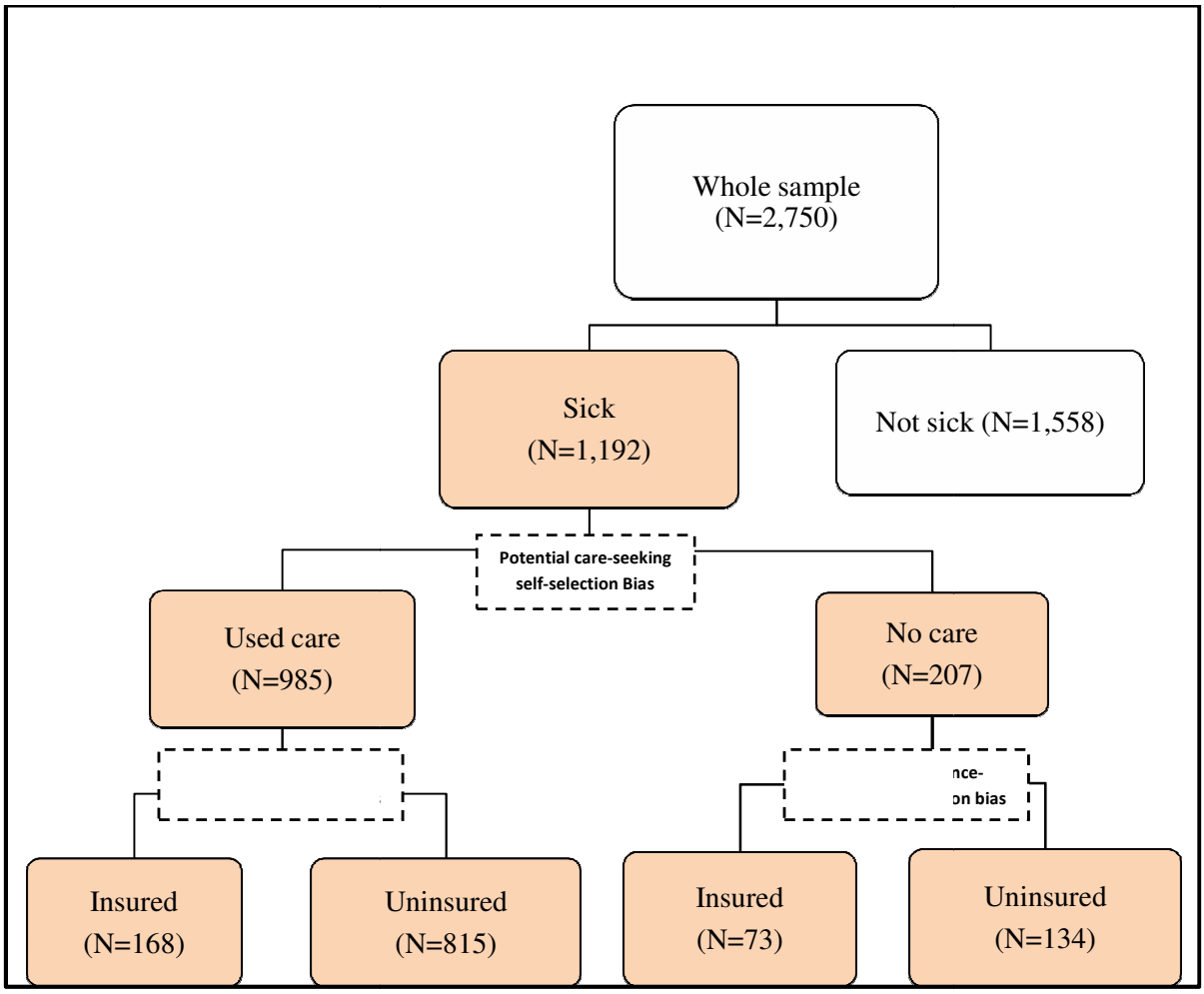
will be followed by results from the econometric analysis. Finally, section 4.5 will conclude the chapter with a discussion on the findings of this analysis.

4.2 Survey methodology and data

Data was collected through one-to-one questionnaire-based interviews, conducted by a team of trained interviewers. All the provinces with an active voluntary health insurance programme were eligible for sampling; however, the survey was conducted across three provinces with reasonably high membership rates, whilst taking account of the geographical variation between provinces. Samples were drawn from Hai Phong (population: 1.7 million; one third of which is urban) and Ninh Binh (population: 1 million; one quarter of which is urban) in the north-east and Dong Thap (population: 1 million; one-quarter of which is urban) in the south-west. Hai Phong was the primary centre for the insurance pilot in 1989, and hence had the most developed insurance programme in the country at the time of the survey. Within each province, one urban and two rural districts were randomly selected, followed by random selection of three communes (referred to as wards in urban areas) within each district. As a result, interviews took place in 27 communes, in nine districts of three provinces. Within each commune, members of voluntary health insurance programmes were randomly selected from lists supplied by Provincial Health Insurance offices. Uninsured individuals were randomly selected from lists of residents provided by the local People's Commune Committee of each commune (Jowett et al 2003). Since the focus of the survey was on the voluntary health insurance programme, members of compulsory or humanitarian-based health insurance programmes were excluded from the study. A total of 1,650 adults and 1,101 children were interviewed, of which 19% were residents of Ninh Binh, 40% of Hai Phong and 41% of Dong Thap.

Figure 4-1 presents a summary of the sample based on sickness, care-seeking decision and insurance status. It also identifies the potential self-selection biases at different levels.

Figure 4-1: Flow chart of potential biases attributable to health care-seeking and insurance-seeking behaviour



* Data missing on care-seeking decision

Since the proportion of insured individuals in the population was small, the survey design oversampled the insured members by increasing their sampling frequency, so as to have enough representation in the dataset to be able to estimate the effect of insurance. To account for oversampling, the analyses were carried out using sampling weights based on the frequency of sampling. These weights were based on insurance status and residence, and were provided with the dataset by the researcher who designed the survey. For the current analysis, both analytical and probability weights were used, where appropriate, using Stata's inbuilt functions – aweight and pweight.

The survey collected data on personal characteristics (age, gender, residence, schooling, occupation and health insurance status), socioeconomic variables, hospital inpatient admission (yes/no), health care financing and health status variables (self-assessed health and the

number of illnesses in the last three months). The socioeconomic status of the respondent was recorded using annual household consumption expenditure in the 12 months preceding the survey. Using 'Permanent Income Theory', attributed to Friedman (1957), it is argued that households smooth their consumption by accumulating or de-cumulating physical buffer stocks that may include farm animals, grains or jewellery. Hence, consumption expenditure is a better estimate of socioeconomic status than income (Conning and Udry 2005). Consumption expenditure data was adjusted for heterogeneity in household size by using the following equivalence scale proposed by Aronson et al (1994):

$$e_h = (A_h + \emptyset K_h)^{\theta} \qquad [4.1]$$

where e_h is the equivalence factor for household h, A_h is the number of adults and K_h is the number of children in the household h. Based on Wagstaff et al (1999), the two unknown parameters $\emptyset$ and θ were set equal to 0.5.

Data on illness, health care utilisation and costs were collected at an individual level for the three months prior to interview. From a total sample of 2,751 interviewees, less than half had fallen ill in the three months prior to this (figure 4-1). This sub-sample is the group of interest for the current analysis. Of these 1,192 individuals who reported illness, 985 individuals sought health care, and provided details of the total cost incurred during the last three months.

Respondents were asked to recall direct health care costs (i.e. user fees for consultations, diagnostic tests and medicines), indirect costs (food and hospital stay, travel and other costs) and any unofficial payments (i.e. gifts to health care providers). Insured individuals were also asked about the payment they made in the form of the insurance premium. However, there were substantial non-responses to this question, possibly because many individuals purchased their policy several months before the survey. Given the difficulty in accurately establishing the premium paid, the amount was not included in estimations of health costs for the insured. Whilst a downward bias in estimates may be expected, the underestimation is unlikely to be substantial, given the low level of premiums relative to average health costs amongst insured patients (Jowett et al 2003).

4.3 Methodology

This thesis models cost of care for the individuals who reported being ill in the three months prior to the survey. The decision to focus on the sick population was made for the following reasons: a) health care expenditure data for the non-sick sub-sample had large number of missing values: 976/1558 (62.6%); b) in order to model health care costs for both sick and non-sick, we would require a complicated three-part model that can simultaneously model probability of illness, probability of self-selection decisions (care-seeking and insurance-seeking) and the cost of health care. Because of the complexity of a three-part model, a methodological choice was made to focus on the sick sub-sample; and finally, c) since the insured often tend to be sicker, the impact of insurance, as measured in the sick population, is likely to be a conservative estimate.

In order for the results of insurance to be generalisable to the population, the analysis makes the following assumptions: (i) insurance status does not alter the threshold for reporting sickness, i.e. insured and uninsured would report sickness at the same level, given the level of other attributes; (ii) had the non-sick become sick, the care seeking decision of the insured non-sick and the uninsured non-sick would be the same as the insured sick and uninsured sick, respectively; and finally, (iii) the effects of insurance on health care costs would be the same for the non-sick, had the non-sick become sick. Later, Table 4-1 shows that only a slightly higher proportion of the sick were insured compared to the non-sick (20.25% compared to 19.35%; t-statistic of difference: -0.58) which supports the assumption that insurance does not alter the probability of reporting sickness, although this is not a formal test.

This study uses five different econometric models to estimate the impact of the Vietnamese VHI on the cost of care, with or without correcting for care-seeking and insurance-seeking self-selection biases. The first model is based on ordinary least squares estimation that does not allow for self-selection biases. The second model is a two-part model that separately estimates the probability of incurring any health care costs and the amount of health costs incurred when care is sought. This model assumes independence of the two processes, and hence does not allow for self-selection bias. Models 3 to 5 evaluate and correct for either care-seeking or insurance-seeking, self-selection or both. Parameter estimates from these models are subsequently compared, and the effect of bias correction is evaluated. Since 'cost of care' and 'household consumption expenditure' variables have skewed distributions, these variables

have been log-transformed before being used in the models. Each of the five models is discussed in detail below.

4.3.1 Model 1: Ordinary Least Squares (OLS) model for cost of care

All models take as their dependent variable the log of the observed cost of health care for those individuals who reported any illness during the three months prior to the survey. Individuals who did not seek health care, despite their illness, were observed to have zero cost. Since the log of zero is undefined, a positive constant (+1) was added to the observed cost of all observations to ensure that the logged cost variable is a non-negative number. The independent variables used in cost models were selected based on: a) theoretical relevance of variables to cost of care; b) explained variance in the model; and c) the variables used in previous models reported in the literature, including the previous analysis of the thesis dataset [Jowett et al (2003)].

The naïve OLS Model 1 for cost of care can be represented as:

$$E[y] = x_o\beta_o \qquad [4.2]$$

Here y is the log of health care cost, and β_o represents the association between independent variables and health care cost. The marginal effect is equal to $[\partial E(y|x_o)/\partial x_o]$ for continuous variables and $\Delta E(y|x_o)$ for binary variables (Cameron and Trivedi 2009 p. 102).

The OLS model assumes that the observed health care expenditures (both zero and non-zero) are actual health care costs. Hence, the OLS approach does not (and need not) model the care-seeking decision hurdle separately before health care costs are observed.

4.3.2 Model 2: Two part model (TPM) for cost of care

The two part model allows the predictors of health care costs to have a differential effect on the probability of incurring any costs and the amount of health care costs when care is sought. The model takes advantage of the rule of conditional probability, and splits the cost of care into two parts: the probability of incurring non-zero cost $[\Pr(y > 0)]$; and the level of observed costs conditional on incurring non-zero costs $[E(y|y > 0]$. In this study, positive costs are incurred only when health care is sought. Hence the probability expressions for non-

zero cost $[\Pr(y > 0)]$ and the care-seeking decision $[\Pr(z = 1)]$ are equivalent (here z represents the care-seeking decision). Hence, the two-part model can be expressed as:

$$E(y|x) = \Pr(y > 0) \ . \ E(y|y > 0) \qquad [4.3]$$

or equivalently as $E(y|x) = \Pr(z = 1) \ . \ E(y|z = 1)$ [4.4]

Here the first part of the model [Pr(z = 1)] is estimated for the care-seeking decision using a probit function, while the second part $[E(y|z = 1)]$ uses an OLS equation for the observations with positive costs, conditional on care seeking. The probit model constrains the variance to be equal to 1 and can be represented by equation [4.5] below:

$$\Pr[z = 1|\omega] = \Phi\ (\omega\beta_z) \qquad [4.5]$$

where Φ is a monotonic transformation representing an inverse cumulative function based on the normal distribution.

The second part of the TPM models health care costs conditional on care-seeking; this can be represented by equation [4.6] below:

$$E[y|z = 1, x] = x_t\beta_t \qquad [4.6]$$

The two part model assumes no care-seeking self-selection bias; hence, it independently models the processes of incurring non-zero expenditure and incurring positive health care expenditure. Calculation of the marginal effects in the TPM takes account of probabilities and expectations from both parts of the model, and can be obtained using the equations below.

For continuous independent variables:

$$\partial E(y)/\partial\, x_{tc} = \left(\Pr(z = 1)\ \text{x}\ \frac{\partial E(y|z = 1)}{\partial x_{tc}}\right) + \left(E(y|z = 1)\ \text{x}\ \frac{\partial \Pr(z = 1)}{\partial x_{tc}}\right) \qquad [4.7]$$

For binary independent variable:

$$E(y|x_{td}=1) - E(y|x_{td}=0)$$
$$= [\{\Pr(z=1|x_{td}=1) - \Pr(z=1|x_{td}=0)\} \text{ x } E(y|z=1|x_{td}=1)]$$
$$+ [\{\Pr(z=1|x_{td}=0)\} \text{ x } \{E(y|z=1|x_{td}=1) - E(y|z=1|x_{td}=0)\}]$$

[4.8]

To measure uncertainty in estimates of the marginal effects of the two-part model, standard errors are obtained by bootstrapping the estimates for marginal effects.

4.3.3 Model 3: Heckman's sample selection model for care-seeking self-selection bias

The assumption of independence of care-seeking decision and cost of care equation is a potential limitation of TPM, since the two processes may be correlated through unobserved factors. Heckman's sample selection model allows for potential correlation between the cost of care and care-seeking equations, in turn accounting for potential care-seeking self-selection bias. Like the TPM, Heckman's model also estimates two equations, namely care-seeking equation and health expenditure equation. However, instead of sequential estimation of the two processes, Heckman's model jointly estimates the two equations for greater efficiency using maximum likelihood estimation method. Joint estimation assumes bivariate normality of error terms of the two equations, and allows for error correlation, which is expressed below:

$$\begin{pmatrix}\varepsilon_z\\ \varepsilon_h\end{pmatrix} \sim N\left\{\begin{pmatrix}0\\0\end{pmatrix}, \begin{bmatrix}1 & \rho\\ \rho & 1\end{bmatrix}\right\} \qquad [4.9]$$

Here ε_z and ε_h represent error terms in selection (care-seeking) and outcome (cost of care) equations respectively, and ρ represents the correlation between error terms.

Following the notation used for TPM, the selection probit for Heckman's model is represented as:

$$\Pr[z=1|\omega] = \Phi(\omega\beta_z) \qquad [4.10]$$

Similarly, the equation for non-selection into care-seeking can be represented by equation [4.11] below:

$$\Pr[z = 0|\omega] = [1 - \Phi(\omega\beta_z)] \qquad [4.11]$$

The outcome equation of Heckman's sample selection model is the same as the second part of TPM (equation 4.12).

$$E[y|z = 1, x] = x_h\beta_h \qquad [4.12]$$

The difference between the two part model and the Heckman model is that the former assumes no care-seeking self-selection bias, hence the two parts are modelled independently; however, the Heckman model simultaneously estimates the two processes to allow for potential care-seeking self-selection bias. Heckman's model should be preferred over the TPM if the null hypothesis of no correlation between the selection and outcome processes ($\rho = 0$) can be rejected; this would suggest that the two equations are not independent of each other and should be modelled simultaneously to allow for error correlation. If ρ is not statistically significantly different from zero, then TPM is more appropriate. If ρ is observed to be positive, the estimated effect of care-seeking will be biased away from zero, and vice versa.

4.3.4 Model 4: Treatment effects model for insurance self-selection

As discussed earlier, insurance-seeking self-selection bias can occur due to correlation between unobserved determinants of the insurance-seeking decision and the cost of care equation, thus resulting in biased regression estimates of the impact of insurance membership on health care costs. This is likely to occur, for example, when sick and risk-averse individuals are more likely to seek insurance, resulting in a higher expected cost of care in the insured group. Insurance endogeneity can occur independently of care-seeking self-selection, and therefore needs to be accounted for separately. Unlike the case of care-seeking self-selection, insurance endogeneity does not directly result in the systematic censoring of cost data.

Here Heckman's treatment effects model is used (different from Heckman's sample selection model). This model jointly estimates the insurance-seeking probit model and the cost of care model using maximum likelihood estimation method. This allows for potential correlation between the unobserved determinants of the insurance decision and the cost of care equation .

Mathematically speaking, the insurance-seeking probit model for selection and non-selection can be represented by:

$$\Pr[M = 1|v_m] = \Phi(v_m\beta_m) \qquad [4.13]$$

$$\Pr[M = 0|v_m] = [1 - \Phi(v_m\beta_m)] \qquad [4.14]$$

Identification of the treatment effects model: Identification relies on finding explanatory variables that uniquely determine the insurance-seeking probit equation, but not the outcome model. This would impose an exclusion restriction assumption, which argues that certain variables in vector v of the probit model have β_ms that are equal to zero in the cost model. This would generate nontrivial variations in the selection equation, which should be enough to identify the process uniquely from the outcome equation.

In the current study, the following binary variables were used to identify the insurance-seeking decision: 'respondent has medium to high level of worry about personal future health'; 'respondent knows where to buy VHI card'; 'respondent knows that VHI subsidises drugs costs'; 'respondent is a member of other mass/community organisation'. Theoretically, it makes sense that individuals who are more worried about their future health are more likely to purchase insurance. Similarly, individuals who are members of other community organisations, and those who have knowledge of the insurance programme, are more likely to become members. Also, it makes theoretical sense to argue that these variables are not likely to directly influence the incurred cost of care. This study further tests the appropriateness of these variables for the current study using the statistical methods discussed below.

Due to the temporal nature of event occurrence, two variables are naturally unique to the cost of care (outcome) equation. These variables are: 'hospital inpatient stay in the last three months' (binary) and 'the number of illnesses in the last three months' (count). Since the insurance membership was sought more than three months before the survey, and the cost of

care was incurred during the past three months, these variables could not have directly influenced the insurance selection probit.

It should be noted however that, while the inpatient stay in the past three months could not have directly influenced the probability of insurance decision, the insurance status could have indirectly increased the probability of hospital inpatient stay. However, the coefficient on the insurance variable in the cost of care model is likely to capture only the direct effect of insurance, i.e. the effect of cost subsidisation, and not the effect of behavioural or supply-side changes resulting from insurance membership.

4.3.5 Model 5: Two part Heckman sample selection model

The previous two models proposed methods to separately correct for either care-seeking or insurance-seeking self-selection bias. Since the cost of care model can potentially suffer from both kinds of biases, a two-part model (model 5) is proposed here to simultaneously account for the two self-selection biases.

The first part of model 5 is a probit model for the insurance-seeking decision and is represented by equation [4.15] below:

$$\Pr[M = 1|v_m] = \Phi\,(v_m\beta_z) \qquad [4.15]$$

This equation is used to generate the so-called 'Inverse Mills Ratio' (IMR) for the insurance decision. IMR (λ_m) is a monotonically decreasing function, represented by a ratio of the probability density function to the cumulative density function of insurance-seeking decision.

$$\lambda_m = \begin{cases} \phi\,(v\beta_m) \Big/ \Phi\,(v\beta_m) & \text{for } M = 1 \\ \phi\,(v\beta_m) \Big/ [1 - \Phi\,(v\beta_m)] & \text{for } M = 0 \end{cases} \qquad [4.16]$$

λ_m represents the unobserved propensity of insurance-seeking self-selection. It estimates the probability of seeking insurance, given that insurance was offered; i.e. the individual was 'at risk' of insurance self-selection. If, based on the known characteristics, the predicted

probability of insurance-seeking is high and the individual is observed to have sought insurance, then the influence of unobservable variables, and hence the selection bias, would be small. On the other hand, if the patients who self-selected into insurance-seeking were predicted not to have self-selected based on the observable characteristics, the potential for bias is high. This would suggest that there are unobservable variables not included in the model that are responsible for self-selection (Crown et al 1995). Self-selection bias is effectively an omitted variable bias. Hence, inclusion of the unobserved insurance-seeking propensity, λ_m, as an additional covariate in the cost model is a way of attempting to correct for the bias.

As the probability of insurance-seeking self-selection approaches 1, the cumulative density function also approaches 1, and the probability density function approaches zero. As a result, the λ_{m} approaches zero, and the expected value of the error term in cost regression also approaches zero. Similarly, as the probability of self-selection decreases, the cumulative density function approaches zero at a faster rate than the probability density function, and the inverse Mills ratio approaches infinity (Renders and Gaeremynck 2006).

The second part of model 5 is the Heckman's sample selection model (same as model 3); however, it is now augmented by the IMR from the insurance probit (from part 1) in both cost of care and care-seeking equations. Hence the final cost equation (in part 2) accounts for the potential insurance-seeking self selection bias through the inclusion of IMR from part 1 (insurance probit) of the model, and for the care-seeking self-selection bias, by allowing for error correlation between cost equation and the care-seeking equation in part 2. The final cost equation can be represented as:

$$E[Y|z = 1,\ x_h] = x_h\beta_h + \rho_m\sigma_m\lambda_m(v\beta_m) \qquad [4.17]$$

Here ρ is the correlation between the error terms of the two equations, and sigma represents the standard error of the residual of the outcome equation. By simultaneously correcting for the two self-selection biases, the unbiased parameters on the cost of care model are estimated.

Identification of Heckman's sample selection model: Instruments to identify sample selection are often unavailable or hard to defend, particularly in cost of care models where variables determining access to care are the same as those determining cost of care (Dow and

Norton 2003). In such situations, identification relies on the functional form of the IMR. If the IMR is non-linear, and does not suffer from multi-collinearity with other covariates in the cost model, the Heckman model can be sufficiently identified (Leung and Yu 1996; Jones 2000).

4.3.6 Testing for self-selection bias

Following Waters (2000), three methods are employed to ascertain the presence of care-seeking and insurance-seeking sample selection biases:

1. **The significance of ρ (rho) in Heckman's sample selection and treatment effects models (model 3 and model 4):** If rho is significant in the two models, the null hypothesis of no self-selection bias can be rejected, and a corrective model is warranted.
2. **The significance of predicted values or residuals from the self-selection equations when inserted in the cost of care model:** This test involves obtaining the predicted probability or the residual (actual binary outcome minus the predicted probability) for care-seeking and insurance-seeking decisions based on separate univariate probit models. The predicted probability or the residual is then used as a regressor in the cost of care model. A statistically significant non-zero coefficient on the predicted value or residual indicates that self-selection bias exists and should be corrected to obtain unbiased estimates. This test is similar to the omitted variable version of the Hausman test (Waters 2000).
3. **Comparison of the coefficient on insurance variable:** A significant difference in the magnitude or direction of the coefficient on insurance would indicate the presence of self-selection.

Each of these tests was applied to establish the presence of potential care-seeking and insurance-seeking self-selection biases.

4.3.7 Testing the appropriateness of the identifying variables

The identifying variables used in the Heckman treatment effects model, and the first part of the two-part Heckman model, should be uniquely associated with the insurance-seeking decision, although not associated with care-seeking or the cost of health care.

Following Waters (1999), the appropriateness of identifying variables was tested using the following two methods:

1. **Association of the identifying variables with the insurance-seeking decision:** The identifying variables were included on the right hand side of a reduced form probit equation for making the insurance-seeking decision. If the coefficient on an identifying variable is statistically significant in the self-selection model, it is retained as an appropriate candidate.

2. **Non-significance of the identifying variables in the cost of care model:** This test is conducted by including all the identifying variables on the right hand side of the cost of care model. In order to appropriately identify the self-selection process, these identifying variables should not be statistically different from zero in the cost of care model.

4.4 Results

This section presents the results of the cost of care analysis. Before presenting the regression results in section 4.4.2, the descriptive results are presented in subsection 4.4.1.

4.4.1. Descriptive results

Table 4-1 provides a summary of the descriptive statistics for the variables used in the analysis.

Table 4-1: Results from the descriptive analysis of variables of interest

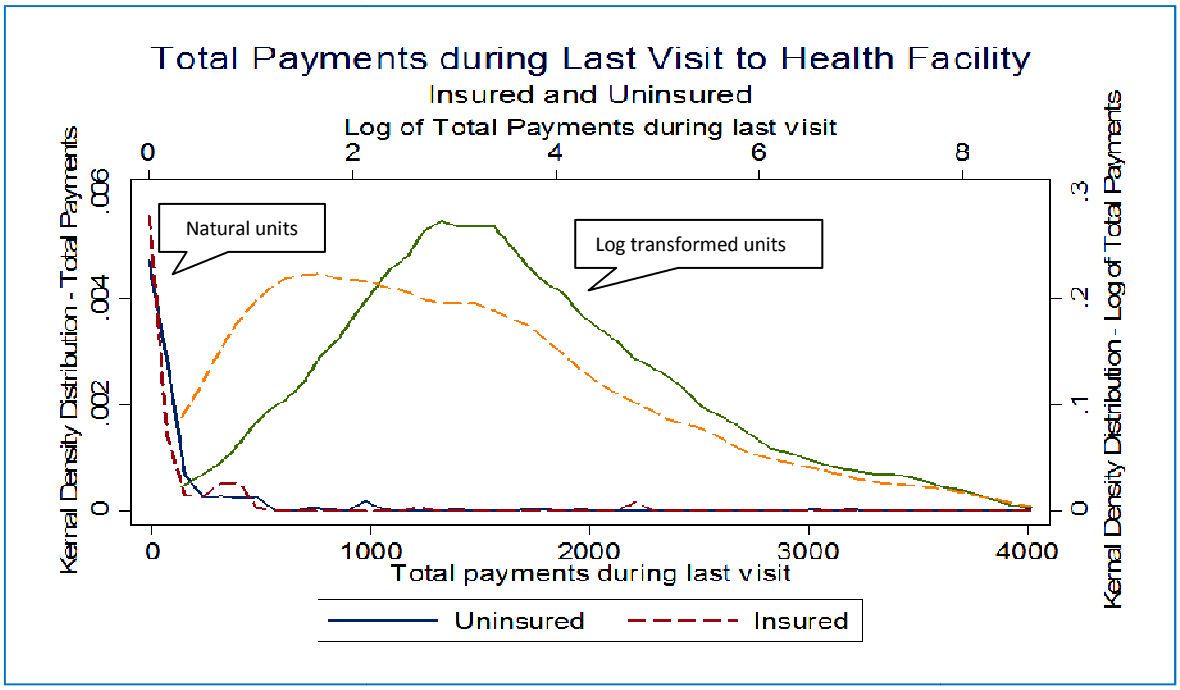
	Respondents who reported illness in the last 3 months (N=1,192)	**Ill respondents who sought health care (N=982)**	**Insured who were also sick (N=242)**	**Uninsured who were also sick (N=950)**	**t-statistic of difference between insured and uninsured ([Pr (T > t)] in brackets)**
Variable Name	**Mean**	**Mean**	**Mean**	**Mean**	**t-statistic**
Member of Voluntary Health Insurance (percentage of respondents)	20.25	17.09	-	-	-
Age (years)	35.86	35.95	34.80	32.42	-1.60 (0.10)
Female (percentage of respondents)	55.75	56.70	38.59	56.38	4.98 (0.00)
Rural resident (percentage of respondents)	81.81	82.22	72.20	71.65	-0.16 (0.86)
Resident of Hai Phong (percentage of respondents)	8.32	6.43	31.95	7.17	-11.01 (0.00)
Resident of Ninh Binh (percentage of respondents)	28.33	27.67	4.98	48.89	13.31 (0.00)
Resident of Dong Thap (percentage of respondents)	63.35	65.90	63.07	43.94	-5.36 (0.00)
Occupation – service/business (percentage of respondents)	11.55	11.28	8.71	10.33	0.74 (0.46)
Occupation – farmer (percentage of respondents)	41.28	41.12	25.31	29.82	1.37 (0.17)
Occupation - hired (percentage of respondents)	6.80	7.38	8.30	5.48	3.10 (0.01)
Occupation – student (percentage of respondents)	22.32	21.18	22.82	35.83	3.84 (0.00)
Occupation – retired (percentage of respondents)	7.68	7.36	2.90	6.74	2.25 (0.02)
Occupation - other (percentage of respondents)	10.37	11.68	3.32	12.96	4.30 (0.00)

Variable Name	Mean	Mean	Mean	Mean	t-statistic
Number of years of schooling	5.32	5.18	8.19	6.03	-8.33 (0.00)
Health status - good (percentage of respondents)	20.27	18.64	37.76	21.29	-5.36 (0.00)
Health status - fairly good (percentage of respondents)	51.54	52.66	37.34	52.90	4.34 (0.00)
Health status - fairly bad (percentage of respondents)	16.21	16.33	14.11	11.70	-1.02 (0.31)
Health status - long-term illness (percentage of respondents)	11.99	12.37	10.79	14.12	1.35 (0.18)
Chronic illness (percentage of respondents)	14.78	15.16	12.45	13.28	0.34 (0.73)
Number of illnesses in the last 3 months	2.01	2.02	2.08	1.88	-2.08 (0.04)
Inpatient care (yes) (percentage of respondents)	10.19	9.82	13.25	9.20	-1.83 (0.07)
Know where to buy VHI card (yes) (percentage of respondents)	-	-	91.70	43.73	-14.44 (0.00)
Know that VHI subsidises drug costs (yes) (percentage of respondents)	-	-	92.53	61.74	-9.47 (0.00)
Member of other mass/community organisation (yes) (percentage of respondents)	-	-	66.39	48.89	-4.90 (0.00)
Medium to high level of worry about future health (yes) (percentage of respondents)	-	-	92.11	82.50	-3.69 (0.00)

Distributions of the cost of health care and total consumption expenditure were observed to be highly skewed. This is because most of the individuals incurred relatively low health care costs; furthermore, 207 individuals did not seek health care at all, resulting in a spike at zero in the observed cost distribution. For the purpose of regression analysis, both cost of care and

consumption expenditure variables were log-transformed. Figure 4-2 shows the distribution of health care costs based on insurance status.

Figure 4-2: Distribution of total health care costs during the last three months



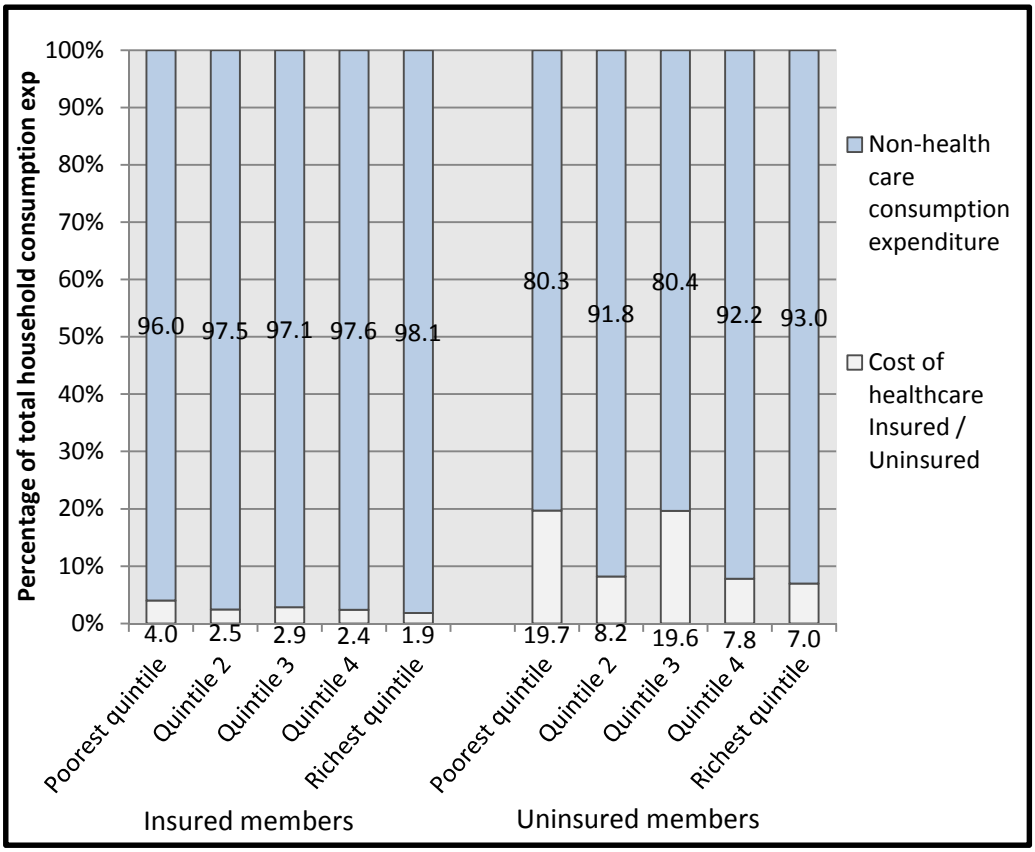
Further descriptive analysis was carried out, in order to compare the average cost of health care over the last three months across socioeconomic quintiles. Table 4-2 shows that, within the insured group, out-of-pocket costs increased consistently with total consumption expenditure. The pattern was less clear for the uninsured group, for which the poorest quintile had a higher cost burden than the second richest quintile. Also, it is obvious from the table that all the socioeconomic quintiles in the insured group incurred substantially lower costs of care, compared to the respective uninsured quintiles. Finally, the average cost of care for the insured group was less than one-third that of the uninsured. These statistics were summarised using sampling weights to reflect the distribution of sampling frequency.

Table 4-2: Average per capita health care costs in the last three months (by consumption quintiles)

	Poorest quintile ('000 VND) (N = 239)	Quintile 2 ('000 VND) (N = 238)	Quintile 3 ('000 VND) (N = 238)	Quintile 4 ('000 VND) (N = 240)	Richest quintile ('000 VND) (N = 236)	Total ('000 VND) (N = 1,192)
Insured	29.85	29.86	45.87	52.95	98.99	66.69
Uninsured	176.40	101.29	356.28	159.15	283.30	212.76
Average	174.758	98.418	322.697	170.794	268.020	206.091

Figure 4-3 summarises the proportionate share of health care costs in the total household consumption expenditure. As one would expect, although richer quintiles incur a higher cost of care in absolute monetary terms, the proportion of income sacrificed is substantially lower than in the poorest quintile. Figure 4-3 shows that proportionate shares were consistently lower for the insured group.

Figure 4-3: OOP health expenditure as percentage of total consumption expenditure



Jowett et al (2003) conducted a similar descriptive analysis using the same dataset, and found slightly different results, although the general pattern of the above findings were similar. This can be attributed as follows: a) Jowett et al (2003) ignored the non-care-seeking sample (207 observations with zero observed cost), which would have resulted in an overestimation of the sample mean, b) When generating quintiles based on equivalent per capita annual consumption expenditure, Jowett et al (2003) used equal consumption weights for children and adults in the household, whereas our analysis used lower weights for children, using the formula suggested in both Aronson et al (1994) and Wagstaff et al (1999) [equation 4.1].

4.4.2. Regression results

The regression models used in this study estimate the impact of insurance membership on cost of health care, after controlling for the effect of observed characteristics on OOP costs. This section presents results from the econometric models of cost of care discussed earlier. Analysis was carried out using Stata software, version 9.2. The unit of analysis was an individual for whom the questionnaire was completed. Table 4-5 presents the results of econometric analysis for cost models.

The OLS analysis was carried out on all the individuals who reported illness over the last three months. Observed cost for those who did not seek care was zero. These observations were also included in the analysis. The OLS model assumes that both zero and non-zero values are actual expenditures; hence, it does not model the care-seeking decision. There were 1,192 eligible observations available for the model, however three dropped out of the analysis due to missing values on explanatory variables. The OLS model passed the Ramsey RESET test with test score $F(3, 1{,}164) = 0.32$ and $p > F = 0.81$, and had an R-squared value of 0.25. OLS results show a statistically significant negative effect of insurance membership on the log of health care expenditure. This implies that, after controlling for differences in need, use of care and other observed characteristics, insurance significantly reduces the cost of care. Regression results also show that the socioeconomic status of an individual is positively related to their observed cost of care. Given that it would be expected for health care to have positive income elasticity, this result makes intuitive sense. Cost of health care was also observed to have a strong positive relationship with inpatient admissions and long-term health care status. Patients who self-assessed their health as fairly bad or those who were suffering from long-term illness incurred substantially higher cost than those in good health.

The TPM model allows differential effect of the independent variables on the probability of care-seeking decision and amount of health expenditure when care is sought. The TPM coefficients in table 4-6 show that individuals with relatively worse health status were more likely to seek health care than those in good health. Also, individuals living in Hai Phong and Ninh Binh provinces were less likely to seek care when ill, compared to the residents of Dong Thap. Part two of the TPM was estimated using only those observations with positive observed cost. Out of 985 eligible observations, three participants dropped out due to missing values on covariates, and the analysis was thus carried out on 982 observations. The R-squared value of part two of the model was 0.36.

Rules of conditional probability were used to estimate the impact of insurance conditional on care-seeking, followed by boot-strapping of coefficients to obtain measures of uncertainty. Table 4-5 shows that the coefficient on insurance was -0.97 while the coefficient on socioeconomic status was 0.439. Both coefficients were statistically significant at 1% level. Since the cost of care equation is semi-logarithmic, the coefficient on insurance variable was transformed using equation [4.19] (Kennedy 1981) to estimate the percentage impact of insurance on cost of care.

$$g^* = \exp\left(c - \frac{1}{2}V(c)\right) - 1 \qquad [4.19]$$

Here g^* is the transformed coefficient, c is the untransformed coefficient on the insurance variable and $V(c)$ is the variance of the untransformed coefficient.

The above two models, i.e. OLS and TPM, do not allow for potential care-seeking and insurance-seeking self-selection bias. The presence of these biases was tested using the methods discussed in the previous section. Table 4-3 shows the outcome for one of these tests, which indicates the presence of both care-seeking and insurance-seeking self-selection. The other two tests, i.e. significance of rho and change in insurance coefficient, are discussed with the regression results for respective models.

Table 4-3: Tests to establish presence of care-seeking and insurance-seeking self-selection bias

Testing for the presence of care-seeking selection bias					
TEST: Statistical significance of predicted values or residuals from care-seeking self-selection model when inserted in the cost of care model					
Variable	**Coefficient**	**t**	**P>t**	**95% Confidence interval**	
Predicted probability	7.192	2.520	0.018	1.319	13.065
Residual (actual outcome – predicted probability)	3.860	23.60	0.000	3.523	4.196
Testing for the presence of insurance-seeking selection bias					
TEST: Statistical significance of predicted values or residuals from insurance self-selection model when inserted in the cost of care model					
Variable	**Coefficient**	**t**	**P>t**	**95% Confidence interval**	
Predicted probability	-1.546	-3.670	0.001	-2.413	-0.679
Residual (actual outcome – predicted probability)	-0.263	-0.86	0.395	-0.888	-0.362

The result for Heckman's sample selection (model 3) shows that the estimated correlation between the residuals of care-seeking probit and cost of care model is statistically significant [Wald statistics for independence of equations: rho = 0 rejected (p>z = 0.06)]. Significance of rho supports the presence of care-seeking self-selection, which is corrected by model 3. After correcting for sample selection bias, the coefficient on insurance was still statistically significant, and shows an increase of 40% in magnitude compared to the OLS estimate. The coefficient on log of consumption expenditure also showed a marginal increase after correction for care-seeking bias. Similar changes were observed for other covariates, whilst there was no change in direction of effect. The difference between the two part model and the Heckman model is that the two part model independently models the two parts, whereas the Heckman model allows for correlation between the two processes.

Model 4 estimates treatment effects, and corrects for potential endogeneity of the insurance decision. This model uses all available observations with zero and non-zero observed cost,

and aims to correct for insurance self-selection bias by independently identifying insurance-seeking decision whilst simultaneously estimating the cost of care model. Appropriateness of variables used for the identification of insurance decisions was tested using methods discussed earlier. Outcomes for each identifying variable are presented below. Tests 1 and 2 are largely consistent for most of the identifying variables, and confirm their appropriateness as instruments.

Table 4-4: Tests for appropriateness of instruments for insurance-seeking self-selection model

Testing for the appropriateness of instruments for endogeneity model						
TEST 1: Association of identifying variables with the insurance-seeking decision						
Variable	**Coefficient**	**SE**	**z**	**P>z**	**95% Confidence interval**	
Worry level: medium to high	1.853	0.433	4.280	0.000	1.004	2.702
Member of mass organisation	0.880	0.267	3.290	0.001	0.356	1.404
Knows where to get VHI card	2.362	0.321	7.350	0.000	1.732	2.992
Knows about discount on drug cost	0.558	0.216	2.580	0.010	0.134	0.982
TEST 2: Significance of identifying variables within the cost of care model						
Variable	**Coefficient**	**SE**	**z**	**P>z**	**95% Confidence interval**	
Worry level: medium to high	-0.132	0.173	-0.770	0.451	-0.488	0.223
Member of mass organisation	0.166	0.151	1.110	0.279	-0.143	0.476
Knows where to get VHI card	-0.675	0.176	-3.830	0.001	-1.038	-0.313
Knows about discount on drug cost	-0.050	0.123	-0.410	0.685	-0.303	0.202

The estimated correlation between the residuals of the insurance-seeking probit and cost of care models is statistically significant [Wald statistics for independence of equations: rho = 0 rejected (p>z = 0.01)]. The significance of rho supports the presence of insurance-seeking self-selection, which is corrected by model 4. The coefficient on insurance was statistically significantly negative, and shows an increase in magnitude by 60.6% compared to the estimate of OLS model. This clearly suggests that the naive OLS model had significantly

underestimated the impact of insurance membership on cost of care. The effect of consumption expenditure was only marginally higher than that estimated by the OLS model.

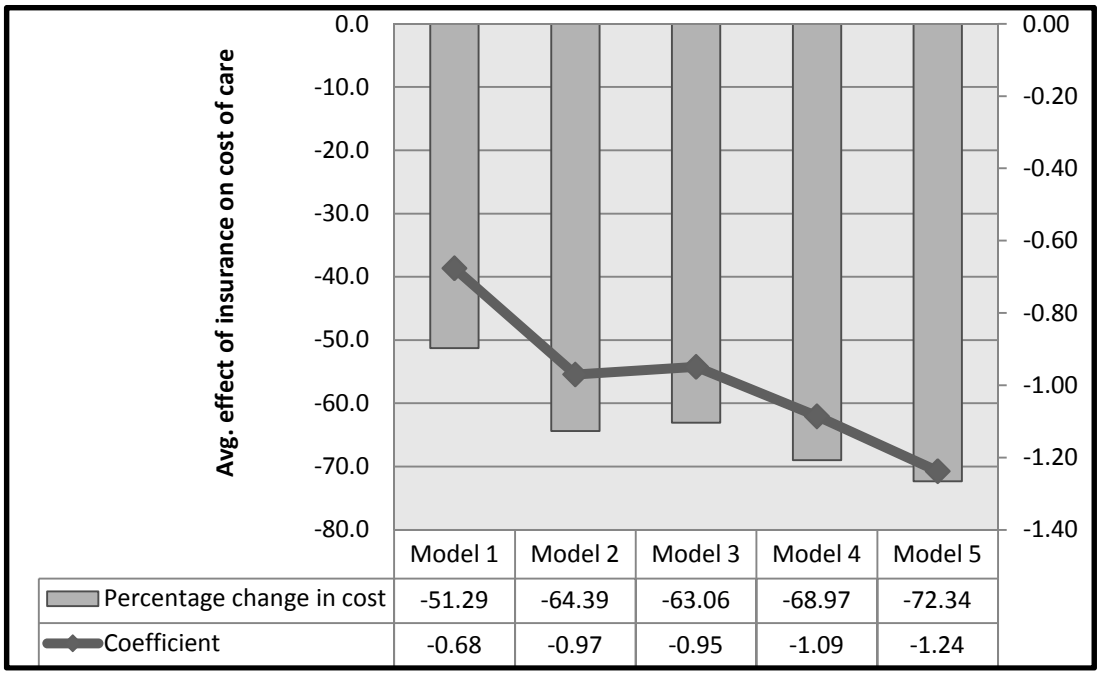
From the results, it was also revealing to note that insurance membership does not seem to influence the decision to seek care given illness, although it significantly reduces the cost of care once treatment is sought. It was also observed that socioeconomic status was not significantly associated with the decision to purchase insurance, whereas rural residence only showed positive association with insurance seeking in model 3. Our analysis also shows that years of schooling is an important predictor of insurance-seeking behaviour.

Heckman's sample selection and treatment effects models (3 and 4) correct either for care-seeking or insurance-seeking self-selection, but not both. Model 5 aims to simultaneously correct for the two types of biases by introducing the IMR term (λ_m) for the insurance-seeking decision, both in the cost of care and in care-seeking equations. λ_m and its quadratic and cube roots from the insurance-seeking part of the model (part one), show different degrees of significance in the sample selection part of the model (second part). Large values of the t-ratio associated with IMR suggest the presence of sample selection bias (Jones 2007). Wald statistics for independence of care-seeking and cost of care equations rejected the null-hypothesis [rho = 0 rejected (p>z = 0.01)], which confirms the presence of care-seeking bias, even after correcting for insurance-seeking bias in both equations by including flexible IMR functions.

The coefficient on λ_m in the cost of care equation represents the correlation between the unobserved factors associated with insurance-seeking and cost of care equations, as estimated by the maximum likelihood procedure. λ_m is a non-linear function, and its effect on the cost of care model is found to be positive and concave. This suggests that the unobservable factors associated with the insurance decision are associated with higher costs of care but at a diminishing rate. In the care-seeking model, λ_m seems to have a negative effect on the probability of seeking care. Also, after controlling for insurance selection bias the effect of insurance status on care-seeking decision changes from negative to positive. This suggests that the unobserved determinants of the insurance-seeking decision were negatively correlated with the care-seeking decision, and once this negative correlation was accounted for, the positive impact of insurance on care-seeking became obvious.

The coefficient on insurance was statistically significant in model 5, and was 1.831 times higher than the OLS model, suggesting that the naive model had significantly underestimated the impact of insurance by ignoring self-selection biases. The coefficient on consumption expenditure remained stable and significant. Figure 4-4 (below) compares the insurance coefficients and their transformation to percentage units from all five models. The figure shows that the estimated impact of insurance in model 5 was 72.3%, which was underestimated by approximately 21 percentage points by the OLS model. This clearly emphasises the need to correct for statistical bias in model estimation.

Figure 4-4: Insurance coefficients in regression models and actual impact measured in percentage reduction in cost of care



4.5 **Discussion**

This chapter has analysed the impact of the voluntary health insurance programme on individual level health care costs in Vietnam. It was argued that the naive OLS model for cost of care may suffer from self-selection biases due to care-seeking and insurance-seeking decisions. This would be attributable to a potential correlation between the unobserved determinants of the care-seeking/insurance-seeking decisions and the cost of care model. The current thesis uses five different methods to model cost of health care; the models varying in

terms of the statistical approach taken to account for potential care-seeking and insurance-seeking self-selection bias.

After applying corrective measures based on Heckman's selection model, the study revealed that health insurance has a significantly negative relationship with cost of health care. The study also showed that the impact of insurance membership on cost of care was significantly underestimated by the uncorrected OLS model (51.29% in OLS model; 72.34% after correcting self-selection biases). When compared with the previous analysis of this data, our analysis suggests that Jowett et al (2003) had overestimated the impact of insurance. Furthermore, the insurance coefficient in the previous study was wrongly interpreted as 208% cost reduction. Such interpretation would imply a pay-out for care seeking, which was not the case in Vietnam.

Our analysis suggested that the socioeconomic status of an individual has a positive and statistically significant relationship with health care costs. This finding makes intuitive sense since out-of-pocket payments are more affordable for the rich, who also tend to have better access to more expensive tertiary care. The study also finds that 'fairly bad' and 'long-term ill' health statuses are associated with a higher cost of care. Also, inpatient hospital admission is positively associated with cost of care in all models. Using the transformation proposed in equation [4.19], inpatient admission appeared to increase the average cost of care more than 10 fold.

The study also found that that insurance membership did not have a statistically significant impact on the probability of care-seeking. This is an interesting finding, as it suggests that there are other factors, possibly related to geographical access to health services, which play a more important role in the care-seeking decision. The care-seeking analysis indicates that the province of residence plays an important role in the care-seeking decision. A separate frequency analysis complimented the regression findings suggesting that 94.05% of the sick residents of Dong Thap sought care, compared to 66.02% and 86.01% of residents from Hai Phong and Ninh Binh provinces, respectively. This study also found that the coefficient on insurance-seeking IMR was negative and non-linear in the care-seeking model. This suggests that the unobserved factors that increase the likelihood of insurance membership may reduce the likelihood of care-seeking at a decreasing rate. Further investigation into this relationship may offer insight into patient behaviour and preferences.

This study also modelled the probability of health insurance uptake, which was found to be positively associated with the socioeconomic status of an individual; hence, the richer individuals were found to be more likely to purchase insurance membership, and in turn benefit from cost reduction. This is likely to have equity implications, especially if the insurance fund is subsidised through government funds. Further research is required into potential ways of extending health insurance coverage to the poor.

Finally, this study has highlighted the significance of employing unbiased econometric models for estimating the impact of health insurance on cost of care. The study found that, in the context of developing countries, where insurance premiums may be community-rated, correction of potential self-selection bias is important in order to estimate the impact of health insurance. Furthermore, the study also found that unobserved health care costs may introduce potential bias in cost of care modelling.

Table 4-5: Models for cost of care for sick individuals

Variables	**Econometric models**				
Dependent variable: Log of individual level cost of healthcare	**Model 1: OLS model with zero cost**	**Model 2: Two-part model**	**Model 3: Heckman's model for care-seeking self-selection bias**	**Model 4 - Treatment effects model for insurance-seeking self-selection**	**Model 5: Heckman's model for care-seeking self-selection with correction for insurance-selection**
Member of VHI programme	-0.676** (0.03)	-0.970*** (0.00)	-0.949*** (0.00)	-1.086*** (0.01)	-1.238*** (0.00)
Log of equivalent annual household expenditure	0.419** (0.03)	0.439*** (0.00)	0.459*** (0.00)	0.437** (0.01)	0.488*** (0.00)
Age	0.008 (0.65)	0.006 (0.76)	0.006 (0.71)	0.006 (0.75)	0.002 (0.90)
Age-squared	-0.000 (0.76)	-0.000 (0.71)	-0.000 (0.66)	-0.000 (0.87)	-0.000 (0.82)
Female	0.041 (0.91)	-0.251 (0.35)	-0.184 (0.51)	0.033 (0.93)	-0.193 (0.51)
Interaction between age and sex	0.004 (0.59)	0.010 (0.16)	0.010 (0.14)	0.005 (0.56)	0.010 (0.13)
No. of illnesses in last 3 months	-0.028 (0.65)	0.022 (0.60)	0.010 (0.84)	-0.029 (0.63)	0.010 (0.83)
Inpatient admission in last 3 months	2.332*** (0.00)	2.465*** (0.00)	2.488*** (0.00)	2.320*** (0.00)	2.467*** (0.00)
Health status: fairly good	0.061 (0.82)	-0.390 (0.15)	-0.201 (0.46)	0.031 (0.91)	-0.243 (0.39)
Health status: fairly bad	0.800** (0.02)	0.606** (0.01)	0.721*** (0.01)	0.796*** (0.01)	0.700** (0.01)
Health status: long-term Illness	0.909** (0.03)	0.412 (0.14)	0.698* (0.06)	0.906** (0.02)	0.675* (0.07)
Chronic illness	0.099 (0.76)	0.121 (0.65)	0.103 (0.72)	0.077 (0.80)	0.076 (0.78)

Rural residence	0.304	0.281	0.317	0.316*	0.332*
	(0.12)	(0.19)	(0.12)	(0.09)	(0.10)
Province: Hai Phong	-0.524	0.405	-0.008	-0.549	-0.004
	(0.23)	(0.28)	(0.99)	(0.20)	(0.99)
Province: Ninh Binh	0.011	0.279	0.144	-0.017	0.115
	(0.96)	(0.33)	(0.62)	(0.93)	(0.68)
Occupation: service	0.270	0.400*	0.385**	0.250	0.350*
	(0.28)	(0.07)	(0.03)	(0.31)	(0.05)
Occupation: farmer	0.021	-0.053	-0.040	-0.004	-0.077
	(0.90)	(0.84)	(0.85)	(0.98)	(0.72)
Occupation: wage	-0.166	-0.401	-0.252	-0.185	-0.284
employment	(0.31)	(0.11)	(0.18)	(0.24)	(0.14)
Years of schooling	-0.022	0.009	-0.010	-0.014	-0.002
	(0.53)	(0.78)	(0.75)	(0.67)	(0.96)
Interaction between	0.001	-0.009	-0.008	0.002	-0.008
schooling and gender	(0.96)	(0.67)	(0.71)	(0.95)	(0.74)
Interaction between	0.001	0.001	0.001	0.000	0.001
schooling and age	(0.50)	(0.44)	(0.30)	(0.55)	(0.34)
Inverse Mills' Ratio	-	-	-	-	0.471*
	-	-	-	-	(0.08)
Inverse Mills' Ratio –	-	-	-	-	-0.236***
squared	-	-	-	-	(0.00)
Inverse Mills' Ratio -	-	-	-	-	0.018
cube-root	-	-	-	-	(0.48)
Constant	-0.635	-0.350	-0.791	-0.701	-0.892
	(0.66)	(0.73)	(0.51)	(0.62)	(0.45)
Rho	-	-	1.269*	0.224**	1.197*
	-	-	(0.06)	(0.01)	(0.05)
Sigma	-	-	0.406***	0.479***	0.398***
	-	-	(0.00)	(0.00)	(0.00)
Observations	1189	1189	1189	1189	1189
R-squared	0.26	0.36	-	-	-

Robust p values in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4-6: Models for care-seeking and insurance-seeking decisions

Variables	**Econometric models**			
	Model 2: Two-part model	**Model 3: Heckman's model for care-seeking self-selection bias**	**Model 5: Heckman's model for care-seeking self-selection with correction for insurance-selection**	**Model 4 - Treatment effects model for insurance-seeking self-selection**
Dependent variable:	**Care-seeking decision**			**Insurance-seeking decision**
Member of VHI	-0.040	-0.254	0.317	-
programme	(0.78)	(0.33)	(0.50)	-
Log of equivalent annual	0.109	0.185	0.190	0.355*
household expenditure	(0.48)	(0.31)	(0.33)	(0.10)
Age	-0.004	-0.015	-0.013	-0.265***
	(0.91)	(0.64)	(0.68)	(0.00)
Age-squared	0.000	0.000	0.000	0.002***
	(0.86)	(0.60)	(0.64)	(0.00)
Female	0.338	0.259	0.302	-1.333***
	(0.64)	(0.70)	(0.67)	(0.00)
Interaction between age and	-0.002	-0.001	-0.001	0.048**
sex	(0.88)	(0.94)	(0.92)	(0.03)
No. of illnesses in last 3	-0.066	-0.092	-0.088*	-
months	(0.25)	(0.10)	(0.09)	-
Health status: fairly good	0.551**	0.416	0.464*	-0.525**
	(0.04)	(0.15)	(0.08)	(0.02)
Health status: fairly bad	0.323	0.334	0.351	0.679*
	(0.23)	(0.29)	(0.23)	(0.07)
Health status: long-term	0.900**	0.682	0.716	0.590
Illness	(0.04)	(0.29)	(0.23)	(0.44)
Chronic illness	-0.061	-0.003	-0.009	-1.720***
	(0.80)	(0.99)	(0.98)	(0.00)
Rural residence	0.130	0.078	0.074	0.988*
	(0.52)	(0.75)	(0.75)	(0.08)

Province: Hai Phong	-1.128***	-1.196***	-1.171***	-2.117***
	(0.00)	(0.00)	(0.00)	(0.00)
Province: Ninh Binh	-0.519**	-0.551*	-0.531**	-2.080***
	(0.01)	(0.05)	(0.04)	(0.00)
Occupation: service	0.006	0.039	0.035	-0.838*
	(0.99)	(0.92)	(0.93)	(0.07)
Occupation: farmer	0.093	0.224	0.241	-0.345
	(0.77)	(0.45)	(0.42)	(0.58)
Occupation: wage	2.009***	1.463	1.539*	-1.213**
employment	(0.00)	(0.11)	(0.05)	(0.05)
Years of schooling	-0.048	-0.033	-0.037	0.166***
	(0.33)	(0.59)	(0.58)	(0.00)
Interaction between	-0.004	0.012	0.010	0.029
schooling and gender	(0.93)	(0.83)	(0.85)	(0.74)
Interaction between	0.000	0.000	0.000	0.007***
schooling and age	(0.72)	(0.78)	(0.77)	(0.01)
Respondent has medium to	-	-	-	1.888***
high level of worry about				
future health	-	-	-	(0.00)
Member of a mass	-	-	-	0.909***
organisation	-	-	-	(0.00)
Do you know where to go	-	-	-	2.432***
get hi card?	-	-	-	(0.00)
Do you think or know of	-	-	-	0.597***
any benefit of VHI when				
getting medicines?	-	-	-	(0.01)
Inverse Mills' Ratio	-	-	-0.221	-
	-	-	(0.57)	-
Inverse Mills' Ratio –	-	-	-0.244**	-
squared	-	-	(0.02)	-
Inverse Mills' Ratio - cube-	-	-	0.047*	-
root	-	-	(0.09)	-
Constant	0.591	0.270	0.142	-4.885***
	(0.66)	(0.86)	(0.93)	(0.00)
Observations	1189	1189	1189	1189

Robust p values in parentheses *** p<0.01, ** p<0.05, * p<0.1

Chapter 5

Impact of Voluntary Health Insurance on Equity and Progressivity of Health Financing

5.1 Introduction

In the previous chapter, the impact of the Vietnamese voluntary health insurance (VHI) programme on the expected level of OOP health care costs was measured. The aim of this chapter is to evaluate the impact of VHI on equity and progressivity of OOP costs. The specific objectives are to:

a) evaluate whether insurance membership, on average, has a pro-poor effect on the expected cost of health care;

b) compare the observed cost distributions of the insured and uninsured groups, in order to assess the level of pro-poorness and progressivity or regressivity;

c) evaluate the effect of need standardisation processes on progressivity or regressivity of cost distributions for insured and uninsured groups;

d) assess the impact of correcting care-seeking and insurance-seeking self-selection biases on need-standardised cost distributions.

The chapter is organised as follows. Section 5.2 discusses the computational methods used to implement the two approaches to equity analysis examined in chapter 3. Section 5.3 presents the empirical results using both approaches. The final section, 5.4, discusses the implications of the findings.

5.2 Study methodology

The equity in financing analysis will be carried out using two distinct approaches. In the first approach, evaluate equity will be evaluated by introducing an interaction term between insurance and socioeconomic status in the cost of care models. In the second approach, equity and progressivity of financing is estimated by evaluating the distribution of health care costs using concentration curves. The methodology is discussed in detail below.

5.2.1 Evaluating the interaction effect between insurance and socioeconomic status

Firstly, an interaction term for insurance status and log of consumption expenditure was introduced in a naive ordinary least squared (OLS) model for cost of care, and then successively introduced it in more complex models that control for the care-seeking and insurance-seeking self-selection biases. The models used in this chapter are the same as those used in chapter 4; the difference being the inclusion of an interaction term, which allows for equity interpretation. The following cost of care models are used in this chapter:

- Ordinary Least Squares model (Model 1: self-selection biases not corrected);
- Two-part model and Heckman's sample selection model (Models 2 and 3: care-seeking bias corrected);
- Treatment effects model (Model 4: insurance-seeking bias corrected);
- Two-part Heckman model, with the first part modelling insurance decision and the second part correcting the care-seeking and insurance-seeking biases simultaneously (Model 5: care-seeking and insurance-seeking corrected).

Since the interaction term is a cross product with combined information on both the main and the interaction effect, we include the constituent components of the interaction term as separate variables in the model so that the main effects are partialled out of the interaction effect (Bedeian and Mossholder 1994). Cohen and Cohen (2002) suggest mean-centring the constituent continuous variable, before computing the interaction term, so that the new mean lies at zero. Therefore, we mean-centre consumption expenditure by subtracting the sample mean from individual consumption expenditure. This mean-centred variable is then included in the model, both as a constituent variable and as part of the interaction term. Mean-centring reduces covariance between the interaction term and the constituent variables, and may also reduce collinearity, although this final point is an ongoing debate in the literature (Aiken and West 1991; Kromrey and Foster-Johnson 1998; Echambadi and Hess 2007). The intercept term in mean-centred regression will be interpreted as the expected cost of care, when consumption expenditure is at mean value, and insurance membership is not taken.

5.2.2 Evaluating the distribution of health care costs for equity and progressivity analyses

The second approach is based on evaluating concentration curves of the cost of care variable, in order to estimate equity and progressivity indices. Recognising the potential for bias associated with unmet need for care and self-selection decisions of care- and insurance-seeking, the equity analysis is conducted in multiple stages using the cost variable with different levels of bias correction. Hence the analysis will be carried out separately on:

a) the unstandardised observed cost of care;
b) the predicted cost of care that standardises for differences in the level of need variables;
c) the predicted cost of care as in (b) but additionally controlling for care-seeking self-selection bias;
d) the predicted cost of care as in (b) and additionally controlling for insurance-seeking self-selection bias; and
e) the predicted cost of care as in (b) and simultaneously correcting for care-seeking and insurance-seeking self-selection biases.

Below, the thesis will first discuss how these variables are generated; subsequently, computational methods for concentration and Kakwani indices will be discussed.

5.2.2.1 Standardisation of the cost of care variable

It was argued in chapter 3 that the unstandardised concentration and Kakwani indices do not account for the differences in the need for health care, and overlook the horizontal inequity in exhausting capacity to benefit from health care. Here, the thesis proposes that a standardised cost of care variable offers a solution, by controlling the differences in need for care. The purpose of standardisation is not to propose a causal model for cost of care, but to establish a refined understanding of the relationship between consumption expenditure, cost of care and insurance status. Similar standardisation methods have only been used in the context of health care utilisation (Gravelle 2003) and not in the case of health care financing; hence this would be the first attempt to need standardise the cost of care.

The need standardisation procedure generates the predicted cost of care that would be observed if all individuals had the same level of need. This level is defined by the sample mean for each of the need variables. The process is implemented using regression analysis that uses both standardising (need) and non-standardising (non-need) variables to estimate partial correlations of standardising variables conditional on non-standardising covariates. If non-confounding variables were not included in the regression model, the coefficients on standardising variables would reflect joint correlation of confounding and non-confounding variables, which will produce biased regression parameters (O'Donnell et al, 2007a).

The process of need standardisation begins with the naive OLS model:

$$y_i = \alpha + \sum_j \beta_j x_{ji} + \sum_k \gamma_k z_{ki} + \pi_m m_i + \varepsilon_i \qquad [5.1]$$

Here y_i is the cost of care variable, x_j is a vector of need variables on which we want to standardise, and z_k represents non-need variables. Insurance status is also a non-need variable in the equation and has been identified separately as m_i. The slope and intercept parameters from equation [5.1] are used, and the need variables are set to their respective sample mean, so the need-standardised cost of care can be predicted. This process is represented as:

$$\hat{y}_i^S = \hat{\alpha} + \sum_j \hat{\beta}_j \bar{x}_j + \sum_k \hat{\gamma}_k z_{ki} + \hat{\pi}_m m_i \qquad [5.2]$$

Here $\hat{y}_i^S$ is the need standardised, predicted cost of care.

In summary, the standardisation method used here involves freezing the need variables to their mean value, and then predicting the cost of care based on the actual value of the non-need variables and the actual insurance status. Through this process, we aim to control the differences in need (by assigning mean need value to everyone), so that the equity analysis reflects the inequality attributable to non-need variables. This proposed method of standardisation is new and different from the conventional method of standardisation, which subtracts the need-predicted health variable from the observed variable (O'Donnell et al, 2007a). The decision not to use this method was based on the finding that the need-predicted cost was higher than the observed cost for many individuals in the sample; this is because the

unstandardised cost of care variable does not account for unmet need for care. Therefore, subtracting the need predicted from the observed cost would produce negative values of the standardised cost variable, which could not be used for equity analysis because, by design, concentration curves plot non-negative variables. However, the method proposed in this thesis always produces non-negative, need-standardised predictions.

In the current analysis, the following need variables were standardised: age, sex, number of self-reported illnesses in the last three months, individual health status in the last 12 months, and the presence of chronic illness. The analysis did not standardise for utilisation, because there was only limited data available on health care use. Instead, we assume that actual expenditure ought to be the same as need-predicted expenditure. This assumption is reasonable, as a principle of horizontal equity in the utilisation of care, as long as poor households do not receive systematic price discounts, such that their actual expenditure could be lower than need-predicted expenditure, and yet they still receive the need-predicted utilisation of care. Furthermore, it is not possible to use the utilisation variables as a proxy for need. The literature on developing countries suggests that health service utilisation in poor economies does not necessarily reflect the level of health care need, but also a host of non-need demand and supply variables (Ensor and Cooper 2004; Makinen et al 2000). This was further confirmed for the current data, when a separate probit analysis for hospital inpatient admissions found that the probability of admission was negatively associated with some of the need variables (for example, 'health status: fairly bad or long-term illness'), and positively related with non-need covariates ('urban residence', 'years of education' and 'socioeconomic status').

The concentration curve of $\hat{y}_i^S$ should therefore be interpreted as the distribution of predicted costs, when no difference exists between individuals in terms of their observed need. If insurance decisions can be assumed to be randomly distributed in the population, the observed difference between the cost distributions of insured and uninsured groups represents the effect of insurance on equity distribution.

5.2.2.2 Correcting for self-selection biases

The need standardisation procedure discussed above uses the OLS model (equation 5.1) to predict the cost of care. As discussed in chapter 3, this model may be biased due to

unaccounted correlation between the unobserved determinants of cost of care and care-seeking/insurance-seeking decisions. Therefore, we follow the systematic modelling approach used in chapter 4 to correct for potential self-selection biases. These models replace the OLS model in equation [5.1], while keeping the need standardisation procedure in equation [5.2] the same. Predictions based on these models produce cost variables mentioned in section 5.1.2, i.e. the need standardised and self-selection, bias corrected cost of care. These predicted cost variables are subsequently used to compute concentration and Kakwani indices.

5.2.2.3 Retransforming the predicted costs: Duan's smearing factor

The regression models discussed above use log-transformed cost of care as the dependent variable; hence the model predictions are also in the log form, which can be difficult to interpret for equity analysis. Manning (1998) famously stated that 'Congress does not appropriate log dollars'. Hence the log form predictions should be transformed back to the natural scale before further analysis is carried out on the predicted values (Manning and Mullahy 2001; Buntin and Zaslavsky 2004). For re-transformation, we use the smearing factor proposed by Duan (1983). This factor is defined as the mean of exponentiated residuals from the regression model, and is represented as:

$$S = \frac{1}{N}\sum_{i=1}^{N} e^{(Y_i - \hat{Y})} \qquad [5.3]$$

Here, S represents the smearing factor and $e^{(Y_i - \hat{Y})}$ represents the exponentiated form of the residual term for each individual. Both Y_i and $\hat{Y}$ are in log form.

It is common practice to employ a single smearing factor for the whole sample; however this method may produce biased estimates if heteroscedasticity of the error term is not accounted for (Manning 1998). To minimise heterscedasticity, we follow the RAND Health Insurance Experiment approach (Newhouse 1993), and use separate smearing factors for the insured and uninsured groups. These smearing factors are then multiplied by exponentiated predictions from the regression models to convert them to natural scale:

$$\hat{Y}_{smeared} = e^{\hat{Y}_i} . \frac{1}{N} \sum_{i=1}^{N} e^{(Y_i - \hat{Y}_i)} \qquad [5.4]$$

5.2.2.4 Computation of Concentration and Kakwani indices

To compute concentration indices (CI) in the current study, the following equation suggested by Kakwani et al (1997) is used:

$$CI = \left({}^{2}/_{n\,.\,\mu}\right) \sum_{i=1}^{n} h_i\, r_i - 1 \qquad [5.5]$$

where h_i is the individual cost of care; μ is the mean cost of health care for the sample; r_i is the relative socioeconomic rank of the *i*th individual; and *n* is the sample size. Hence, the concentration index is a function of socioeconomic rank, which dictates the distribution of the cost of care. For computational convenience, equation [5.5] is estimated using the so-called 'convenient regression' method [equation 5.6], which directly calculates the index:

$$2\sigma_r^2 \left({}^{h_i}/_{\mu}\right) = \alpha_c + \beta_c r_i + \varepsilon_{ci} \qquad [5.6]$$

where σ_r^2 represents variance of the fractional rank of individuals sorted by their socioeconomic status. The coefficient β on the ranking variable is the estimate of CI, and the standard error of β in the convenient regression, is the standard error of CI (O'Donnell et al, 2007a).

After computing the CI, the Kakwani index of progressivity (KI) is also computed using the convenient regression approach in equation [5.7]:

$$2\sigma_r^2 \left({}^{h_i}/_{\hat{\mu}_h} - {}^{y_i}/_{\hat{\mu}_y}\right) = \alpha_k + \beta_k r_i + \varepsilon_{ki} \qquad [5.7]$$

Here y_i is an individual's socioeconomic variable and $\hat{\mu}_h$ and $\hat{\mu}_y$ are the mean values of cost of care and socioeconomic status respectively. The coefficient β on the ranking variable represents the KI, and its standard error is that of the index (O'Donnell et al, 2007a).

5.3 Results

Empirical results are presented in two parts; the first part focuses on results from the interaction models, while the second part presents results from the concentration and Kakwani analyses.

5.3.1 Results from the interaction models

Table 5-1 presents results from cost of care regression models that use an interaction term between insurance and socioeconomic status. The interaction term coefficients are consistently negative and statistically significant in all models, suggesting that insurance is more protective for poorer households. The rho parameter is also statistically significant for the Heckman sample selection, treatment effects and Heckman two-part models, suggesting that the corrected models are to be preferred, because the error terms of the self-selection decisions and the cost of care equation are correlated.

Table 5-1: Results for the cost of care regression models with interaction term for insurance status and log of consumption expenditure

Variables	Econometric models				
Dependent variable: Log of individual level cost of healthcare	**Model 1: OLS model**	**Model 2: Two-part model**	**Model 3: Heckman's model for care-seeking self-selection**	**Model 4: Treatment effects model for insurance-seeking self-selection**	**Model 5: Insurance probit followed by Heckman's model for care-seeking self-selection**
Interaction between VHI status and log of consumption expenditure	-0.65**	-0.73**	-0.72**	-0.57**	-0.75*
	(0.02)	(0.01)	(0.02)	(0.03)	(0.06)
Member of VHI programme	-0.38	-0.77**	-0.62**	-0.74*	-0.66
	(0.16)	(0.01)	(0.02)	(0.06)	(0.11)
Log of equivalent annual household expenditure (mean-centred)	0.46**	0.49***	0.50***	0.47**	0.53***
	(0.03)	(0.00)	(0.00)	(0.02)	(0.00)
Age	0.00	0.01	0.01	0.01	0.00
	(0.66)	(0.75)	(0.72)	(0.73)	(0.87)
Age-squared	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.78)	(0.72)	(0.69)	(0.87)	(0.80)
Female	0.10	-0.21	-0.13	0.09	-0.13
	(0.79)	(0.45)	(0.66)	(0.81)	(0.67)
Interaction between age and sex	0.00	0.01	0.01	0.00	0.01
	(0.67)	(0.20)	(0.20)	(0.64)	(0.19)
No. of illnesses in last 3 months	-0.03	0.02	0.01	-0.03	0.01
	(0.62)	(0.62)	(0.87)	(0.60)	(0.85)
Inpatient admission in last 3 months	2.34***	2.47***	2.50***	2.34***	2.48***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Health status: fairly good	0.06	-0.39	-0.21	0.04	-0.27
	(0.83)	(0.14)	(0.46)	(0.89)	(0.41)

Health status: fairly bad	0.81** (0.01)	0.62*** (0.01)	0.74*** (0.01)	0.81*** (0.01)	0.71*** (0.01)
Health status: long-term illness	0.92** (0.03)	0.42 (0.13)	0.71* (0.06)	0.92** (0.02)	0.68* (0.07)
Chronic illness	0.09 (0.79)	0.11 (0.68)	0.09 (0.75)	0.07 (0.82)	0.07 (0.80)
Rural residence	0.30 (0.14)	0.28 (0.20)	0.31 (0.13)	0.31 (0.11)	0.32 (0.11)
Province: Hai Phong	-0.52 (0.24)	0.42 (0.27)	0.01 (0.98)	-0.53 (0.21)	0.02 (0.96)
Province: Ninh Binh	0.01 (0.94)	0.28 (0.32)	0.15 (0.60)	-0.01 (0.97)	0.14 (0.63)
Occupation: service	0.27 (0.29)	0.40* (0.07)	0.38** (0.04)	0.25 (0.31)	0.35** (0.05)
Occupation: farmer	0.02 (0.91)	-0.06 (0.84)	-0.04 (0.85)	0.00 (1.00)	-0.07 (0.75)
Occupation: wage employment	-0.15 (0.37)	-0.39 (0.13)	-0.24 (0.22)	-0.17 (0.30)	-0.26 (0.19)
Years of schooling	-0.03 (0.48)	0.01 (0.84)	-0.01 (0.65)	-0.02 (0.58)	-0.01 (0.79)
Interaction between years of schooling and gender (female)	0.00 (0.99)	-0.01 (0.67)	-0.01 (0.68)	0.00 (0.98)	-0.01 (0.68)
Interaction between years of schooling and age	0.00 (0.46)	0.00 (0.42)	0.00 (0.28)	0.00 (0.50)	0.00 (0.28)
Inverse Mills' Ratio	- -	- -	- -	- -	0.29 (0.35)
Inverse Mills' Ratio - squared	- -	- -	- -	- -	-0.30*** (0.01)

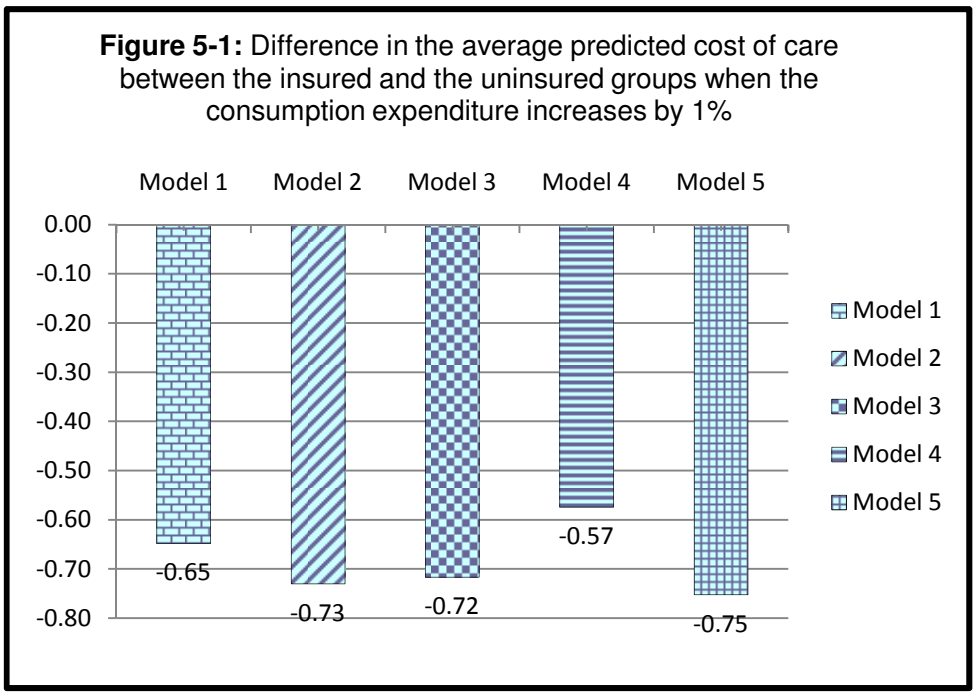
Inverse Mills' Ratio - cube-root	-	-	-	-	0.03
	-	-	-	-	(0.31)
Constant	2.43***	2.83***	2.58***	2.49***	2.66***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Rho	-	-	1.26*	0.18**	1.18*
	-	-	(0.09)	(0.05)	(0.09)
Sigma	-	-	0.40***	0.48***	0.40***
	-	-	(0.00)	(0.00)	(0.00)
Observations	1189	1189	1189	1189	1189

Robust p values in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 5-1 plots the interaction coefficients for all five models. The figure shows that the interaction term coefficient was underestimated by 10% when care-seeking and insurance-seeking self-selection biases were not taken into account, leading to a biased estimate.

The magnitude of this interaction term can be interpreted as the difference in income elasticities between the insured and uninsured. The coefficient on log of consumption expenditure represents the income elasticity for the uninsured group (note: the interaction term equals 0 for the uninsured; hence, the coefficient on log of consumption expenditure represents elasticity for the uninsured). This income elasticity coefficient for the uninsured is positive and inelastic (0.53). For the insured group, the elasticity is obtained by adding the coefficients on the interaction term and the log of consumption expenditure. The income elasticity coefficient for the insured group is negative and inelastic (-0.22). The sign of the interaction term is consistently negative. This suggests that those in higher socioeconomic groups experience a less dramatic effect of insurance membership on the cost of care than those in poorer quintiles. In other words, insurance has a greater protective effect on the poor than the rich. This finding is in line with the results presented in Jowett, Contoyannis and Vinh (2003), who used the same data for regression analysis (although they only used observations with positive OOP costs, N = 980); however the magnitude of the interaction effect was underestimated [coefficient = -0.433] in that study.

Figure 5-1: The coefficients on interaction term between insurance and socioeconomic status



It should be noted that the interaction term estimates the marginal effect of consumption expenditure on the cost of care for the insured and the uninsured. However, in order to evaluate the entire distribution of expenditure and consumption expenditure, an analysis based on concentration and Lorenz curves is required. This analysis is presented in the following section.

5.3.2 Results from concentration and Kakwani index analysis

Figure 5-2 presents the concentration and Lorenz curves for the observed and predicted cost distributions. Figure 5-3 provides further insight into the cost distribution, by plotting the proportion of total sample health care cost shared by each socioeconomic quintile. Figure 5-4 presents the progressivity gap between concentration and Lorenz curves (this is effectively the difference between the concentration and Lorenz curve at each point along the socioeconomic gradient) and shows the socioeconomic distribution of progressivity; table 5-2 summarises CIs and KIs for each analysis.

The concentration indices based on the observed cost of care (the unstandardised analysis) suggest that the average level of inequality in health care costs was more pro-poor in the insured group [CI = 0.145, p <0.01] than the uninsured group [CI = 0.120, p = 0.15] [table 5-

2]. A graphical examination of the concentration curves [figure 5-2 (a)] revealed that the cost distribution for the lowest three socioeconomic quintiles in the insured group was more pro-poor than the respective quintiles of the uninsured group. This is because the lowest three insured quintiles contribute 42.4% to the total insured cost of care, while the respective uninsured quintiles contribute 58.2% to the total uninsured cost of care [figure 5-3]. A progressivity analysis of unstandardised costs suggests that the cost distributions are on average regressive or pro-rich for both groups: insured [KI = -0.244, p<0.01], uninsured [KI = -0.242, p = 0.01] [table 5-2] [2]. Figure 5-4 shows that the level of regressivity in financing was less pronounced in the poorest quintiles of the insured group, compared to the uninsured.

Since observed cost is a function of need and non-need variables, once the need standardisation process was implemented, the concentration indices for both groups become more positive, i.e. more pro-poor; insured [CI = 0.31, p<0.01], uninsured [CI = 0.16, p<0.01] [table 5-2]. Figure [5-2] shows that the need standardisation procedure shifts the concentration curves down for both the groups. This finding is not surprising, since need variables have a higher concentration among the poorer quintiles. When these need differences are averaged out, the standardised distribution becomes a function of the non-need determinants, which are concentrated among the richer quintiles. As a result, the need standardised costs are relatively more pro-poor than the observed costs used in the unstandardised analysis [figure 5-3].

It is important to note that, for first half of the cost distribution, the unstandardised concentration curve for the insured group lies below the concentration curve for the uninsured group. Once the need variables were standardised and the self-selection biases were corrected, almost entire cost distribution of the insured lies below the distribution of the uninsured. This suggests that insurance is associated with relatively pro-poor distribution of health care costs. Furthermore, the poor half of the insured cost distribution lies below the Lorenz curve for income distribution; whereas the uninsured cost distribution always lie

[2] It should be noted that the analysis was carried out in Stata, and that the command for concentration curves, -glcurve-, randomly sorts individuals when the level of socioeconomic status is the same. This sort order remains stable within a particular Stata session but not between sessions. Hence the magnitude of the index may change marginally when the analysis is re-run. This issue was raised with the authors of the –glurve- package. Communication available on Statalist at http://www.stata.com/statalist/archive/2008-06/msg00726.html. This communication resulted in an update of –glcurve- on Stata and the contribution was acknowledged. The current results are based on the updated version of –glcurve-, which remains stable within a session but not between sessions.

above the respective Lorenz curve. This clearly indicates that insurance membership is associated with progressive financing for the poor. This is an important finding, as it implies that the cost reduction associated with insurance (as established in chapter 4) benefits the poor more than the rich.

It was also interesting to note that the insured concentration curve has sharp dips in the richer half of the distribution (figure 5-4) which become less pronounced when the self-selection biases are corrected. This could potentially occur due to correlation between the unobserved determinants of socioeconomic status and the care-seeking/insurance-seeking decision. Once this correlation was taken into account in the cost of care model, the dips becomes less pronounced.

The progressivity analysis of need adjusted distributions revealed that the Kakwani indices, for both the insured and uninsured groups, became less regressive after standardisation: insured [KI = -0.080, $p<0.001$], uninsured [KI = -0.203, $p<0.01$] [table 5-2]. In fact, the need standardised progressivity gap shows progressivity in financing for the poorest 45% of the insured sample, while the remaining distribution remained regressive [figure 5-4].

In the next step, we use the two-part and Heckman's sample selection models to correct care-seeking self-selection bias along with need standardisation. Both models result in a marginal decrease in the CI for the insured, and an increase for the uninsured; insured [TPM: CI = 0.278, $p<0.01$; Heckman: CI = 0.303, $p<0.01$], uninsured [TPM: CI = 0.180, $p<0.01$; Heckman: CI = 0.186, $p<0.01$] [table 5-2]. A separate analysis showed that, after care-seeking correction, the predicted cost of care increased in absolute monetary terms for all the quintiles of insured and uninsured groups. However, the relative increase in the predicted cost was proportionately higher for the richer quintiles [figure 5-3]. This finding is not surprising, since the bias-corrected cost distribution is dictated solely by non-need variables, such as income and education (need variables have been standardised), which have higher values among the richer quintiles, thus predicting higher costs among the rich. The analysis of progressivity shows corresponding changes in Kakwani indices, reflecting these same movements in concentration curves. The insured distribution is still observed to be less regressive than the uninsured distribution.

In the next step, insurance-seeking self-selection bias was corrected, using a treatment effects model. The results suggest a marginal increase in the concentration indices, compared to OLS predictions, for both insured and uninsured groups; insured [CI = 0.316, p<0.01], uninsured [CI = 0.170, p<0.01] [table 5-2]. The corresponding concentration curves [figure 5-2] and predicted cost share graphs [figure 5-3] suggest that the impact of insurance endogeneity correction is more or less uniform across the socioeconomic quintiles. This suggests that the unobserved characteristics associated with the insurance decision do not have a significant distributional impact on cost predictions. The corresponding Kakwani indices also follow a similar pattern, producing only a marginal decrease for both groups.

Finally, the two-part Heckman model (insurance probit followed by Heckman sample selection model) corrects for both types of self-selection bias, whilst standardising for need. The predicted cost distributions are significantly more pro-poor for the insured [CI = 0.324, p<0.01] compared to the uninsured [CI = 0.189, p<0.01]. The corresponding Kakwani indices also show that the insured cost distributions are significantly less regressive [KI = -0.065, p<0.01] than the uninsured [KI = -0.173].

An analysis of distributional graphs suggests that, in the insured group, the pro-poorness and progressivity of cost distribution is concentrated mainly in the poorest three quintiles. In contrast, for the uninsured group, pro-poorness of the cost distribution is uniformly distributed, and the distribution of progressivity gap is always regressive [figures 5-2 and 5-4].

5.4 Discussion

This study has identified potential biases in the standard practice of measuring equity and progressivity of financing, and has proposed an improved methodology that was applied to the case of Vietnamese VHI. The proposed method standardised the differences in the level of observed need variables and aimed to correct for potential self-selection biases associated with care-seeking and insurance-seeking decisions.

Based on the proposed methodology, this study has shown that the VHI membership reduces the level of regressivity of financing. The study also found that the need standardisation procedure increased the level of pro-poorness of cost distribution and reduced the level of

regressivity for insured and uninsured groups. However, correcting for self-selection biases only produced minimal changes in the overall distribution. This study also found that, after standardisation and bias correction, the OOP payments were progressive for the poorest half of the insured sample, although the overall Kakwani index remained regressive.

The process of need standardisation has enabled the study to highlight the inequalities attributable to non-need determinants of health care costs. The findings of this study have important relevance to policy making in the developing countries. Since formal mechanisms of progressive taxation are limited in the context of informal economies, insurance can be a useful tool to reduce the cost burden on the poor and improve progressivity of financing. Furthermore, a progressive method of financing can potentially redistribute societal resources to the advantage of the poor. Hence, the study proposes that the Vietnamese VHI programme should be extended further with targeted measures to facilitate membership uptake, especially among the poor whose proportionate share of OOP payments can be reduced substantially by insurance membership. However, policy-makers need to be cautious about the concerns on financial sustainability of such programmes where relatively small cost recovery may leave significant funding gaps.

Figure 5-2 (a): Concentration and Lorenz curves for unstandardised and need standardised cost of care (based on OLS model)

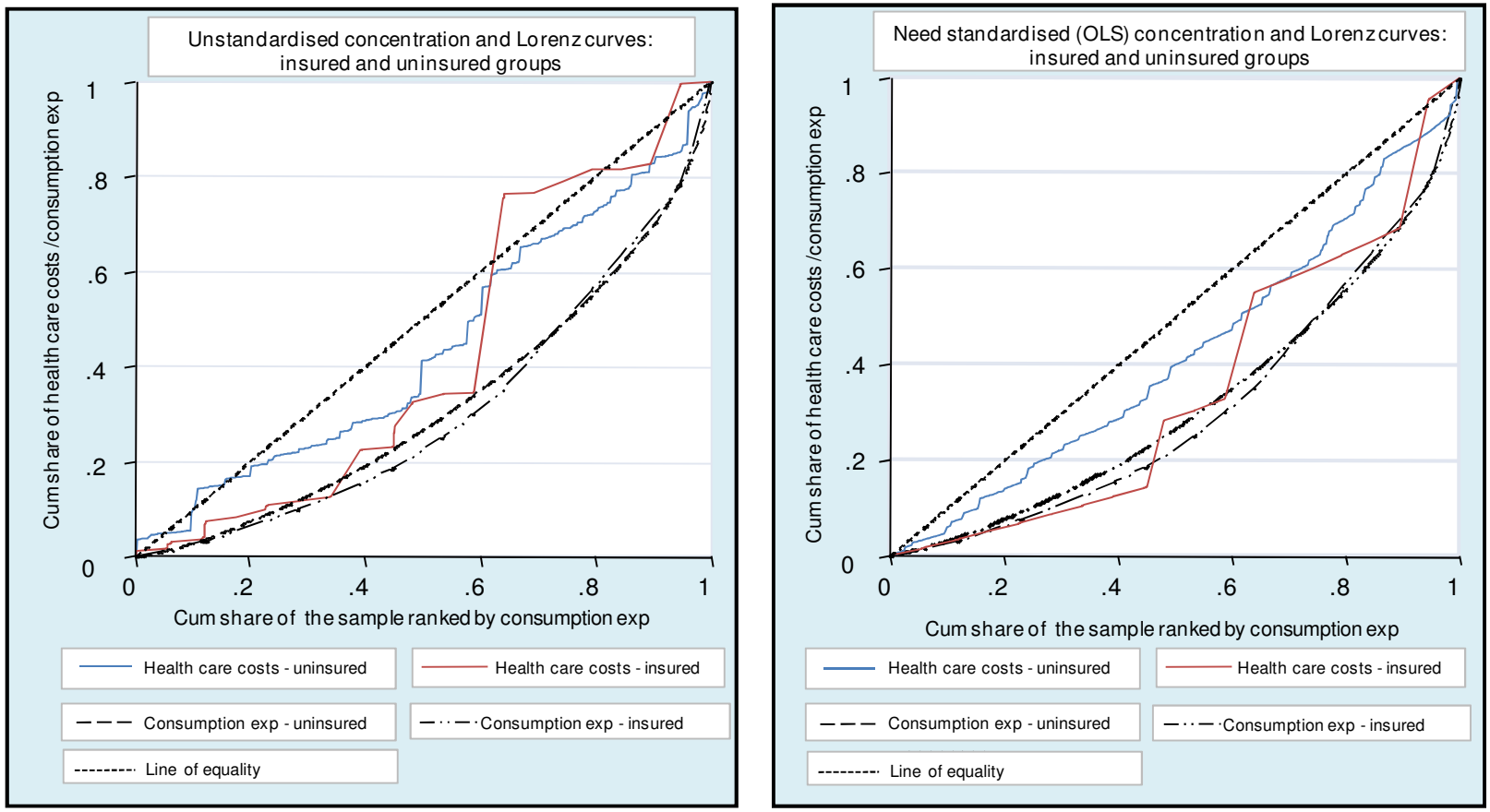
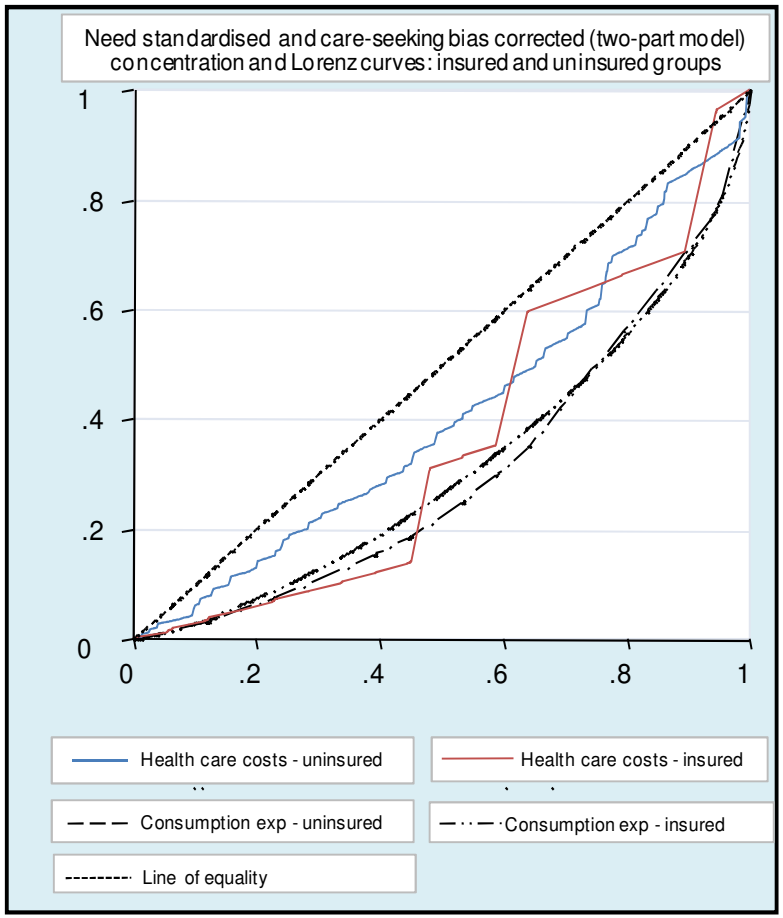


Figure 5-2 (b): Concentration and Lorenz curves for need standardised and care-seeking self-selection bias corrected cost of care (based on TPM and Heckman models)



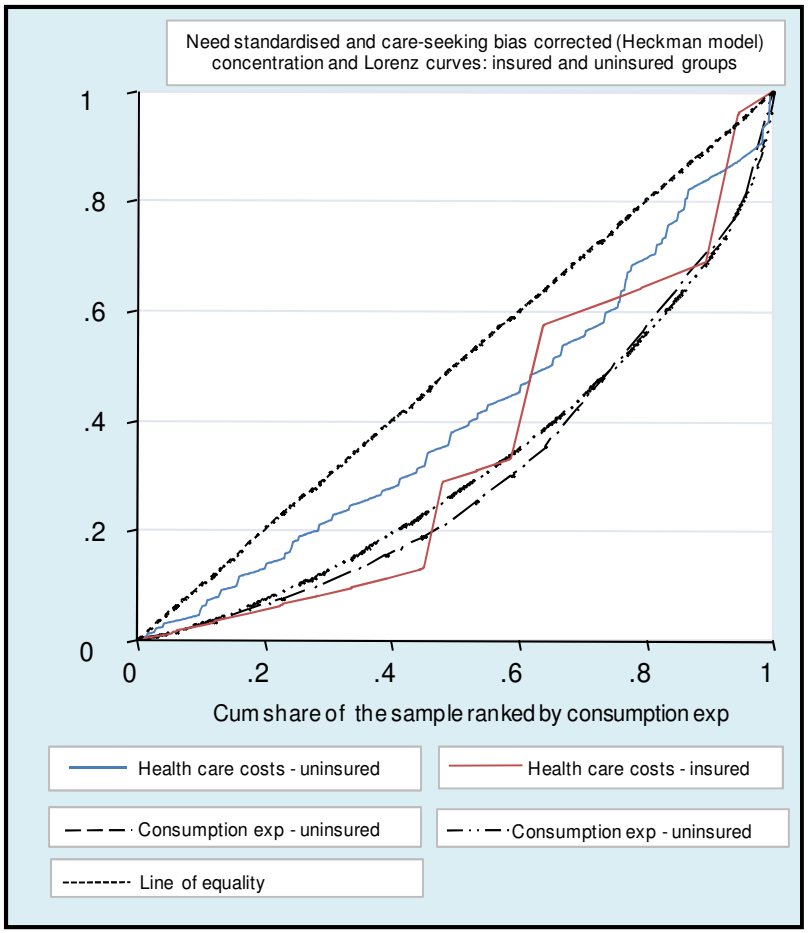
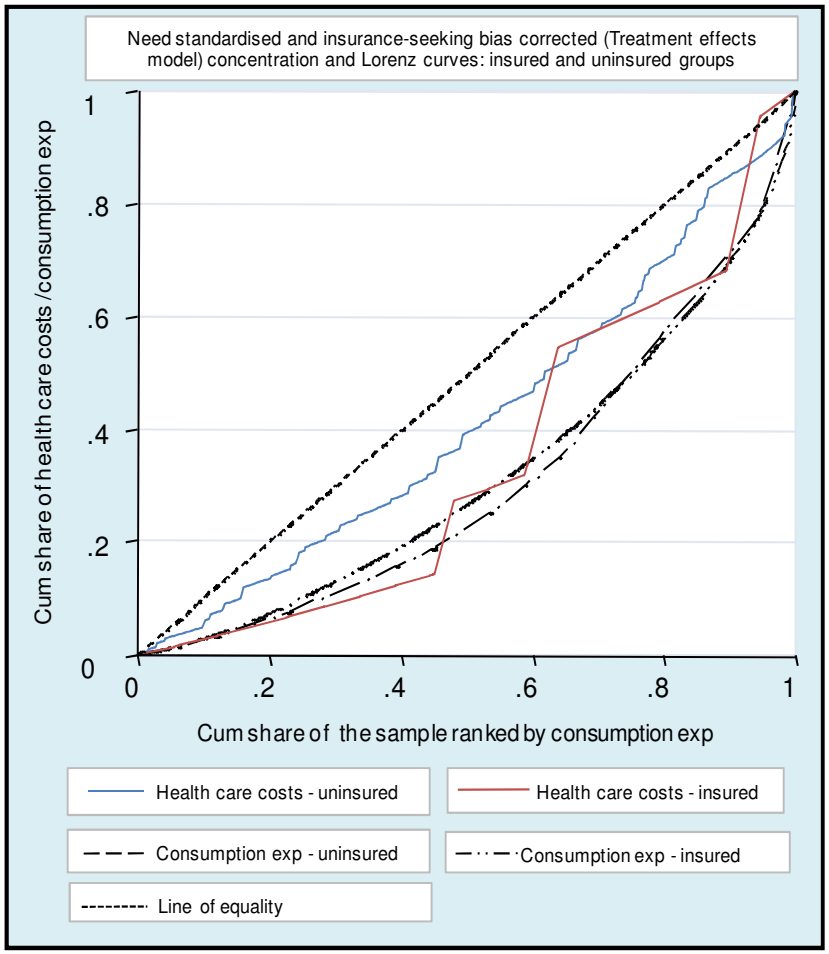


Figure 5-2 (c): Concentration and Lorenz curves for need standardised and insurance-seeking bias corrected cost of care (left) and both care- and insurance-seeking, bias corrected cost of care (right)



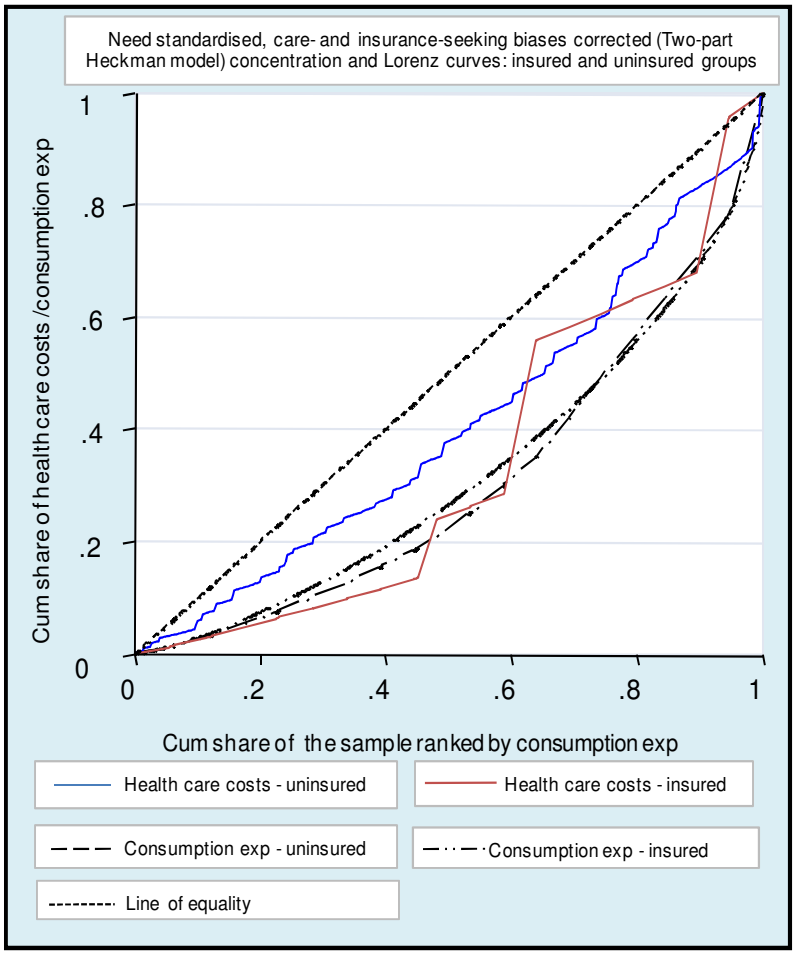
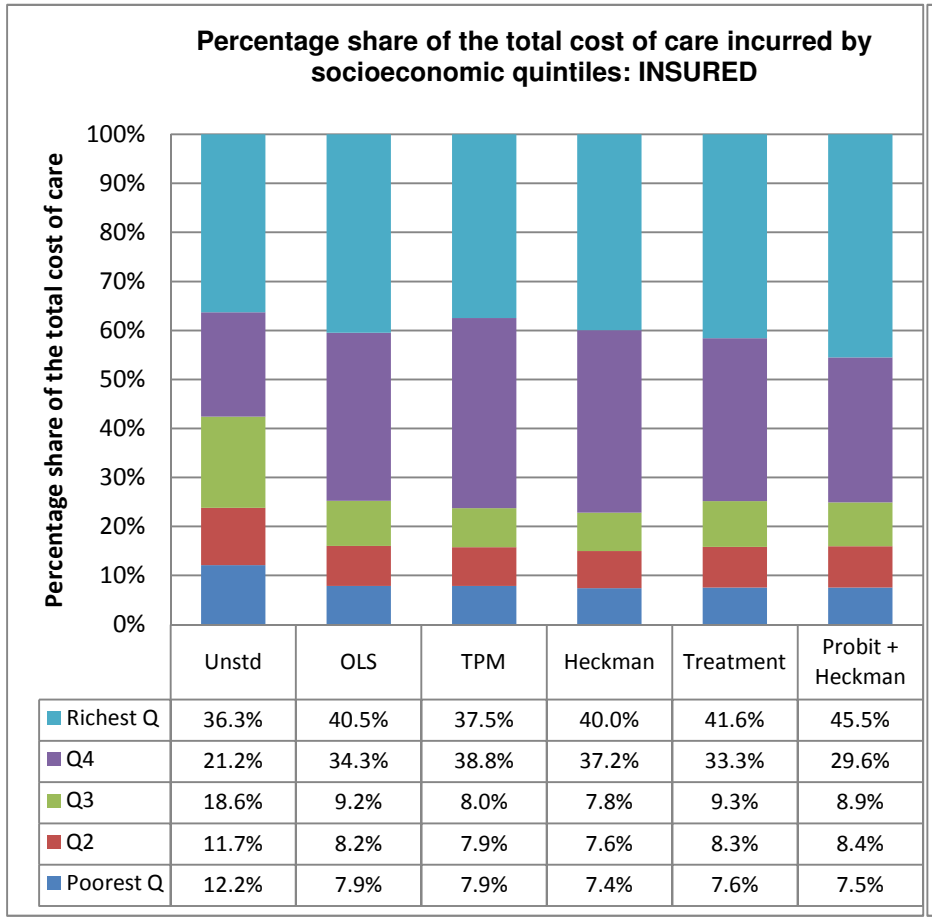
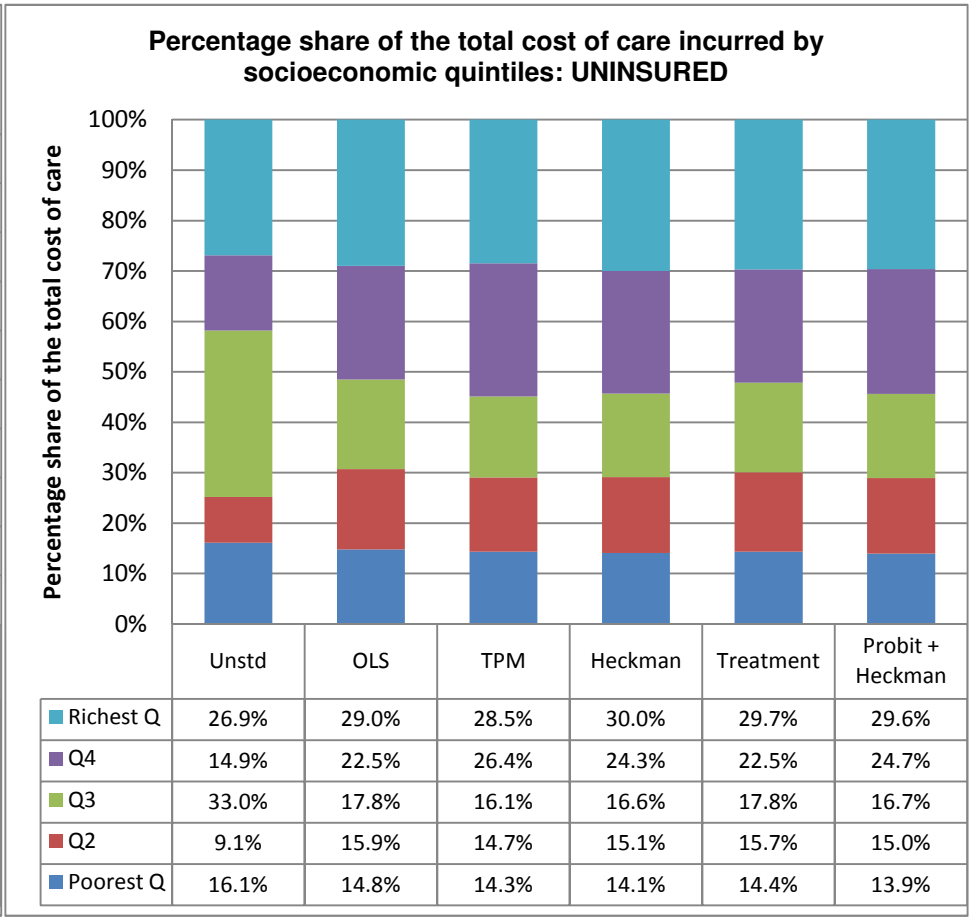


Figure 5-3: Percentage share of total cost of care by socioeconomic quintiles (by insurance status)

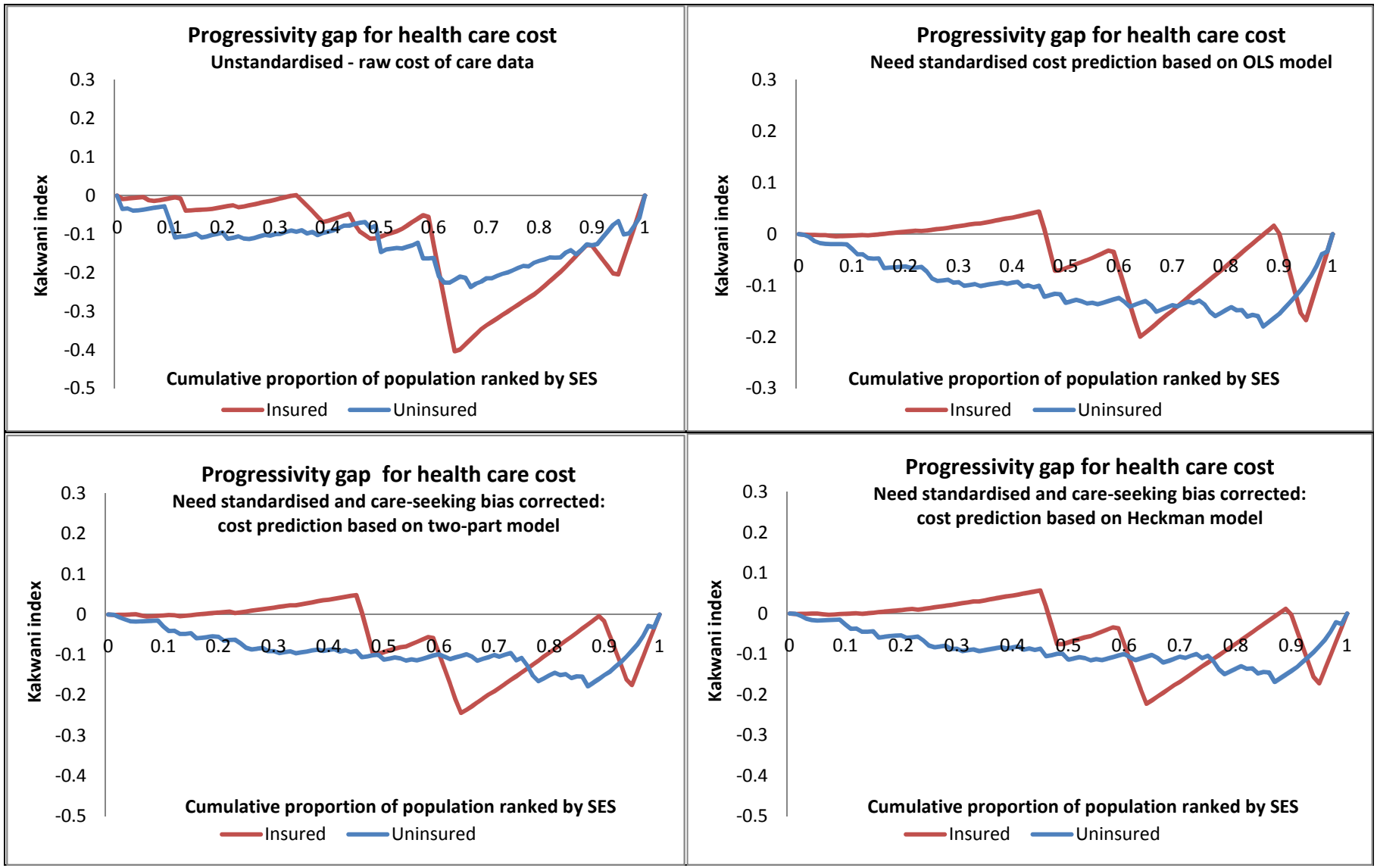


	Unstd	OLS	TPM	Heckman	Treatment	Probit + Heckman
Richest Q	36.3%	40.5%	37.5%	40.0%	41.6%	45.5%
Q4	21.2%	34.3%	38.8%	37.2%	33.3%	29.6%
Q3	18.6%	9.2%	8.0%	7.8%	9.3%	8.9%
Q2	11.7%	8.2%	7.9%	7.6%	8.3%	8.4%
Poorest Q	12.2%	7.9%	7.9%	7.4%	7.6%	7.5%



	Unstd	OLS	TPM	Heckman	Treatment	Probit + Heckman
Richest Q	26.9%	29.0%	28.5%	30.0%	29.7%	29.6%
Q4	14.9%	22.5%	26.4%	24.3%	22.5%	24.7%
Q3	33.0%	17.8%	16.1%	16.6%	17.8%	16.7%
Q2	9.1%	15.9%	14.7%	15.1%	15.7%	15.0%
Poorest Q	16.1%	14.8%	14.3%	14.1%	14.4%	13.9%

Figure 5-4: Distribution of the difference between concentration and Lorenz curves (the progressivity gap) along the socioeconomic gradient



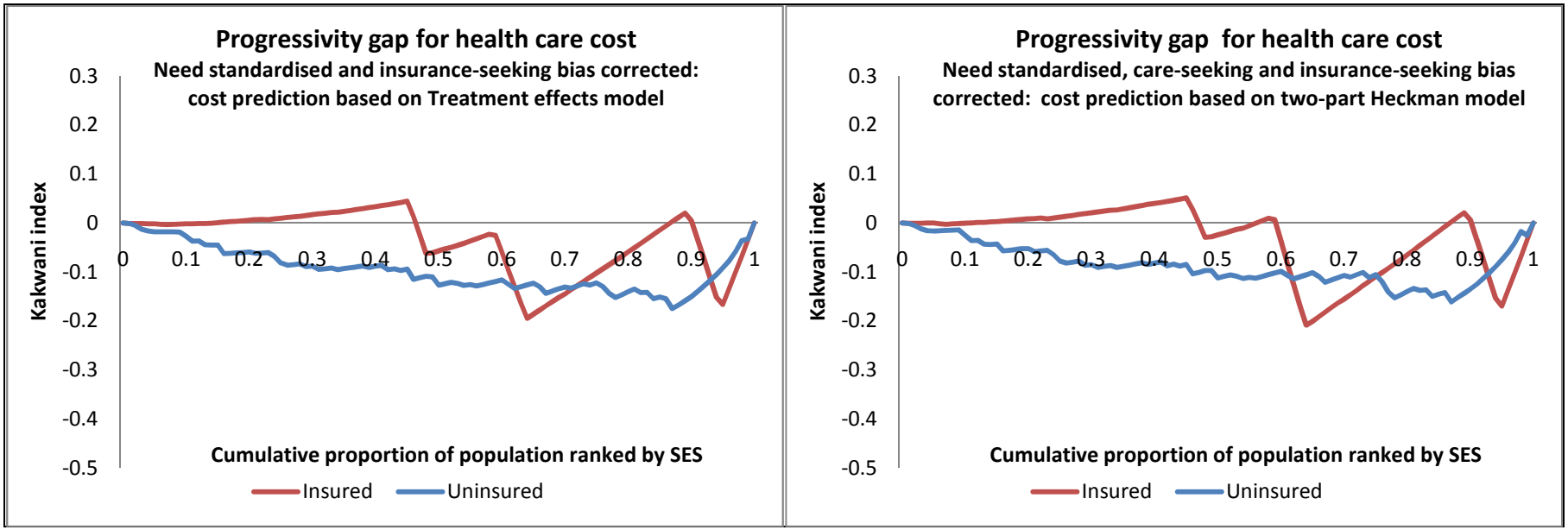

Progressivity gap for health care cost
Need standardised and insurance-seeking bias corrected: cost prediction based on Treatment effects model
Kakwani index
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Cumulative proportion of population ranked by SES
Insured
Uninsured
Progressivity gap for health care cost
Need standardised, care-seeking and insurance-seeking bias corrected: cost prediction based on two-part Heckman model
Kakwani index
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Cumulative proportion of population ranked by SES
Insured
Uninsured

Table 5-2: Concentration and Kakwani indices for insured and uninsured groups based on unstandardised and standardised analysis

	Unstandardised analysis		OLS model		TPM model		Heckman model		Treatment effects model		Two-part Heckman model	
	Insured	**Uninsured**	**Insured**	**Uninsured**	**Insured**	**Uninsured**	**Insured**	**Uninsured**	**Insured**	**Uninsured**	**Insured**	**Uninsured**
Concentration Index	0.145***	0.120	0.309***	0.160***	0.278***	0.180***	0.303***	0.186***	0.316***	0.170***	0.324***	0.189***
	(0.00)	(0.15)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Kakwani Index	-0.244***	-0.242***	-0.080***	-0.203***	-0.111***	-0.182**	-0.086***	-0.176**	-0.073***	-0.192***	-0.065***	-0.173**
	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)

Robust p values in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Chapter 6

Impact of Voluntary Health Insurance on catastrophic health care costs

6.1 Introduction

The aim of this chapter is to measure the impact of the Vietnamese Voluntary Health Insurance (VHI) programme on the incidence and intensity of catastrophic health care costs. The specific research objectives are to:

i) compare the observed incidence and intensity of catastrophic events in the insured and uninsured groups;

ii) analyse the impact of membership of the VHI programme on the probability of catastrophic event using discrete regression models;

iii) correct for any potential bias in catastrophic probability models attributable to non-random distribution of self-selection decisions;

iv) analyse the catastrophic risk reduction attributable to insurance membership, and compute the number needed to treat (NNT) to prevent one catastrophic event; and

v) evaluate the socioeconomic distribution of the protective effect of insurance on the occurrence of catastrophic events.

The above analysis is carried out using: a) the observed health care costs, and b) the predicted probabilities of financial catastrophe, calculated before and after correcting for potential care-seeking and insurance-seeking self-selection bias.

The rest of the chapter is organised as follows. Sections 6.2 to 6.4 will discuss the study methodology. More specifically, section 6.2 will discuss the two standard methodological approaches traditionally used for catastrophic cost analysis, i.e. the headcount and positive overshoot method, and regression-based catastrophic event modelling. Section 6.3 will discuss the potential biases in the regression models due to self-selection decisions, and the corrective models employed in this thesis. Sections 6.4 will discuss the computational method used to calculate risk reduction and NNTs. Section 6.5 will present the descriptive and analytical results from the catastrophic analysis. Finally, section 6.6 will discuss the implications of the study's findings for social policy.

6.2 Methodology

The cost of health care is defined as catastrophic when its share as a fraction of the total consumption expenditure exceeds a pre-defined threshold value. This study uses a range of threshold values between 10% and 40%, with equal intervals of 10%. This approach controls for the possibility of introducing a subjective bias in the choice of threshold value. The numerator for the current analysis is the individual level health care cost for the three months prior to the study. The two denominators used separately in the analysis are total consumption expenditure and non-food consumption expenditures. Both are equivalised to account for the heterogeneity of household size. A consistent pattern of consumption across four quarters of the year was assumed, and therefore annual consumption was appropriately divided by four to match the duration of health care costs incurrence.

In the literature, two standard approaches of catastrophic cost analyses have commonly been used. The first involves measuring the incidence and intensity of financial catastrophe based on the observed cost of care (Wagstaff and van Doorslaer 2003). The second uses binary regression models to estimate the probability of a catastrophic event after controlling for need and non-need variables (O'Donnell and van Doorslaer 2005; Ekman 2007a). Both of these approaches have been employed in the literature to measure the impact of voluntary health insurance on the catastrophic cost of care (Ranson 2002; Cavagnero et al 2006; Joglekar 2008).

The current study goes a step further by correcting for any potential self-selection bias in the regression-based approach. Furthermore, based on results from the regression models, the catastrophic risk reduction attributable to insurance membership, and the 'number needed to treat' in order to avoid catastrophic event will be evaluated. These results will be presented separately for each socioeconomic quintile, in order to draw equity conclusions about the impact of the insurance programme.

6.2.1 Measuring the incidence and intensity of catastrophic health care costs

Catastrophic event incidence is defined as the percentage of individuals for whom the cost of care, as a proportion of the socioeconomic measure of their ability-to-pay, is greater than the threshold value [Z] (O'Donnell and van Doorslaer 2005). For an individual:

$$C_i = 1\ if\ \frac{H_i}{S_i} > Z, \qquad else\ 0 \qquad [6.1]$$

Here C represents a catastrophic event, H_i is the cost of care variable and S_i represents consumption expenditure (the socioeconomic variable). The threshold values are defined at 10%, 20%, 30% and 40%, and the incidence is obtained through a simple process of headcount of those incurring catastrophic costs. If the total sample size is represented by *N*, the proportion of individuals in the sample with catastrophic costs is represented by K and is calculated in equation [6.2]:

$$K = \left(\frac{1}{N}\right)\sum_{i=1}^{N} C_i \qquad [6.2]$$

The catastrophic cost overshoot, defined as the amount by which an individual exceeds the threshold, can be calculated as:

$$O_i = \frac{H_i}{S_i} - Z\ if\ C_i = 1 \qquad [6.3]$$

The average cost overshoot, $\bar{O}$, is simply the mean of O_i represented as $\left(\frac{1}{N}\right)\sum_{i=1}^{N} O_i$.

6.2.2 Modelling the probability of a catastrophic event

The observed headcount does not control for the differences in any covariates that may influence the catastrophic event rate. In order to control for the observed need and non-need determinants, a probit function was used to model the probability of a catastrophic event. This model is represented below:

$$\Pr[C] = \Phi\left(x_p \beta_p\right) \qquad [6.4]$$

Here, $\Pr[C]$ represents the probability of a catastrophic event and x_p represents the independent variables that influence this probability. The analysis includes all the individuals with one or more reported illnesses in the three months prior to the survey, irrespective of whether or not they sought health care for their illness.

6.3 Correcting for care-seeking and insurance-seeking self-selection bias in catastrophic event models

The naive probit model for the occurrence of a catastrophic event is based on the observed health care costs. This analysis may be biased due to the non-random distribution of care-seeking decision, particularly if care-selection is not independent of the probability of a catastrophic event. In principle, the bias would be similar to that observed in chapter 4 when modelling the cost of care; however in this case, the dependent variable models the probability of extreme values of health care costs, rather than the mean expected values. To correct for the potential selection issue, the care-seeking decision is modelled independently, using the probit function below:

$$Pr[z = 1|\omega_z] = \Phi\,(\omega_z\beta_z) \qquad [6.5]$$

Here z represents the care-seeking decision and ω_z represents the predictor variables. Equation [6.6] is subsequently used to generate an inverse Mills ratio (IMR) for care-seeking decision in the same way as was implemented in chapter 4. The IMR represents the ratio of the probability density function to the cumulative density function for care-seeking decision [equation 6.6].

$$\lambda_{ci} = \begin{cases} \phi\,(w_{zi}\beta_z) \Big/ \Phi\,(w_{zi}\beta_z) & \text{for } z_i = 1 \\ \phi\,(w_{zi}\beta_z) \Big/ [1 - \Phi\,(w_{zi}\beta_z)] & \text{for } z_i = 0 \end{cases} \qquad [6.6]$$

Since self-selection bias is effectively an omitted variable bias, the inclusion of the unobserved propensity of seeking care (λ_c) as an additional covariate in the catastrophic event model, aims to correct the bias [equation 6.7].

$$\Pr\,[C] = \Phi\,(x_c\beta_c + \lambda_c) \qquad [6.7]$$

Catastrophic event models may also suffer selection bias, due to the endogeneity of insurance self-selection, if the unobserved propensity of insurance decision is systematically associated with the catastrophic event rate. Again, the underlying principle of bias is the same as

discussed in chapter 4. In order to correct for the potential insurance-seeking bias, we employ a probit model for insurance decision [equation 6.8].

$$Pr[M = 1|v_z] = \Phi\,(v_z\beta_z) \qquad [6.8]$$

An inverse Mills ratio (λ_m) is generated, so that insurance decision can be used as an additional regressor in the catastrophic incidence model [equation 6.9].

$$\Pr\,[C] = \Phi\,(x_c\beta_c + \lambda_m) \qquad [6.9]$$

Finally, in order to simultaneously correct for the two self-selection biases, the IMRs from both the care-seeking and insurance-seeking equations are included into the catastrophic incidence model [equation 6.10]:

$$\Pr\,[C] = \Phi\,(x_c\beta_c + \lambda_c + \lambda_m) \qquad [6.10]$$

6.4 Absolute risk reduction and the number needed to treat analysis

The predicted probabilities from the catastrophic event models can also be presented in the form of a reduction in risk that is attributable to insurance membership. The concept of absolute risk reduction (ARR) is borrowed from epidemiological literature (Griffith et al 2009; Barratt et al 2004; Schechtman 2002; Cook and Sackett 1995) and applied to the context of catastrophic event analysis. ARR is defined as the absolute amount by which the risk of a catastrophic event is reduced due to insurance membership. If the absolute risk is represented by the predicted probability of financial catastrophe, the absolute risk reduction can be expressed as the difference between the predicted probabilities in the uninsured and the insured groups [6.11]:

$$ARR = \Pr\,[C]_u - \Pr\,[C]_m \qquad [6.11]$$

Here $\Pr\,[C]_u$ represents the predicted probability of financial catastrophe in the uninsured group, and $\Pr\,[C]_m$ represents the same variable for the insured group. If the sign of ARR is

positive, it would suggest that the uninsured are more likely to suffer a catastrophic event, and vice versa.

Another important concept borrowed from the epidemiological literature for this study is that of the number needed to treat (NNT). This metric is highly relevant to the policy context, as it provides an assessment of the potential impact of investment on a programme. Conceptually, an NNT estimate represents the number of individuals who need to be treated in order to prevent one adverse event. In the case of the current study, treatment refers to insurance membership and adverse event refers to a catastrophic event. Hence, NNTs provides an estimate of the potential gain, in terms of prevention of catastrophic events, from improving access to insurance membership. To the best of my knowledge, the concept of NNT has not been applied before to the context of catastrophic event analysis.

Computationally, NNT is the reciprocal of absolute risk reduction, and can be represented as:

$$NNT = \frac{1}{|\Pr[C]_u - \Pr[C]_m|} \qquad [6.12]$$

In this study, the results from ARR and NNT analyses are presented for each socioeconomic quintile of the insured and uninsured groups, to estimate the potential equity implication of insurance membership on catastrophic incidence.

6.5 Results

The catastrophic cost analysis was carried out using all observations with at least one episode of reported illness in the three months prior to the survey. The total number of eligible observations was 1,192, of whom 207 individuals did not seek any care, and thus had zero costs and hence no catastrophic financial costs due to health care expenditure.

The results are presented in three parts:

1) The incidence and intensity of catastrophic events based on the observed costs, and their distribution across socioeconomic quintiles [section 6.5.1];
2) Regression results based on probit models for catastrophic event probability before and after correction for self-selection biases [section 6.5.2];

3) The estimates of absolute risk reduction and the number needed to treat, and their distribution across the socioeconomic quintiles [section 6.5.3].

6.5.1 Incidence and intensity of catastrophic events

Tables 6-1 (a) and (b) summarise the catastrophic headcount and mean overshoot at threshold levels of 10%, 20%, 30% and 40%. Table 6-1 (a) uses total consumption expenditure as the denominator while table 6-1 (b) uses non-food consumption expenditure as the denominator.

Table 6-1 (a): Incidence and intensity of catastrophic health costs (Denominator: total consumption expenditure)

Catastrophe measure: Out-of-pocket cost of care as share of total consumption expenditure		**Threshold budget share**			
Catastrophic payment measure	**Insurance status**	**10%**	**20%**	**30%**	**40%**
Headcount	Uninsured	15.19%	8.12%	4.43%	3.39%
Std Error		1.60%	1.19%	0.89%	0.79%
Headcount	Insured	5.59%	0.28%	0.16%	0.11%
Std Error		4.95%	0.11%	0.07%	0.06%
Overshoot	Uninsured	3.10%	1.99%	1.36%	0.95%
Std Error		0.50%	0.41%	0.33%	0.26%
Overshoot	Insured	0.39%	0.05%	0.02%	0.01%
Std Error		0.30%	0.02%	0.01%	0.01%

Table 6-1 (b): Incidence and intensity of catastrophic health costs (Denominator: non-food consumption expenditure)

Catastrophe measure: Out-of-pocket cost of care as share of non-food expenditure		**Threshold budget share**			
Catastrophic payment measure	**Insurance status**	**10%**	**20%**	**30%**	**40%**
Headcount	Uninsured	30.77%	18.59%	9.60%	6.27%
Std Error		2.15%	1.81%	1.32%	1.09%
Headcount	Insured	6.07%	5.60%	0.38%	0.35%
Std Error		4.95%	4.95%	0.13%	0.12%
Overshoot	Uninsured	5.69%	3.38%	2.05%	1.28%
Std Error		0.61%	0.48%	0.37%	0.28%
Overshoot	Insured	0.94%	0.36%	0.11%	0.08%
Std Error		0.70%	0.21%	0.04%	0.03%

The results show that the incidence of financial catastrophe in the insured group was consistently lower than that observed in the uninsured group. When the threshold was defined at 10% of total consumption expenditure, the insured headcount was 9.6% lower than the uninsured headcount. The difference increased to 24.7% when non-food consumption expenditure was used as the denominator at the same threshold value. At a higher threshold value of 40%, the underlying risk of catastrophic expenditure significantly reduced for both insured and uninsured groups; as a result the absolute difference between the two groups was reduced to 3.3% (denominator: total consumption expenditure) and 5.9% (denominator: non-food consumption expenditure).

The intensity of financial catastrophe, as measured by mean overshoot, suggests that, when a catastrophic event is experienced, the intensity for the insured individuals was lower than that for the uninsured group. Although these figures support the argument that insurance membership has a protective role at all threshold values, the results should be interpreted carefully, since the individuals were not randomised to insured or uninsured groups.

The thesis also assessed the distribution of catastrophic incidence and intensity across socioeconomic quintiles. Figure 6-1 (below) shows the difference between the uninsured and insured, in their catastrophic incidence at each socioeconomic quintile. A positive difference suggests that the incidence is higher in the uninsured group. Although the observed pattern does not show a consistent gradient when total consumption expenditure is used as the denominator, when compared against non-food consumption expenditure, the difference is observed to be higher in the poorer quintiles. Figure 6-2 (below) presents results for the difference between the uninsured and insured in catastrophic intensity across socioeconomic quintiles. Again, a positive difference suggests that the intensity is higher in the uninsured group. The observed pattern does not show a consistent difference; however, at least at lower thresholds of 10% and 20%, the protective role of insurance appears to be greater in the lower socioeconomic quintiles.

Figure 6-1: The difference between uninsured and insured catastrophic headcounts

([Headcount] $_{uninsured}$ - [Headcount] $_{insured}$)

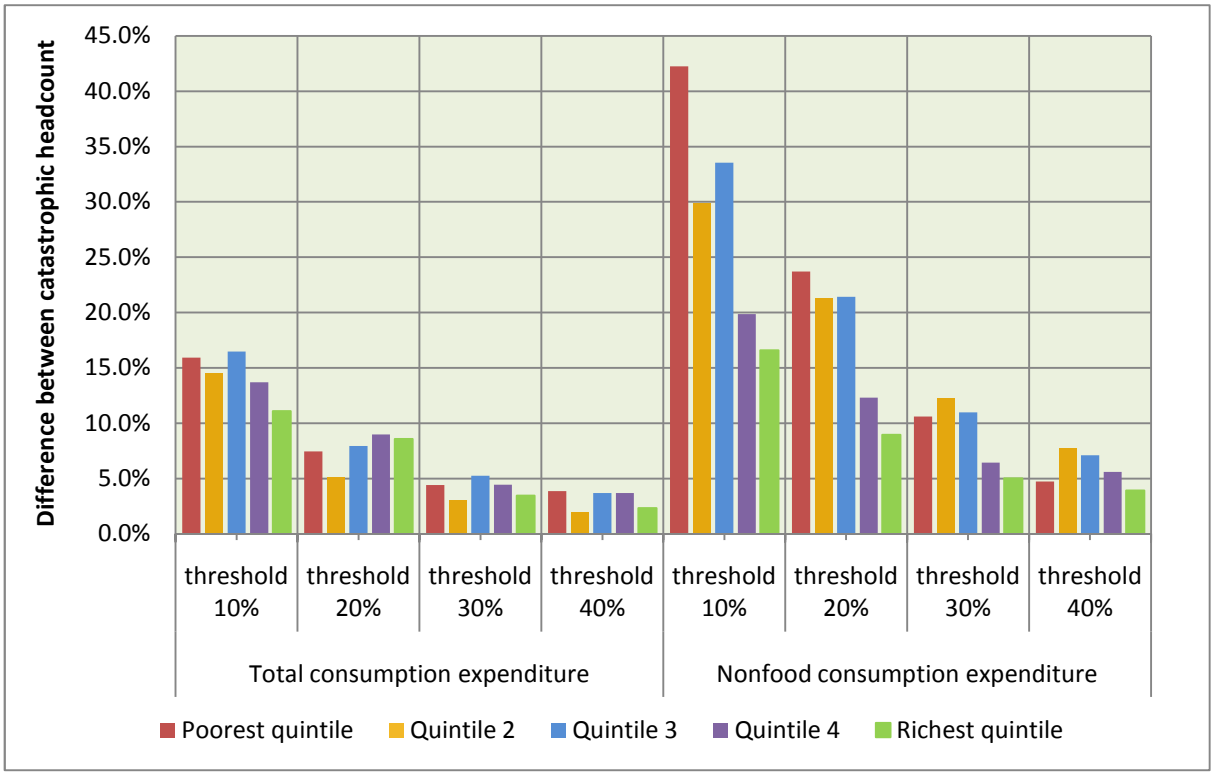
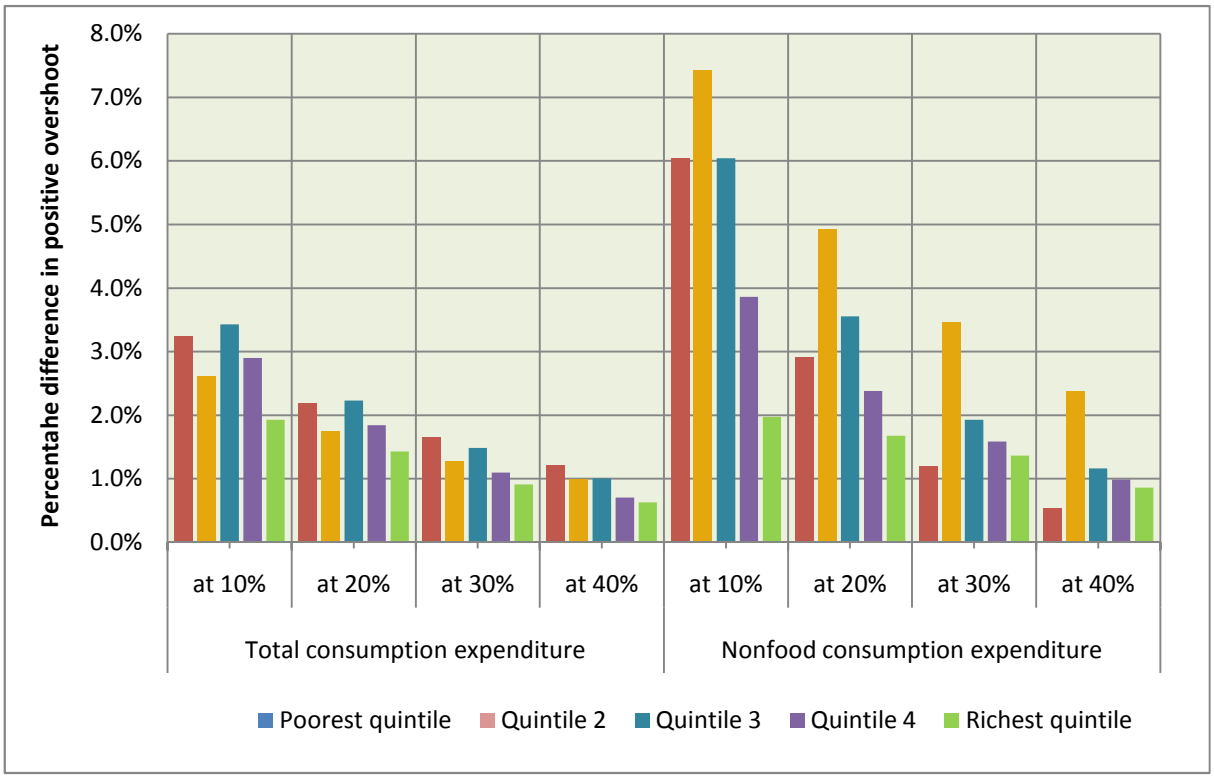


Figure 6-2: The difference between uninsured and insured catastrophic overshoot

([Mean overshoot] $_{uninsured}$ - [Mean overshoot] $_{insured}$)



6.5.2 Results from regression models for catastrophic event

Tables 6-2 and 6-3 present the results of regression models for the probability of a catastrophic event defined at threshold values of 10%, 20%, 30% and 40%, against two alternative denominators: total and non-food consumption expenditures.

Table 6-2: Probit models for incidence of catastrophic health care cost

(Denominator: total consumption expenditure)

Dependent variable: Catastrophic event (yes/no)	Probability of health expenditure>10% of total expenditure		Probability of health expenditure>20% of total expenditure		Probability of health expenditure>30% of total expenditure		Probability of health expenditure>40% of total expenditure	
	No bias correction	Self-selection bias corrected	No bias correction	Self - selection bias corrected	No bias correction	Self - selection bias corrected	No bias correction	Self - selection bias corrected
Insurance membership = yes	-0.91**	-1.08***	-2.04***	-2.17***	-1.86***	-1.95***	-1.82***	-1.91***
	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Log of equivalent consumption expenditure	-0.24*	-0.26*	-0.14	-0.14	-0.24	-0.22	-0.29	-0.25
	(0.09)	(0.07)	(0.38)	(0.39)	(0.12)	(0.20)	(0.13)	(0.25)
Age	0.04**	0.03*	0.01	0.00	-0.00	-0.01	-0.02	-0.03
	(0.02)	(0.08)	(0.57)	(0.96)	(0.90)	(0.56)	(0.37)	(0.17)
Age-squared	-0.00	-0.00	-0.00	0.00	0.00	0.00	0.00	0.00*
	(0.19)	(0.46)	(0.97)	(0.75)	(0.53)	(0.30)	(0.13)	(0.05)
Female sex	0.15	0.07	0.24	0.10	0.71	0.60	0.58	0.47
	(0.80)	(0.90)	(0.69)	(0.87)	(0.38)	(0.45)	(0.49)	(0.57)
Interaction between age and sex	-0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01
	(0.98)	(0.87)	(0.62)	(0.39)	(0.71)	(0.53)	(0.56)	(0.43)
Rural residence	0.55**	0.58**	0.58**	0.64**	0.26	0.33	0.01	0.10
	(0.03)	(0.02)	(0.01)	(0.01)	(0.46)	(0.36)	(0.97)	(0.81)
Residence: Hai Phong	-0.02	-0.58	-0.15	-0.65*	-0.53	-1.24**	-0.40	-1.13
	(0.96)	(0.21)	(0.69)	(0.06)	(0.24)	(0.03)	(0.36)	(0.11)

Residence: Ninh Binh	-0.00	-0.19	0.05	-0.10	-0.18	-0.42	-0.40	-0.66**
	(0.98)	(0.33)	(0.81)	(0.63)	(0.52)	(0.18)	(0.14)	(0.05)
Occupation: service	0.29	0.44	0.51*	0.68**	-0.04	0.11	-0.42	-0.32
	(0.33)	(0.14)	(0.07)	(0.02)	(0.92)	(0.79)	(0.25)	(0.41)
Occupation: farmer	-0.21	-0.18	-0.11	-0.07	0.06	0.11	0.14	0.18
	(0.29)	(0.36)	(0.45)	(0.68)	(0.72)	(0.58)	(0.39)	(0.33)
Occupation: hired	-0.76**	-0.63**	-0.10	0.07	-0.42**	-0.25	-0.18	-0.00
	(0.01)	(0.04)	(0.80)	(0.86)	(0.05)	(0.28)	(0.53)	(0.99)
Years of schooling	0.10**	0.09	0.06	0.05	0.09	0.08	0.08	0.08
	(0.04)	(0.16)	(0.31)	(0.55)	(0.28)	(0.28)	(0.33)	(0.34)
Interaction between gender and years of schooling	-0.01	-0.01	0.00	0.00	-0.03	-0.04	-0.01	-0.02
	(0.86)	(0.88)	(0.92)	(0.95)	(0.61)	(0.52)	(0.86)	(0.82)
Interaction between age and education	-0.00*	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.07)	(0.13)	(0.44)	(0.67)	(0.61)	(0.68)	(0.79)	(0.81)
Health status: fairly good	0.01	0.16	-0.03	0.09	-0.31*	-0.11	-0.52**	-0.30
	(0.98)	(0.51)	(0.89)	(0.70)	(0.07)	(0.67)	(0.02)	(0.36)
Health status: fairly bad	0.71***	0.83***	0.28	0.37*	0.18	0.31	0.29	0.43*
	(0.00)	(0.00)	(0.13)	(0.05)	(0.28)	(0.11)	(0.10)	(0.05)
Health status: long-term illness	0.57**	0.90***	0.46**	0.72***	0.23	0.61*	0.19	0.58
	(0.04)	(0.00)	(0.03)	(0.00)	(0.37)	(0.05)	(0.51)	(0.15)
Chronic illness (yes = 1)	-0.01	-0.04	-0.14	-0.17	-0.38	-0.45	-0.26	-0.35
	(0.97)	(0.91)	(0.64)	(0.55)	(0.21)	(0.15)	(0.47)	(0.35)
Number of illnesses in last 3 months	-0.04	-0.04	-0.03	-0.03	0.01	0.00	-0.06	-0.07
	(0.33)	(0.31)	(0.51)	(0.48)	(0.84)	(0.97)	(0.45)	(0.39)
Inpatient care (yes = 1)	1.62***	1.80***	1.71***	1.83***	1.47***	1.55***	1.42***	1.47***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Days stopped normal activities due to illness	0.20***	1.71***	0.20***	1.55***	0.24***	1.93	0.19*	1.97
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.10)	(0.05)	(0.21)
Inverse Mills Ratio for care-seeking	-	0.21***	-	0.20***	-	0.24***	-	0.19*
	-	(0.00)	-	(0.00)	-	(0.00)	-	(0.07)

Constant	-1.6	-1.65	-2.35	-2.41	-1.49	-1.77	-0.48	-0.88
	(0.19)	(0.15)	(0.11)	(0.10)	(0.33)	(0.28)	(0.79)	(0.66)
Observations	1123	1123	1123	1123	1123	1123	1123	1123

*** p<0.01, ** p<0.05, * p<0.1. Robust p-values in parentheses

Table 6-3: Probit models for incidence of catastrophic health care cost (Denominator: non-food consumption expenditure)

Dependent variable: Catastrophic event (yes/no)	Probability of health expenditure>10% of non-food expenditure		Probability of health expenditure>20% of non-food expenditure		Probability of health expenditure>30% of non-food expenditure		Probability of health expenditure>40% of non-food expenditure	
	No bias correction	Self - selection bias corrected	No bias correction	Self - selection bias corrected	No bias correction	Self - selection bias corrected	No bias correction	Self - selection bias corrected
Insurance membership = yes	-1.26***	-1.54***	-0.85***	-1.07***	-1.73***	-1.84***	-1.83***	-1.89***
	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Log of equivalent consumption expenditure	-0.62***	-0.67***	-0.68***	-0.71***	-0.66***	-0.70***	-0.52***	-0.56***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age	0.05***	0.04**	0.05**	0.04*	0.02	0.01	0.03**	0.03
	(0.01)	(0.04)	(0.02)	(0.09)	(0.23)	(0.47)	(0.05)	(0.11)
Age-squared	-0.00***	-0.00**	-0.00**	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.02)	(0.02)	(0.10)	(0.52)	(0.82)	(0.38)	(0.60)
Female sex	0.04	-0.01	-0.29	-0.31	-0.16	-0.15	0.87	0.85
	(0.91)	(0.99)	(0.57)	(0.59)	(0.74)	(0.78)	(0.19)	(0.22)
Interaction between age and sex	0.01	0.01	0.01	0.01	0.00	0.004	-0.01	-0.007
	(0.31)	(0.17)	(0.36)	(0.29)	(0.65)	(0.65)	(0.45)	(0.53)
Rural residence	0.21	0.28	0.60**	0.72**	0.28	0.298	0.31	0.326
	(0.22)	(0.15)	(0.04)	(0.02)	(0.29)	(0.28)	(0.26)	(0.26)
Residence: Hai Phong	0.24	-0.44	0.03	-0.93	-0.70**	-1.477***	-0.58*	-1.364***
	(0.39)	(0.14)	(0.94)	(0.16)	(0.02)	(0.00)	(0.08)	(0.01)

Residence: Ninh Binh	0.10	-0.17	-0.14	-0.50*	0.03	-0.187	-0.10	-0.309
	(0.62)	(0.41)	(0.46)	(0.07)	(0.87)	(0.42)	(0.63)	(0.24)
Occupation: service	-0.10	-0.01	0.47**	0.63***	0.49	0.622**	0.29	0.418
	(0.54)	(0.96)	(0.04)	(0.00)	(0.11)	(0.05)	(0.38)	(0.21)
Occupation: farmer	-0.65***	-0.71***	-0.45***	-0.45***	-0.13	-0.101	-0.23	-0.198
	(0.00)	(0.00)	(0.00)	(0.00)	(0.45)	(0.55)	(0.24)	(0.32)
Occupation: hired	-0.52*	-0.36	-0.66***	-0.38	-0.45**	-0.270	-0.38*	-0.213
	(0.07)	(0.28)	(0.00)	(0.17)	(0.02)	(0.22)	(0.08)	(0.32)
Years of schooling	-0.01	-0.03	0.03	-0.01	0.00	-0.018	0.07	0.049
	(0.83)	(0.40)	(0.55)	(0.90)	(1.00)	(0.76)	(0.28)	(0.55)
Interaction between gender and years of schooling	-0.03	-0.04	0.01	0.00	0.03	0.027	-0.03	-0.030
	(0.42)	(0.41)	(0.87)	(0.91)	(0.48)	(0.47)	(0.53)	(0.55)
Interaction between age and education	0.00	0.00	-0.00	-0.00	-0.00	-0.000	-0.00	-0.001
	(0.87)	(0.41)	(0.42)	(0.82)	(0.83)	(0.94)	(0.49)	(0.60)
Health status: fairly good	-0.48**	-0.28	-0.19	0.14	0.05	0.290	0.27	0.524*
	(0.03)	(0.23)	(0.40)	(0.64)	(0.85)	(0.31)	(0.19)	(0.08)
Health status: fairly bad	0.40*	0.59**	0.38*	0.61***	0.40*	0.584**	0.56***	0.750***
	(0.10)	(0.04)	(0.06)	(0.00)	(0.08)	(0.01)	(0.01)	(0.00)
Health status: long-term illness	0.28	0.76**	0.60***	1.26***	0.42*	0.841***	0.30	0.717
	(0.32)	(0.01)	(0.00)	(0.00)	(0.09)	(0.01)	(0.35)	(0.10)
Chronic illness (yes = 1)	0.07	0.03	0.21	0.17	-0.19	-0.228	-0.04	-0.075
	(0.73)	(0.86)	(0.31)	(0.39)	(0.52)	(0.45)	(0.88)	(0.78)
Number of illnesses in last 3 months	-0.07	-0.08*	-0.08*	-0.09*	-0.06	-0.076	-0.08	-0.101
	(0.17)	(0.10)	(0.09)	(0.07)	(0.34)	(0.21)	(0.22)	(0.11)
Inpatient care (yes = 1)	1.16***	1.52***	1.46***	1.77***	1.50***	1.694***	1.64***	1.797***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Days stopped normal activities due to illness	0.19***	0.22***	0.18***	0.20***	0.24***	0.25***	0.27***	0.28***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Inverse Mills Ratio for care-seeking	-	2.38***	-	3.21**	-	2.24**	-	2.21*
	-	(0.00)	-	(0.02)	-	(0.01)	-	(0.07)
Constant	3.30***	3.34***	2.61**	2.28*	2.53*	2.51*	0.24	0.24
	(0.01)	(0.01)	(0.03)	(0.07)	(0.07)	(0.08)	(0.87)	(0.88)
Observations	1122	1122	1122	1122	1122	1122	1122	1122

*** p<0.01, ** p<0.05, * p<0.1. Robust p-values in parentheses

Table 6-4: Marginal effects estimated in the probit models for incidence of catastrophic health care cost (Denominator: total consumption expenditure)

	Probability of health expenditure>10% of total expenditure				Probability of health expenditure>20% of total expenditure				Probability of health expenditure>30% of total expenditure				Probability of health expenditure>40% of total expenditure			
	No bias correction		Self- selection bias corrected		No bias correction		Self- selection bias corrected		No bias correction		Self- selection bias corrected		No bias correction		Self- selection bias corrected	
Dependent variable: Catastrophic event (yes/no)	Marginal effect	p-value	Marginal effect	p-value	Marginal effect	p-value	Marginal effect	p-value	Marginal effect	p-value	Marginal effect	p-value	Marginal effect	p-value	Marginal effect	p-value
Insurance member	-0.30	0.00	-0.10	0.00	-0.16	0.00	-0.05	0.00	-0.11	0.00	-0.02	0.08	-0.08	0.00	-0.02	0.05
Log of equivalent consumption expenditure	-0.22	0.00	-0.04	0.09	-0.18	0.00	-0.01	0.44	-0.11	0.00	-0.01	0.38	-0.07	0.02	-0.01	0.38
Age	0.02	0.01	0.01	0.14	0.01	0.02	0.00	0.96	0.00	0.29	0.00	0.54	0.00	0.12	0.00	0.22
Age-squared	0.00	0.01	0.00	0.48	0.00	0.03	0.00	0.75	0.00	0.54	0.00	0.29	0.00	0.42	0.00	0.12
Female sex	0.01	0.91	0.01	0.90	-0.08	0.57	0.01	0.87	-0.03	0.73	0.02	0.55	0.11	0.28	0.01	0.62
Interaction between age and sex	0.00	0.30	0.00	0.87	0.00	0.35	0.00	0.34	0.00	0.64	0.00	0.48	0.00	0.50	0.00	0.36
Rural residence	0.07	0.21	0.08	0.01	0.14	0.01	0.04	0.02	0.04	0.26	0.01	0.36	0.03	0.24	0.00	0.79
Residence: Hai Phong	0.09	0.40	-0.07	0.07	0.01	0.94	-0.04	0.05	-0.08	0.01	-0.02	0.09	-0.05	0.05	-0.01	0.04
Residence: Ninh Binh	0.03	0.62	-0.03	0.32	-0.04	0.46	-0.01	0.65	0.01	0.87	-0.01	0.28	-0.01	0.65	-0.02	0.09

Occupation: service	-0.04	0.53	0.09	0.18	0.15	0.06	0.09	0.10	0.11	0.17	0.01	0.81	0.04	0.45	-0.01	0.40
Occupation: farmer	-0.22	0.00	-0.03	0.40	-0.12	0.00	-0.01	0.68	-0.02	0.46	0.00	0.55	-0.03	0.27	0.01	0.36
Occupation: hired	-0.16	0.04	-0.07	0.01	-0.14	0.00	0.01	0.86	-0.06	0.00	-0.01	0.24	-0.04	0.03	0.00	0.99
Years of schooling	0.00	0.83	0.02	0.14	0.01	0.53	0.00	0.56	0.00	1.00	0.00	0.34	0.01	0.31	0.00	0.38
Interaction between gender and years of schooling	-0.01	0.42	0.00	0.88	0.00	0.87	0.00	0.96	0.00	0.48	0.00	0.54	0.00	0.55	0.00	0.82
Interaction between age and education	0.00	0.87	0.00	0.12	0.00	0.41	0.00	0.68	0.00	0.83	0.00	0.69	0.00	0.49	0.00	0.81
Health status: fairly good	-0.17	0.03	0.03	0.48	-0.05	0.42	0.01	0.69	0.01	0.85	0.00	0.70	0.03	0.17	-0.01	0.48
Health status: fairly bad	0.15	0.11	0.20	0.00	0.11	0.06	0.04	0.08	0.08	0.09	0.02	0.23	0.10	0.03	0.02	0.13
Health status: long-term illness	0.10	0.33	0.23	0.01	0.19	0.00	0.10	0.01	0.09	0.10	0.04	0.18	0.05	0.41	0.03	0.28
Chronic illness	0.02	0.73	-0.01	0.90	0.06	0.33	-0.01	0.51	-0.03	0.48	-0.01	0.12	-0.01	0.88	-0.01	0.23
Number of illnesses in last 3 months	-0.02	0.17	-0.01	0.32	-0.02	0.10	0.00	0.50	-0.01	0.37	0.00	0.97	-0.01	0.22	0.00	0.42
Inpatient care	0.44	0.00	0.56	0.00	0.52	0.00	0.43	0.00	0.45	0.00	0.22	0.00	0.44	0.00	0.17	0.02

Days stopped normal activities due to illness	0.07	0.00	0.04	0.00	0.05	0.00	0.02	0.00	0.04	0.00	0.01	0.00	0.03	0.00	0.01	0.01
Inverse Mills Ratio for care-seeking	-	-	0.29	0.00	-	-	0.14	0.00	-	-	0.08	0.12	-	-	0.06	0.16

Table 6-5: Marginal effects estimated in the probit models for incidence of catastrophic health care cost

(Denominator: non-food consumption expenditure)

Dependent variable: Catastrophic event (yes/no)	Probability of health expenditure>10% of total expenditure				Probability of health expenditure>20% of total expenditure				Probability of health expenditure>30% of total expenditure				Probability of health expenditure>40% of total expenditure			
	No bias correction		Self- selection bias corrected		No bias correction		Self- selection bias corrected		No bias correction		Self- selection bias corrected		No bias correction		Self- selection bias corrected	
	Marginal effect	p-value	Marginal effect	p-value	Marginal effect	p-value	Marginal effect	p-value	Marginal effect	p-value	Marginal effect	p-value	Marginal effect	p-value	Marginal effect	p-value
Insurance member	-0.30	0.00	-0.30	0.00	-0.16	0.00	-0.13	0.00	-0.11	0.00	-0.09	0.00	-0.08	0.00	-0.06	0.01
Log of equivalent consumption expenditure	-0.22	0.00	-0.23	0.00	-0.18	0.00	-0.16	0.00	-0.11	0.00	-0.10	0.01	-0.07	0.02	-0.06	0.04
Age	age	0.01	0.01	0.06	0.01	0.02	0.01	0.11	0.00	0.29	0.00	0.50	0.00	0.12	0.00	0.19
Age-squared	0.00	0.01	0.00	0.03	0.00	0.03	0.00	0.12	0.00	0.54	0.00	0.82	0.00	0.42	0.00	0.62
Female sex	0.01	0.91	0.00	0.99	-0.08	0.57	-0.07	0.59	-0.03	0.73	-0.02	0.78	0.11	0.28	0.09	0.31

Interaction between age and sex	0.00	0.30	0.00	0.15	0.00	0.35	0.00	0.27	0.00	0.64	0.00	0.64	0.00	0.50	0.00	0.56
Rural residence	0.07	0.21	0.09	0.14	0.14	0.01	0.12	0.00	0.04	0.26	0.04	0.25	0.03	0.24	0.03	0.25
Residence: Hai Phong	0.09	0.40	-0.13	0.09	0.01	0.94	-0.13	0.00	-0.08	0.01	-0.09	0.00	-0.05	0.05	-0.06	0.01
Residence: Ninh Binh	0.03	0.62	-0.06	0.40	-0.04	0.46	-0.10	0.03	0.01	0.87	-0.02	0.44	-0.01	0.65	-0.03	0.26
Occupation: service	-0.04	0.53	0.00	0.97	0.15	0.06	0.18	0.01	0.11	0.17	0.12	0.11	0.04	0.45	0.06	0.31
Occupation: farmer	-0.22	0.00	-0.23	0.00	-0.12	0.00	-0.10	0.01	-0.02	0.46	-0.01	0.57	-0.03	0.27	-0.02	0.37
Occupation: hired	-0.16	0.04	-0.11	0.24	-0.14	0.00	-0.07	0.12	-0.06	0.00	-0.03	0.12	-0.04	0.03	-0.02	0.25
Years of schooling	0.00	0.83	-0.01	0.41	0.01	0.53	0.00	0.90	0.00	1.00	0.00	0.77	0.01	0.31	0.01	0.58
Interaction between gender and years of schooling	-0.01	0.42	-0.01	0.40	0.00	0.87	0.00	0.91	0.00	0.48	0.00	0.48	0.00	0.55	0.00	0.57
Interaction between age and education	0.00	0.87	0.00	0.41	0.00	0.41	0.00	0.81	0.00	0.83	0.00	0.94	0.00	0.49	0.00	0.61
Health status: fairly good	-0.17	0.03	-0.10	0.25	-0.05	0.42	0.03	0.63	0.01	0.85	0.04	0.26	0.03	0.17	0.05	0.04
Health status: fairly bad	0.15	0.11	0.22	0.05	0.11	0.06	0.17	0.00	0.08	0.09	0.11	0.02	0.10	0.03	0.12	0.01
Health status: long-term illness	0.10	0.33	0.29	0.01	0.19	0.00	0.40	0.00	0.09	0.10	0.18	0.02	0.05	0.41	0.11	0.20

Chronic illness	0.02	0.73	0.01	0.86	0.06	0.33	0.04	0.43	-0.03	0.48	-0.03	0.39	-0.01	0.88	-0.01	0.77
Number of illnesses in last 3 months	-0.02	0.17	-0.03	0.10	-0.02	0.10	-0.02	0.07	-0.01	0.37	-0.01	0.27	-0.01	0.22	-0.01	0.15
Inpatient care	0.44	0.00	0.55	0.00	0.52	0.00	0.59	0.00	0.45	0.00	0.48	0.00	0.44	0.00	0.45	0.00
Days stopped normal activities due to illness	0.07	0.00	0.08	0.00	0.05	0.00	0.72	0.00	0.04	0.00	0.04	0.02	0.03	0.00	0.03	0.05
Inverse Mills Ratio for care-seeking	-	-	0.82	0.00	-	-	0.05	0.00	-	-	0.32	0.00	-	-	0.23	0.00

The results show that insurance has a statistically significant protective effect on the probability of financial catastrophe at all threshold levels. The effect is more pronounced at higher catastrophic thresholds; this can be explained by the fact that those who spend a higher proportion of their consumption expenditure on health care are more likely to be the ones needing inpatient hospital care, which is highly subsidised by insurance.

The results also show that the coefficient on log of consumption expenditure was consistently negative in all models, albeit this was not always statistically significant. This finding suggests that richer individuals are less likely to incur catastrophic health care costs at all threshold values. The regression coefficients on inpatient hospital care are significantly positive in all models, suggesting that those who seek inpatient care are significantly more likely to experience catastrophic events at all threshold values. Also, those in poor health status, or with long-term illness, are more likely to experience financial catastrophe. Finally, rural residents are observed to be more likely to experience catastrophe at all threshold levels. This may be due to higher incidence of infectious diseases in rural communities, and the level of poverty in rural villages.

The probit models observed that the Inverse Mills Ratio (IMR) for care-seeking self-selection decisions was statistically significant in all models; however the IMR for insurance-seeking was not significant at any threshold value. This suggests that, while the unobserved heterogeneity of care-seeking decision influences the probability of catastrophic incidence, the unobserved determinants of the insurance-seeking decision are not associated with this probability. The positive and significance IMR for care-seeking suggests that the unobserved factors that positively affect the decision to seek care are also positively associated with the probability of experiencing a catastrophic financial event. The non-significance of insurance-seeking IMR is also plausible, because the insurance decision was made before the three-month period during which health care costs (in this survey) were incurred. While one may be able to anticipate the regular health care expenditure in the following quarter, based on current health status, the extreme values of health care costs could not necessarily be anticipated or predicted in advance. Hence, the determinants of insurance decisions could not necessarily be associated with the unobserved determinants of catastrophic costs of care. This argument finds further support in Thuan et al (2006), who noted that the catastrophic OOP payments in Vietnam were incurred mostly as a result of relatively minor communicable illnesses, that included respiratory infections, diarrhoea and fever. Since it is difficult to

predict episodes of infectious diseases a few months in advance, it is not likely that the unobserved determinants of insurance decision would have influenced the catastrophic probability.

Tables 6-2 and 6-3 also show that, after correcting for self-selection bias, the coefficient on insurance membership increased, on an average, by 1.19 times [at 10% threshold] and 1.05 times [at 40% threshold]. The smaller increase at higher threshold level suggests that, when the need for health care expenditure is very high (such that the health care expenditure would be more than 40% of the consumption expenditure), then the unobserved heterogeneity of care-seeking plays a less significant role than at lower thresholds.

6.5.3 Absolute risk reduction and number needed to treat analyses

This section presents results for ARR and NNT analyses. The coefficients on the insurance variable in probit model are converted into catastrophic probabilities; these are presented separately for insured and uninsured groups in figure 6-4, along with the difference in probabilities, defined as ARR. The figure shows that the VHI membership consistently reduces the absolute risk of catastrophic events at all threshold values.

Table 6-4 presents results for the number needed to treat analysis. NNTs are useful measures of absolute effectiveness of the VHI programme, providing intuitive and easy-to-interpret results for policy makers. The analysis suggests that, at a 10% catastrophic threshold, approximately nine individuals should be provided with insurance membership to prevent one catastrophic event (defined against total consumption expenditure). The NNT increases to 17.42 at a threshold of 40%. Table 6-4 also suggests that NNTs are underestimated at all threshold values if care-seeking self-selection was not taken into account.

Table 6-4: Number needed to treat to prevent one catastrophic event
(Before and after correcting for self-selection bias)

	Threshold 10%		**Threshold 20%**		**Threshold 30%**		**Threshold 40%**	
	Total exp	**Non-food exp**	**Total exp**	**Non-food exp**	**Total exp**	**Non-food exp**	**Total exp**	**Non-food exp**
Uncorrected	11.36	4.22	11.36	8.73	14.17	6.60	17.23	8.24
Corrected	8.54	3.74	9.69	6.50	14.25	6.47	17.42	8.03

Figure 6-5: Predicted probabilities and Absolute Risk Reduction (ARR) of catastrophic events based on insurance status

(Before and after correcting for care-seeking self-selection bias)

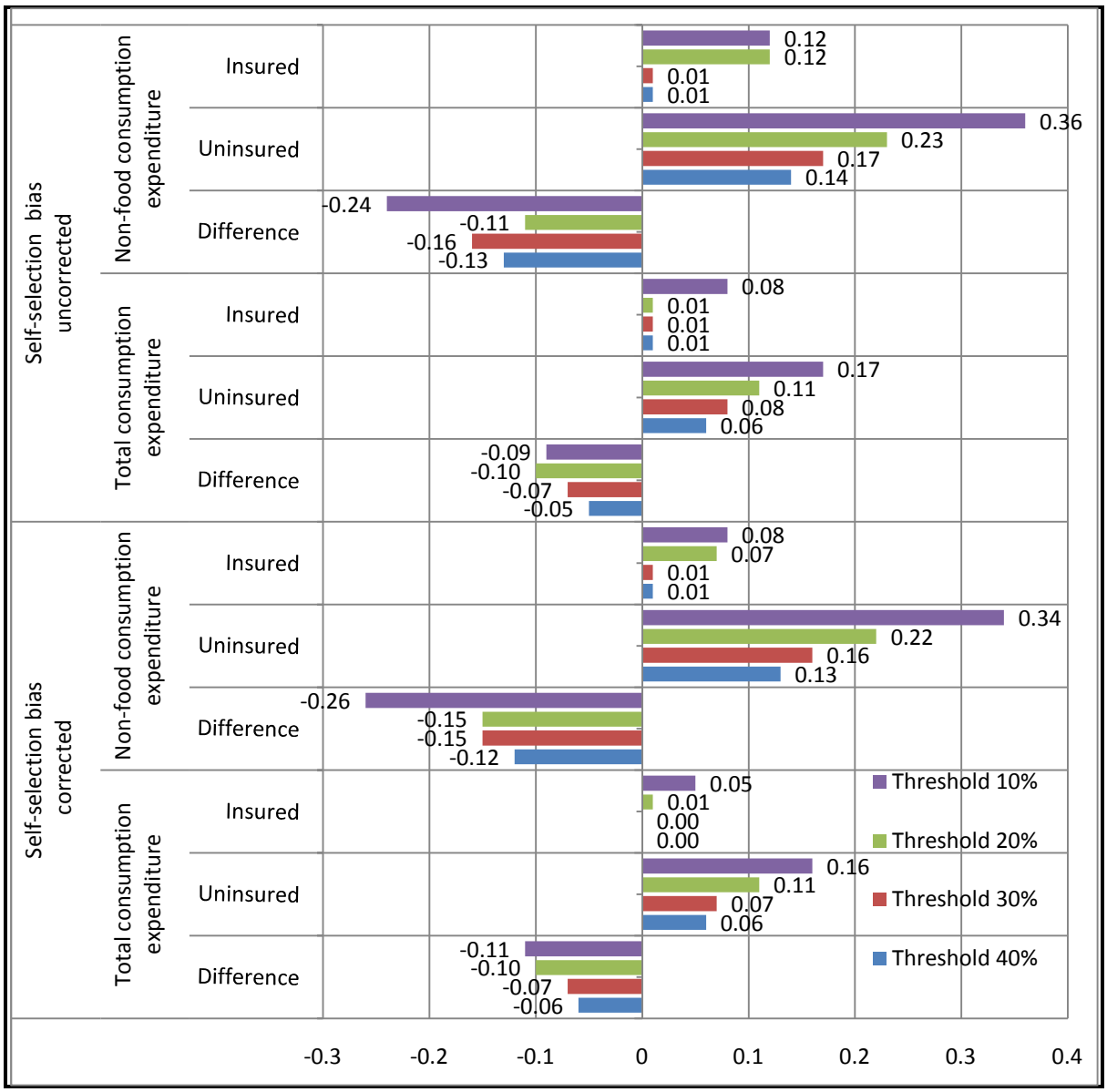


Figure 6-4 plots the ARR across socioeconomic quintiles; the figure suggests that the influence of insurance on catastrophic risk reduction was highest in the poorest quintile at all threshold values. Also, this difference was, in most cases, underestimated by the uncorrected models; hence correction for care-seeking self-selection bias was warranted. Similarly, the distribution of NNTs across socioeconomic quintiles suggests that a lesser number of poor individuals with insurance need to be treated to achieve the same results, in terms of protection from financial catastrophe. In other words, when insurance coverage is targeted at the poorest quintiles, the policy makers can achieve a greater reduction in catastrophic incidence, for a given amount of resources.

6.6 Discussion

Reduction in the incidence of financial catastrophe was one of the primary objectives of the Vietnamese VHI programme (Solan and Tien, 1997). This study shows that the insurance membership reduced both the incidence and intensity of financial catastrophe. Furthermore, the current analysis found that the standard probit model had underestimated the protective effect of VHI due to uncorrected self-selection bias. Finally, the absolute risk reduction attributable to insurance membership was found to be most pronounced for the poorest quintile. However, it should be noted that the NNT analysis is more relevant when applied to the whole sample, rather than a sub-sample of sick individuals. This is because when insurance is offered to members of a community it is not known who will be sick beforehand. Since the sick are more likely to experience catastrophic expenditure, NNT analysis of the sick alone is likely to bias the estimates in favour of insurance. Furthermore, if the insured were more likely to become sick (or report sickness) compared to the uninsured, the insurance effect would be biased further. However, the potential application of the NNT approach for catastrophic analysis should be noted.

The above mentioned findings are significant from both analytical and policy perspectives. In two recent studies, Ekman (2007a) and Wagstaff and Lindelow (2008) found that voluntary insurance membership appeared to increase the risk of catastrophic events in Zambia and China respectively. Both the studies point out that when self-selection biases are not accounted for, such counterintuitive results may be expected. Thus the current study proposes methodological advancement by suggesting models that aim to correct for self-selection biases. From a policy perspective, the findings of this study strengthen the argument that governments in the developing countries should devote resources to expand the VHI programmes, especially to the poor households whose risk reduction due to insurance membership is greater than that observed for richer quintiles. Also, this study, for the first time, also quantified the numbers-needed-to-treat with insurance to prevent one episode of financial catastrophe. The results clearly suggest that, with the given level of resources, targeting the poor with insurance programme can have much greater impact on catastrophic risk reduction. Hence, policy-makers in the developing countries should be looking towards voluntary insurance as an important mechanism to reduce impoverishing consequences of health care.

Figure 6-3: Absolute risk reduction attributable to insurance membership (with and without correction for selection bias)

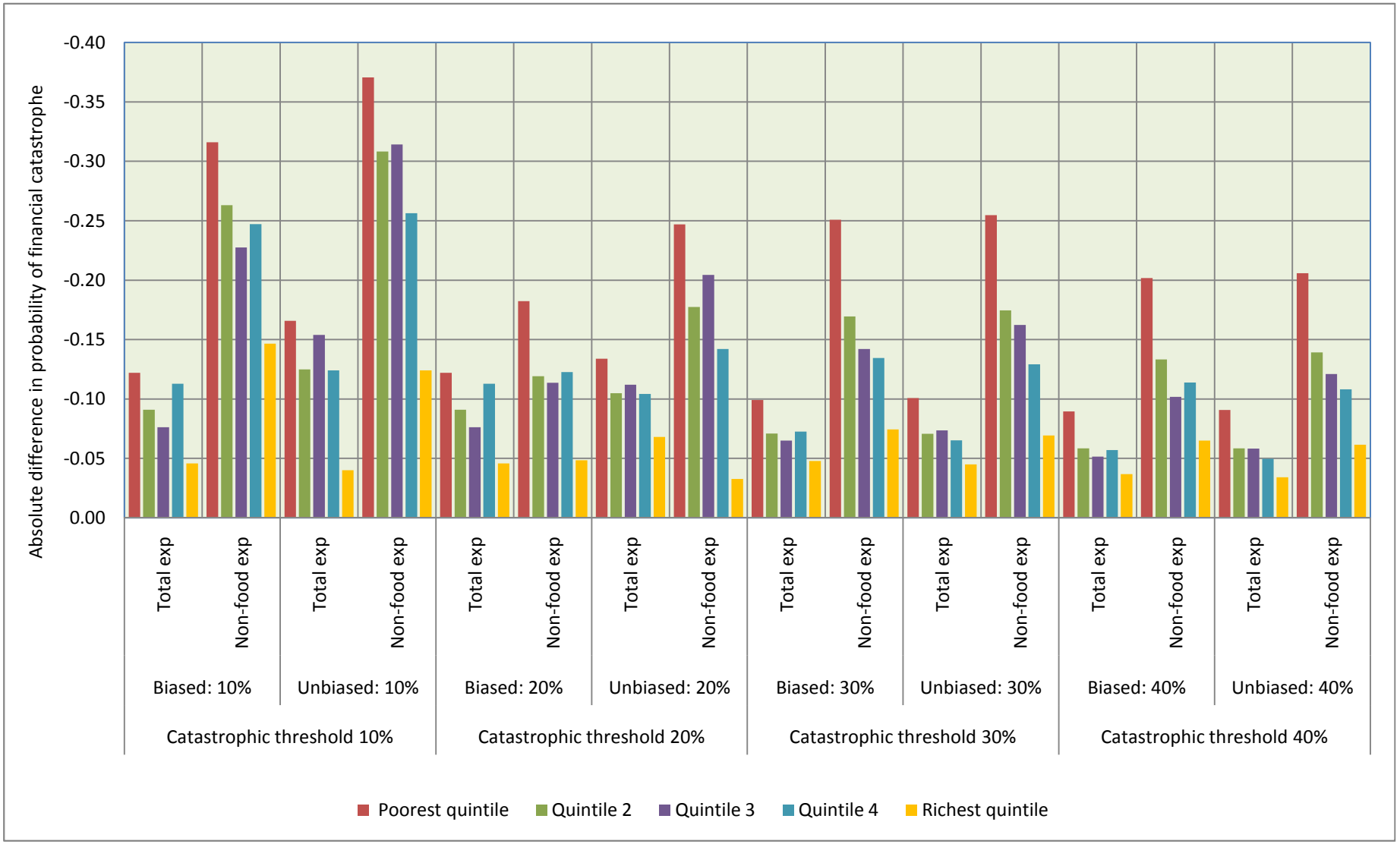
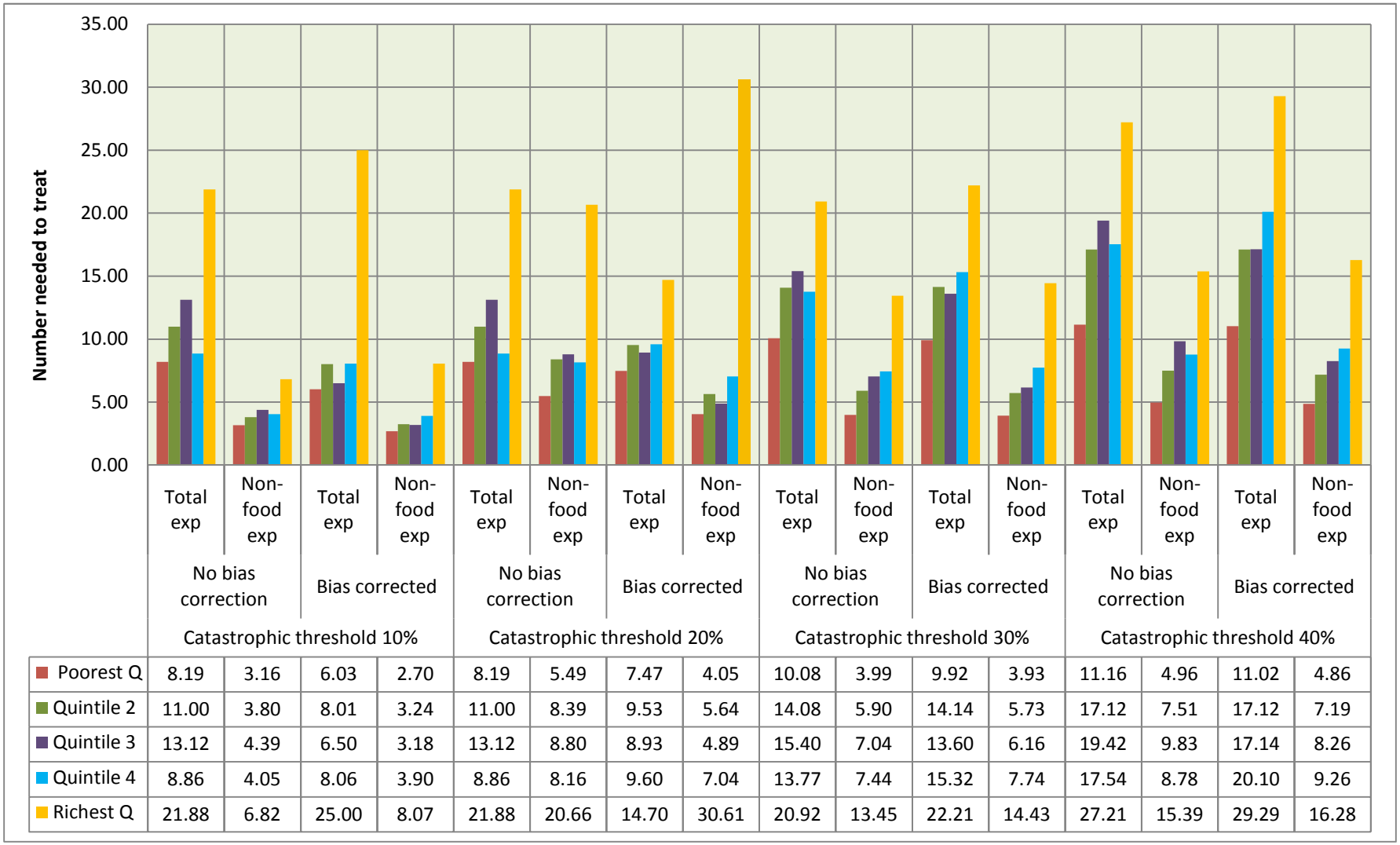


Figure 6-4: Number needed to treat to prevent one catastrophic event (before and after correction for self-selection bias)



	Catastrophic threshold 10%				Catastrophic threshold 20%				Catastrophic threshold 30%				Catastrophic threshold 40%			
	No bias correction		Bias corrected		No bias correction		Bias corrected		No bias correction		Bias corrected		No bias correction		Bias corrected	
	Total exp	Non-food exp	Total exp	Non-food exp	Total exp	Non-food exp	Total exp	Non-food exp	Total exp	Non-food exp	Total exp	Non-food exp	Total exp	Non-food exp	Total exp	Non-food exp
Poorest Q	8.19	3.16	6.03	2.70	8.19	5.49	7.47	4.05	10.08	3.99	9.92	3.93	11.16	4.96	11.02	4.86
Quintile 2	11.00	3.80	8.01	3.24	11.00	8.39	9.53	5.64	14.08	5.90	14.14	5.73	17.12	7.51	17.12	7.19
Quintile 3	13.12	4.39	6.50	3.18	13.12	8.80	8.93	4.89	15.40	7.04	13.60	6.16	19.42	9.83	17.14	8.26
Quintile 4	8.86	4.05	8.06	3.90	8.86	8.16	9.60	7.04	13.77	7.44	15.32	7.74	17.54	8.78	20.10	9.26
Richest Q	21.88	6.82	25.00	8.07	21.88	20.66	14.70	30.61	20.92	13.45	22.21	14.43	27.21	15.39	29.29	16.28

Chapter 7

Conclusion

7.1 Introduction

The final chapter summarises the methodological and empirical findings generated by the thesis. Implications of the findings regarding health insurance in Vietnam and in the general policy context are discussed, together with limitations of the current thesis and the agenda for future research.

Chapter 1 had outlined that the focus of this research was methodological, and that Vietnam was used as a case study to demonstrate limitations of the current standard methodological practice, and to propose improvement that could be generalised to other contexts. The aim of this thesis was to measure the impact of VHI on individual level OOP cost of health care, and its distribution across the socioeconomic gradient. More specifically, the study objectives were to measure:

i. The impact of VHI on average OOP cost of health care;
ii. The effect of VHI in reducing inequalities in health care costs and promoting progressivity of health financing;
iii. The effect of VHI in reducing the incidence and intensity of financially catastrophic events.

This thesis contributed to the wider literature by proposing econometric models that can also be employed in other studies with similar concerns about potential sources of measurement bias associated with self-selection and unmet need for health care.

The remaining chapter is organised as follows. Section 7.2 will summarise the main methodological and empirical findings of the thesis. Section 7.3 will discuss the policy implications of these findings. Section 7.4 will point out the limitations of the current thesis, followed by section 7.5, which will outline the agenda for further research. Section 7.6 will conclude the chapter.

7.2 Methodological and empirical findings

The thesis identified three main methodological challenges in measuring the impact of VHI on average cost of care and its socioeconomic distribution. These challenges are attributed to potential biases associated with:

a) care-seeking self-selection decision;

b) insurance-seeking self-selection decision; and

c) non-random distribution of unmet need for health care.

Below, I will summarise the contributions made by the thesis to correct for these potential sources of bias.

7.2.1 Correcting for self-selection biases

Care-seeking self-selection bias occurs when the decision to seek health care, given illness, is not distributed randomly in the population, and is also associated with the expected cost of health care. Similarly, insurance-seeking self-selection occurs when individuals who expect high cost of care are selectively more likely to purchase insurance membership. If these biases are not accounted for, the potential impact of VHI membership on the cost of care may be underestimated.

While some recent studies have taken account of either the insurance-seeking self-selection (Jowett et al 2003; Waters 1999), or less commonly, the care-seeking self-selection bias (Sepehri, Simpson and Sarma 2006), there are no studies in the context of developing countries that model OOP cost of care after simultaneously accounting for the two sources of bias. Furthermore, some of the studies that corrected for either of the two biases, including the previous analysis of the current study dataset (Jowett et al 2003), relied solely on the non-linearity of Inverse Mills Ratio (IMR) to identify the self-selection decision. The current thesis tested for the presence of the two sources of bias, and proposed an econometric model that aimed to simultaneously correct for care-seeking and insurance-seeking decisions. Furthermore, appropriate instrumental variables were proposed to independently identify the

insurance-seeking decision, although the care-seeking equation relied on the non-linearity of IMR because of unavailability of appropriate instruments. The thesis demonstrated that, when the naive OLS model was used to model health care costs, the insurance coefficient was underestimated by 42.6% (TPM) or 39.7% (Heckman sample selection model). Similarly, when the insurance-seeking self-selection was not accounted for, the coefficient on the insurance variable in the cost of care model was underestimated by 60.2%. When both types of self-selection were simultaneously taken into account, it became apparent that the naive OLS model had underestimated the insurance coefficient by 82.3%.

A similar modelling approach was used to evaluate interaction between socioeconomic status and insurance membership. The results suggested that, when self-selection biases were not corrected for, the OLS coefficient on the interaction term had underestimated the coefficient by 15.3%. Finally, the same approach was applied to catastrophe probability models. When the corrective approach was applied to the catastrophic probability models, the coefficient on insurance membership increased by 18.68%, 6.3%, 4.8% and 4.9% at threshold values of 10%, 20%, 30% and 40% respectively, suggesting that the uncorrected models underestimated the protective effect of VHI.

Overall, the econometric approaches presented in this thesis have attempted to correct for the methodological limitations in the standard approach of modelling cost of care. The proposed methods will improve the process of estimating the true impact of voluntary health insurance on the cost of care in the developing countries.

7.2.2 Accounting for unmet need for health care

This thesis also evaluated the standard practice of measuring vertical equity and progressivity of health care financing, and highlighted the potential for seriously misleading results when this method is applied to the context of OOP financing. This study has highlighted that a health financing system that provides limited access to health care to the poor by imposing costly financial barriers, may produce apparently good results in terms of vertical equity in financing. However, this will be misleading for the purpose of policy making, since the approach does not take account of the unmet need for care (horizontal equity in use).

In order to overcome the potential bias associated with the standard practice of measuring vertical equity, this thesis proposed a need standardised equity index which takes account of the unmet need for care by standardising for the differences in the observed need variables. The process of need standardisation has enabled the study to highlight the inequalities attributable to non-need determinants of health care costs. This index is particularly useful when data on health care utilisation is not comprehensive, and therefore it is not possible to standardise on use. Using the proposed methodology, this study has also shown that a) the need standardisation procedure increased the level of pro-poorness of cost distribution and reduced the level of regressivity for insured and uninsured groups; and b) insurance is associated with more pro-poor distribution of health care costs and less pro-rich distribution of progressivity of financing.

The study found that the socioeconomic-related cost distribution was more pro-poor for the insured than the uninsured. Furthermore, the study noted that insurance was associated with progressive health financing for the poorest half of the cost distribution. Hence, insurance was not only associated with pro-poor cost distribution; its equity effect seems to benefit the poorest the most. The findings of this study have important relevance to policy making in the developing countries.

7.3 Policy implications of thesis findings

Governments in the developing countries have been looking for affordable and accessible options of health care financing for the poor. When the tax base is low, and formal mechanisms of social protection are absent for the poor, voluntary health insurance is a potential option to improve financial access, especially for those employed in the informal sector.

The obvious policy recommendation based on this thesis is to expand the VHI programme to all provinces of Vietnam. At the time of data collection for this study, approximately 6% of the population was enrolled with VHI. Expanding the programme will provide financial protection to greater numbers and may reduce regressivity of financing associated with OOP payments. Expansion of VHI will also increase size of the risk pool and (probably) heterogeneity of risk distribution within the pool which will enable the programme to better cope with financial shocks. Smaller risk pools may suffer from bankruptcy if few people

requiring expensive treatments deplete the resources. This is more likely to happen in VHI programmes since they do not practice risk rating or cream-skimming of bad risk.

The study also suggests that more households can be protected from financial catastrophe if VHI specifically targets the poor households. In other words, given the financial resources required to expand VHI, the programme can get greater output ('bigger bang for the buck') by targeting the poor households for insurance membership.

The benefit package offered by voluntary insurance programmes is also an important issue for policy debate. The benefit package of the Vietnamese VHI was known to be broad and poorly defined at the time of this study. It not only covered services at the level of primary care, but also included an extensive list of high-tech treatments. Since most of the expensive treatments were available only at the level of tertiary care, the distribution of government subsidies systematically favoured the better off. Ekman et al (2008) suggests that Vietnamese VHI can learn from the Mexican voluntary health insurance programme, which has a comprehensive list of affordable and cost-effective services included in the benefit package. This decision may need to trade-off between the variety of services on offer and their relevance to financial protection.

Finally, purchasing decisions are crucial in influencing the demand for insurance. At the time of this study, members of Vietnamese VHI had to select one public institution where the insurance card would be accepted. Given that the users may have a preference for private health care providers, the programme may wish to consider purchasing part of the services from private practitioners to influence demand for voluntary insurance.

7.4. Limitations of the current study

The following limitations should be considered in this thesis.

Limitation 1: The current study used cross-sectional data to analyse the impact of VHI on cost of care. Since cross-sectional analysis is based on observations at one time point, it was not possible to estimate the long-term financial impact of insurance membership.

Limitation 2: The available data on health service utilisation was not sufficiently detailed to be able to standardise for health service use. The available data included binary variables for

the health care utilisation decision and for seeking inpatient hospital care. There was no data on the quantity, quality and type of care received. Therefore, it was not possible to control for the differences in health care utilisation.

It can be argued that, since insurance membership reduces the price of health care, it may have an elastic demand effect, resulting in an increase in frequency and intensity of health care sought. In such case, it would be important to control for the differences in health service utilisation; however, due to the limitation of available data, this thesis could not standardise on the quantity and quality of health care received. If insurance status does have an elastic demand effect, the estimates from the above analyses may be underestimation of the effect of health insurance.

Limitation 3: In this study, assessment of the need for health care relied on self-assessed health status and self-reported illnesses. Although self-assessed health is commonly used in survey analysis, it may be influenced by self-perception, level of education, reference system, beliefs about illness and attitude towards risk. In addition, self-reported illness may be correlated with insurance status; for instance, the insured may be more likely to report illness because of their higher level of awareness of personal health and disease.

If, given a particular health status, the insured are more likely to report poor health, it would reflect their higher expectation about health. This will have an impact on their care-seeking behaviour and, in turn, their health care expenditure. Hence, the insured will be systematically more likely to incur higher cost of care, given a particular health status. If such systematic association between self-assessed health and insurance status exists, then the effect of insurance in the cost of care model is likely to be conservative.

Limitation 4: This thesis analysed the impact of voluntary health insurance on cost of care using a sub-sample of individuals who reported being sick in the last three months. Since the analysis was restricted to the sick population, the effect of insurance on the expected expenditure could not be generalised to the entire population of sick and non-sick. The decision to restrict the analysis to the sick was made due to high proportion of missing expenditure data in the non-sick population, and due to potential complexity of using a three-part model that would also accommodate the probability of reporting sickness.

For the results of the effects of insurance, as estimated in this thesis, to be generalisable to the entire population of sick and non-sick, we would need to assume that insurance does not affect the probability of self-reporting of illness. However, as mentioned earlier, if the insured are more likely to report sickness and in turn have higher expected cost of care, then the estimates of the impact of health insurance on health care expenditure are likely to be conservative.

Limitation 5: The use of consumption expenditure data to establish the socioeconomic status of an individual has its limitations. It provides no information about the coping mechanism used by individuals to overcome the financial consequences of health care. However, within the limitations of the available data, consumption expenditure was a reasonable proxy to the socioeconomic status.

Limitation 6: The survey data used for this study collected information on health care costs incurred during the last three months; here there is a potential for recall bias and seasonal variations in illness and expenditure pattern, which were not taken into account. If the recall bias systematically under or over-estimated the actual expenditure and this over/under-estimation was systematically associated with insurance status, then the estimates obtained in our analysis may be biased. However, in the data, there was no indication of such systematic reporting errors.

Limitation 7: While the study used reliable instrumental variables to identify the insurance-seeking decision, it could not find appropriate instruments for care-seeking decision. It is not certain how, if at all, the use of instruments in the care-seeking equation would have changed the results.

These limitations can be overcome in future research by designing studies that take account of the above-mentioned concerns.

7.5 Agenda for further research

This study proposes the following agenda for further research:

- This study recommends that the econometric models proposed in this thesis should be used in further empirical contexts to test the robustness of the proposed tools.

- In the current study, data on utilisation and need of health care was limited. Further research work should collect more comprehensive data on need and use variables and then apply the standardisation procedures to establish the impact of VHI after standardising for need and use variables.
- In order to establish long-term financial consequences of VHI membership, the proposed methods should be applied to longitudinal data.
- Further research is required to establish the long-term consequences of VHI programme on public sector resources. This is relevant especially to the policy context, since VHI programmes may be too costly or difficult to financially sustain for the public sector.
- Further research is required to establish whether VHI membership has such effect on the behaviour of health care providers. It has been argued in the literature that the attitude of health professionals may depend on whether an individual is a full fee-paying patient or member of a scheme that subsidises user fees.
- Further research can also inform the long-term changes due to VHI programmes on quality of care provided at public and private facilities, utilisation patterns and choice of providers by members and non-members.
- Research is also required to evaluate any change in risk behaviours as a result of VHI membership.

7.6 Final thoughts

Providing access to affordable health care is one of the top policy priorities for health sectors in the developing countries. The prevailing mechanism of out of pocket payments tends to suppress demand for health care and in turn have a detrimental effect on equity of health care use and progressivity of health financing. This can negatively influence poor households in two ways: if poor individuals consume all the needed health care, they can potentially end up in financial catastrophe; whereas if the required health care is not consumed, the available health stocks may be seriously compromised. Hence, improving access to affordable health care is fundamental to the policy context in developing countries.

Policy makers have also highlighted that health financing methods have a bearing on broader development objectives. Four of the eight 'Millennium Development Goals' targeted for 2015 are directly or indirectly related to affordable financing of health care (The MDG

Report 2008); these include the health sector goals of reducing child mortality, improving maternal health and combating HIV/AIDS, malaria and other diseases, and socioeconomic goal of eradicating extreme poverty. These goals can only be achieved if access to health care is made affordable for the poor, and its impoverishing effects are minimised.

The current study has demonstrated that voluntary health insurance has a desirable role in the context of developing countries. The findings suggest that the Vietnamese VHI programme not only reduced the average cost of care but also improved progressivity of financing whilst reducing the probability of financial catastrophe. This thesis has highlighted potential biases in the standard modelling approach and has contributed to the wider literature by proposing methodological advancement that will help inform the evidence base.

APPENDICES

Appendix 1: Map of Vietnam and neighbouring countries in south-east Asia

Appendix 2: Membership of health insurance in Vietnam 1997

		ALL HEALTH INSURANCE			VOLUNTARY HEALTH INSURANCE		
		TOTAL	Compulsory	Voluntary	School children	Other voluntary	Humanitarian
1	*Viet Nam*	164,197	164,197	0	0	0	0
2	*Chi Nhanh*	148,636	148,636	0	0	0	0
3	*Ha Noi*	596,000	376,000	220,000	150,000	0	70,000
4	*Tp.Hcminh*	1,123,352	421,160	702,192	696,194	0	5,998
5	*Hai Phong*	649,100	231,000	418,100	294,600	61,500	62,000
6	*Ha Giang*	37,760	29,910	7,850	7,850	0	0
7	*T/Quang*	64,967	49,317	15,650	12,864	2,786	0
8	*Cao Bang*	43,240	41,930	1,310	1,310	0	0
9	*Lang Son*	70,202	44,402	25,800	25,000	500	300
10	*Lai Chau*	40,549	29,549	11,000	10,000	1,000	0
11	*Yen Bai*	66,190	59,190	7,000	7,000	0	0
12	*Lao Cai*	44,557	37,470	7,087	6,655	422	0
13	*Thai Nguyen*	234,900	108,200	126,700	125,000	1,700	0
14	*Son La*	53,400	53,400	0	0	0	0
15	*Phu Tho*	196,807	123,387	73,420	71,095	2,239	86
16	*Bac Giang*	88,000	88,000	0	0	0	0
17	*Q/Ninh*	259,918	116,370	143,548	138,823	0	4,725
18	*Hoa Binh*	64,301	53,563	10,738	9,200	1,500	38
19	*Ha Tay*	167,420	164,064	3,356	2,867	0	489
20	*Hai Duong*	159,594	142,648	16,946	16,700	60	186
21	*Thai Binh*	283,655	158,440	125,215	118,998	6,000	217

22	*Nam Dinh*	315,358	174,599	140,759	133,119	7,640	0
23	*Ninh Binh*	229,127	91,347	137,780	100,800	1,055	35,925
24	*Than Hoa*	368,458	255,690	112,768	98,000	13,703	1,065
25	*Nghe An*	336,879	233,179	103,700	95,000	1,500	7,200
26	*Ha Tinh*	117,426	106,345	11,081	11,024	0	57
27	*Q/Binh*	85,173	65,964	19,209	19,191	0	13
28	*Quang Tri*	66,929	45,050	21,879	19,414	2,396	9
29	*TT Hue*	193,288	64,400	128,888	125,000	1,300	2,583
30	*TP Da Nang*	122,898	74,250	48,648	48,638	0	10
31	*Q/Ngai*	98,594	65,594	33,000	33,000	0	0
32	*Binh Dinh*	228,215	79,880	148,335	145,000	200	3,135
33	*Kh/Hoa*	80,695	57,106	23,589	14,493	0	9,096
34	*Ninh Thuan*	56,695	18,429	38,266	38,090	0	176
35	*Binh Thuan*	120,500	40,500	80,000	80,000	0	0
36	*Phu Yen*	52,901	34,432	18,469	17,691	618	160
37	*Gia Lai*	57,775	57,500	275	275	0	0
38	*Kontum*	20,712	20,641	71	71	0	0
39	*Daklak*	136,889	86,889	50,000	50,000	0	0
40	*Lam Dong*	80,431	43,600	36,831	35,000	1,822	9
41	*Binh Duong*	125,500	55,500	70,000	70,000	0	0
42	*Tay Ninh*	37,966	37,966	0	0	0	0
43	*Dong Nai*	124,468	114,189	10,279	9,000	0	1,279
44	*Long An*	162,701	63,894	98,807	98,165	642	0
45	*Dong Thap*	109,748	43,850	65,898	65,000	870	28
46	*An Giang*	92,451	48,800	43,651	40,000	3,169	482
47	*Tien Giang*	101,051	69,420	31,631	31,631	0	0
48	*Ben Tre*	71,209	64,157	7,052	7,052	0	0

49	*Vinh Long*	67,821	36,367	31,454	30,927	463	64
50	*Tra Vinh*	38,552	38,552	0	0	0	0
51	*Can Tho*	98,999	68,497	30,502	29,950	250	302
52	*Soc Trang*	47,040	35,605	11,435	10,000	591	844
53	*Kien Giang*	76,670	46,050	30,620	30,000	600	20
54	*Ca Mau*	49,241	48,497	744	0	0	744
55	*Br-Vtau*	95,431	45,337	50,094	50,000	0	94
56	*Gia Thong/Transport*	115,480	111,480	4,000	3,000	0	1,000
57	*Dau Khi/Petroleum*	12,500	12,120	380	380	0	0
58	*Cao Su/Rubber*	93,740	74,400	19,340	0	19,340	0
59	*Than/Coal-Energy*	69,086	63,584	5,502	4,098	1,404	0
60	*Bac Can*	25,164	17,402	7,762	7,762	0	0
61	*Bac Ninh*	108,300	63,300	45,000	40,000	5,000	0
62	*Hung Yen*	73,252	73,252	0	0	0	0
63	*Bac Lieu*	67,198	28,770	38,428	36,220	2,051	157
64	*Ha Nam*	96,008	48,300	47,708	47,708	0	0
65	*Quang Nam*	141,800	87,500	54,300	54,000	0	300
66	*Binh Phuoc*	41,200	16,200	25,000	25,000	0	0
67	*Vinh Phuc*	80,265	67,013	13,252	12,615	637	0
	TOTAL	9,548,529	5,736,230	3,812,299	3,460,470	142,958	208,791

Appendix 3: Survey Questionnaire

RESPONDENT INFORMATION (Adult member sample)

a) Individual ID: ☐☐ ☐☐ ☐☐☐ *Interviewer code:* ☐☐
Province Commune Household *Supervisor code:* ☐☐

b) Name of respondent: ________

c) Type of sampling group:

Member of voluntary health insurance 1

Non- member of voluntary health insurance 2

d. Assigned to interview children 6 -17 years old (if has): Yes 1 No 2

e. Year of birth: .....

f. Sex of respondent: *Male = 1* *Female = 2*

g. Home address:

Province:.....District:.....

Commune/ Ward:.....

This place is: *Rural = 1* *Urban = 2*

i) Insurance details (taken from the Health Insurance Office):

dd mm yy dd mm yy

Card issued date: ☐☐☐☐☐☐ *Card expired date:* ☐☐☐☐☐☐

*Health facility nominated by HI Card:*_____

j) Other details:

dd mm yy

Date of interview: ☐☐☐☐☐☐

Time interview begins: ☐☐☐☐

Time interview ends: ☐☐☐☐

k) Visit record

	Date	Available	Not present / unavailable	Dead	Refusal	Appointment date and time	Other notes
Visit 1							
Visit 2							
Visit 3							

INTRODUCTION

Locate respondent and say…

I am from the Institute of Sociology in Hanoi and we are undertaking a research project in partnership with the University of York in England. The research is investigating how much people use and spend on health care, and what they think about the health insurance system. The aim of the research is to provide information to Vietnamese Health Insurance and the Ministry of Health. The survey will provide vital information to help improve the health services that you use. We are not trying to sell you health insurance. We would like to ask you some questions about a variety of issues and ask you to be as honest as possible. All the answers you give will be treated confidentially and no-one apart from key members of the research team will be able to trace them back to you. We expect the interview to last less than one hour. Are you available?

If NO then fill in details on cover page making an appointment if possible.

If YES then ask:

1. If the respondent is from MEMBER'S SAMPLING GROUP

a) Do you currently have a valid health insurance card (respondent is the Card holder) ?

Yes	1	
No	2	**go to c)**
Don't know/can't remember	3	**go to c)**

b) Which health insurance scheme are you a member of?

State compulsory health insurance	1	
Humanitarian / Welfare (free card)	2	
State voluntary health insurance	3	
Bao Viet	4	
Bao Minh	5	**go to Part I**
Local community health insurance scheme	6	

Other (WRITE IN) 7

c) Have you ever had a state voluntary health insurance card?

Yes	1	
No	2	**end interview**
Don't know/can't remember	3	**end interview**

d) When did your last insurance card expire?

Before 1st January 1997	1	**end interview**
On or after 1st January 1997	2	**go to Part I**
Don't know/can't remember	3	**go to Part I**

e) Do you have any children between 6 and 17 years old (born in 1982-1993) who currently live in the household?

Yes	1	**go to Part I**
No	2	**end interview**
Don't know/can't remember	3	**end interview**

2. If the respondent is from NON - MEMBER'S SAMPLING GROUP:

a) Do you currently have a valid health insurance card?

Yes	1	
No	2	**go to c)**
Don't know/can't remember	3	**go to c)**

b) Which health insurance scheme are you a member of?

State compulsory health insurance	1	**go to e)**
Humanitarian / Welfare (free card)	2	**go to e)**
State voluntary health insurance	3	**end interview**
Bao Viet	4	
Bao Minh	5	
Local community health insurance scheme	6	
Other (WRITE IN)	7	

c) Have you ever had a state voluntary health insurance card?

Yes	1	
No	2	**go to Part I**
Don't know/can't remember	3	**go to Part I**

d) When did your last insurance card expire?

Before 1st January 1997	1	**goto Part I**
On or after 1st January 1997	2	**end interview**
Don't know/can't remember	9	**go to Part I**

e) Do you have any children between 6 and 17 years old (born in 1982-1993) who currently live in the household?

Yes	1	**go to Part I**
No	2	**end interview**
Don't know/can't remember	3	**end interview**

PART I: HOUSEHOLD QUESTIONNAIRE

a. Code: ☐☐ ☐☐ ☐☐☐

Province Commune Household

A. HOUSEHOLD SOCIO-ECONOMIC CHARACTERISTICS

I'd now like to ask you a few questions about the people that live in the household?

1. Please, tell me about the people who live in your household:

N	Common name/ Relation to head of household		Year of birth	Sex	Marital Status	Current main occupation WRITE IN/ Code		Other jobs/ ways of making money (code)
	1	2	3	4	5	6	7	8
	Name	Relation				Write in	Code	*Code as column 7*
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

***Note:** If interview children: Circle the order of children (of Respondent) on the Number Column who were born between the period 1982 to 1993.*

	Religion	Level of education	Health insurance member	Health status in last 12 months	Details of long-term illness if relevant (WRITE IN)	Pregnant (yes/no)
	9	10	11	12	13	14
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

2. Now code the type of house

Apartment	1
Villa	2
Permanent house (1 floor)	3
Permanent house (2 or more floors)	4

Tiled roof, brick wall	5
Thatch roof, brick wall	6
Thatch roof, wood/mud wall	7
Other_____	8
Don't know	9

3. What type of latrine do you have in your house?

Primitive latrine	1
Private - 2 tank system	2
Private – flush system	3
Shared toilet	4
No latrine	5
Other_____	6
Don't know	9

4. What is your main source of drinking water from?

Piped water	1
Rain water	2
Well/pump well	3
Lake/pond/river	4
Other_____	5
Don't know	9

5. Which of the following does your household have in working order? (still in good conditions)

ITEMS	YES	NO	NOTES
a) Motorbike	1	2	
b) Car / van / lorry / motor boat	1	2	
c) Video	1	2	
d) Colour TV	1	2	
e) Refrigerator / washing machine	1	2	
f) Telephone	1	2	
g) Agricultural machine	1	2	
h) Air conditioner	1	2	
i) Electric water pump (bought themselves)	1	2	
j) Salon / bed (valuable furniture)	1	2	
k) Other luxury items	1	2	

6. For each of the following items (paddy and cereal crops and husbandry) can you tell me how many you have, or have produced. (READ OUT)

ITEM	UNIT (kg)	VALUE ('000s Dong)
a) Crop 1		
b) Crop 2		
c) Crop 3		
d) Cereal 1		
e) Cereal 2		

f) Animal 1 ……		
g) Animal 2 ……		
h) Animal 3 ……		
i) Animal 4 ……		
	TOTAL=	

I'd now like to ask you a few more questions about the income of the household…

7. Approximately how much income did the household make in the last month, in **VND** from the following. (READ OUT)

	PERSON 1	PERSON 2	PERSON 3	OTHERS	**TOTAL**
a) Salary from main non-agricultural occupation (including suplement)					
b) Bonuses					
c) Earnings from extra jobs					
d) Pension					
e) Remittances / support from family					
f) Interest on savings					
e) Other (specify)					
TOTAL=					
TOTAL FOR 12 MONTHS =					

SUPERVISOR TO COMPLETE QUESTION 8 BELOW :

8. ADD THE INCOME TOTALS FROM Q6 and Q7 AND WRITE IN BELOW

_____VND

Now thinking about household expenditure:

9. Approximately how much does the household spend each day on **food and drink,** including food you have grown?

_____VND Total for 12 months = ☐

10. Approximately how much did the household spend on **electricity** last month?

☐

_____VND Total for 12 months =

11. About how much did the household spend on **education** in the last 12 months / for one school year?

	CHILD 1	CHILD 2	CHILD 3	OTHERS	ALL CHILDREN
a) Annual fee					
b) Other fee					
c) Fee for extra lessons					
d) Other (gifts....)					
TOTAL =					

12. Approximately how much did the household spend on **health services** in the last 12 months?

	PERSON 1	PERSON 2	PERSON 3	PERSON 4	OTHERS	TOTAL
a) 1st visit						
b) 2nd visit						
c) 3rd visit						
TOTAL =						

13. How much did the household spend on **production and investment** in the last 12 months? (E.g. machinery, fertiliser for farmers; furniture, computers for urban residents, etc.).

TOTAL _____VND

14. In the last 12 months how much did the household spend on **ceremonies**?

a. Festivals _____'000 VND
b. Holiday, entertainment _____'000 VND
c. Funeral, wedding _____'000 VND
TOTAL _____'000 VND

15. In the last 12 months how much did the household spend **paying off regular debts**? (READ OUT)

_____VND

16. INTERWIER TO COMPLETE THE BOX BELOW:

ADD THE TOTALS FROM Q9 to Q15 INCLUSIVE AND WRITE IN: VND

I'd now like to ask you a few questions about savings and credit ……..

17. In the last 12 months what methods did the household use to **save money,** and how much was set aside with each method? (READ OUT)

	YES	**NO**	**AMOUNT SAVED '000s VND**
a) Money pooling circle	1	2	
b) Credit book at bank	1	2	
c) Community fund (local official scheme)	1	2	
d) Secret place	1	2	
e) Make a special purchase/investment (e.g. gold, foreign currencies)	1	2	
f) Other (write in)	1	2	
TOTAL=			

18. What was your **main reason** for setting money aside? (CIRCLE ONLY THE MAIN REASON)

In case of bad harvest	1
To pay for children's education	2
To pay future health fees	3
To repay debt	4
To help relatives	5
To help buy extra land/extend house	6
Save for household item	7
To invest in production	8
Other (specify)_____	9
Don't know	99

19. In the last 12 months, did the household have to borrow or loan money/paddy?

Yes	1	
No	2	**go to Q21**
Don't know	3	**go to Q21**

20. FILL IN FOLLOWING TABLE (3 MAIN REASONS)

What was the money borrowed for? (WRITE IN)	How much money was borrowed? ('000s VND)	Where was the money borrowed from? (WRITE IN)
1 = Production 2 = buying/construct house/land 3 = buying consumption goods 4 = ceremonies 5 = Education 6 = Health/medicines		1 = Family/ relative 2 = Friend 3 = Formal savings scheme 4 = Informal savings scheme 5 = Money lender 6 = Bank

7 = Holiday/entertainment 8 = Other		7 = other sources
a)		
b)		
c)		
TOTAL=		

21. How do you feel your household compares economically to other households in the commune?

Much poorer than average	1
A little poorer than average	2
About average	3
A little better off than average	4
Much better off than average	5
Don't know	9

22. INTERVIEWER TO FILL IN THE FOLLOWING BOX FOR CROSS CHECK

'000 VND

TOTAL FROM Q8 PLUS Q20 = (INCOME PLUS BORROWINGS)	
TOTAL FROM Q16 PLUS Q17 = (EXPENDITURE PLUS SAVINGS)	

B) RISK ATTITUDES, RESOURCE POOLING AND SOCIAL CAPITAL

I'd now like to ask you some questions about your local community. First of all……

23. Which of the following organisations, if any, are you a member of? (READ OUT)

GROUP / ORGANISATION	**YES**	**NO**
a) Farmers Union	1	2
b) Women's Union	1	2
c) Veterans Union	1	2

24. And which of the following groups, if any, are you a member of? (READ OUT)

GROUP / ORGANISATION	**YES**	**NO**
a) Peer Union	1	2
b) Native Union	1	2
c) Longevity Union	1	2
d) Elderly Union	1	2
e) Funeral group	1	2
f) Savings / credit / money-pooling scheme	1	2
g) Other (WRITE IN) ……	1	2

25. If you could join only one group which one would it be; which group do you like to join most?

Farmers Union	1
Women's Union	2
Veterans organisation	3

Peer group	5
Native Union	7
Longevity Union	8
Elderly Union	9
Funeral group	10
Savings / credit / money-pooling scheme	11

If not a member of any group - GO TO Q33

26. Which of the groups involve credit, savings or money-pooling programmes, or types of social support mechanisms ?

	POOLING/ SAVING SCHEMES 1 = Yes 2 = No 9 = Don't know	PAYING FEE 1 = Yes 2 = No 9 = Don't know	Which of the groups that involve saving/credit scheme is the most important to you? (select only 1)
a) Farmers Union			**1**
b) Women's Union			**2**
c) Veterans organisation			**3**
d) Peer group			**4**
e) Native Union			**5**
f) Longevity Union			**6**
g) Elderly Union			**7**
h) Funeral group			**8**
i) Savings / credit / money-pooling scheme			**9**
j) Other (write in)			**10**

- Ask following Questions if respondent belongs to groups that have saving/or pooling

if Not, skip to Q. 33

- If Respondent is member of many different saving/pooling groups, ask the main group.

27. Can you tell me what the purpose of the group is? For example can you use the scheme to raise money for health services, or must it be used for another purpose?

_____

_____

28. Who are the group's members? Are they……. (READ OUT)

a) Close relatives	1
b) Close friends	2
c) Business partners	3
d) People from local community	4
e) Other (WRITE IN)	5
f) All the above	6
g) Don't know	9

29. Are all members from the same economic group?

All are the same	1
Most are the same	2
Mixture	3
Other (WRITE IN)	4
Don't know	9

30. If a new person wants to join the group, what conditions should they meet?

Must be friend/relative	1
Must be from same commune	2
Must be recommended	3
Pay a fee	4
Other (WRITE IN)	5
No conditions	6
Don't know	9

31. Overall, how would you rate the functioning of the group?

Very poorly functioning	1
Poorly/weakly	2
Average	3
Good	4
Excellent	8
Don't know	9

32. Why don't you put this money in the bank instead ?

_____

_____

33. SHOW THE FOLLOWING SCALE TO THE RESPONDENT

In general how cohesive would you say the community you live in is ? Circle the number you think is closest.

1 2 3 4 5

VERY LOW COHESION VERY HIGH COHESION

34. In general how would you say you think about the future in terms of your health and your family's health? IF NECESSARY PROMPT: For example would you say that in general you worry about the future or do you take each day as it comes ?

_____

_____

35. Please circle the number you think is closest to your attitude.

1 2 3 4 5

DON'T WORRY AT ALL WORRY A LOT

C) ACCESS TO HEALTH SERVICES

I'd now like to ask you some questions about health facilities. First of all…….

36. Think about the last time when members of your household used health services at health facilities, how would they usually travel there and about how long would it take? If going to health facilities which you have not ever been there, what type of transportation would you use and how long would it take you there?

	Distance (Kms)	**Method of transport**	**1 = Less than 15 minutes** **2 = 15-30 minutes** **3 = 31-59 minutes** **4 = 1 hour or more** **9 = Don't know/ never been**
a) Commune health centre			
b) Inter-communal polyclinic			
c) District Hospital			
d) Provincial Hospital			
e) Traditional / spiritual healer			
f) Private health worker			
g) State pharmacy			
h) Private pharmacy			
i) Drug seller (unlicensed)			
j) Other (WRITE IN) ……..			

CODES FOR METHOD OF TRANSPORT

1	Car/taxi
2	Bus
3	Motorbike
4	Motor Boat
5	Rowing boat
6	Bicycle/cyclo
7	Walk
8	Others

GO TO INDIVIDUAL QUESTIONNAIRE

PART II: INDIVIDUAL QUESTIONNAIRE

a. Code: ☐☐ ☐☐ ☐☐☐ ☐☐

Province Commune Household Individual

a. This individual questionnaire refers to:

Adult (respondent) 1

Child of respondent 2 Name of the child: .....

(If refers to the child, use this name instead of word "CHILD" in questionnaire)

Province: ..... District: .....

Commune/Ward: .....

Name of Respondent: .....

D) UTILISATION OF HEALTH SERVICES

I'd now like to ask you some questions about your visit to health workers, for personal health issues. First of all:

37. How many times have you / CHILD been ill in the last 3 months? (CIRCLE ONLY ONE RESPONSE)

None	0	Member: **go to Q39** Non-member: **go to Q41**
Once	1	
Twice	2	
Three times	3	
Four times	4	
Five or more times	5	
Don't know/can't remember	9	

38. How many times did you / CHILD visit a health facility or call a health worker to your house?

None	0
Once	1
Twice	2
Three times	3
Four times	4
Five or more times	5
Don't know/can't remember	9

This box for Member only:

39. When was the last time you/ CHILD used the health insurance card?

Never	0	1997	4
1994	1	1998	5
1995	2	1999	6
1996	3	Don't know/can't remember	9

NOW IDENTIFY THE MONTH USING THE FOLLOWING CALENDAR

1	2	3	4	5	6	7	8	9	10	11	12

IF USED CARD SINCE 1997 GO TO **Q41**

40. Why didn't you use your / CHILD health insurance card since 1997?

_____

_____

41. When was the last time you / CHILD visited a health facility or called a health worker to your house ? (CIRCLE ONLY ONE RESPONSE)

One month or less ago	1	
2-6 months ago	2	
7-12 months ago	3	
1 - 2 years ago	4	
Over 2 years ago	5	
Never	7	=> Member: **go to Q68** Non-member: **go to Q67**
Don't know/Can't remember	8	

42. What were main reasons for you / CHILD to look for medical advice the last time?

Routine preventive care/ante-natal care	1	
Felt ill	2	
Chronic illness / long-term care	3	
Accident	4	
Other (please specify)_____	5	**go Q44**
Don't know	8	
No answer	9	

43. Thinking about the last time you / CHILD were **ill** and got medical advice, what was the reason?

Felt ill	1	
Chronic illness / long-term care	2	
Accident	3	
Other	4	
(please specify:_____)		
Never	8	=> Member: **go to Q68** Non-member: **go to Q67**
Don't know/ No answer	9	

44. Refer to the last illness, how long did you / CHILD have to stop normal activities for?

Not at all	1
Less than one day	2
2-7 days	3
1-2 weeks	4
3-4 weeks	5
2-6 months	6
Over 6 months	7
Don't know/Can't remember	9

45. What did you / CHILD do when you started to feel ill ? (UP TO FOUR ACTIONS MAY BE CODED - CODE CHRONOLOGICALLY)

	First	Second	Third	Fourth
1. Used home-made medicine	1	1	1	1
2. Bought drugs from drug-seller (unlicensed)	2	2	2	2
3. Bought drugs from private pharmacy	3	3	3	3
4. Bought drugs from state pharmacy	4	4	4	4
5.Visited commune health centre / CHW at home	5	5	5	5
6.Visited inter-communal polyclinic	6	6	6	6
7. Visited district hospital	7	7	7	7
8.Visited provincial hospital	8	8	8	8
9. Visited private health worker	9	9	9	9
10. Visited traditional / spiritual healer	10	10	10	10
11. Other (please specify).....	11	11	11	11
12. Carried on as normal	98	98	98	98
13. Don't know / can't remember	99	99	99	99

46. How long was it between when you / CHILD felt ill to when you…… (READ OUT)

	BOUGHT DRUGS	CONTACT WITH HEALTH PROFESSIONAL
Less than one day	1	1
2 - 7 days	2	2
1 - 2 weeks	3	3
3 - 4 weeks	4	4
2 - 6 months	5	5
Over 6 months	6	6
Don't know/can't remember	9	9

=> Goto Q 48

47. Why did you / CHILD delay going to the health facility when you felt ill?

Thought it might go away/wait and see	1
Too much work	2
Charges too expensive	3
Too far away	4
Wait until health facility open	5
Other	6

(WRITE IN:_____)

Don't know/can't remember 9

48. Did you / CHILD need in-patient services?

Yes	1	
No	2	=> **go to Q.50**
Don't know/can't remember	3	=> **go to Q.50**

49. How long did you / CHILD spend in hospital?

< 3 days	1
3 - 7 days	2
8 - 14 days	3
15 - 30 days	4
Over one month	5
(WRITE IN:_____ Months)	
Don't know/can't remember	9

50. About how long would you say you / CHILD spent **in total** at health facilities **waiting to see and being treated** by health workers for this illness episode?

Less than 30 minutes	1
30 - 59 minutes	2
1 - 2 hours	3
Over 2 hours but less than 4 hours	4
Over 4 hours but less than 6 hours	5
Over 6 hours	6
Don't know/can't remember	9

51. Did you have difficulties getting an examination when you / CHILD arrived at the health facility ?

Yes (WRITE IN DETAILS)	1

_____

_____

No	2
Don't know/can't remember	9

E) HEALTH EXPENDITURES

I'd like to ask you some questions about your/ CHILD last visit(s) to the health facility

52. Did you have to spend any money during your last visit to a health facility?

Yes	1	**go to Q54**
No	2	
Don't know/can't remember	9	**go to Q60**

53. Why didn't you need to make any payment?

No fee required for consultation	1
No medicines received	2
Exempt - poor	3
Covered under health insurance	4
Has relative, acquaintance there	5
Other	6

(Write in:_____)

Don't know/can't remember	9

(GO TO Q60)

54. For that visit, can you estimate how much in Dong you had to pay for each of the following items?

(IF PAYMENT NOT MADE IN CASH ASK FOR EQUIVALENT CASH AMOUNT AND WRITE IN)

	VND '000s	Don't know/ can't remember
a) Bill for treatment and medicines		
b) Food/bed for patient/carer		
c) Extra fee		
d) Extra payment, gift		
e) Other (WRITE IN)		
TOTAL=		

(IF THERE IS NO GIFT OR EXTRA PAYMENT IN Q54/d => GO TO Q.58)

55. Thinking about the extra payment/gift you made, who did you make it to?

	VND '000s	Can't remember
a) Doctor / doctor assistant		
b) Nurse / midwife		
c) Receptionist		
d) Manager/administrator		
e) Other (WRITE IN)		
f) Don't know/can't remember		
TOTAL		

56. Why did you make this extra payment/gift?

To get better treatment	1
To get quicker treatment	2
To get better treatment next time	3
Custom / workers expect it	4
To say thank-you / gift from the heart	5
Other	6

(If "other" WRITE IN:_____)

Don't know/can't remember	9

57. Where did you get the gift / the money for the gift from? (CIRCLE ALL REASONS)

Readily available cash / savings	1
Reduce main spending (food for example)	2
Reduce spending on non-essentials	3
Sell personal belongings/animals	4
Borrow money	5
Other (WRITE IN)	6
…….....	
Don't know/can't remember	9

This box for Member only:

58. Can I just check that even though you had a health insurance card you still had to make additional payments, is that correct?

Yes	1	
No	2	=> **go to Q60**
Don't know/can't remember	3	=> **go to Q60**

59. Why did you have to make this payment?

Loss the card, forgot at home	1
Not used facility named on the card	2
Use special drugs	3
Use special services	4
Suggestion/ requirement of health worker	5
Want to receive more attention from health worker	6
Has to pay extra-fees (20%)	7
Was a out-patient only	8
For the items, which are not covered by VHI	9
Used private sesrvices, not want to use card	10
The card expired	11
Did not have card at that time	12
Too complicated to use card	13
Don't know why	98
Don't remember	99

60. About how much did you **pay in total for transportation** travelling to and from that health facility?

(IF PARENT WENT WITH CHILD ASK FOR TOTAL COST FOR BOTH)

_____ ('000s VND)

(WRITE IN IF NECESSARY:
_____

F. PATIENT SATISFACTION

I'd now like to ask you some questions about the quality of health services and how satisfied you are with them. Thinking again about the last time you/CHILD visited a government health facility……

61. How satisfied were you overall with the quality of service you received last time at the GOVERNMENT health facility?

	Very satisfied	Quite satisfied	Neither satisfied not dissatisfied	Quite dissatisfied	Very dissatisfied	Don't know
a) Commune health centre	1	2	3	4	5	9
b) Inter-communal polyclinic	1	2	3	4	5	9
c) Government district hospital	1	2	3	4	5	9
d) Government provincial hospital	1	2	3	4	5	9
e) Other gov. facility (WRITE IN)	1	2	3	4	5	9

62. How did you satisfy with the service you received the last time you visited a GOVERNMENT facility?

READ OUT BELOW	Very satisfied	Quite satisfied	Neither satisfied nor dissatisfied	Quite dissatisfied	Very dissatisfied	Not applicable
a) Waiting time	1	2	3	4	5	9
b)Quality of facility/equipment	1	2	3	4	5	9
c)Attitude of health workers	1	2	3	4	5	9
d) Advice/ explaination	1	2	3	4	5	9
e) Skill of health workers	1	2	3	4	5	9
f) Official bill payment	1	2	3	4	5	9
g) un official payment	1	2	3	4	5	9

63. Do you have any (other) comments about the quality of GOVERNMENT health services?

_____

_____

64. Thinking now about PRIVATE health services that you/CHILD ever used, how satisfactory do you think the services they provide are?

	Very satisfied	Quite satisfied	Neither satisfied nor dissatisfied	Quite dissatisfied	Very dissatisfied	Never visited
a) Drug-seller (unlicensed)	1	2	3	4	5	9
b) Private pharmacy	1	2	3	4	5	9
c) Private doctor/nurse/midwife/CHW	1	2	3	4	5	9
d) Other private facility (WRITE IN)	1	2	3	4	5	9

65. How did you satisfy with the service you /CHILD received the last time you visited a PRIVATE facility?

READ OUT BELOW	Very satisfied	Quite satisfied	Neither satisfied nor dissatisfied	Quite dissatisfied	Very dissatisfied	Not applicable
a) Waiting time	1	2	3	4	5	6
b)Quality of facility/equipment	1	2	3	4	5	6
c)Attitude of health workers	1	2	3	4	5	6
d) Advice/ explaination	1	2	3	4	5	6
e) Skill of health workers	1	2	3	4	5	6
f) Bill payment	1	2	3	4	5	6
g) Other (write in)	1	2	3	4	5	6

66. Do you have any other comments about the service at PRIVATE health facilities?

G) HEALTH INSURANCE

This Box for Non-member only:

Finally I'd like to ask you some questions about the Vietnamese voluntary health insurance scheme whereby individuals can buy insurance cards and get a reduction in the cost of care at government hospitals.....

67. First of all have you ever heard of the Vietnamese state voluntary health insurance scheme (for adults-children, school chilren)?

Yes	1	Name of card:.....
No	2	**go to Page 9**
Don't know/can't remember	9	**go to Page 9**

This Box for Member only:

Finally I'd like to ask you some questions about your /CHILD CURRENT/or LASTEST voluntary health insurance card (do not ask about previous cards)

68. What was your **main reason** for buying the card ? (CODE ONE ANSWER ONLY)

DID NOT BUY CARD / GOT FOR FREE	0
Reduces cost of health care	1
I /CHILD often get ill	2
In case getting serious sick	3
Currently I/CHILD use services a lot	4
Propaganda/encouragement	5
Follow other people	6
Other (WRITE IN)_____	7
Don't know/can't remember	9

69. How did you first hear about the scheme (for adult or children insurance)?

Newspaper / radio / TV	1
Family / friends /neighbours	2
VHI office representative	3
Commune Peoples Committee	4
School/teachers	5
Health facility	6
Women's Union	7
Other_____	8
Don't know/can't remember	99

This Box for Member only:

70. Where did you get your /CHILD health insurance card from ?

Bought from VHI office /travelling representative	1	
Bought from school	2	
Bought from local health centre	3	(WRITE IN NAME.....)
Provided free by CPC	4	
Provided free by NGO	5	
Other (WRITE IN.....)	6	=> **go to Q77**
Don't know/can't remember	9	

70a) *I'd now like to ask you a few questions about how you would value the state voluntary health insurance scheme. Imagine that you are currently not covered by an insurance scheme and that you could buy a card for yourself only, which would last for one year. You would have to pay the full amount in cash at the time you buy the card, which would give you certain benefits. You must pay* ***20%*** *of the total cost of consultations, medicines, and other diagnostic procedures yourself, as well as 20% of any in-patient stay. The card covers the remaining* ***80%*** *of the cost.*

What is the maximum amount of money you would be prepared to pay for a card ? Remember that the money will be taken from your personal income and will hence decrease the money you have available to spend on other goods and services.

_____VDN

70b) How certain would you say you were of your answer to previous question? (MARK THE SCALE)

1 2 3 4 5

Absolutely uncertain Absolutely certain

70c) Why **would you/would you not** be willing to buy a card?

.....

.....

70d) Do you think you would actually use the benefits included in the scheme?

Yes definitely	1
Yes probably	2
No probably not	3
No definitely not	4
Don't know	5

71. How long was it from when you first heard about the scheme, to when you bought the card?

Less than 3 months	1
3-6 months	2
7-12 months	3
Over one year	4
Don't know/can't remember	9

72. How long was it between when you wanted to buy the card, and when you actually bought it?

Less than 1 month	1	**=> go to Q.74**
1-2 months	2	
3-6 months	3	
7-12 months	4	
Over one year	5	
Don't know/can't remember	9	

73. Why didn't you buy card right after you intend to buy card?

Scheme not operating in district	1
Lack of finances	2
Do not need	3
Complicated application procedure	4
Other (WRITE IN)_____	5
Don't know/can't remember	9

This Box for Member only:

74. Did you have any difficulties in getting the card ?

None	1
Waiting to long	2
Complicated administrative procedures	3
Bad attitude of VHI's worker	4
They issue card not often	5
VHI office not want to issue card	6
Lack of advice/ explaination	7
Has been forced to buy card	8
Financial difficulty	9

75. Who paid for your card ?

Myself	1	
Parent	2	
Child	3	Amount.....'000 NVD
Other (WRITE IN)……	4	
Don't know/can't remember	9	

76. Where did you / the person get the money from to pay for the card?

Readily available cash	1
Savings	2
Sale of assets	3
Borrowed / credit	4
Other (WRITE IN)_____	5
Don't know/can't remember	9

77. Did you receive any written or verbal information about the benefits of the card?

	Yes	No	Don't know/can't remember
a. Directly from the HI office	1	2	9
b. From newspapers/radio/TV	1	2	9
c. Other sources	1	2	9

78. Which health service benefits were covered with your/CHILD health insurance card? (If you buy card)

	Free of charge	Receive price reduction	As non-member	Don't know/can't remember
a) Treatment in emergencies	1	2	3	9
b) Examination only	1	2	3	9
c) Medicines only	1	2	3	9
d) In-patient services	1	2	3	9
e) Other (WRITE IN)	1	2	3	9

This Box for Member only:

79. Did you use a facility other than that named on your/CHILD card?

Yes	1
Never	2 **go to Q. 80**
Can't remember	3

79a. If Yes, write in that health facility and ask Why :

a1. Health facility:

Commune health center	1	Provincial hospital	4
Inter-communal polilinic	2	Private health service	5
Districr hospital	3	Private health worker	6
		Other	7

a2. Reason: _____

80. Did you ever use your/CHILD health insurance card?

Yes	1	**go to Q82**
No	2	
Don't know/can't remember	9	**go to Q84**

81. You say you had a card but have never used it. Why is this? (WRITE IN)

_____

_____ **go to Q84**

82. Did you use the card for inpatient services, outpatient services or both? If so how many times have you used the card for each?

		Don't know/ Can't remember
a. Number of Outpatient only	_____	99
b. Number of both inpatient and outpatient	_____	99

83. How long was it between when you bought your most recent card and first used it?

Less than 3 months	1
3-6 months	2
7-12 months	3

Over one year	4
Don't know/can't remember	9

84. Did you hear of anybody in the commune lending their card to someone else, or borrow someone else's card?

Never heard	1
Yes, few cases	2
Yes, rather popular	3
Don't know/no answer	9

This Box for Member only:

85. What comments would you make to Vietnamese Health Insurance about improving the scheme?

a)_____

b)_____

c)_____

I'd now like to do a short exercise with you, in order to find out what you think about different aspects of the state voluntary health insurance scheme. Under the scheme you buy a card for yourself/child only, which then lasts for one year. Once you become a member of the scheme you get certain benefits. For example if you need health care at the hospital you can receive it without paying anything extra for consultations, drugs or inpatient care.

86. If you would buy a card for yourself/child, which level of health insurance do you prefer?

Registerd facility	Premium	
+Commune/Ward health clinic	40,000 VND	**1**
+District hospital + Commune/Ward health clinic	60,000 VND	**2**
+Provincial/city hospital + District + Commune/ward	90,000 VND	**3**
+National hospital + Provincial/city + District + Commune/ward	120,000 VND	**4**

87. You have the option to make one full payment, as listed above, or make several payments across the year. However, the more times you pay, the more money you have to pay in total. Please consider the options below and tell me which you prefer.

ONE time, paying right at the rate selected above 1

TWO times, paying at the rate selected above add 10% 2

FOUR times, paying at the rate selected above add 20% 3

88. Would you consider buying another health insurance card?

Definitely yes	1 => Member: **go to Q.91**	Non-member: **go to Q.90**
Probably yes	2 => Member: **go to Q.91**	Non-member: **go to Q.90**

Undecided / it depends	3
Probably not	4
Definitely not	5
Don’t know	9

89. **Member:** Why would you not continue to buy another health insurance card for you/CHILD?

Non-member: Why would you not to buy a health insurance card for you/CHILD?

I have just heard about health insurance today	1
Waite until have stable job	2
Fin no need because I/CHILD feel healthy	3
Receive few benefit from card	4
Too high premium	5
Bad treatment to card holder by health worker	6
Facility is to far to go	7
Not confident in the health insurance policy	8
If you already paid tax you don't need to buy card	9
It's not easy to buy health insurance card	10
Other (write in) _____	11
Don't know	99

(END INTERVIEW HERE)

This Box for Non-member only:

90. What was **main reason** that you intend to buy the card for you/CHILD?

Reduces cost of health care	1
I /CHILD often get ill	2
In case getting serious sick	3
Currently I/CHILD use services a lot	4
Propaganda/encouragement	5
Follow other people	6
Other (WRITE IN)_____	7
Don't know/	9

91. Where would you get the money from to pay for the insurance?

Readily available cash	1
From household savings	2
Household work longer hours	3
Reduce expenditure on essentials	4
Reduce expenditure on non-essentials	5
Sell personal belongings	6
Sell products/livestock	7
Borrow from friend or relative	8
Borrow from money lender	9
Other (WRITE IN)_____	10
Don't know	98
No answer	99

END INTERVIEW. THANK RESPONDENT

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